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A Novel Rebroadcast Technique for Reducing Routing Overhead In Mobile Ad Hoc Networks

Vinayak T. Patil [1], Asst.Prof. Padma. S. Dandannavar [2]
Department of Computer Science and EngineeringKLS Gogte Institute of Technology, Belgaum-59008, INDIA.

Abstract- *In mobile ad hoc networks (MANETs), the network topology changes frequently and unpredictably due to the arbitrary mobility of nodes. This feature leads to frequent path failures and route reconstructions, which causes an increase in the routing control overhead. The overhead of a route discovery cannot be neglected. Thus, it is imperative to reduce the overhead of route discovery in the design of routing protocols of MANETs. One of the fundamental challenges of MANETs is the design of dynamic routing protocols with good performance and less overhead. In a route discovery, broadcasting is a fundamental and effective data dissemination mechanism, where a mobile node blindly rebroadcasts the first received route request packets unless it has a route to the destination, and thus it causes the broadcast storm problem. This paper focuses on a probabilistic rebroadcast protocol based on neighbor coverage to reduce the routing overhead in MANETs.*
Keywords *- Mobile Ad Hoc Networks, Neighbor Coverage, and Network Connectivity, Probabilistic Rebroadcast, Routing Overhead, AODV.*

I. Introduction

Due to high mobility of nodes in mobile ad hoc networks (MANETs), there exist frequent link breakages which lead to frequent path failures and route discoveries. The overhead of a route discovery cannot be neglected. In a route discovery, broadcasting is a fundamental and effective data dissemination mechanism, where a mobile node blindly rebroadcasts the first received route request packets unless it has a route to the destination, and thus it causes the broadcast storm problem [1, 5]. In our implementation some broadcasting techniques are used to reduce the overhead of Hello packets and neighbor list in the RREQ packet. In order to reduce the overhead of Hello packets, we do not use periodical Hello mechanism. Since a node sending any broadcasting packets can inform its neighbors of its existence, the broadcasting packets such as RREQ and route error (RERR) can play a role of Hello packets. To reduce the overhead of Hello packets: Only when the time elapsed from the last broadcasting packet (RREQ, RERR, or some other broadcasting packets) is greater than the value of Hello Interval, the node needs to send a Hello packet. The value of Hello Interval is equal to that of the original AODV.

II. Literature Review

The routing overhead occurred because of the dissemination of routing control packets such as RREQ packets can be quite huge, especially when the network topology frequently changes. Traditional on-demand routing protocols produce a large amount of routing traffic by blindly flooding the entire network with RREQ packets during route discovery. Recently, the issue of reducing the routing overhead associated with route discovery and maintenance in on demand routing protocols has attracted increasing attention.

Huang [2] proposed a methodology of dynamically adjusting the Hello timer and the Timeout timer according to the conditions of the network. For example, in a high mobility network (with frequent topology changes) it is desirable to use small values for the timers to quickly detect the changes in the network. On the other hand, in a low mobility network where the topology remains stable and with few changes, a large value for the timers is more effective to reduce the overhead. In order to decide whether the mobility of the network is high or low, we use a simple way to approximate in real time of the link change rate. The reduction of the overhead is greatly achieved with the minimal cost of slightly increasing the drop rate in data traffic. While the packet loss increases around 1%, the overhead reduction reaches 40%.

Ould-Khaoua[4]proposed two new probabilistic route discovery method, called Adjusted Probabilistic route discovery(AP) and Enhance Adjusted Probabilistic route discovery (EAP) which addresses the broadcast storm problem in the existing on-demand routing protocols. The forwarding probability is determined by taking into account about the local density of the sending node. In order to reduce the routing overhead without degrading the network throughput in dense networks, the forwarding probability of nodes located in sparse areas is set high while it is set low at nodes located in dense areas. EAP-AODV reduces overhead by 71% while APAODV reduces the overhead by 55%.

Aminu[6] proposed a rebroadcast probability function which takes in to account about the value of the packet counter together with some key simulation parameters(i.e. network topology size, transmission range and number of nodes) to determine the appropriate rebroadcast probability for a given node. The rebroadcast probability of a node is computed based on these parameters. Compared to the other schemes, simulation results have revealed that counter Function achieved superior saved rebroadcast (about 20% better than its closest competitor i.e., counter-based scheme, in dense network) and end-to-end delay (around 26% better than counter-based scheme in dense network) without sacrificing reach ability in medium and dense networks.

III. Neighbor Coverage Based Probabilistic Rebroadcast (NCPR) Protocol

This paper proposes neighbor coverage based probabilistic rebroadcast protocol [1] which combines both neighbor coverage and probabilistic methods. In order to effectively exploit the neighbor coverage knowledge, we need a novel rebroadcast delay to determine the rebroadcast order, and then we can obtain a more accurate additional coverage ratio. In order to keep the network connectivity and to reduce the redundant retransmissions, we need a metric named connectivity factor to determine how many neighbors should receive the RREQ packet [9]. After that, by combining the additional coverage ratio and the connectivity factor, we introduce rebroadcast probability, which can be used to reduce the number of rebroadcasts of the RREQ packet and to improve the routing performance.

3.1 Rebroadcast Delay

We proposed a scheme to calculate the rebroadcast delay. The rebroadcast delay is to determine the forwarding order. The node which has more common neighbors with the previous node has the lower delay. If this node rebroadcasts a packet, then more common neighbors will know this fact [10]. Therefore, this rebroadcast delay enables the information about the nodes which have transmitted the packet to more neighbors, which is the key success for the proposed scheme.

When a node ni receives an RREQ packet from its previous node s, node s can use the neighbor list in the RREQ packet to estimate how many its neighbors have not been covered by the RREQ packet . If node ni has more neighbors uncovered by the RREQ packet from s, which means that if node ni rebroadcasts the RREQ packet, the RREQ packet can reach more additional neighbor nodes.

To sufficiently exploit the neighbor coverage knowledge, it should be disseminated as quickly as possible. When node s sends an RREQ packet, all its neighbors ni, i = 1, 2 …receive and process the RREQ packet. We assume that node nk has the largest number of common neighbors with node s, node nk has the lowest delay. Once node nk rebroadcasts the RREQ packet, there are more nodes to receive the RREQ, because node nk has the largest number of common neighbors. Node nk rebroadcasts the RREQ packet depends on its rebroadcast probability calculated in the next subsection. The objective of this rebroadcast delay is not to rebroadcast the RREQ packet to more nodes, but to disseminate the neighbor coverage knowledge more quickly. After determining the rebroadcast delay, the node can set its own timer.

3.2 Rebroadcast Probability

We also proposed a novel scheme to calculate the rebroadcast probability. The scheme considers the information about the uncovered neighbors, connectivity metric and local node density to calculate the rebroadcast probability. The rebroadcast probability is composed of two parts: a) additional coverage ratio, which is the ratio of the number of nodes that should be covered by a single broadcast to the total number of neighbors, and b) connectivity factor, which reflects the relationship of network connectivity and the number of neighbors of a given node. The node which has a larger rebroadcast delay may listen to RREQ packets from the nodes which have lowered one [9]. We do not need to adjust the rebroadcast delay because the rebroadcast delay is used to determine the order of disseminating neighbor coverage knowledge. When the timer of the rebroadcast delay of node ni expires, the node obtains the final uncovered neighbor set. The nodes belonging to the final uncovered neighbor set are the nodes that need to receive and process the RREQ packet. Note that, if a node does not sense any duplicate RREQ packets from its neighborhood, its uncovered neighbor set is not changed, which is the initial uncovered neighbor set. Now we study how to use the final uncovered neighbor set to set the rebroadcast probability. The metric Ra indicates the ratio of the number of nodes that are additionally covered by this rebroadcast to the total number of neighbors of node ni. The nodes that are additionally covered need to receive and process the RREQ packet. As Ra becomes bigger, more nodes will be covered by this rebroadcast, and more nodes need to receive and process the RREQ packet, and, thus, the rebroadcast probability should be set to be higher.

Xue [7] derived that if each node connects to more than 5.1774 log n of its nearest neighbors, then the probability of the network being connected is approaching 1 as n increases, where n is the number of nodes in the network. Then we can use 5.1774 log n as the connectivity metric of the network. We assume the ratio of the number of nodes that need to receive the RREQ packet to the total number of neighbors of node ni is Fc(ni).If

the local node density is low, the parameter Fc increases the rebroadcast probability, and then increases the reliability of the NCPR in the sparse area. If the local node density is high, the parameter Fc could further decrease the rebroadcast probability, and then further increases the efficiency of NCPR in the dense area. Thus, the parameter Fc adds density adaptation to the rebroadcast probability.

In this section, we calculate the rebroadcast delay and rebroadcast probability of the proposed protocol. We use the upstream coverage ratio of an RREQ packet received from the previous node to calculate the rebroadcast delay, and use the additional coverage ratio of the RREQ packet and the connectivity factor to calculate the rebroadcast probability in our protocol, which requires that each node needs its 1-hop neighborhood information.

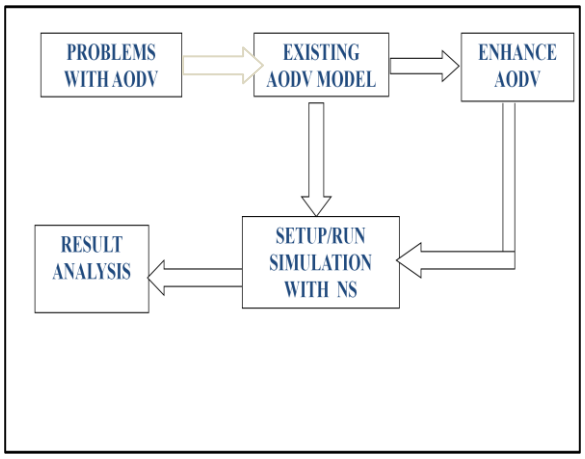

Fig. 3.1 Flow Diagram Of Protocols

Fig 3.1shows the flow diagram of protocols in this model enhancing of AODV protocol at Mac layer will be done.

Algorithm

The formal description of the Neighbor Coverage based Probabilistic Rebroadcast (NCPR) for reducing routing overhead in route discovery is shown in algorithm [12].

Definitions:

RREQv: RREQ packet received from node v.

Rv.id: the unique identifier (id) of RREQv.

N(u): Neighbor set of node u.

U(u, x): Uncovered neighbors set of node u for RREQ whose id is x.

Timer(u, x): Timer of node u for RREQ packet whose id is x.

{Note that, in the actual implementation of NCPR protocol,every different RREQ needs a UCN set and a Timer.}

1: if ni receives a new RREQs from s then
2: {Compute initial uncovered neighbors set U(ni,Rs.id) for RREQs:}
3: $U(ni,Rs.id) = N(ni) - [N(ni) \cap N(s)] - \{s\}$
4: {Compute the rebroadcast delay Td(ni):}
5: $Tp(ni) = 1 - \frac{|N(s) \cap N(ni)|}{|N(s)|}$
6: $Td(ni) = MaxDelay \times Tp(ni)$
7: Set a Timer(ni,Rs.id) according to Td(ni)
8: end if 9:
10: while ni receives a duplicate RREQj from nj before Timer(ni,Rs.id) expires do
11: {Adjust U(ni,Rs.id):}
12: $U(ni,Rs.id)=(ni,Rs.id)-[U(ni,Rs.id) \cap N(nj)]$
13: discard(RREQj);
14: end while
15:
16: if Timer(ni,Rs.id) expires then
17: {Compute the rebroadcast probability Pre(ni):}
18: $Ra(ni) = |U(ni,Rs.id)|$

|N(ni)|
19: Fc(ni) = Nc
|N(ni)|
20: Pre(ni) = Fc(ni) · Ra(ni)
21: if Random(0,1) ≤ Pre(ni) then
22: broadcast(RREQs)
23: else
24: discard(RREQs)
25: end if
26: end if

IV. Protocol Implementation and Performance Evaluation

4.1 Protocol Implementation

We enhance the source code of AODV at MAC in NS-2 to implement our proposed protocol. The proposed NCPR protocol needs Hello packets to obtain the neighbor information, and also needs to carry the neighbor list in the RREQ packet. Therefore, in our implementation, some techniques are used to reduce the overhead of Hello packets and neighbor list in the RREQ packet, which are described as follows In order to reduce the overhead of Hello packets; we do not use periodical Hello mechanism. Since a node sending any broadcasting packets can inform its neighbors of its existence, the broadcasting packets such as RREQ and route error (RERR) can play a role of Hello packets. In order to reduce the overhead of neighbor list in the RREQ packet, each node needs to monitor the variation of its neighbor table and maintain a cache of the neighbor list in the received RREQ packet. For sending or forwarding of RREQ packets, the neighbor table of any node ni has the following 3 cases:

1)If the neighbor table of node ni adds at least one new neighbor nj , then node ni sets the num neighbors to a positive integer, which is the number of listed neighbors, and then fills its complete neighbor list after the num neighbors field in the RREQ packet.

2) If the neighbor table of node ni deletes some neighbors, then node ni sets the num neighbors to a negative integer, which is the opposite number of the number of deleted neighbors, and then only needs to fill the deleted neighbors after the num neighbors field in the RREQ packet;

3) If the neighbor table of node ni does not vary, node ni does not need to list its neighbors, and set the num neighbors to 0.The nodes which receive the RREQ packet from node ni can take their actions according to the value of num neighbors in the received RREQ packet:

1) If the num neighbors is a positive integer, the node substitutes its neighbor cache of node ni according to the neighbor list in the received RREQ packet;

2) If the num neighbors is a negative integer, the node updates its neighbor cache of node ni and deletes the deleted neighbors in the received RREQ packet;

3) If the num neighbor is 0, the node does nothing. Because of the two cases 2) and 3), this technique can reduce the overhead of neighbor list listed in the RREQ packet.

We evaluate the performance of routing protocols using the following performance metrics:

- **Normalized routing overhead:** the ratio of the total packet size of control packets (include RREQ, RREP, RERR and Hello) to the total packet size of data packets delivered to the destinations. For the control packets sent over multiple hops, each single hop is counted as one Transmission. To preserve fairness, we use the size of RREQ packets instead of the number of RREQ packets, because the protocols include a neighbor list in the RREQ packet and its size is bigger than that of the original AODV.
- **Packet delivery ratio:** the ratio of the number of data packets successfully received by the CBR destinations to the number of data packets generated by the CBR sources.
- **Average end-to-end delay:** the average delay of successfully delivered CBR packets from source to destination node. It includes all possible delays from the CBR sources to destinations.

The experiments are divided to three parts, and in each part we evaluate the impact of one of the following parameters on the performance of routing protocols:

- **Number of nodes**: We vary the number of nodes from 50 to 300 in a fixed field to evaluate the impact of different network density. In this part, we set the number of CBR connections to 15, and do not introduce extra packet loss.
- **Number of CBR connections:** We vary the number of randomly chosen CBR connections from 10 to 20 with a fixed packet rate to evaluate the impact of different traffic load. In this part, we set the number of nodes to 150, and also do not introduce extra packet loss.

- **Random packet loss rate:** We use the Error Model provided in the NS-2 simulator to introduce packet loss to evaluate the impact of random packet loss. The packet loss rate is uniformly distributed, whose range is from 0 to 0.1. In this part, we set the number of nodes to 150 and set the number of connections to 15.

4.2 Simulation parameters

Simulation parameters and scenarios which are used to investigate the performance of the proposed protocol.

Table 4.1

Simulation Parameter	Value
Simulator	NS-2 (v2.31)
Topology Size	1000m × 1000m
Number of Nodes	10,20,30
Transmission Range	250m
Bandwidth	2Mbps
Interface Queue Length	40
Traffic Type	CBR
Number of CBR Connections	10, 12, ..., 15,
Packet Size	512 bytes
Packet Rate	4 packets/sec
Min Speed	1 m/s
Max Speed	5 m/s

V. Results

1. Performance with Varied Number of Nodes

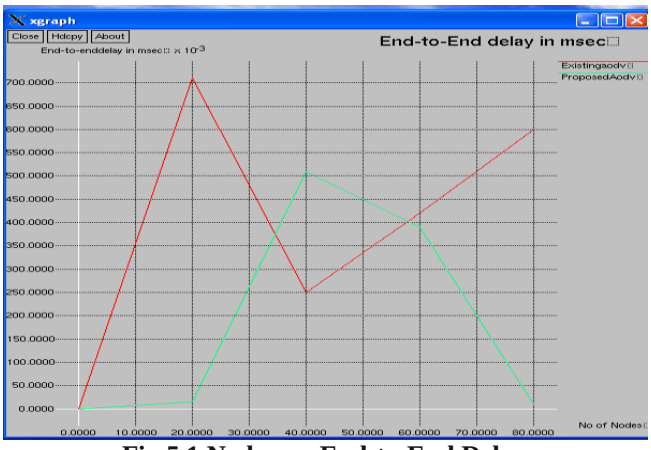

Fig.5.1 Nodes vs. End-to-End Delay

Fig. 5.1 measures the average end-to-end delay of CBR packets received at the destinations with increasing network density. The NCPR protocol decreases the average end-to end delay due to a decrease in the number of redundant rebroadcasting packets. The redundant rebroadcast increases delay because 1) it incurs too many collisions and interference, which not only leads to excessive packet drops, but also increases the number of retransmissions in MAC layer so as to increase the delay; 2) it incurs too many channel contentions, which increases the back off timer in MAC layer, so as to increase the delay.

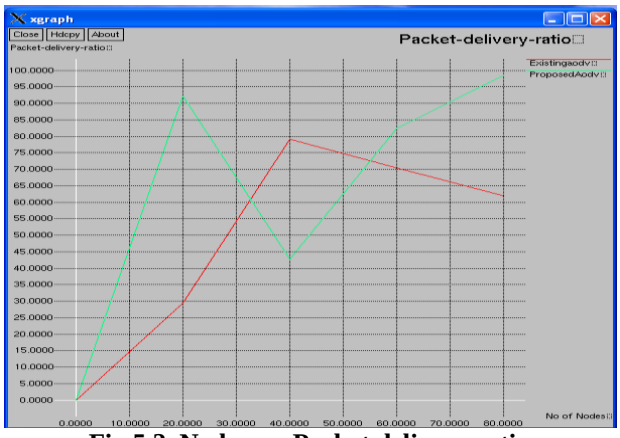

Fig.5.2. Nodes vs. Packet delivery ratio

Fig. 5.2 shows the packet delivery ratio with increasing network density. The NCPR protocol can increase the packet delivery ratio because it significantly reduces the number of collisions, so that it reduces the number of packet drops caused by collisions.

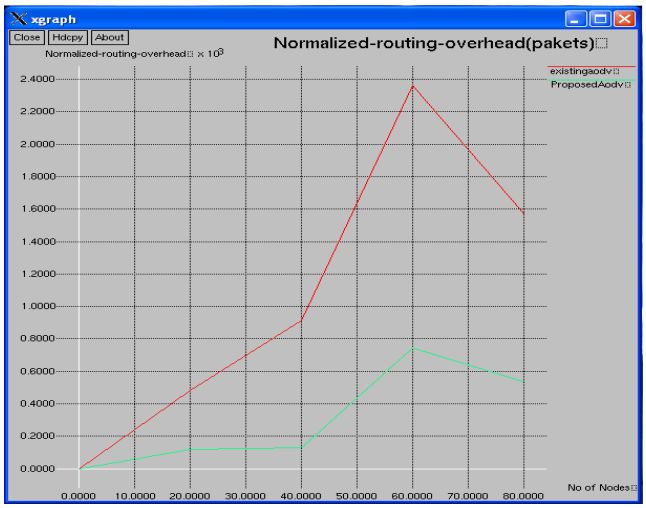

Fig.5.3 Nodes vs. Routing Overhead

Fig. 5.3 shows the normalized routing overhead with different network density. The NCPR protocol can significantly reduce the routing overhead incurred during the route discovery, especially in dense network. Although the NCPR protocol increases the packet size of RREQ packets, it reduces the number of RREQ packets more significantly. Then, the RREQ traffic is still reduced. In addition, for fairness, the statistics of normalized routing overhead includes *Hello* traffic. Even so, the NCPR protocol still yields the best performance, so that the improvement of normalized routing overhead is considerable.

2. Performance with Varied Number of CBR Connections

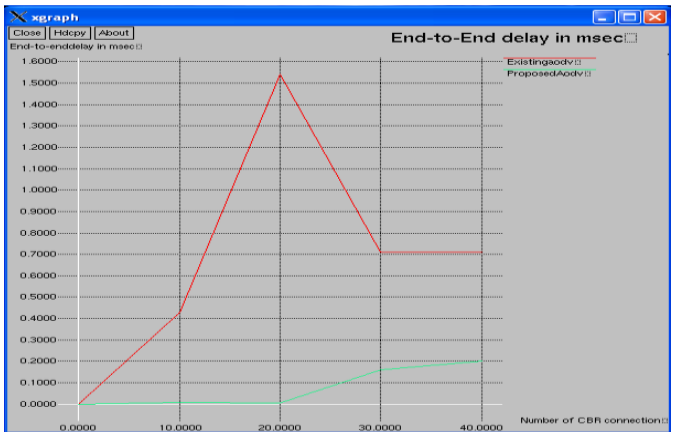

Fig.5.4 Number of CBR connection vs. End-to-End Delay

Fig. 5.4 measures the average end-to-end delay of CBR packets received at the destinations with increasing traffic load. The end-to-end delay of the conventional AODV protocol significantly increases with the increase of traffic load, which is the same as the MAC collision rate and routing overhead. When the traffic load is heavy, by reducing the redundant rebroadcast, NCPR protocols alleviate the channel congestion and reduce the retransmissions at MAC layer, thus, to reduce the end-to-end delay.

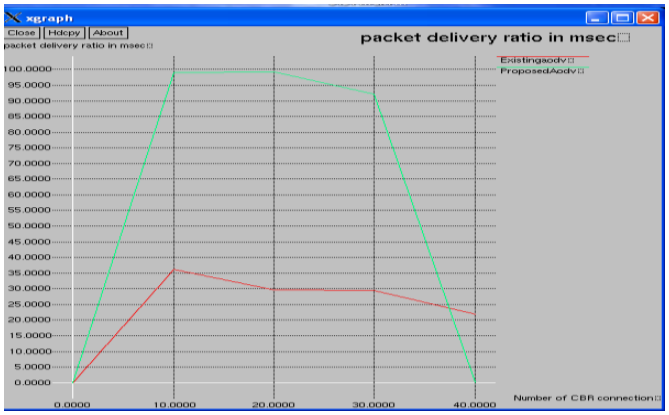

Fig.5.5 Number of CBR connection vs. Packet delivery ratio

Fig. 5.5 shows the packet delivery ratio with increasing traffic load. As the traffic load increases, the packet drops of the conventional AODV protocol without any optimization for redundant rebroadcast are more severe. NCPR protocols increase the packet delivery ratio compared to the conventional AODV protocol, because of the significantly reduce the number of collisions and then reduce the number of packet drops caused by collisions.

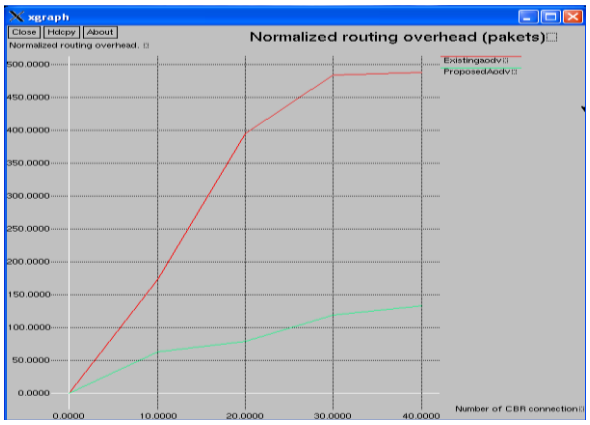

Fig.5.6 Number of CBR connection vs. Routing overhead

Fig. 5.6 shows the normalized routing overhead with different traffic load. At very light traffic load (10 CBR connections), NCPR protocols have more routing overhead than the conventional AODV protocol. This is because that the Hello packets and neighbor list in the RREQ packet add extra overhead, and the effect of reducing redundant rebroadcast is not significant when traffic load is light. As the traffic load increases, the routing overhead of the conventional AODV protocol significantly increases, but the overhead of the D NCPR protocols is relatively smooth. By contrast, NCPR protocols reduce the routing overhead.

3. Performance with Varied Random Packet Loss Rate

Fig. 5.7 measures the average end-to-end delay of CBR packets received at the destinations with increasing packet loss rate. Due to the increase of packet loss, the retransmissions caused by random packet loss at MAC layer will increase so as to increase the end-to-end delay. NCPR protocols alleviate the channel congestion and reduce the retransmissions caused by collision at MAC layer, thus, to have a lower end-to-end delay than the conventional AODV protocol.

Fig.5.7 Random packet loss vs. End-to-End Delay

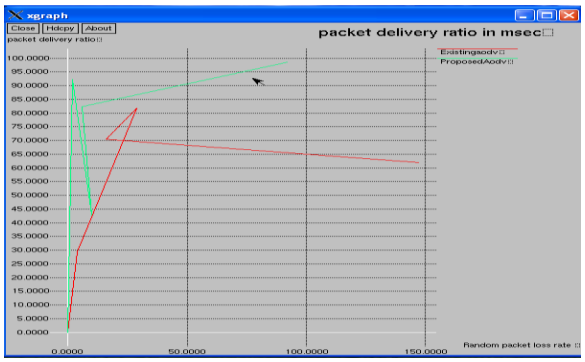

Fig.5.8 Random packet loss vs. Packet delivery ratio

Fig. 5.8 shows the packet delivery ratio with increasing packet loss rate. As the packet loss rate increases, the packet drops of all the three routing protocols will increase. Therefore, all the packet delivery ratios of the three protocols increase as packet loss rate increases. NCPR protocols do not exploit any robustness mechanism for packet loss, but it can reduce the redundant rebroadcast, so as to reduce the packet drops caused by collision.

Fig. 5.9 shows the normalized routing overhead with different packet loss rate. As the packet loss increases, there will be more link breakages and route discoveries, and then there will be more routing overhead (such as RREQ packets and RERR packets). On the other hand, the CBR connection using UDP protocol does not have any retransmissions mechanism, thus, the CBR connections will drop more packets as packet loss rate increases.

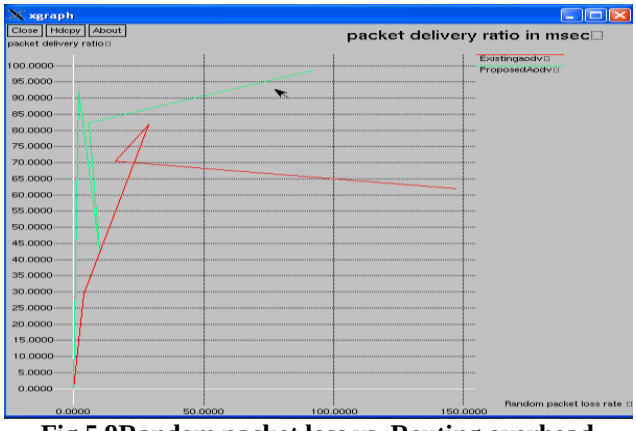

Fig.5.9Random packet loss vs. Routing overhead

By reducing redundant rebroadcast of RREQ packets, both NCPR protocols incur less routing overhead than the conventional AODV protocol.

I. Conclusion

In this paper we proposed a Novel Rebroadcast Technique for Reducing Routing Overhead in Mobile Ad Hoc Networks. This neighbor coverage knowledge includes additional coverage ratio and connectivity factor. We proposed a new scheme to dynamically calculate the rebroadcast delay, which is used to determine the forwarding order and more effectively exploit the neighbor coverage knowledge.

Simulation results show that the proposed protocol generates less rebroadcast traffic than Existing protocol. Because of less redundant rebroadcast, the proposed protocol mitigates the network collision and contention, so as to increase the packet delivery ratio and decrease the average end-to-end delay. The simulation results also show that the proposed protocol has good performance when the network is in high-density or the traffic is in heavy load.

In future, we can calculate the result for another performance matrix i.e. MAC collision rate. The NCPR algorithm can be apply to DSR and results comparison can be done with AODV protocol.

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Motion analysis in video surveillance using edge detection techniques

Anupam Mukherjee[1], Debaditya Kundu[2]
[1](Department of Computer Science & Engineering, Siliguri Institute of Technology, Siliguri, India)
[2](Department of Information Technology, Siliguri Institute of Technology, Siliguri, India)

Abstract : *Motion tracking is an important task in image processing applications. To track moving objects and their interaction in a complex environment is a difficult task, this work basically explains the technique of tracking moving objects. Moving object detection can be accomplished by image capturing, background subtraction and Prewitt edge detection operator. The main idea of our approach, called the background subtraction technique, is to subtract directly between two consecutive frames to extract the difference image. The difference image marks the areas where a moving object was in frame N and where the object is in frame N+1, respectively. Prewitt operator is more suitable in case of moving object analysis.*
Keywords - *Background subtraction, Canny edge detection operator, Edge detection, Motion Tracking, Moving object detection, Noise reduction, Prewitt edge detection operator.*

I. INTRODUCTION

Edge detection is an important part of digital image processing, it is not only reduces the amount of data but also maintain useful structural information[1].In this paper we analyzed and visually compare between Canny and Prewitt edge detection operators.**.** This work is done by using following phases; In the first phase we focused on Edge detection followed by motion tracking with the help of background subtraction and in the last phase prewitt edge detected result is compared with Canny edge detected results. All of these operations are implemented by using Matlab2012a which is best suited for image processing applications. Moving object detection is a basis for a number of important applications, such as real-time surveillance and visual tracking [4]. In this paper we have proposed five different techniques for motion tracking, which will help us to track moving objects in a complex environment.

II. EDGE DETECTION

Edges are significant local changes of intensity in an image. Edges typically occur on the boundary between two different regions in an image. The goal of edge detection is to produce something like a line drawing of an image. In practice we will look for places in the image where the intensity changes quickly. Observe that, in general, the boundaries of objects tend to produce sudden changes in the image intensity[5]. For example, different objects are usually different colours or hues and this causes the image intensity to change as we move from one object to another [4]. In addition, different surfaces of an object receive different amounts of light, which again produces intensity changes [5].

III. TYPES OF EDGES

Edges can be modeled according to their intensity profiles [2].

Step edge: the image intensity abruptly changes from one value to one side of the discontinuity to a different value on the opposite side.

Ramp edge: a step edge where the intensity change is not instantaneous but occur over a finite distance.

Roof edge: a ridge edge where the intensity change is not instantaneous but occur over a finite distance (generated usually by the intersection of surfaces).

IV. BACKGROUND SUBTRACTION

Background subtraction is a technique in the fields of image processing and computer vision wherein an image's foreground is extracted for further processing (object recognition etc)[6]. Generally an image's regions of interest are objects (humans, cars, text etc) in its foreground. After the stage of image preprocessing (which may include image denoising etc) object localisation is required which may make use of this technique. Background subtraction is a widely used approach for detecting moving objects in videos from static cameras. The rationale in the approach is that of detecting the moving objects from the difference between the current frame and a reference frame, often called "background image", or "background model". Background subtraction is mostly done if the image is a part of a video stream.

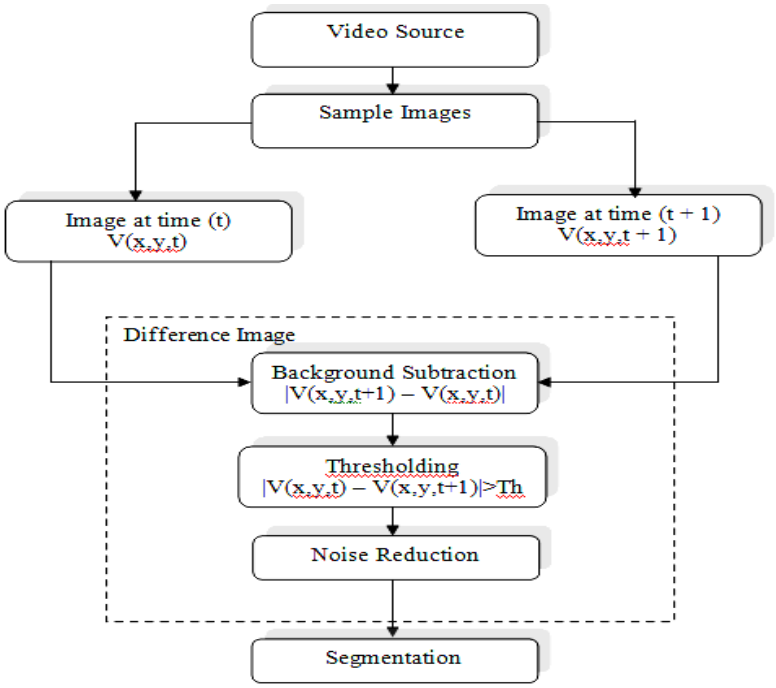

Figure1. Flow chart of Background Subtraction.

V. ALGORITHMS FOR REAL TIME MOVING OBJECT DETECTION

Five different approaches for moving objection detection are described[4].

V.I Motion Tracking: Using Single Prewitt Operator.

Step1: Read Video Sequences by using Video Reader.
Step2: Capture two consecutive images and store it in IMG and IMG1.
Step3: IMG: = Convert Frame number N to Gray Scale.
Step4: IMG1: = Convert Frame number N + 1 to Gray Scale.
Step5: Subtract frame N from frame N+1, to generate the difference image.
Step6: Remove noise by using median filter.
Step7: Run Prewitt operator on the difference image in order to remove noise and to detect the edges.

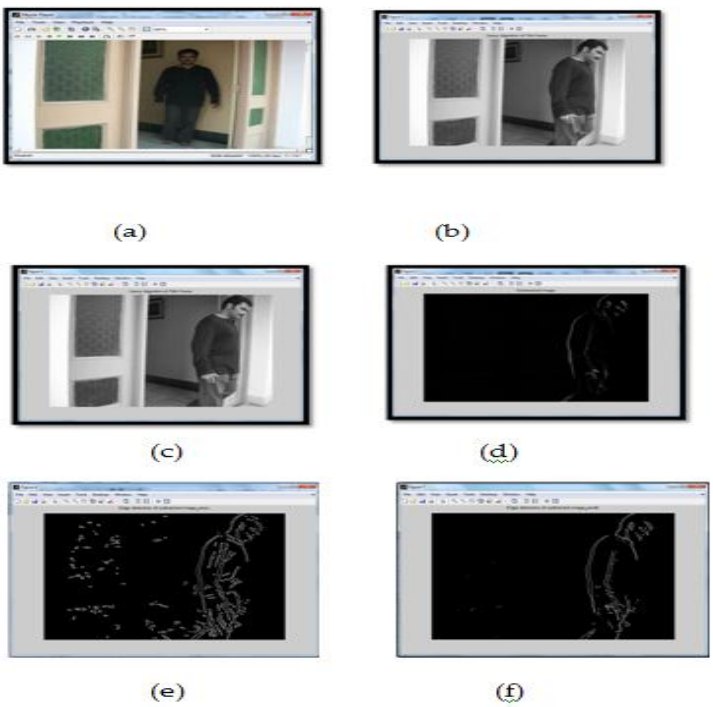

Figure2. (a) Source Video (b) Captured frame-70 (c) Captured frame-71 (d) Difference image. (e) Edge detection by Canny operator. (f) Edge detection by Prewitt operator.

In this paper we have analyzed and made visual comparison between Canny and Prewitt edge detection operators. Visual comparison between fig (e) and fig (f) shown that prewitt is more suitable in case of motion tracking.

V.II Motion Tracking: Background Elimination Using Single Prewitt Operator.

Step1: Read Video Sequences by using Video Reader Object.
Step2: Capture two images and store it in IMG and IMG1. IMG is the static background image having no moving object. IMG1 is the N th number of frame having moving object.
Step3: IMG: = Convert Frame to Gray Scale.
Step4: IMG1: = Convert Frame number N to Gray Scale.
Step5: Subtract frame IMG from frame IMG1, to generate the difference image.
Step6: Remove noise by using median filter.
Step7: Run Prewitt operator on the difference image in order to remove noise and to detect the edges.

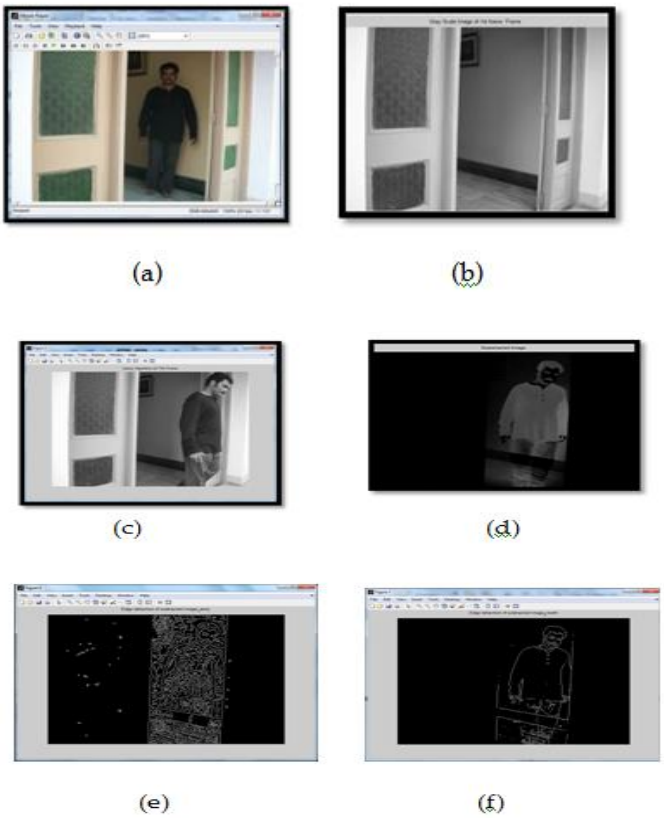

Figure3. (a) Source Video (b) Captured frame-45(c) Captured frame-71 (d) Difference image. (e) Edge detection by Canny operator. (f) Edge detection by Prewitt operator.

V.III Motion Tracking By Using Double Prewitt Operators.

Step1: Read Video Sequences by using Video Reader Object.
Step2: Capture two images and store it in IMG and IMG1.
Step3: IMG: = Convert Frame number N to Gray Scale.
Step4: IMG1: = Convert Frame number N + 1 to Gray Scale.
Step5: EDGE:= Applying prewitt edge detection on IMG.
Step6: EDGE1:= Applying prewitt edge detection on IMG1.
Step7: Subtract EDGE from EDGE1, to generate the difference image.

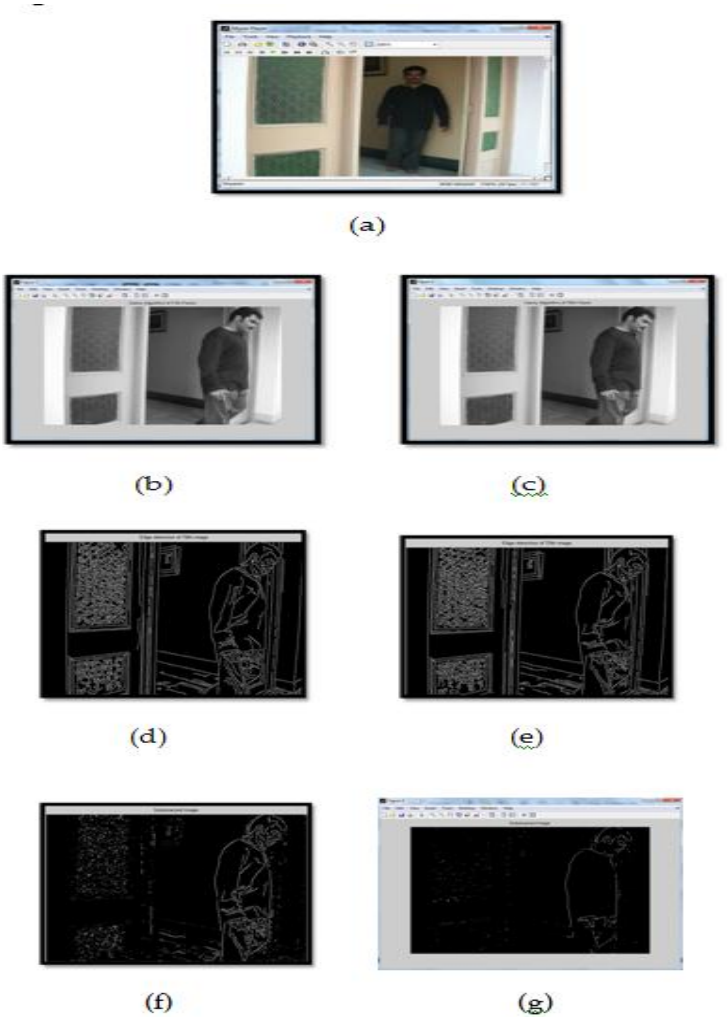

Figure4. (a) Source Video (b) Captured frame-71 (c) Captured frame-72 (d) Edge detection-71. (e) Edge detection-72. (f) Difference image using Canny operator. (g) Difference image using Prewitt operator.

V.IV Motion Tracking By Using Single Prewitt Operator And Crop Function.

Step1: Read Video Sequences by using Video Reader Object.
Step2: Capture two images and store it in IMG and IMG1.
Step3: IMG: = Convert Frame number N to Gray Scale.
Step4: IMG1: = Convert Frame number N + 1 to Gray Scale.
Step5: Subtract frame IMG from frame IMG1, to generate the difference image.
Step6: Applying CROP function to Select the particular area of an image and store it into a variable (say Crop).
Step7: Run Canny filtering on the Crop image in order to remove noise and to detect the edges.

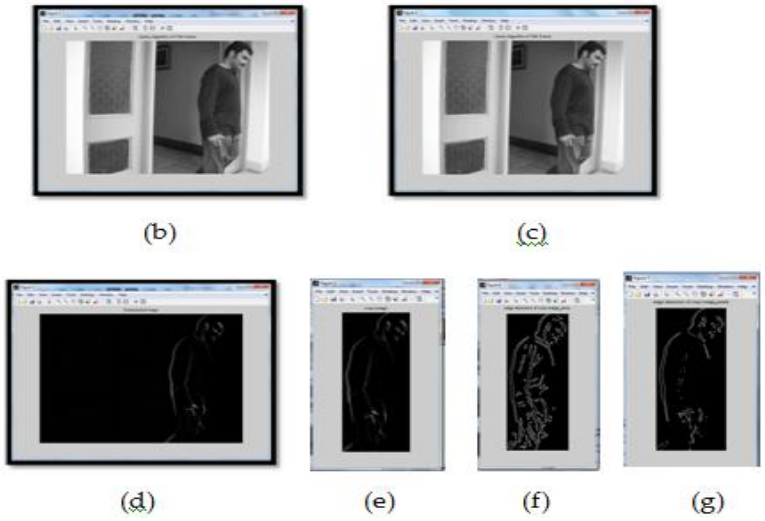

Figure5. (a) Source Video (b) Captured frame-71(c) Captured frame-72 (d) Difference image.(e) Croped image.(f) Edge detection using Canny operator. (g) Edge detection using Prewitt operator.

V.V Motion Tracking By Using Background Subtraction On Color Images And Applying A Single Prewitt Operator.

Step1: Read Video Sequences by using Video Reader Object.
Step2: Capture two consecutive colour images and store it in IMG and IMG1.
Step3: Subtract IMG from IMG1, to generate the difference image.
Step4: Convert the difference image to gray scale image.
Step5: Remove noise by using median filter.
Step6: Run prewitt operator on the Gray scale image in order to remove noise and to detect the edges.

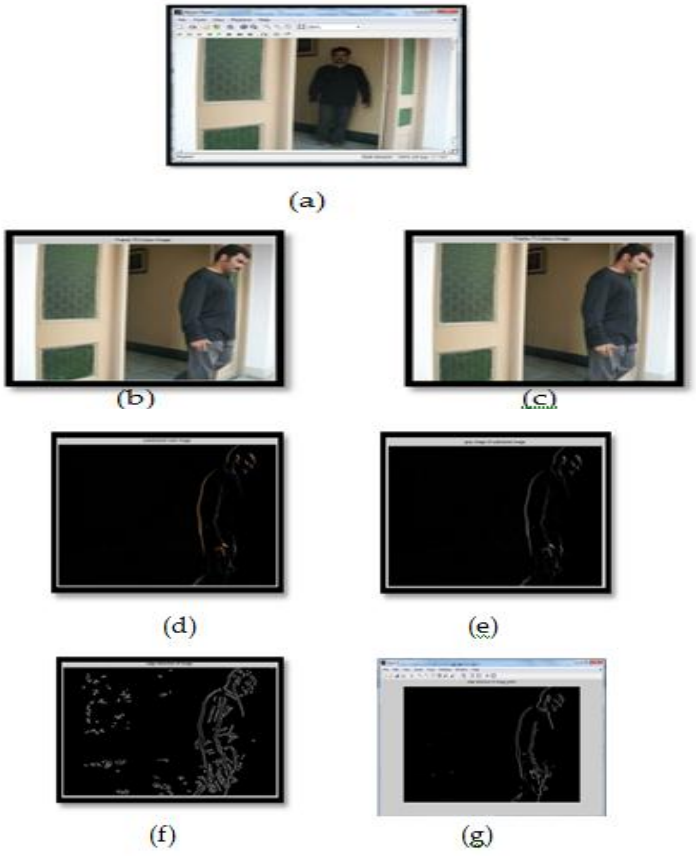

Figure6. (a) Source Video (b) Captured frame-

71 (c) Captured frame-72 (d) Colour difference image. (e) Gray scale difference image. (f) Edge detection using Canny operator. (g) Edge detection using Prewitt operator.

VI. Conclusion

In this paper we have proposed five different techniques of motion tracking by using background subtraction method and two edge detection operators: "Prewitt" and "Canny". By analysis and visual comparing the experimented result we come to conclusion that prewitt edge detection operator is more suitable than canny edge detection operator for motion tracking. As canny operator detects maximum number of edges, this leads to noise when we perform background subtraction method for tracking moving objects.

Acknowledgements

We tender our heartily gratitude to our parents, family members and friends.

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Detecting Spam Tags Against Collaborative Unfair Through Trust Modelling

N.Shravani[1], Dr.P.Govardhan[2]
[1]*computer science / vardhaman college of engineering, India*
[2]*Information technology, Vardhaman college of engineering, India*

Abstract : *In the past few years sharing photos, within social networks has become very popular .In order to make these huge collection easier to explore, images are usually tagged with representative keywords such as persons, events, objects, and locations. In order o speed up the time consuming tag annotation process, tags can be propagated based on the similarity between image content and context .In this paper, daily and continuous communication implies the exchange of several types of content, including free text, image, audio and video data. Based on the established correspondences between these two image sets and the reliability of the user, tags are propagated from the tagged to the untagged images. The user trust modeling reduces the risk of propagating wrong tags caused by spamming or faulty annotation. The effectiveness of the proposed method is demonstrated through a set of experiments On an image database containing various landmarks. Tagging in online social networks is very popular these days as it facilitates search and retrieval of multimedia content .However, noisy and spam annotations often make it.*
Keywords – *annotation process, audio and video data, trust modeling, tagging, spams.*

I. Introduction

The past few years have witnessed an increasing popularity of social networks, digital photography and web-based personal image collections. A social network service typically focuses on building online communities of people who share interests and activities, or who are interested in exploring the interests and activities of others. Most social network services are web-based and provide a variety of ways for users to interact. They have become also a popular way to share and disseminate information, e.g. users upload their personal photos and share them through online communities asking other people to comment or rate their content. This has resulted in a continuously growing volume of publicly available photos ,e.g. Flicker.

One of the key features of social information systems is their reliance on users as primary contributors of content and as annotators and raters of other content. this reliance on users can lead to many positive effects, including large-scale growth in the size and content in the community (e.g., YouTube, Wikipedia), bottom-up discovery of "citizen-experts" with specialized Social networks and multimedia content sharing Web sites have become increasingly popular in recent years. Their service typically focuses on building online communities of people who share interests and activities, or are interested in exploring the interests and activities of others. At the same time, they have become a popular way to share and disseminate information. For example, users upload their personal photos and share them through online communities, letting other people comment or rate them. This trend has resulted in a continuously growing volume of publicly available multi- media content on content sharing Web sites like Flickr, Picasa and YouTube as well as social networks like Face book, which have created new challenges for access, search, and retrieval of the shared content. For instance, Flicker has hosted more than 6 billion photos since August 2011,and Facebook has approximately 100 billion photos stored on its servers. Every minute, 48 h of video are uploaded to YouTube .and 20 million videos are uploaded to Face book every month.

Trust provides a natural security policy stipulating that users or content with low trust values should be investigated or eliminated. Trust can predict the future behavior of users to avoid undesirable influences of untrustworthy users .Trust- based schemes can be used to motivate users to positively con- tribute to social network systems and/or penalize adversaries who try to disrupt the system. The distribution of the trust values of the users or content in a social network can be used to represent the health of that network.

II. Tag Prpogation.

The goal of the tag propagation module is to propagate the geo tags from the tagged to the non-tagged images according to the matching scores, provided by the object duplicate detection module. As a result, labels from the training set are propagated to the same object found in the test set. The geographical metadata (geo tags) embedded in the image file usually consist of location names and/or GPS coordinates, but may also include altitude, viewpoint, etc. Two of the most commonly used metadata formats for image files are EXIF and IPTC. In this paper, we consider the existing IPTC schema and introduce a hierarchical order for a subset of the

available geo tags, namely: city (name of the city where image was taken) and sub location (area or name of the landmark).

Our system supports two application scenarios as shown in Fig. 2.Inthe closed set problem, each test image is assumed to correspond to exactly one of the known (trained) landmarks. Therefore, the image gets assigned to the most probable trained landmark and the corresponding tag is propagated to the test image. This is comparable to an identification task in biometrics. However, in the open set problem the test picture may correspond to an unknown landmark. This problem is comparable to a watch list task in biometrics where the goal is to distinguish between known and unknown persons (landmarks) and to propagate the tags only for the known ones. For example, we assume that the system is trained with only three known landmarks: Budapest (Parliament), Belgrade (Church St. Sava) and Tokyo (Tower). Given the input test image of Paris (Eiffel Tower), the system gives different results for the closed and open set problems. In the closed set problem, our system finds that Tokyo (Tower) is the most suitable model for the test image. If we consider the open set problem, the system does not retrieve any of the trained models since the matching scores between the object models and the test image do not exceed a predefined threshold. The open and closed set problems are separately evaluated in Section 4 as detection and recognition tasks, respectively.

In this paper ground truth data are used for the estimation of the user trust ratio. However, for a real photo sharing system, such as Panoramic, it is not necessary to collect ground truth data since user feedback can replace them. The main idea is that users evaluate tagged images by assigning a true or a false flag to the tag associated with an image. If the user assigns a false flag, then he/she needs to suggest a correct tag for the image. The more misplacement a user has, the more untrusted he/she is. By applying this method, spammers and unreliable users can be efficiently detected and eliminated. Therefore, the user trust ratio is calculated as the ratio between the number of true flags and all associated flags over all images tagged by that user. The number of misplacements in Panoramic is analogous to the number of wrongly tagged images in our approach.

In case that a spammer attacks the system, other users can collaboratively eliminate the spammer. First, the spammer wants to make other users un trusted, so he/she assigns many false flags to the tags given by those other users and sets new, wrong, tags to these images. In this way, the spammer becomes trusted. Then, other users correct the tags given by the spammer, so that the spammer becomes un trusted and all of his/her feedbacks in the form of flags are not considered in the whole system. Finally, previously trusted users, who were untrusted due to spammer attack, recover their status. Following this scenario, the user trust ratio can be constructed by making use of the feedbacks from other users who agree or disagree with the tagged location. However, due to the lack of a suitable dataset which provides user feedback, the Xu et al. introduced the concept of "authority" in social bookmarking systems, where they measured the goodness of each tag with respect to a content by the sum of the authority scores of the users who have assigned the tag to the content. Authority scores and goodness are iteratively updated by using hyperlink-induced topic search (HITS), which was initially used to rank Web pages based on their linkage on the Web .In contrast, Krestel and Chen iteratively updated scores for users only. They proposed to use a spam score propagation tech-nique to propagate trust scores through a social graph, similar to that shown in Figure 1, where edges between nodes (in this case, users) indicate the number of common tags supplied by users, common content annotated by users and/or common tag-content pairs used by users. Starting from a manually assessed set of nodes labeled as spammers or legitimate users with the initial spam scores, a TrustRank metric is used to calculate.

III. Trust Modelling.

When information is exchanged on the Internet, malicious individuals are everywhere, trying to take advantage of the information exchange structure for their own benefit, while bothering and spamming others. Before social tagging became popular, spam content was observed in various domains first in e-mail, and then in Web search networks have been also influenced by malicious peers, and thus various solutions based on trust and reputation have been proposed, which dealt with collecting information on peer behavior, scoring and ranking peers, and responding based on the scores Today, even blogs are spammed. Ratings in online reputation systems, such as eBay, Amazon, and Epinions, are very similar to tagging systems and they may face the problem of unfair ratings by artificially inflating or deflating reputations. Several filtering techniques for excluding unfair ratings are proposed in the literature. Unfortunately, the countermeasures developed for e- mail and Web spam do not directly apply to social networks

3.1 Content Trust Modeling

Content trust modeling is used to classify content (e.g., Web pages, images, and videos) as spam or legitimate. In this case, the target of trust is a content (resource), and thus a trust score is given to each content based on its content and/or associated tags. Content trust models reduce the prominence of content likely to be spam, usually in query-based retrieval results. They try to provide better ordering of the results to reduce the expo- sure of the spam to users. Koutrika et al. proposed that each incorrect content found in a system could

be simply removed by an administrator. The administrator can go a step further and remove all content contributed by the user who posted the incorrect content, on the assumption that this user is a spammer (polluter).

Approaches for content trust modeling utilize features extracted from content information, users' profiles and/or associated tags to detect specific spam content proposed an algorithm called Trust Rank to semi automatically separate reputable from spam Web pages. Trust Rank relies on an important empirical observation called approximate isolation of the good set: good pages seldom point to bad ones. It starts from a set of seeds selected as highly qualified, credible, and popular Web pages in the Web graph, and then iteratively propagate trust scores to all nodes in the graph by splitting the trust score of a node among its neighbors according to a weighting scheme. Trust Rank effectively removes most of the spam from the top-scored Web pages, however it is unable to effectively separate low-scored good sites from bad ones, due to the lack of distinguishing features. In search engines, Trust Rank can be used either solely to filter search results, or in combination with Page Rank and other metrics to rank con- tent in search results.

3.2 User Trust Modeling

In user trust modeling, trust is given to each user based on the information extracted from a user's account, his/her interaction with other participants within the social network, and/or the relationship between the content and tags that the user contributed to the social tagging system. Given a user trust score, the user might be flagged as a legitimate user or spammer.

User trust can be established in a centralized or distributed manner In centralized trust systems, users' trust models are maintained by one central authority, i.e., manager, while in distributed trust systems each user maintains his/her own trust manager based on the previous interactions with other users. Distributed trust models are mainly used in P2P networks while social networks usually use centralized systems .user trust modeling has a disadvantage of "broad brush," i.e., it may be excessively strict if a user happens to post one bit of questionable content on otherwise legitimate content. The trust-worthiness of a user is often judged based on the content that the user uploaded to a social system, and thus "subjectivity" in discriminating spammers from legitimate users remains an issue for user trust modeling as in content trust modeling.

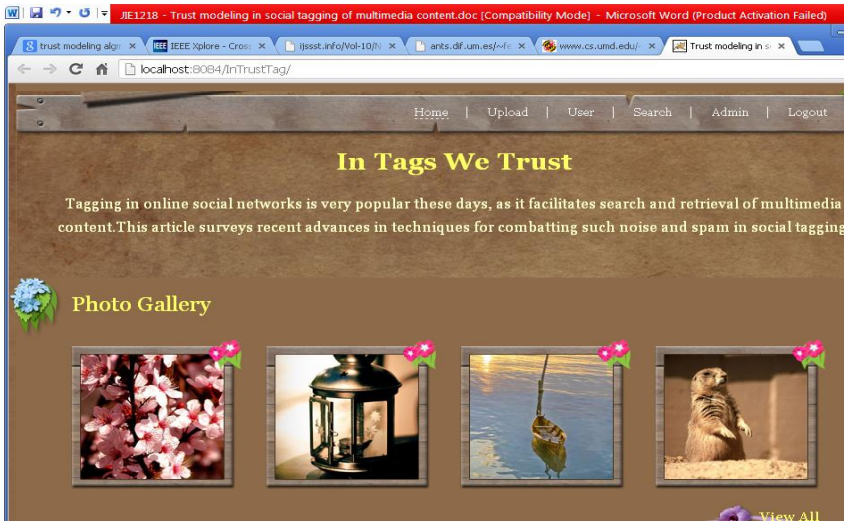

Fig 1

IV. Open Issues And Challenges:

There have been a variety of data sets from different social networks and even different data sets of one social network for evaluation of trust modeling approaches, as shown in the "Evaluation" section. However, publication of such data sets is rarely found, which makes it difficult to compare results and performance of dif- ferent trust modeling approaches. Therefore, it would be desirable to promote researchers to make their data sets publicly available to the research community, which can be used for comparison and benchmarking of different approaches. Furthermore, most of the data sets provide data for evaluating only one aspect of trust modeling, either user or content trust modeling, while evaluation of the other aspect requires introducing simulated objects in the real-world social tagging data sets (e.g., [20] and [29]). However, fo r the thorough

evaluation of a trust model it is necessary that real-world data sets have ground- truth data for both users and content.

Most of the existing trust modeling approaches based on text information assume monolingual environments. However, many social network services are used by people from various countries, so that various languages simultaneously appear in tags and comments. In such cases, some text information may be regarded as wrong due to the language difference. Therefore incorporating the multilingualism in trust modeling would be useful to solve this problem.

V. Conclusion:

In this article, we dealt with one of the key issues in social tagging systems combating noise and spam. We classified existing studies in the literature into two categories, i.e., content and user trust modeling.

Representative. we dealt with one of the key issues insocial tagging systems: combating noise and spam. We classified existing studies in the literature into two categories, i.e., content and user trust modeling. Representative techniques in each category were analyzed and compared. In addition, existing databases and evaluation protocols were re viewed. An example system was presented to demonstrate how trust modeling can be particularly employed in a popular application of image sharing and geo tagging. Finally, open issues and future research trends were prospected. As online social networks and content sharing services evolve rapidly, we believe that the research on enhancing reliability and trust worthiness of such services will become increasingly important.

Currently the user trust model relies on predefined ground truth to estimate the user trust ratios. Future work will focus on automatic ground truth generation using Word Net and Wikipedia to obtain tagged image samples. In addition, we will work on developing new approaches for creating user trust models by considering user trust values assigned by particular user to other users and employing some ranking algorithm such as Page Rank. we aim to achieve hybridization through aggregating with the system that was proposed in and that isbased on extracting association rules from navigation sessions. Therefore, in future works.

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Wavelets in Medical Image Processing On Hip Arthroplasty and De-Noising, Segmentation

Himadri Nath Moulick[1], Moumita Ghosh[2]
[1]*CSE, Aryabhatta Institute of Engg & Management, Durgapur, PIN-713148, India*
[2]*CSE,University Institute Of Technology,(The University Of Burdwan) Pin -712104,India*

Abstract: *Computers have become indispensable in all domains, and the medical segment does not represent an exception. The need for accuracy and speed has led to a tight collaboration between machines and human beings. Maybe the future will allow the existence of a world where the human intervention won't be necessary, but for now,the best approach in the medical field is to create semiautomatic applications, in order to help the doctors with the diagnoses, with following the patients' evolution and managing them and with other medical activities. Our application is designed for automatic measurements of orthopedic parameters, and allows the possibility of human intervention in case the parameters have not been detected properly. The segment of the application is Hip Arthroplasty. And Wavelet transforms and other multi-scale analysis functions have been used for compact signal and image representations in de-noising, compression and feature detection processing problems for about twenty years. Numerous research works have proven that space-frequency and space-scale expansions with this family of analysis functions provided a very efficient framework for signal or image data. The wavelet transform itself offers great design flexibility. Basis selection, spatial-frequency tiling, and various wavelet threshold strategies can be optimized for best adaptation to a processing application, data characteristics and feature of interest. Fast implementation of wavelet transforms using a filter-bank framework enable real time processing capability. Instead of trying to replace standard image processing techniques, wavelet transforms offer an efficient representation of the signal, finely tuned to its intrinsic properties. By combining such representations with simple processing techniques in the transform domain, multi-scale analysis can accomplish remarkable performance and efficiency for many image processing problems. Multi-scale analysis has been found particularly successful for image de-noising and enhancement problems given that a suitable separation of signal and noise can be achieved in the transform domain (i.e. after projection of an observation signal) based on their distinct localization and distribution in the spatial-frequency domain. With better correlation of significant features, wavelets were also proven to be very useful for detection {jin_Mallat_1992a} and matching applications {jin_Strickland_1995}.*

Key-Words *- Hip Arthroplasty, Canny Edge Detection, DICOM, Hough Transform, Radiographic Image Processing De-noising, Segmentation*

I. Introduction

Medical image processing is an area of increasing interest. It includes a wide range of methods and techniques, starting with the acquisition of images using specialized devices (for example, CT devices), image enhancement and analysis, to 3D model reconstruction from 2D images. Thus, the research in this field represents a point of interest for both doctors and engineers, in their attempt to improve medical techniques, with computer assistance, in order to obtain more accurate results in treating the patients. Among many research projects in this area of interest some of the most relevant are: The SCANIP [11] image processing software that provides a broad range of image visualization, processing and segmentation tools for medical purposes. This software has been created by Simpleware in Great Britain. The SCANIP programs ensure the conversion of 3D medical images into quality meshes. These meshes can be used in future processing in analysis programs, in fluid dynamics, CAD and the creation of Rapid Prototyping models. The sources for these programs come from MRIs, CTs or MicroCTs. The 3D-DOCTOR Project [12] that comes with an advanced 3d modeling software, with strong processing and measurement functions for MRI-s, CT-s, PET-s, and other types of medical images. The possible applications of this software are in the scientific and medical domain, but also in the image processing industrial field. The functioning principle of this software is based on edge detection techniques using 3D image segmentation functions and on the construction of 3D surfaces and volumes, that are afterwards visualized and measured for the purpose of a quantitative and qualitative analysis. - The Hip-OpCT software [13] that allows importing CT images in DICOM format. Once imported, the CT dataset is visualized through several modalities from which the doctors can plan the size and the position of the prosthesis. Wavelets have been widely used in signal and image processing for the past 20 years. Although a milestone paper by Grossmann and Morlet {jin_Grossman_1984} was considered as the beginning point of modern wavelet analysis, similar ideas and theoretical bases can be found back in early 20th century {jin_Haar_1910}. Following

two important papers in late 1980s by S. Mallat {jin_Mallat_1989} and I. Daubechies {jin_Daubechies_1988}, more than 9,000 journal papers and 200 books related to wavelets have been published {jin_Unser_2003a}.

Wavelets were first introduced to medical imaging research in 1991 in a journal paper describing the application of wavelet transforms for noise reduction in MRI images. {jin_Weaver_1991}. Ever since, wavelet transforms have been successfully applied to many topics including tomographic reconstruction, image compression, noised reduction, image enhancement, texture analysis/segmentation and multi-scale registration. Two review papers in 1996 {jin_Unser_1996} and 2000 {jin_Laine_2000} provide a summary and overview of research works related to wavelets in medical image processing from the past few years. Many related works can also be found in the book edited by A. Aldroubi and M. Unser {jin_Aldroubi_1996}. More currently, a special issue of IEEE Transactions on Medical Imaging {jin_Unser_2003a} provides a large collection of most recent research works using wavelets in medical image processing. The purpose of this chapter is to summarize the usefulness of wavelets in various problems of medical imaging. The chapter is organized as follows. Section 2 overviews the theoretical fundamentals of wavelet theory and related multi-scale representations. As an example, the implementation of an over-complete dyadic wavelet transform will be illustrated. Section 3 includes a general introduction of image de-noising and enhancement techniques using wavelet analysis. Section 4 and 5 will summarize the basic principles and research works in literature for wavelet analysis applied to image segmentation and registration.

II. Arthroplasty- General Presentation

Arthroplasty [10] represents a surgical procedure in which the arthritic or dysfunctional joint surface is replaced with prosthesis or by remodeling or realigning the joint. The important joint for this article is the one located at hip area. This is the reason why the article details the parameters that belong to the thigh-bone and the pelvis. Fig.1 presents the most important parameters in Hip Arthroplasty, extracted from an anterior-posterior radiography. Fig.2 presents the parameters extracted from an anterior-lateral radiography representing the hip after the insertion of the prosthesis. For the scope of this article, three areas of the thighboneare analyzed: the femoral head (the nearest part to the pelvis), the femoral neck, and the femoral shaft or body (the longest part of the thigh-bone).

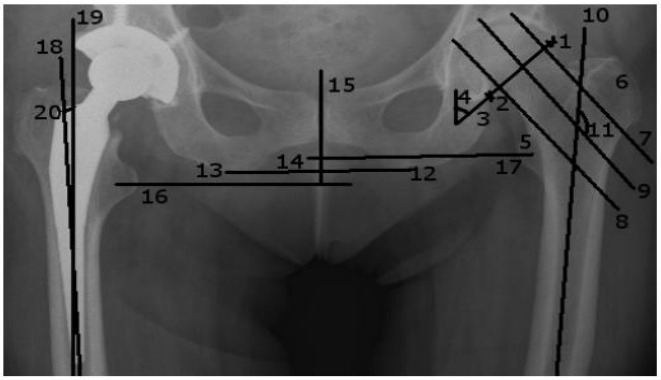

Fig.1. Parameters important in Hip Replacement, extracted from an anterior-posterior radiography

The parameters of interest for the Hip Replacement [7] are listed below:

1) the superior margin of the acetabulum (the superior point in which the thigh-bone meetsthe pelvis). 2) the inferior margin of the acetabulum (the inferior point in which the thigh-bone (thefemoral head) meets the pelvis).3) the femoral head axis or the acetabulum axis (the line determined by the two points that represent the superior margin and the inferior margin of the acetabulum). 4) the angle created by the acetabulum axis with the vertical line. This angle has to be the same for both of the femoral bones. 5) the lesser trochanter (located in the upper left part of the femoral body). 6) the greater trochanter (located in the upper right part of the femoral body). 7) the tangent to the superior cortical of the femoral neck 8) the tangent to the inferior cortical of the femoral neck 9) the femoral neck axis (the axis of the cylinder determined by the tangents 7 and 8) 10) the femoral body axis or the diaphyseal axis (the axis of the cylinder that approximates the femoral body) 11) the most important parameter, extracted from the x-ray before the surgical intervention is represented by the cervicodiaphyseal angle (the angle determined by the neck axis and the diaphyseal axis). Depending on the value of this angle, it can be determined whether the patient needs or not a prosthesis. If the angle has values between 125 and 135 degrees, the thigh-bone is considered to be in normal ranges. 12) the right ischiadic tuberosity (the lowest right part of the pelvic bone). 13) the left ischiadic tuberosity (the lowest left part of the pelvic bone).14) the ischiadic line or the horizontal reference line (the line determined by the two ischiadic tuberosities). 15) the vertical reference line, that is perpendicular on the ischiadic line,

in its middle. 16) the line starting from the center of the lesser left trochanter, parallel to the ischiadic line 17) the line starting from the center of the right lesser trochanter, parallel to the ischiadic line; the distance between lines 16 and 17 represents the vertical distance between the two thigh-bones. If this distance is greater than a chosen threshold, there is an indication of a difference between the lengths of the two femoral bones that has to be resolved surgically (in most cases). After inserting the prosthesis, some new parameters must be taken into consideration: 18) the diaphyseal axis of the femoral bone (the same as parameter 10). 19) the diaphyseal axis of the prosthesis or the axis of the prosthesis' body (the axis of the cylinder that approximates the prosthesis' body). 20) The deviation of the prosthesis (the angle determined by lines 18 and 19). This parameter will be computed in several radiographic images, following the evolution of the same patient. The important parameters extracted from an anteriorlateral radiography, after inserting the prosthesis, are shown in Fig.2:

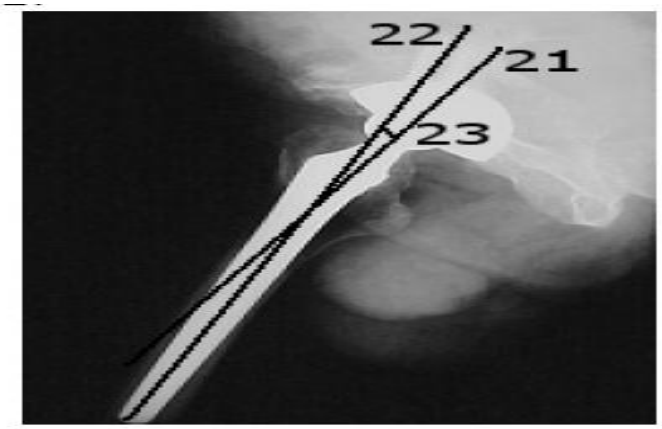

Fig.2. Parameters important in Hip Replacement, extracted from an anterior-lateral radiography, after the insertion of the prosthesis

21) The axis of the prosthesis' neck 22) The axis of the prosthesis' body 23) The anteversion angle (the angle determined by the axes 21 and 22). If this angle has its value situated between 5 and 10 degrees, it's considered to be in normal ranges.

1.The DICOM Standard

In order to manage and interpret the x-rays data in a simple and organized manner, a standard for the x-ray files is needed. This is the reason why the most popular standard for medical images was chosen: DICOM [14]. The Digital Imaging and Communications in Medicine (DICOM) standard is a detailed specification of the coding and transfer of medical images and their associated information.

2. Representing Data in the DICOM Format

The clinical data are represented in a variety of formats: the distances are measured in millimeters, the time in seconds, etc. The PS 3.5 part of the standard, entitled Data Structure and Their Encoding, defines 27 types of standard data, known as "value representations" (VR), that include all types of data that can appear in the medical domain. Any information encoded in a DICOM file has to belong to one of these predefined types.

Some of the most important standard data are: Person Name (PN), Date Time (DT), and Age String (AS). A DICOM file has the following structure: - A preamble of 128 bytes - A prefix (4 bytes) for retaining the letters 'D', 'I', 'C', 'M' (the signature of a DICOM file) - A data set that contains information like: patient's name, image type, image dimension, etc. - Pixels that form the image (or the images) contained in the file.

3. Extracting Data from DICOM Files

Extracting data from a DICOM file can be made using the tags defined in the DICOM dictionary. Every tag is searched in the file, and, if found, is interpreted. The steps in extracting the information are: - Checking the existence of the characters 'D', 'I', 'C', 'M' - Determining of the VR type - Setting the order of the bytes (Big Endian or Little Endian) - Searching for a tag in the DICOM file, corresponding to the order of bytes and the VR type - Extracting the values corresponding to that tag Some characteristics of the DICOM files, important when extracting data, are: - the number of images contained in the DICOM file - the number of bits per pixel: 8, 12, 16, 24 - the compression - the photometric interpretation: shades of gray or color images In case of images without compression, the extraction of the images is made pixel by pixel, according to the number of bits per pixel. For images with compression, a decompression step should be previously performed.

4. The Structure of the CR DICOM files

Computer radiographic images (CR) stored in DICOM files are accompanied by general identification elements and some specific information. For example, the Patient module contains: the name of the patient, the patient's ID, the patient's date of birth, etc. Another module, specific for CR, CR Series, contains information about the examined body part, the view position, etc. Our application extracts from every module the important elements for managing and interpreting the patient's data.

III. Wavelet Transform And Multi-Scale Analysis

One of the most fundamental problems in signal processing is to find a suitable representation of the data that will facilitate an analysis procedure. One way to achieve this goal is to use transformation, or decomposition of the signal on a set of basis functions prior to processing in the transform domain. Transform theory has played a key role in image processing for a number of years, and it continues to be a topic of interest in theoretical as well as applied work in this field. Image transforms are used widely in many image processing fields, including image enhancement, restoration, encoding, and description {jin_Jain_1989}. Historically, the Fourier transform has dominated linear time-invariant signal processing. The associated basis functions are complex sinusoidal waves $e^{i\omega t}$ that correspond to the eigenvectors of a linear time-invariant operator. A signal $f(t)$ defined in the temporal domain and its Fourier transform $\hat{f}(\omega)$ defined in the frequency domain, have the following relationships {jin_Jain_1989; jin_Papoulis_1987}:

$$\hat{f}(\omega) = \int_{-\infty}^{+\infty} f(t) e^{-i\omega t} dt, \quad (1)$$

$$f(t) = \frac{1}{2\pi} \int_{-\infty}^{+\infty} \hat{f}(\omega) e^{i\omega t} d\omega. \quad (2)$$

Fourier transform characterizes a signal $f(t)$ via its frequency components. Since the support of the bases function $e^{i\omega t}$ covers the whole temporal domain (i.e infinite support), $\hat{f}(\omega)$ depends on the values of $f(t)$ for all times. This makes the Fourier transform a global transform that cannot analyze local or transient properties of the original signal $f(t)$ In order to capture frequency evolution of a non-static signal, the basis functions should have compact support in both time and frequency domain. To achieve this goal, a windowed Fourier transform (WFT) was first introduced with the use of a window function w(t) into the Fourier transform {jin_Mallat_1998}:

$$Sf(\omega, t) = \int_{-\infty}^{+\infty} f(\tau) w(t-\tau) e^{-i\omega\tau} d\tau. \quad (3)$$

The energy of the basis function $g_{\tau,\xi}(t) = w(t-\tau)e^{-i\xi t}$ is concentrated in the neighborhood of time τ over an interval of size σ_t measured by the standard deviation of $|g|^2$ Its Fourier transform is $\hat{g}_{\tau,\xi}(\omega) = \hat{w}(\omega-\xi)e^{-i\tau(\omega-\xi)}$ with energy in frequency domain localized around ξ over an interval of size σ_ω In a time-frequency plane (t, ω) the energy spread of what is called the atom $g_{\tau,\xi}(t)$ is represented by the Heisenberg rectangle with time width σ_t and frequency width σ_ω. The uncertainty principle states that the energy spread of a function and its Fourier transform cannot be simultaneously arbitrarily small, verifying:

$$\sigma_t \sigma_\omega \geq \frac{1}{2}. \quad (4)$$

Shape and size of Heisenberg rectangles of a windowed Fourier transform therefore determine the spatial and frequency resolution offered by such transform. Examples of spatial-frequency tiling with Heisenberg rectangles are shown in Fig 3. Notice that for a windowed Fourier transform, the shape of the time-frequency boxes are

identical across the whole time-frequency plane, which means that the analysis resolution of a windowed Fourier transform remains the same across all frequency and spatial locations.

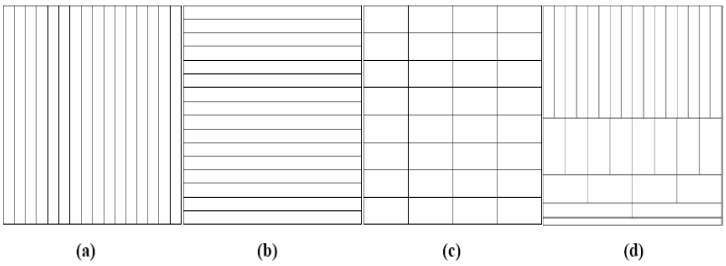

Fig .3. Example of spatial-frequency tiling of various transformations. x-axis: spatial resolution. y-axis: frequency resolution. (a) discrete sampling (no frequency localization). (b) Fourier transform (no temporal localization). (c) windowed Fourier transform (constant Heisenberg boxes). (d) wavelet transform (variable Heisenberg boxes).

To analyze transient signal structures of various supports and amplitudes in time, it is necessary to use time-frequency atoms with different support sizes for different temporal locations. For example, in the case of high frequency structures, which vary rapidly in time, we need higher temporal resolution to accurately trace the trajectory of the changes; on the other hand, for lower frequency, we will need a relatively higher absolute frequency resolution to give a better measurement on the value of frequency. We will show in the next section that wavelet transform provide a natural representation which satisfies these requirements, as illustrated in Fig. 3 (d).

1. Noise Reduction and Image Enhancement Using Wavelet Transforms

De-noising can be viewed as an estimation problem trying to recover a true signal component X from an observation Y where the signal component has been degraded by a noise component N:

$$Y = X + N. \tag{5}$$

The estimation is computed with a thresholding estimator in an orthonormal basis $\mathbf{B} = \{g_m\}_{0 \le m < N}$ as {jin_Donoho_1994b}:

$$\hat{X} = \sum_{m=0}^{N-1} \rho_m(\langle X, g_m \rangle) g_m \tag{6}$$

where ρ_m is a thresholding function that aims at eliminating noise components (via attenuating of decreasing some coefficient sets) in the transform domain while preserving the true signal coefficients. If the function ρ_m is modified to rather preserve or increase coefficient values in the transform domain, it is possible to enhance some features of interest in the true signal component with the framework of Equation (6). Fig. 4 illustrates a multi-scale enhancement and de-noising framework using wavelet transforms. An over-complete dyadic wavelet transform using bi-orthogonal basis is used. Notice that since the DC-cap contains the overall energy distribution, it is usually kept untouched during the procedure. As shown in this figure, thresholding and enhancement functions can be implemented independently from the wavelet filters and easily incorporated into the filter bank framework.

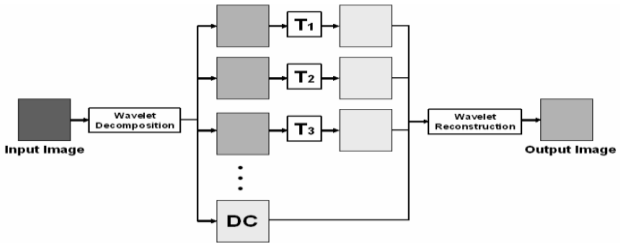

Fig .4. A Multi-scale framework of de-noising and enhancement using discrete dyadic wavelet transform. A three level decomposition was shown.

2.Thresholding operators for de-noising

As a general rule, wavelet coefficients with larger magnitude are correlated with salient features in the image data. In that context, de-noising can be achieved by applying a thresholding operator to the wavelet

coefficients (in the transform domain) followed by reconstruction of the signal to the original image (spatial) domain.

Typical threshold operators for de-noising include hard thresholding

$$\rho_T(x) = \begin{cases} x, if & |x| > T \\ 0, if & |x| \le T \end{cases}; \quad (7)$$

soft thresholding (wavelet shrinkage) {jin_Donoho_1995b}:

$$\rho_T(x) = \begin{cases} x - T, & if \quad x \ge T \\ x + T, & if \quad x \le -T \\ 0, & if \quad |x| < T \end{cases}; \quad (8)$$

and affine(firm) thresholding{jin_Gao_1997}:

$$\rho_T(x) = \begin{cases} x, & if \quad |x| \ge T \\ 2x + T, & if \quad -T \le x \le -T/2 \\ 2x - T, & if \quad T/2 \le x \le T \\ 0, & if \quad |x| < T \end{cases}. \quad (9)$$

The shapes of these thresholding operators are illustrated in Fig 5.

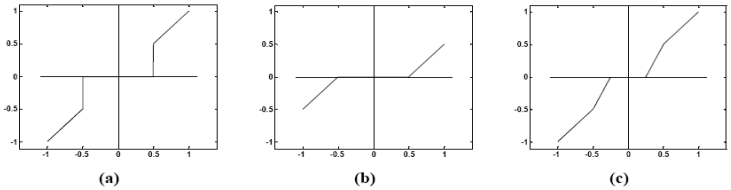

Fig .5. Example of thresholding functions, assuming that the input data was normalized to the range of [-1,1]. (a) Hard thresholding. (b) Soft thresholding. (c) Affine thresholding. The threshold level was set to T=0.5;

3.Image Segmentation Using Wavelets

3.1 Multi-scale Texture Classification and Segmentation

Texture is an important characteristic for analyzing many types of images, including natural scenes and medical images. With the unique property of spatial-frequency localization, wavelet functions provide an ideal representation for texture analysis. Experimental evidence on human and mammalian vision support the notion of spatial-frequency analysis that maximizes a simultaneous localization of energy in both spatial and frequency domain {jin_Beck_1987; jin_Julez_1981; jin_Watson_1983}. These psychophysical and physiological findings lead to several research works on texture-based segmentation methods based on multi-scale analysis. Gabor transform, as suggested by the uncertainty principle, provides an optimal joint resolution in the space-frequency domain. Many early works utilized Gabor transforms for texture characteristics. In {jin_Daugman_1988} an example is given on the use of Gabor coefficient spectral signatures {jin_Daugman_1985} to separate distinct textural regions characterized by different orientations and predominant anisotropic texture moments. Porat and Zeevi proposed in {jin_Porat_1989} six features derived from Gabor coefficients to characterize a local texture component in an image: the dominant localized frequency; the second moment (variance) of the localized frequency; center of gravity; variance of local orientation; local mean intensity; and variance of the intensity level. A simple minimum-distance classifier was used to classify individual textured regions within a single image using these features. Many wavelet-based texture segmentation methods had been investigated thereafter. Most of these methods follow a three-step procedure: multi-scale expansion, feature characterization, and classification. As such, they are usually different from each other from these aspects. Various multi-scale representations have been used for texture analysis. Unser {jin_Unser_1995a} used a redundant wavelet frame.

Laine and Fan {jin_Laine_1993} investigated a wavelet packets representation and extended their research to a redundant wavelet packets frame with Lemarié-Battle filters in {jin_Laine_1996a}. Modulated wavelets were used in {jin_Hsin_1998} for better orientation adaptivity. To further extend the flexibility of the spatial-frequency analysis, a multi-wavelet packets, combining multiple wavelet basis functions at different expansion levels was used in {jin_Wang_2002}. An M-band wavelet expansion, which differs from a dyadic wavelet transform in the fact that each expansion level contains M channels of analysis was used in {jin_Acharyya_2002} to improve orientation selectivity. Quality and accuracy of segmentation ultimately depends on the selection of the characterizing features. A simple feature selection can use the amplitude of the wavelet coefficients {jin_Hsin_1998}. Many multi-scale texture segmentation methods construct the feature

vector from various local statistics of the wavelet coefficients, such as its local variance {jin_Unser_1995a; jin_Wang_2001}, moments {jin_Etemad_1997} or energy signature {jin_Acharyya_2002; jin_Laine_1993; jin_Porter_1996}. Wavelet extrema density (WED), defined as the number of extrema of wavelet coefficients per unit area, was used in {jin_Wang_2002}. In {jin_Laine_1996a}, a 1-D envelope detection was first applied to the wavelet packets coefficients according to their orientation, and a feature vector was constructed as the collection of envelope values for each spatial-frequency component. More sophisticated statistical analysis involving Bayesian analysis and Markov random fields were also used to estimate local and long-range correlations {jin_Choi_2001; jin_Zhang_1998}. For other examples of multi-scale textural features, χ^2 test and histogram testing were used in {jin_Li_2000}, "Roughness" based on fractal dimension measurement was used in {jin_Charalampidis_2002}. Texture-based segmentation is usually achieved by texture classification. Classic classifiers such as the minimum distance classifier {jin_Porat_1989}, are easier to implement when the dimension of the feature vector is small and the groups of samples are well segregated. The most popular classification procedures reported in the literature are the K-mean classifier {jin_Acharyya_2002; jin_Charalampidis_2002; jin_Hsin_1998; jin_Laine_1996a; jin_Porter_1996; jin_Unser_1995a; jin_Wang_2001} and the neural networks classifiers {jin_Daugman_1988; jin_Etemad_1997; jin_Laine_1993; jin_Zhang_1998}.

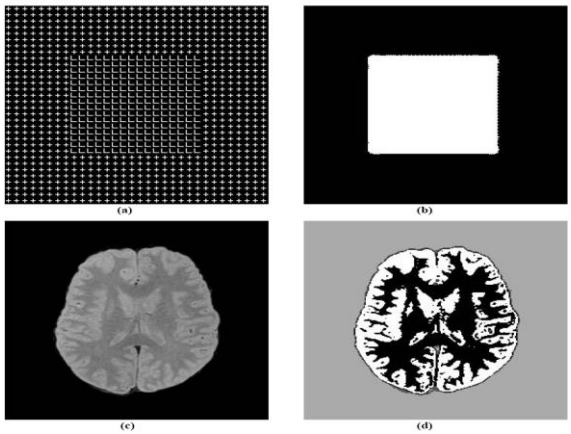

Fig .6. Sample results using multi-scale texture segmentation. (a) Synthetic texture image. (b): segmentation result for image (a) with a 2-class labeling. (c) MRI T1 image of a human brain. (d) segmentation result for image (c) with a 4-class labeling**.**

As an example, we illustrate in Fig. 6 a texture-based segmentation method on both a synthetic texture image and a medical image from a brain MRI data set. The algorithm used for this example from {jin_Laine_1996a} uses the combination of wavelet packets frame with Lemarié-Battle filters, multi-scale envelope features, and a K-mean classifier.

4. Wavelet Edge Detection and Segmentation

Edge detection plays important role in image segmentation. In many cases, boundary delineation is the ultimate goal for an image segmentation and a good edge detector itself can then fulfill the requirement of segmentation. On the other hand, many segmentation techniques require an estimation of object edges for their intialization. For example, with standard gradient-based deformable models, an edge map is used to determine where the deforming interface must stop. In this case, the final result of the segmentation method depends heavily on the accuracy and completeness of the initial edge map. Although many research works have made some efforts to eliminate this type of inter-dependency by introducing non-edge constraints {jin_Chan_2001; jin_Yezzi_1999}, it is necessary and equally important to improve the edge estimation process itself. As pointed out by the pioneer work of Mallat and Zhong {jin_Mallat_1992b}, first or second derivative based wavelet functions can be used for multi-scale edge detection. Most multi-scale edge detectors smooth the input signal at various scales and detect sharp variation locations (edges) from their first or second derivatives. Edge locations are related to the extrema of the first derivative of the signal and the zero crossings of the second derivative of the signal. In {jin_Mallat_1992b}, it was also pointed out that first derivative wavelet functions are more appropriate for edge detection since the magnitude of wavelet modulus represents the relative "strength" of the edges, and therefore enable to differentiate meaningful edges from small fluctuations caused by noise.

Using the first derivative of a smooth function $\theta(x, y)$ as the mother wavelet of a multi scale expansion results in a representation where the two components of wavelet coefficients at a certain scale s are

related to the gradient vector of the input image $f(x,y)$ smoothed by a dilated version of $\theta(x,y)$ at scale s.

$$\begin{pmatrix} W_s^1 f(x,y) \\ W_s^2 f(x,y) \end{pmatrix} = s\bar{\nabla}(f * \theta_s)(x,y). \tag{10}$$

The direction of the gradient vector at a point (x,y) indicates the direction in the image plane along which the directional derivative of f(x,y) has the largest absolute value. Edge points (local maxima) can be detected as points 00(,)xysuch that the modulus of the gradient vector is maximum in the direction towards which the gradient vector points in the image plane. Such computation is closely related to a Canny edge detector {jin_Canny_1986}. Extension to higher dimension is quite straightforward. Fig. 7 provides an example of a multi-scale edge detection method based on a first derivative wavelet function. To further improve the robustness of such multi-scale edge detector, Mallat and Zhong {jin_Mallat_1992b} also investigated the relations between singularity (Lipschitz regularity) and the propagation of multi-scale edges across wavelet scales. In {jin_Aydin_1996}, the dyadic expansion was extended to an M-band expansion to increase directional selectivity. Also, continuous scale representation was used for better adaptation to object sizes {jin_Laine_1997}. Continuity constraints were applied to fully recover a reliable boundary delineation from 2D and 3D cardiac ultrasound in {jin_Laine_1996b} and {jin_Koren_1994}. In {jin_Dima_2002}, both cross-scale edge correlations and spatial continuity were investigated to improve the edge detection in the presence of noise.

Wilson et al. in {jin_Wilson_1992} also suggested that a multi-resolution Markov model can be used to track boundary curves of objects from a multi-scale expansion using a generalized wavelet transform.

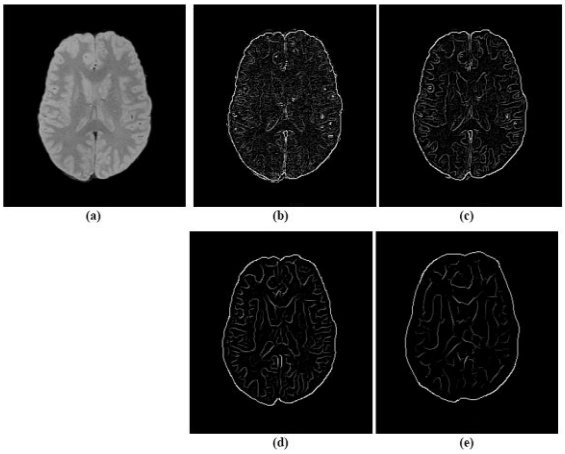

Fig.7. Example of a multi-scale edge detection method finding local maxima of wavelet modulus, with a first-derivative wavelet function. (a) Input image, (b)~(e): Multi-scale edge map at expansion scale 1 to 4.

Given their robustness and natural representation as boundary information within a multi-resolution representation, multi-scale edges have been used in deformable model methods to provide a more reliable constraint on the model deformation {jin_de Rivaz_2000; jin_Sun_2003; jin_Wu_2000; jin_Yoshida_1997}, as an alternative to traditional gradient based edge map. In {jin_Neves_2003}, it was used as a pre-segmentation step in order to find the markers that are used by watershed transform.

IV. Radiographic Image Processing

As in any image analysis application, the first step is a preprocessing step, needed to improve the image by noise removal, contrast improvement, edge enhancement and others [4]. In our application, this step is followed by a contour extraction step, which helps in the arthroplasty parameters' extraction.

1. Image Enhancement

One reason why the automatic interpretation of radiographic images doesn't give accurate results is the fact that the radiographic images are blurred. This is why enhancing images before applying contour detection algorithms is a step that should not be omitted. In the case of our application, the radiographic images are enhanced by noise removal, edge enhancement and contrast improvement. We will detail each method in the following subsections.

2. Noise Removal

A series of methods have been tested in order to choose the best way for noise removal.The first approach was that of using Gaussian filtering, that led to good results. Another interesting approach would be Impulsive Noise removal [15]. The classic linear unsharp masking is an important scheme in feature based image enhancement category, in which a high pass filter scaled version of the original image is added to itself, in order to give more emphasis on the high frequency components. There is a very big possibility that the noise will be amplified along with the detail features of the image. Thus, the main objective of this approach is to separate the noisy and the noise-free images based on a certain threshold. The creators of the method propose the use of a CV (coefficient of variance) based adaptive threshold technique for impulsive noise detection. The main idea is to train a functional link artificial neural network (FLANN) [16] with a single statistical parameter CV as input. The third approach meant for image enhancement is Image Noise removal using Graph Theory Concepts [17]. This method first creates an image graph, based on the original image. There are many possible mappings, but the most intuitive approach is to map each pixel in the image onto a vertex of the graph. This graph will be four-way connected, so that each vertex corresponds to a pixel, and each edge has an associated weight that corresponds to the distance between the color levels of the adjacent vertices. This technique has been tested for impulse noise and for random noise, leading to the conclusion that the proposed method displays good edge and detail preservation, while suppressing impulse and random noise. The chosen method for noise removal was Gaussian Filtering, because of the need for speed in this preprocessing phase.

3.Edge Enhancement

The first method used for edge enhancement was Adaptive Smoothing. This represents a filter that enhances edges, being applied like a matrix filter. The main difference between adaptive smoothing and matrix filter is the fact that the first does not apply weights over the pixel's neighborhood in order to compute its new intensity or color, but uses a gradient. The output obtained by using this gradient consists of both positive and negative intensities, but also emphasized high frequency details. Another method for edge enhancement was the curvelet transform [18]. Curvelet coefficient can be modified in order to enhance edges in an image by y(x) (Velde function). We have chosen the first method because it was faster.

4. Contrast Improvement

The method tried for contrast improvement was histogram equalization that usually increases the global contrast of images, especially when the usable data of images is represented by close contrast values. Peaks in the image histogram (that indicate commonly used grey levels) are widened, while valleys are compressed.

5. Contour Extraction

Most of the contour extraction algorithms which are based on edge detection follow these steps:
- detecting the edge pixels (pixels where the intensity changes abruptly) - eliminating the edge pixels which are not also contour pixels - connecting the contour pixels using local methods (based on the pixels' relations to their neighbor pixels) or global methods (based on global information, for example the shape of a bone, in a computer radiography). After trying a series of methods, the Canny algorithm [5] has been chosen in order to extract the contour lines, because this produced the best results. The Canny algorithm will be briefly described in the following lines. The Canny edge detection algorithm is a very well known algorithm and is considered by many the optimal edge detector. The algorithm is structured into 6 steps: 1) filter out any noise in the original image with the Gaussian filter 2) apply the Sobel operator on the resulting image, estimating the gradient in the horizontal direction (Gx) and in the vertical direction (Gy). The magnitude, or the edge strength is approximated by the sum between Gx and Gy

3) find the edge direction , as the arctangent of Gy/Gx. 4) Once the direction is known, relate the edge direction to a discretized direction (all the angles between 67.5 and 112.5 will be considered to be of 90 degrees, all angles between 112.5 and 157.5 are set to 135 degrees, etc). Fig.8 shows the possible discretized edge directions, previously determined in step 3.

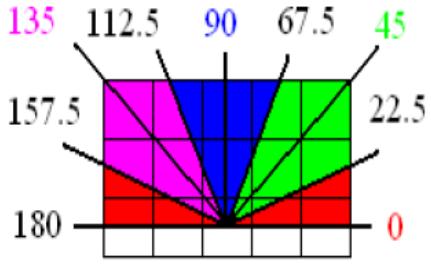

Fig. 8. Gradient direction

5) Non-maximum suppression (trace along the edge in the edge direction and suppress any pixel that is not considered to be an edge - that is not a local maximum) 6) Hysteresis for eliminating streaking, using two thresholds, T1 (high) and T2 (low). Any pixel with a value greater than T1 is considered to be an edge pixel.

After applying the first threshold, any pixels connected to the edge pixels that have a value greater than T2 will also be selected as edge pixels. Usually T1=2*T2. The result of applying the Canny detector is a binary image (Fig. 9), where white pixels represent contour pixels. Having the contour lines of the bones, the next step in our application is the extraction of the important parameters in hip arthroplasty (automatic and semiautomatic extraction). We can observe in Fig. 4 that the contour is disconnected in some parts of the radiography, and that it cannot be reconstructed with accuracy. That is why we propose to search for some salient parameters (for example the lines representing the contour of the femoral body) that can be identified without the previous reconstruction of the entire pelvic and femoral contour. In the following section we will present the methods used after preprocessing the image (with noise removal, edge enhancement, contrast improvement and Canny edge detection), in order to extract the parameters important in arthroplasty.

Fig.9. The image after applying the Canny Edge Detector

V. Conclusions

The research in the field of medical image analysis is a continuous challenge. The need to discover new image analysis algorithms and new automatic learning techniques that would help in computer assisted diagnosis is and will be a topic of interest for researchers.The results of our research, presented in this paper,prove that solutions do exist. Although not all the arthroplasty parameters determined automatically were 100% accurate, the application proved to be very useful to doctors.The fact that the application allows patient's data saving management, during a long period of time after the hip replacement procedure is another plus.This application can be used for a single hospital, or for an entire national/international network of hospitals,integrating other applications of diagnosis or of assisting doctors in planning certain surgeries and following the patients' evolution after the surgeries.

The versatility of these multi-scale transforms make them a suitable tool for several applications in signal and image processing that can benefit from the following advantages: 1. A wavelet transform decomposes a signal to a hierarchy of sub-bands with sequential decrease in resolution. Such expansions are especially useful when a multi-resolution representation is needed. Some image segmentation and registration techniques can benefit from a "coarse to fine" paradigm based on a multi-resolution framework. 2. A signal can be analyzed with a multi-resolution framework into a spatial-frequency representation. By carefully selecting the wavelet function and the space-frequency plane tiling of the transform, distinct components from a noisy observation signal can be easily separated based on their spatial-frequency characteristics. 3. Many important features from an image data can be characterized more efficiently in the spatial-frequency domain. Such feature

characterization was shown to be extremely useful in many applications including registration and data compression. We summarized in this chapter some important applications in medical image processing using wavelet transforms. Noise reduction and enhancement can be easily implemented by combining some very simple linear thresholding techniques with wavelet expansion. Efficient de-noising and enhancement improve image quality for further analysis including segmentation and registration. Feature characteristics in wavelet domain were proven to be potentially more efficient and reliable when compared to spatial analysis only, and therefore provided more effective segmentation and registration algorithms. We point out that many other important applications of multi-resolution wavelet transforms, that were beyond the scope of this book, have not been covered in this chapter, especially image compression, which is considered as one of the greatest achievement of wavelet transform in recent years {jin_Unser_2003b}. Other important applications include tomographic image reconstruction, analysis of functional MRI images (fMRI), and data encoding for MRI acquisition. Despite the great success of multi-resolutions wavelet transform in medical imaging applications for the past twenty years, it continues to be a very active area of research. We list a few resources below that are of interest to readers willing to get more knowledgeable in research and applications in this area.

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Adaptive Search Based On User Tags in Social Networking

Ch.Priyanka[1], Dr. P. Govardhan[2]
[1](Computer Science and Engineering, Vardhaman College of Engineering, India)
[2](Information Technology, Vardhaman College of Engineering, India)

Abstract: *With the popularity of the network and development of multimedia retrieval and relevant technology, the traditional information retrieval techniques do not meet the users' demand. We empirically validate this approach on the social photo-sharing site Flickr, which allows users to annotate images with freely chosen tags and to search for images labeled with a certain tag. In the existing system we are going to use the content based image retrieval methodologies which were not sufficient to retrieve the required image so, we are going to propose a new methodology called as tagging. The results of our study show that it is possible to use social tags to improve the accessibility. We use metadata associated with images tagged with an ambiguous query term to identify topics corresponding to different senses of the term, and then personalize results of image search by displaying to the user only those images that are of his/her interest.*

Keywords*—Tagged image search, Topic model, Image retrieval, Tagging, Reranking.*

I. Introduction

As human beings get image sound and any other information by seeing, hearing, perception and analysis. Human judge similarity of images and sounds according to their semantic contents, for instance the searching for a star's picture is based on his facial characters or other contents. So the retrieval methods based on text or keywords for the digital multimedia apparently can't meet the demand that human being get multimedia information exactly. With more and more multimedia information appear on the Internet and other digital multimedia as well as human beings thirst for exact and fast retrieval, we will go deep into this area in this paper which is based on contents multimedia information retrieval becoming the focus of the academic research, as well as image retrieval of contents is one of the important study aspect of multimedia information retrieval. Rather than simply searching for, and passively consuming information, users of blogs, wikis and social media sites like del.icio.us, Flickr and dig, are creating, evaluating, and distributing information. In the process of using these sites, users are generating not only content that could be of interest to other users, but also a large quantity of metadata in the form of tags and ratings, which can be used to improve Web search and personal.

Previous literature has considered image reranking methods aimed at dealing with noisy metadata with the goal of promoting relevant content to the top ranks. A common strategy is to select a group of relevant images from the original result set, and learn content-based models to select similar images Nevertheless, the increasing size of collections poses an additional challenge, when working at very large scale, and the chances of having too many assets similarly relevant to the original query grow. For instance, querying for "dog" would find thousands of relevant images in typical Web image datasets. Increasingly sophisticated ranking and reranking schemes solely based on relevance can deal with the problem only to a certain extent. When too many relevant resources exist in the dataset, additional parameters need to be considered for ranking search results.

The image retrieval that is based on artificial notes labels images by using text firstly, in fact it has already changed image retrieval into traditional keywords retrieval. There are two problems remain in this method. On the one hand, it brings too heavy workload. On the other hand, it still remains subjectivity and uncertainty. Because the image retrieval that is based on artificial notes still remains insufficiency, the further study that adapts vision image features has been come up and become the main study. The character of this method is image feature extraction impersonally, whether the retrieval is good or not depends on the accuracy of the features extraction. So the research based on vision features is becoming the focus in the academic community. The feature of vision can be classified by semantic hierarchy into middle level feature and low-level feature. Low-level feature includes color, texture and inflexion. Middle level involves shape description and object feature.

II. Framework

In this chapter we focus on tags, although the analysis can be easily expanded to include other types of metadata, including social networks (Lerman et al., 2007). Tags are freely-chosen keywords users associate with content. Tagging was introduced as a means for users to organize their own content in order to facilitate searching and browsing for relevant information. The distinguishing feature of tagging systems is that they use

an uncontrolled vocabulary, and that the user is free to highlight any one of the object's properties. The methods for personalizing results of image search on Flickr.

2.1 Reranking For Aesthetics

This paper studies the impact of aesthetic characteristics of images on the perceived quality of search results by users. To the end, we combine relevance scores obtained by relevance-oriented rank methods with aesthetic quality scores predicted for photographs. We call this combination of relevance and aesthetic scores as ranking aesthetic-aware reranking. Intuitively, relevance and aesthetic quality are orthogonal dimensions and therefore convey complementary information about documents being retrieved. In the simplest case scenario, we can think of aesthetic quality as a way to break relevance score ties to enhance results. In this section, we introduce and describe the main components of the reranking strategy adopted.

Most systems use the query by example approach, where the user selects one or several images, and the system returns the ones judged similar. An alternative way of querying the image database based on content is by allowing the user to sketch the desired image's color/texture layout, thus abstracting himself, the objects searched for. Other more targeted systems allow the user to specify spatial constraints on the dominant objects. All of these methods suffer some-what from the drawback that the system relies on the users abilities and does not adapt to his/her needs.

The personalization method described in this chapter will fail if a user makes a query in a domain in which he/she has not previously expressed any interest. For example, suppose that a child portrait photographer wants to find beautiful mountain scenery. If she has never created tags relating to mountains landscape photography in general, the personalization method described above will fail. However, the Flickr community as a whole has generated a significant amount of data about nature and landscape photography and mountains in particular. Analysis of community-generated data can help the user discover mountain imagery the community has identified as being good. We need algorithms to mine community-generated metadata and knowledge to identify community-specific topics of interest, vocabulary, authorities within the communities and community-vetted content.

When define a new primitive, a function for computing the similarity between two sets of feature data previously extracted must also be supplied by the developer. When comparing two images, for each primitive in the current query combination, a similarity score is computed using the distance function defined within the primitive. These individual scores are combined in an overall score using a set of weights in a way characteristic to the application. This score is then stored in a score structure, which contains also the individual similarity scores for each primitive. This allows a quick recompilation of the overall score for a new set of weights. In recent years, extensive efforts have been focusing on personalized search. Regarding the resources they leveraged, explicit user profile relevance feedback user history data (browsing log click-through data and social annotations context information and social network are exploited. For the implementation there are two primary strategies query refinement and result processing. In the following we review the related work by the strategy they used.

2.2 Automatic Web Image Retrieval

In this module, for each group of Flickr photos, we first construct a group-specific lexicon which contains only the tags of all photos within the same group. for each query tag (*e.g.*"dog"), we exploit the inverted file method to automatically find the positive training web im-ages that are related to the tag "dog" as well as negative training web images which do not contain the tag "dog" in the surrounding texts. Considering the total number of negative training web images (up to millions) is much larger than that of the positive training web images, we randomly sample a fixed number of negative web images and combine them with the positive web images to construct a smaller training set. To reduce the representation size, to facilitate the retrieval process while maintaining translation invariance, an alternative approach is to use an adaptive sampling scheme. Wavelet maxima have been shown to work well in detecting edges which are likely key features in a query. Moreover this method provides flexibility in choosing filters and the size of extracted data. By varying the applied filers, one could control the amount of data to be recorded. We are currently experimenting with this approach and results will be reported soon.

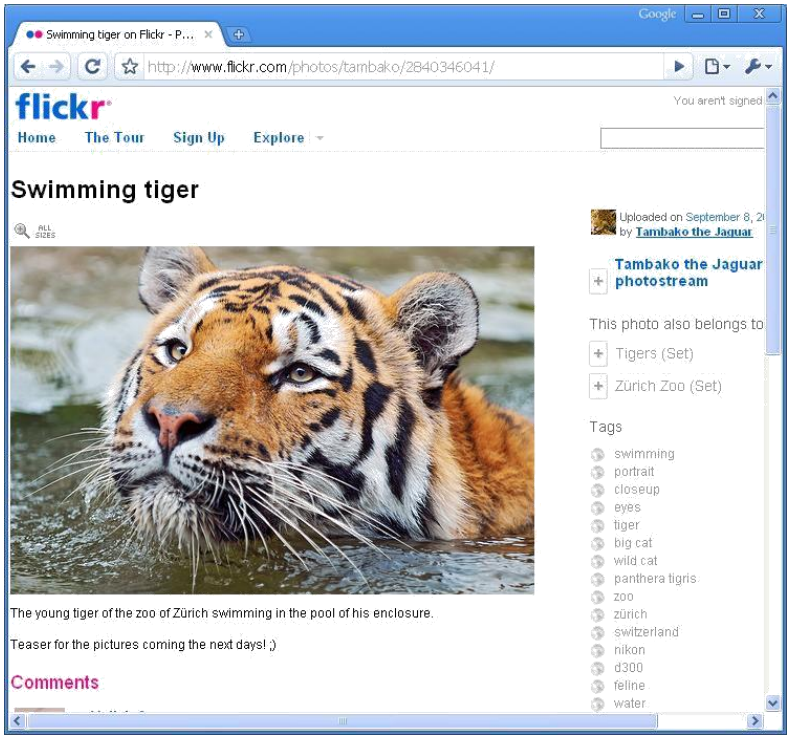

Figure 1: Screen shot of an image page of Flickr user Tambako the Jaguar showing the image and the tags he attached to the image

2.3 Tag-Based Personalization

We outline a probabilistic model that takes advantage of the images' tag and group information to discover latent topics contained in a set of images. If the dataset is a result of a search for images that have been tagged with the query term, the topics correspond to different senses of the query term. The users' interests can similarly be described by collections of tags they used to describe their own images. In the research community of personalized search, evaluation is not an easy task since relevance judgment can only be evaluated by the searchers themselves. The most widely accepted approach is user study where participants are asked to judge the search results. Obviously this approach is very costly. In addition, a common problem for user study is that the results are likely to be biased as the participants know that they are being tested. Another extensively used approach is by user query logs click or-through history However, this needs a large-scale real search logs, which is not available for most of the researchers. Suppose a user is interested in wildlife photography and wants to see images of tigers on Flickr. The user can search for all public images tagged with the keyword "tiger" As of March 2007, such a search returns over 55, 500 results. When images are arranged by their "interestingness," the first page of results contains many images of tigers, but also of a tiger shark, cats, butterfly and a fish. Subsequent pages of search results show, in addition to tigers, children in striped suits, flowers (tiger lily), more cats, Mac OS X (tiger) screenshots, golfing pictures (Tiger Woods), etc. In other words, results include many false positives, images that are irrelevant to what the user had in mind when executing the search.

III. Future Research Directions

In this paper, we have shown that community feedback found in Web based social sharing systems can be used to improve the ranking of image search results. More specifically, we have leveraged user comments about photographs to create a comment-based feature representation of images conveying the opinion, positive or negative, of users about the images. We have used these features for building regression models aimed at Predicting the aesthetic quality of images, using ratings provided by users of the community as ground truth. Finally, we have studied how to combine relevance and aesthetic scores to rerank image search results. Our experiments have shown that context-based representations outperform visual-based in terms of prediction accuracy. We also conducted a user study to determine user satisfaction with aesthetic aware reranking of search results, which revealed a consistent preference of results reranked by the combination of aesthetic and relevance scores.

IV. Conclusion

We presented two methods for personalizing results of image search on Flickr. Both methods rely on the meta-data users create through their everyday activities on Flickr, namely user's contacts and the tags they used for annotating their images. We claim that this information captures user's tastes and preferences in photography and can be used to personalize search results to the individual user. In addition to creating content, users of Web 2.0 sites generate large quantities of metadata, or data about data, that describe their interests, tastes and preferences. These metadata, in the form of tags and social networks, are created mainly to help users organize and manage their own content. Our method relies on metadata created by users through their everyday activities on Flickr, namely the tags they used for annotating their images and the groups to which they submitted these images.

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A Novel Approach for Tracking with Implicit Video Shot Detection

Kiran S[1], Amith Kamath B[2]
[1,2](Master of Technology, Department of Computer Science, NMIT, Bangalore, India)

Abstract: *Video shot detection – Shot change detection is an essential step in video content analysis. The field of Video Shot Detection (VSD) is a well exploited area. In the past, there have been numerous approaches designed to successfully detect shot boundaries for temporal segmentation. Robust Pixel Based Method is used to detect shot changes in a video sequence. Tracking algorithm is a time consuming process due to the large amount of data contained in video using the video shot detection the computational cost can be reduced to a great extent by the discarding the frames which are not of any interest for the tracking algorithm. In this paper we present a novel approach of combining the concepts of Video shot detection and Object tracking using particle filter to give us a efficient Tracking algorithm with implicit shot detection.*
Keywords – *Bhattacharyya distance, Local adaptive threshold, Particle filter, Robust Pixel Difference method, Residual Re-sampling, Shot detection.*

I. INTRODUCTION

The rapid development of storage and multimedia technologies has made the retrieval and processing of videos relatively easy. Temporal segmentation is a fundamental step in video processing, and shot change detection is the most basic way to achieve it. However, while hard cuts (abrupt transitions) can be easily detected by finding changes in a color histogram, gradual transitions such as dissolves, fades, and wipes are hard to locate.

In practice, however, 99% of all edits fall into one of the following four categories hard cuts, fades, wipes and dissolves. Many shot change detection studies focus on finding low-level visual features, e.g., color histograms and edges, and then locate the spots of changes in those features. We focus on using Robust Pixel Method for shot detection. The conventional shot detection method using pixel wise comparison is not very efficient since it doesn't provide noise tolerance and because of its global thresholding nature. Many scenes involving sudden illumination changes such as lighting etc false trigger a shot change in the conventional method. The robust pixel method used in this paper provides threshold for noise and also locally adaptive threshold which makes it effective in situations where the conventional method fails.

Object tracking is an important task in the field of computer vision. It generates the path traced by a specified object by locating its position in each frame of the video sequence. The use of Object tracking is pertinent in many vision applications such as automated surveillance, video indexing, vehicle navigation, motion based recognition, security and defence areas. Occlusion and noise are generally the biggest problems in any target tracking implementation. Tracking algorithms robustness is a measure of how well it continues to track and when it loses its target. Tracking is the observation of person(s) or object(s) on the move and supplying a timely ordered sequence of respective location data to a model under consideration. It is the process of locating a moving human or object over time using a camera. It is based on computer vision. Image registration is the basic step used in tracking application. It is a process that finds the location where a good matching is obtained by matching the template over the searching area of an input image. Registration algorithm fails in complex situations and loses the target in presence of noise, scaling and transformation changes. To address the above mentioned problems, we use a particle filter based tracking method for efficient tracking. Video shot detection and tracking algorithms have both been extensively researched and have been used in real world applications individually. Very less effort has been made to combine the concepts of video shot detection and tracking which can be of great help in real-world as both the technologies complement each other. Combining the two concepts guarantees a computationally quicker, cost effective solution for tracking on large video database with minimal pre-processing. In this paper Section II covers the concepts of Video shot detection using robust pixel difference method and also demonstrates it effectiveness with results. Section III focuses on concepts of tracking algorithm with results. Section IV elaborates the method of combining the two approaches where tracking algorithm is initiated after every shot change hence serving its final purpose of computationally efficient shot detection cum tracking system.

II. VIDEO SHOT DETECTION

1.1 Robust Pixel Method(Rpm)

In Robust Pixel Method, we consider a Metric M, computed for each Video Frame.
Defined as:

$$M(I^K | I^{K-1}) = \frac{1}{HW}\sum_{i,j}\rho_{i,j}^K$$

where Ik and Ik-1 are each pair of consecutive images to be compared. H and W are the image height and width.(i; j) are the coordinates of each one of the pixels in the image.
And ρ is:

$$\rho_{i,j}^K = \begin{cases} 1 & if\ |I_{i,j}^K - \mu^K| > T_n\ \&\ sign(I_{i,j}^K - \mu^K) = sign(I_{i,j}^{K-1} - \mu^{K-1}) \\ -1 & f\ |I_{i,j}^K - \mu^K| > T_n\ \&\ sign(I_{i,j}^K - \mu^K) \neq sign(I_{i,j}^{K-1} - \mu^{K-1}) \\ 0 & otherwise \end{cases}$$

where μk is the mean value of the image Ik, and Tn is a noise threshold (Heuristically set to Tn = 2). Between two consecutive images belonging to the same shot, a large amount of pixels change their values when there is a sudden illumination change. Conventional pixel-based method computes a large difference between and falsely classify the images as a transition or shot change. This limitation is addressed by computing the above mentioned metric M, as all the pixels in an image change the intensity evenly in case of sudden illumination change. Therefore, if the difference between pixel values and the mean of the image is computed, for each one of the two consecutive images, no significant variations occur for pixels. Robustness to sudden illumination changes is achieved by using Metric M for purpose of Shot Change detection. The Noise threshold Tn takes care of any noise distortions in images.

1.2 Locally ADAPTIVE THRESHOLDING

Conventional Pixel difference method uses a Global Threshold value which is computed using the mean and standard deviation of the Pixel Difference values for the entire video, this threshold is often too High (does not detect many shot changes that are actually present in the video) or too Low (Falsely Detects shot changes).In Robust Pixel Method it is necessary to use a locally adaptive threshold value, to overcome false detections, or missed shot changes [5]. Therefore we can consider a window of 20 frames (as not more than 1 shot change occurs in a window of 20 frames) as Tw, for which we adaptively compute a threshold, and detect if there has been a shot change or not. We consider the Value of Metric M for every frame between Ia and Ia+Tw to set the threshold. The two local minimum values of M between Ia and Ia+Tw are identified as M min1 and Mmin2. The shot is classified as a shot Change only if:

$$|M_{\min 1} - M_{\min 2}| > T_{LocalAdaptive}$$

Where T Local Adaptive is heuristically set to 0.3.

1.3 RESULTS

Fig 1. Test Data set to demonstrate the effectiveness of robust pixel method.

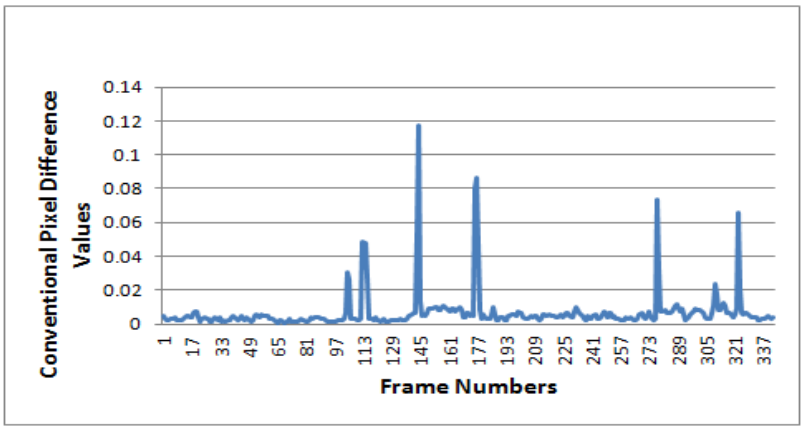

Fig 2. Graph of conventional pixel difference for above test video

Conventional Pixel Difference Method Falsely Detects 7 shots, due to the sudden change of intensity in the video.

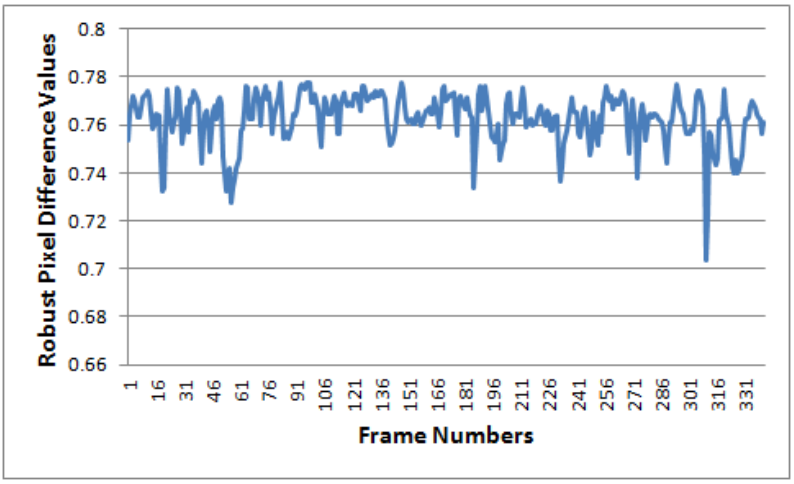

Fig 3. Graph of Robust pixel difference for above test video sequence

Robust Pixel Difference Method does not detect any false shot changes which occur due to sudden change in global illumination. Hence this method is more robust and resistant to sudden intensity changes [6].

III. PARTICLE FILTER BASED TRACKING

Particle filtering has emerged recently in the domain of computer vision. Particle Filter is concerned with the problem of tracking single and multiple objects. It is a hypothesis tracker that is intended to explain certain observations, that approximates the filtered posterior distribution by a set of weighted particles. It weights the particles based on the likelihood score and propagates them according to the motion model used The advantage of particle filter over other types of filters (Kalman, Extended Kalman, etc.) is that it allows for a state space representation of any distribution. It also allows for non-linear, non-Gaussian models and processes.

Particle Filter is concerned with the problem of tracking single or multiple objects. It is a hypothesis tracker that is intended to explain certain observations, that approximates the filtered posterior distribution by a set of weighted particles. It weights the particles based on the likelihood score and propagates them according to the motion model used. Particle filter algorithm is a popular substitute for the Kalman filter in presence of non-Gaussianity of the noise statistics and non-linearity of the relationships between consecutive state. Particle Filter is a promising technique because of its inherent property that cope up with data association problems, account for certain uncertainties, also allows fusion of other algorithms and data.

The algorithm for Particle filter based tracking is shown below.

1.4 STEPS

i. Select the number of samples(particles).
ii. Select the target to track and initiate the start point.
iii. Generate a randomly distributed uniform number of particles around the start point.
iv. Observe the color distribution.

v. Calculate the RGB color distribution from each sample of the set.
vi. Then calculate the Bhattacharyya coefficient for each sample of the set 's'.
vii. Weight each sample.
viii. Resample these samples using residual Re-Sampling.
ix. Iterate these steps.

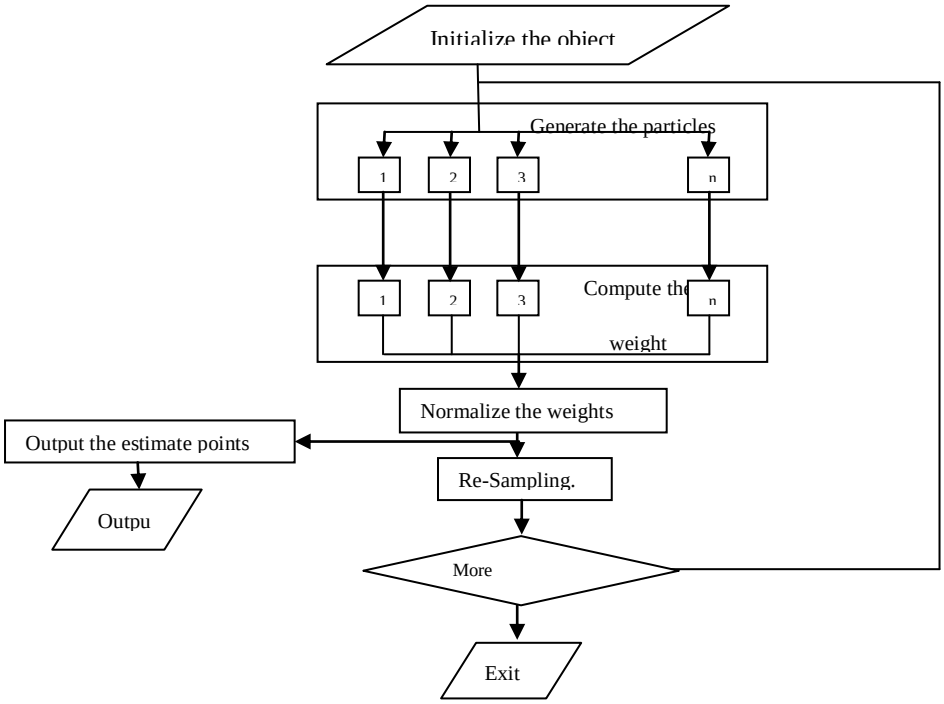

Fig 4. Flowchart of Particle filter based tracking algorithm

The tracking algorithm employs color model based particle filter. It integrates the Color distribution into particle filtering. [3] They are applied as they are robust to partial occlusion, are rotation and scale invariant and computationally efficient. The observation model of particle filter is defined by the Color information of the tracked object. This model is compared to hypotheses of the grey model particle filter using the Bhattachayya coefficient. Color histograms in particular have many advantages for tracking non-rigid objects as they are robust to partial occlusion, are rotation and scale invariant and are calculated efficiently. A target model is tracked using particle filter by comparing its histogram with the histograms of the sample positions using the Bhattacharyya distance and further Re-Sampling them. A complete segmentation of the image is not required as the image content only needs to be evaluated at the sample positions. We apply such a particle filter in a color-based context. To achieve robustness against non-rigidity, rotation and partial occlusion we focus on color distributions as target models. These are represented by histograms which are produced with the function h(xi), that assigns one of the m-bins to a given color at location (xi). The histograms are typically calculated in the RGB space using 8x8x8 bins. To weight the sample set, the Bhattacharyya coefficient has to be computed between the target distribution and distribution of hypotheses in RGB color space. Bhattacharyya coefficient or the Bhattacharyya distance [1], measure the similarity of two continuous probability distributions. The coefficient can be used to determine the relative closeness of the two samples being considered.

$$d(H_1, H_2) = \sqrt{1 - \frac{1}{\sqrt{\bar{H}_1 \bar{H}_2 N^2}} \sum_{I} \sqrt{H_1(I) \cdot H_2(I)}}$$

Eqn 1: Bhattacharyya distance measure

The measurement process is based on histogram similarity: the target histogram is compared with that of other candidate patches extracted from last captured frame and the most similar one is chosen. The similarity measure is directly computed over the entire sample point sets. The affinities between all pairs of sample points are considered based on their distances. We can compute the similarity measure between target model and candidate model by applying distance measure methods. The value obtained from the distance measure for every particle set is called the score. They are used to represent and predict the next match point. The particles

set are to be re-sampled to select and re-generate the particles around the target location to keep the tracking process intact. This avoids particle degeneracy. Residual re-sampling method is used in our algorithm [2].
The algorithm for Residual Re-Sampling is shown below
Input: Match Values, Score points
Output: Re-sampled particles

1.5 STEPS FOR RESIDUAL RE-SAMPLING

i. Calculate the sum of scores and select the maximum score.
ii. Select the index of the particle with maximum score.
iii. Normalize all the weights of the particles to the sum of scores.
iv. Initialize the Index with Integer part.
v. Select only the particles with particles greater than 1.
vi. Generate random particles around the particle with maximum score with existing particles.

The above steps[2] give only those selected particles that assist to predict the object in further frames. The particles will be re-generated at each frame for prediction. After re-sampling step the algorithm again runs observation part calculates scores and re-samples them. These steps run iteratively. Even when re-sampling steps is in progress at some time few particles having low weights tends to be discarded hence to maintain the number of particles, the remaining number of particles that are discarded has to be randomly re-generated.

1.6 RESULTS

Below shown are the results of particle filter based tracking algorithm that uses HSV color model to show is insensitivity to light changes taken in an indoor environment with illumination changes, it uses remainder re-sampling for regeneration of particles. The algorithm provides satisfactory results and is test for videos that has various light changes, scaling and rotation.

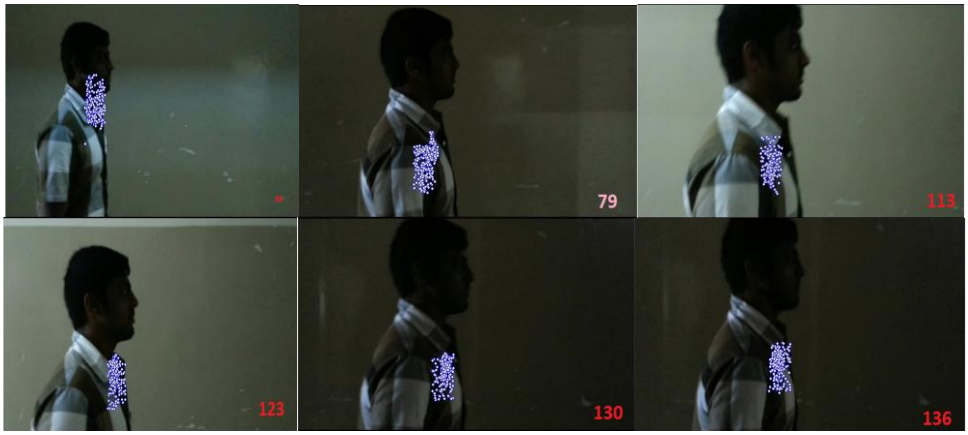

Fig 5. Output of Particle Filter based tracking algorithm on the sequence of video frames with illumination changes.

IV. COMBINING OF VIDEO SHOT DETECTION AND TRACKING ALGORITHM

This section elaborates combining methodology of shot detection along with tracking. The proposed model acts at two levels. The first level is Video Shot Detection, where a huge video is temporally segmented into individual shots based on the algorithm described in Section II. The second level is particle filter based tracking in the video sequence as described in Section III. Upon each occurrence of a shot change the Video shot detection algorithm is interrupted and the tracking algorithm is triggered for initiation. On initiation, the object to be tracked has to be selected manually by a mouse where the position of the object is fed to the algorithm. If the tracking algorithm is not initiated then shot detection algorithm continues until it finds the next shot change. The tracking algorithm, whenever active, runs in phase with video shot detection algorithm, the detection of next shot change terminates the tracking algorithm. The algorithm again prompts the user for a valid input either to initiate the tracking algorithm or continue the shot detection algorithm at the occurrence of next shot change. Tracking algorithm will start from the video frame that is fed by shot detection algorithm at a shot change. It will continue tracking the selected object until the algorithm is interrupted for termination. In a large video data such as unedited footage of CCTV surveillance etc, this approach guarantees reduction of pre-processing time by directly presenting the tracking algorithm, the initial frame from which tracking can be initiated. As tracking algorithm has high computational demand, this approach greatly reduces the

computational complexity by discarding unwanted frames and triggering tracking algorithm only when necessary.

4.1 Proposed Method

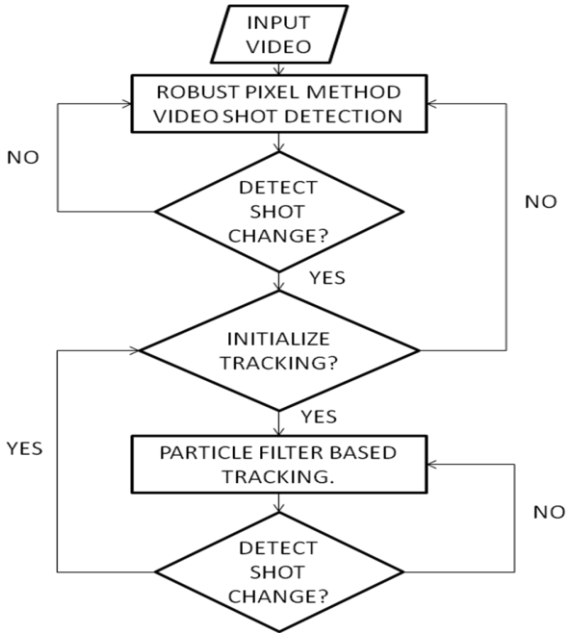

Fig 6. Flowchart showing the methodology for combining Video shot detection and tracking.

V. EXPERIMENTAL RESULTS

Fig 7.

In fig 7 in a transition from frame 316 to frame 317 a shot change has been detected and the user is prompted for input to initiate the tracking algorithm when the user initializes the object, the particle filter algorithm tracks the object continuously until the next shot change is detected. In this phase the Video shot detection algorithm will work in phase with the tracking to detect every possible shot change. It is also observed that tracking and video shot detection continues positively without losing the target and false shot detection respectively even in presence of illumination changes. When the algorithm encounters frame 523 a new shot has been detected and the tracking algorithm is asked for a decision whether to re-initiate the tracking or to terminate it. On termination the video continues with shot detection algorithm to find the next change in shot.

VI. CONCLUSION

Tracking with implicit shot detection algorithm provides an efficient framework for temporal segmentation and tracking in huge videos. It reduces data computational complexity to a great extent. In our methods we have observed the merits of video shot detection using robust pixel method that is insensitive to light sources or sudden illumination changes and its locally adaptive thresholding adds additional adaptability to the approach. Particle filter based tracking is an promising technique in various situation and also is insensitive to illumination changes and scaling. The advantages of both the methods makes it possible to integrate them together to provide real-time applicable system which automatically detect shot change and also gives a chance to track the objects of interest.

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Universal Artificial Intelligence for Intelligent Agents: An Approach to Super Intelligent Agents

Sushil Kumar Singh[1], Prof. Ashish Kumar Srivastava[2], Prof. Sitendra Tamrakar[3]
[1](*M. Tech. 4th Sem., Computer Science & Engineering, NRI Institute of Information Science & Technology, Bhopal, (M. P.), India)*
[2](*Asst. Prof., CSE Deptt., NRI Institute of Information Science & Technology, Bhopal, (M. P.), India)*
[3](*Asst. Prof., CSE Deptt., NRI Institute of Information Science & Technology, Bhopal, (M. P.), India)*

Abstract: *Human beings have the real intelligence. The intelligence triggers new thoughts in mind. Human thoughts so many things but he may take long times to solve a complex problem. If he builds such a system which work as like human intelligence, then the time taken to solve the complex problem may be very less. In this case he provides the Artificial Intelligence (AI) to the system. Artificial intelligence based system has the ability to mimic the functions of the human brain. An intelligent agent works on behalf of man. What will happen if send the intelligent agent in new environment? It can work properly or not properly in the new environment. If we provide such intelligence to the agent that it works proper in the new environment without changing their set of rules. Such type of intelligence generally known as Universal Artificial Intelligence (UAI). This paper suggests an idea to build such an intelligent agent that attempts to take the right decision in the new environment. Here we will use the neuro-fuzzy system to provide the more intelligence to agent and this agent can take right decision with learning capability in new environment. If an agent has more intelligence than other agent we can call it super intelligent agent. This paper also shows the simulation of intelligent agent to avoid obstacle in new environment. This simulated intelligent agent shows the good result as compared to existing work.*

Keywords- *Universal Artificial Intelligence, Hidden Markov Model, Neuro-Fuzzy Systems*

I. Introduction

The main objective is concerns with the behavior of intelligent agents in new environments. How these intelligent agents react in the new environments? Here we try to provide the Universal Artificial Intelligence for intelligent agent i.e. it will work properly in unknown computable environments. Universal Artificial Intelligence based system will work anywhere without changing the rules of that system. Here the Universal Artificial Intelligence based intelligent agent will adept the new environment which are unknown for it and will try to perform the best action for that environment. Here the concept is to make an agent more intelligent i.e. the working of agents just like the best human brain. Such an agent is generally called as a Super Intelligent agent. A super intelligence is associate in nursing intellect that immensely outperforms the simplest human brain in much each field, as well as scientific creative thinking, general knowledge, and social skills. The following basic terms which are the main building blocks for the proposed methodology are as follows:

1.1 Universal Artificial Intelligence

Universal artificial intelligence provides the technologies that can drive a car, fly an airplane, play chess, play basketball, or do any human task - no human beings are required to modify the environment of the artificial intelligence rules or change the machine learning algorithm. The foundations of universal intelligence initiate to the origins of philosophy and inductive intellection. Universal engineering correct started with the work of Ray J. Solomonoff at intervals the 1960's. Solomonoff was considering the matter of predicting binary sequences and what he discovered was a formulation for associate inductive mentation system which may be tested to actually apace learn to optimally predict any sequence that features a estimated chance distribution. Not alone is that this theory astonishingly powerful, it put together brings on and elegantly formalizes key philosophical principles behind inductive intellection.

1.2 Hidden Markov Model (HMM)

A hidden markov model is AN augmentation of the Markov chain to incorporate observations. A bit like the state transition of the Markov chain, a hidden markov model conjointly includes observations of the state. These observations is also partial in this totally different states can map to an analogous observation and abuzz in that an analogous state can stochastically map to different observations at different times. The assumptions behind a hidden markov model area unit that the state at time t+1 solely depends on the state at time t, as within the Markov chain. The observation at time t alone depends on the state at time t. The

observations square measure sculptured practice the variable Ot for each time t whose domain is that the set of potential observations. The concept network illustration of associate within the hidden markov model is represented in one. The concept network is shown for four stages, it'll proceed indefinitely.

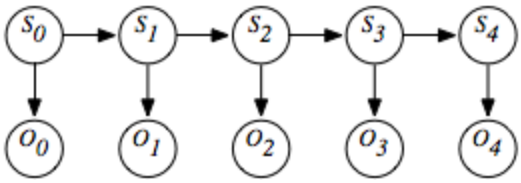

Fig. 1. A Hidden Markov Model as a belief network

A stationary hidden markov model includes the subsequent chance distributions:

- P(S0) specifies initial conditions
- P(St+1|St) specifies the dynamics
- P(Ot|St) specifies the device model

There area unit variety of tasks that area unit common for hidden markov model. The problem of filtering or belief-state observance is to work out the present state supported the present and former observations, particularly to work out,

P(Si|O0,...,Oi).

Note that every one state and observation variables once Si area unit extraneous as a result of they're not discovered and might be unnoticed once this conditional distribution is computed. The matter of smoothing is to work out state supported past and future observations. Let an agent has observed up to time k and wants to determine the state at time i for i<k; the smoothing problem is to determine
$P(S_i|O_0,...,O_k)$.
All of the variables S_i and V_i for i>k can be ignored.

1.3 Neuro-Fuzzy System

A neuro-fuzzy system could be a fuzzy system that uses a learning algorithmic rule derived from or galvanized by neural network theory to work out its parameters (fuzzy sets and fuzzy rules) by process knowledge samples. Neuro-Fuzzy System combines the benefits of Fuzzy Inference System (FIS) and Artificial Neural Network (ANN), thus it's thought-about as powerful approach in space of Hybrid Intelligent systems to handle complicated real time issues with success. It's like neural net-work with equivalent practicality of fuzzy abstract thought system as a result of it's ability to mix the parallel learning and computation skills of neural network with information illustration and clarification like humans of fuzzy model. This approach will increase the transparency of neural network with infusion of learning capability in fuzzy models.
The neuro fuzzy system is the example of hybrid systems. Hybrid systems are designed as a mix of machine systems and real-world physical components. The machine components are often seen united or additional embedded computers connected by a network and interacting with the physical world via sensors and actuators, with management engineering techniques serving to to coordinate this set-up. The machine a part of the system is so full of the real-world physical part; furthermore, it's to wear down the period properties of the physical world.

II. Literature Survey

A research paper in 2001 uses a neuro-fuzzy approach to avoid the obstacle for a mobile robot. Here the approach is able to extract automatically the fuzzy rules and the membership functions in order to guide a mobile robot. The proposed neuro-fuzzy strategy consists of a three-layer neural network along with a competitive learning algorithm. This system has been implemented in simulation obtaining satisfactory results.

A research paper in 2005 uses the hidden markov model for recognition of human motion. A new approach for calculating transition and emission matrices was introduced. Here the observation symbols with fuzzy measurement may be applied in the stochastic model to calculate the real motion primitive sequence. The approach was applied to the human wrist motion to identify the sequence of motion, and the results show that the proposed algorithm has a performance superior to normal hidden markov model when applied to detection of them human wrist motion.

In 2007 a research paper describes the methodology for building the multiagent systems for achieving fault tolerant control system in industry. It uses the concept of fuzzy logic for making the decision. The

intelligent agents are able to monitor and make diagnosis of possible problems in the process if it uses the concept of fuzzy logic.

III. Proposed Methodology

Our proposed methodology is an attempt to provide universal artificial intelligence to agent which can work proper in new environment. Fig. 2 is the schematic diagram of our proposed methodology. It consists the following terms:

- **Environment-** that the agent occupies, the states that this setting may be in
- **Sensors-** senses the environment and generate the sensed states/objects
- **Hidden Markov Model-** generates the sequences or model of sensed states/objects. It also shows the steady states for the dynamic environment

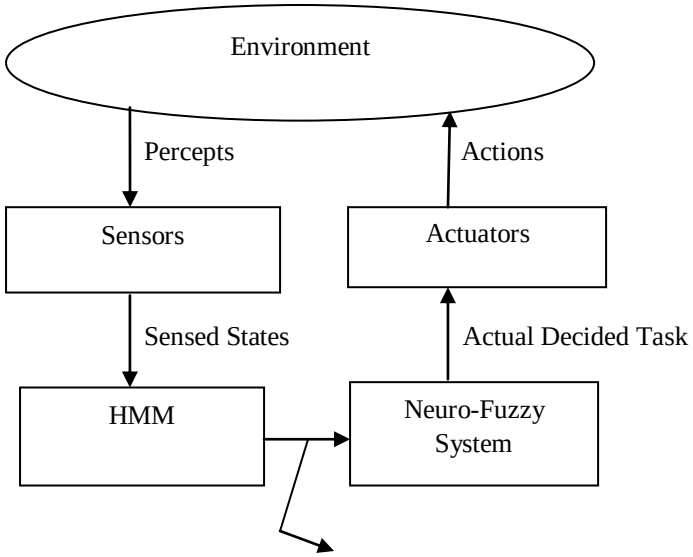

Fig. 2 Proposed model for intelligent agent

- **Training and Decision based on Hybrid System (Neuro-Fuzzy System)-** generates the actual decided task which are based on training and decision making calculated by hybrid system (neuro-fuzzy system)
- **Actuators-** used for performing the action upon the environment

When an agent interact with new environment than it percepts the new environment through sensor it generates the sensed states. The sensed states may be obstacles in front of agent, colors, temperature, other agents, voice etc. The hidden markov model generates the sequences of states with observation. After generating the states the agent make necessary decision and take action upon environment through actuators. The decision and actions are based on hybrid system. Here the neuro-fuzzy system is used in proposed model. A neuro-fuzzy system can be viewed as a three layer neural network. First layer for input variable, the second (hidden) layer for fuzzy rules and third layer for output variable.

IV. Result Analysis

Here is the simulation of intelligent agent to avoid obstacle in new environment using the proposed methodology. The basic concept is that the agent will sensed the states (obstacle) in new environment and making appropriate angle it will avoid the obstacle.

4.1 Observations of states using Hidden Markov Model

After sensing the obstacle through sensors, the hidden markov model generates the sequences of states (obstacles). The fig. 3. Shows the result of observations for hidden markov model.

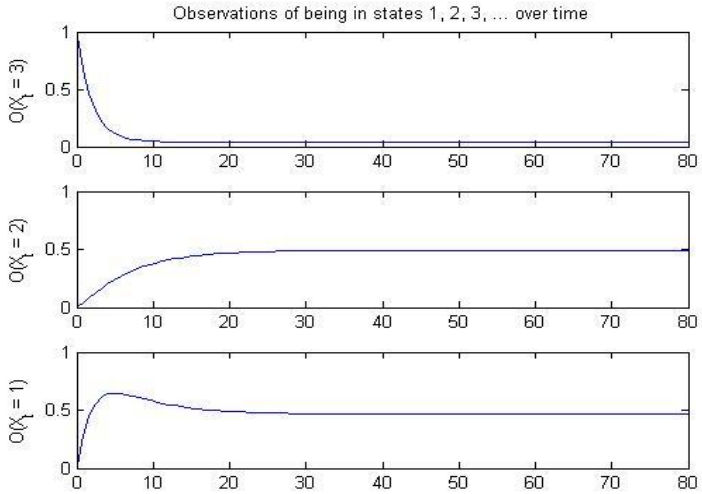

Fig. 3. Observation Result of hidden markov model

4.2 Add the Fuzzy Rules to Making Appropriate Angle for Avoiding Obstacle

The agent encompasses a detector which will notice the gap from objects. Detector knowledge provides the indication of a distance from associate degree object, we are able to apply the mathematical logic on those knowledge to get the escaping angle at rational position. Fuzzy may be a smart approach to issues that involve uncertainty, angle management to flee obstacle, rate management, and vision system. Groups of people create choices supported rules. Even if, we tend to might not remember of it, all the selections we tend to create area unit supported laptop like if-then statements. Mathematical logic incorporates an easy, rule-based IF X AND Y THEN Z approach to a resolution management drawback instead of trying to model a system mathematically.
Fig. 4 shows the FIS in agent and Fig. 5 shows the input parameters in agent.

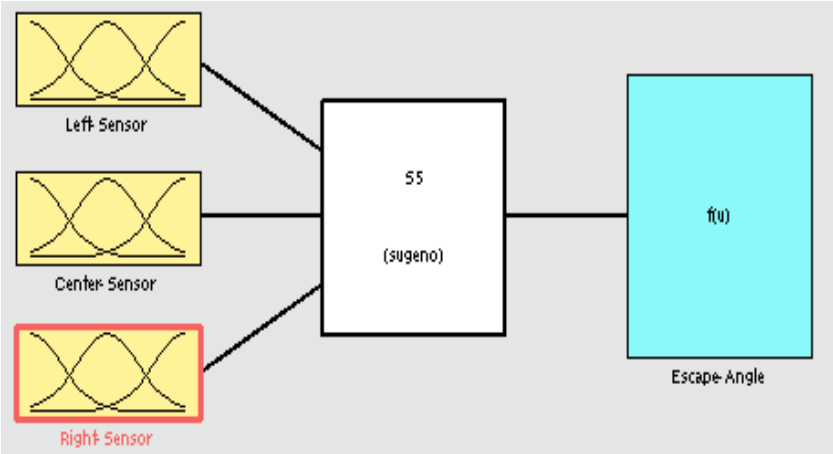

Fig. 4 FIS in Agent

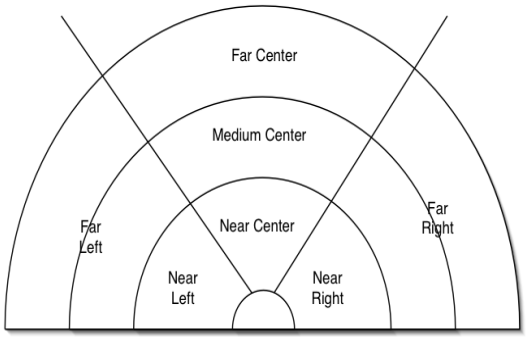

Fig. 5 Input parameters in agent: Left, Right and Center

The fuzzy variables on input parameters in agent are: close to and much on Left and Right parameters, and near, middle and much for Center parameter. The agent has seven fuzzy rules as below:

1. IF right is far and center is near and left is near THEN angle is RRR.
2. IF right is near and center is near and left is far THEN angel is LLL.
3. IF right is far and center is medium and left is near THEN angle is RR.
4. IF right is near and center is medium and left is far THEN angle is LL.
5. IF right is far and center is far and left is near THEN angle is R.
6. IF right is near and center is far and left is far THEN angel is L.
7. IF right is far and center is far and left is far THEN angle is straight.

Fig. 6 shows the result in MATLAB and fig.

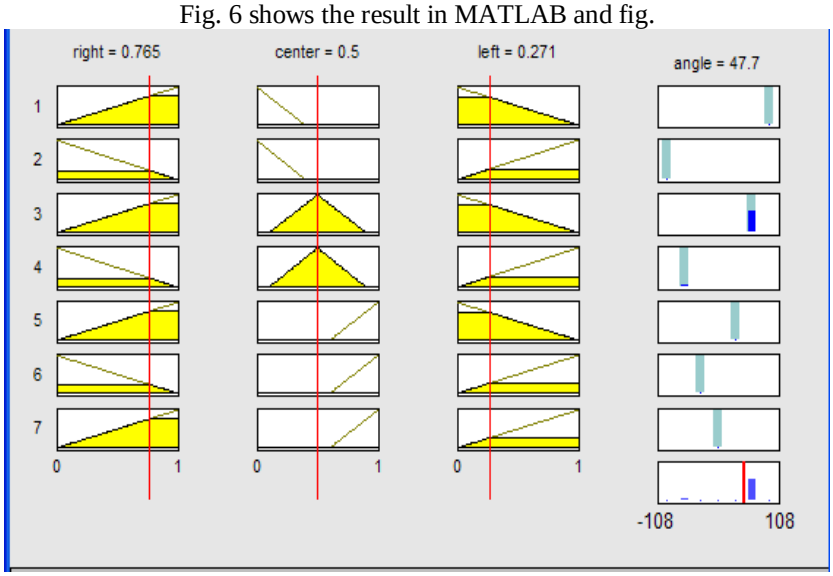

Fig. 6 Result in MATLAB

4.3 Comparison with existing work and Proposed Methodology

The table 1 shows the comparison with existing work and the proposed methodology which are differ in some factors.

Table 1. Comparison Table for Existing Work and Proposed Methodology

S. No.	Factors	Existing Work	Proposed Methodology
1.	Working Capability	Based on fixed commands	Based on rules
2.	Decision Making Power	Has no decision making power	Has good decision making power
3.	Learning Capability	Has no learning capability	Has good learning capability
4.	Updating Capability	Has no updating capability	Has updating capability
5.	Efficiency	Average	Very good

4.4 Discussion

We think that increase the quantity of input variables and membership functions will build the result additional correct. However, we should always not forget that fuzzy inference system should be easy and simple to grasp. Will increase the quantity of variables additionally will increase the quality of fuzzy inference system.

V. Conclusion

Mostly intelligent agents work properly which are designed for the known environment. The inbuilt functions are designed for these agents, on the basis they work. Although the intelligent agents work on behalf of man. Suppose we design an intelligent agent for the earth and it contain the features which will proper work for earth and sudden we send it at the other space then how it will react? Imagine! Will it work properly or not? So here this paper tries to build such an intelligent agent which will work for new environment. If it will success then it may solve many complex problems. We can apply the same concepts for the autonomous taxi driver and this autonomous taxi will work for different countries where each country has their own rules for driving i. e. the

new environments for the taxi. Then this taxi will self learn for unknown environment and then it will take the appropriate action for performing the task. Here we simulate the intelligent agent to avoid obstacle in new environment. Based on the same concept we can simulate other intelligent agent for other task for a new environment and it will show the good result as compared to existing work.

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User Priority Based Search on Organizing User Search Histories with Security

Gogula. Vijay Kumar[1], A. Krishna Chaitanya[2]
[1] *M.Tech (CSE), Vardhaman College of Engineering, Hyd, A.P, INDIA*
[2] *Associate Professor in IT Dept, Vardhaman College of Engineering, Hyd, A.P, INDIA*

Abstract: *Presently, users are facing many complicated and complex task-oriented goals on the search engine. Those are managing finances, making travel arrangements or any other planning and purchases. To reduce this problem, usually break down the tasks into a few codependent steps and issuing multiple queries, and which store repeatedly over a long period of time, whatever the user search in the search engine, that information search engines keep track of their queries and clicks while search in the search engine or online. In this paper we become skilled at the complexity of organizing user's historical queries into in an active and expected manner. Automatic identifying query groups are compassionate for the number of different search engines, deals with applications. Those are result status, query suggestions, query alterations. In this we are proposing security for the related query groups. When we work in the single or any organization, security will provides the security for the user's data or information in the search engine or any data base.*

Keywords *- User history, search history, query clustering, query reformulation, click graph, task recognition, security.*

I. Introduction

Now a days we have large information or data in the web, but we have some complex problems while searching in the online for the required data.whn the user enter a query in the search engine , then the user may or may not get the required information within the short time and minimum clicks. Various studies on query logs like, Yahoo's and AltaVista's has reveal that only 20-30 percent of queries are navigational[1]. That is since user's now pursuing broader information and task leaning goals, such as arranging for outlook tour, organization their assets, scheduling and their obtain decisions. The searching will start by entering a keyword in the search engine. A complicated task such as travel scheduling has to be broken down into a number of codependent steps over a period of time. User may primary search on probable destinations, time lines, proceedings, etc., and then the user may search for most proper planning for rental cars, air tickets, temporary housing and meals etc. Each step requires one or more queries, and each query results in one or more clicks on related pages.

To decrease the trouble on the user's while searching in the search engine. Some of major search engines introduced a new "Search History" feature. Which helps to the users during their complex search quests online is the capability to identify group related queries together, which allows the user's to track their online searches by recording their queries and clicks. For example, user interested to search some queries in the online, that queries will be stored in the search history, which helps to the users to make sense and keep track of queries and clicks in the search history[2]. This query grouping allows the users to better understanding which the user searched before. For example, if the user searched for a query that already in the history log, then that will be displayed in the related query group, by which the user can select required query from the query group. The query group consists of correlated queries, and it will show only significant query as an alternative of Wikipedia.

In this paper we study the problem of organizing a user's search history into a set of query groups in an automated and dynamic fashion. Every query group is a group of queries by the similar user that are related to each other. And the user searched for new query groups may be created over time. In particular, we develop an online query grouping method over the query fusion graph that combines a probabilistic query reformulation graph[3], which captures the relationship between queries frequently issued together by the user's, and query click graph, which captures the relationship between queries and clicks on similar URLs.

Time	Query
01:05:33	Crick info
01:06:21	Hotel
01:10:42	Bangalore
01:12:44	Ipl
01:22:55	Taj banjara hotel
01:45:12	Eenadu

01:56:33	Sitara hotel
02:02:33	Live score
02:05:22	Vaartha
02:06:34	Cricket
02:12:22	Madhura hotel
02:35:34	Hyderabad
03:05:22	Chennai
03:12:23	sakshi
04:34:44	Mumbai

Fig (a): Users search history

Group 1	Group 2	Group 3
Hotels	Cric info	Bangalore
Taj banjara	Ipl	Chennai
Sitara hotel	Cricket	Hyderabad
Madhura hotel	Live score	Mumbai

Fig (b): Search history of a user's one day together with query groups

II. Preliminary Results

2.1 Objectives

Our major objective is organizing a user's search history into correlated query groups automatically, which consists of one or more related queries and their correlated clicks.

Select Best Query Group

Input:

1) The current singleton query group s_c containing query q_c and set of clicks clk_s
2) A set of existing query groups S={s1……,sm}
3) A similarity threshold T_{sim}, 0<_T_{sim}<_1

Output:

The query group s that best matches s_c, or a new one if necessary

(0) S= ϕ
(1) $T_{max}=T_{sim}$
(2) For i=1 to m
(3) If $sim(s_c,s_i)>t_{max}$
(4) $S=s_i$
(5) $T_{max}= sim(s_c,s_i)$
(6) If s= ϕ
(7) S=s s_c
(8) $S=s_c$
(9) Return s

Fig: Algorithm for query group

2.2 Dynamic Query Grouping

In which, identification of user's search history into a related query group and then merge these query groups in an iterative fashion, there will not be any undesirable effect of changing a user's existing query group. So that, which involves high-computational cost for every new query, so it is not possible to create single group to every new query entered by the user. When the user enter a query in the search engine, we first place the current query and clicks into a singleton query group $S_c= \{q_c,clk_c\}$, and then we compare with existing query group s_i within a user's history[4]. If there is an existing query group sufficiently relevant to S_c. If so, we merge with the S_c with the query group S having highest similarity T_{max} above or equal to the threshold T_{sim}, otherwise we keep S_c as a new singleton query group and insert it into S.

III. Query Relevance

If the user entered an existing query in the search engine, that is the query relevant and appear close to each other in time in the user's history, in that situation we define time-based relevance metric as follows,

3.1 Query Import Ants

(3.1.1) Time

$$Sim_{time}(S_c,S_i) = \frac{1}{|time(q_c) - time(q_i)|}$$

Where, $sim_{time}(S_c,S_i)$ is defined as the inverse of the time interval between the times

(3.1.2) Jacquards

If the query group textually similar then we use jaccard similarity, as follows,

$$Sim_{jaccard}(S_c,S_i) = \frac{|words(q_c) \cap words(q_i)|}{|words(q_c) \cup words(q_i)|}$$

$Sim_{jaccard}(S_c,S_i)$ is defined as the fraction of common words between q_c and q_i

Above two time-based and text-based relevance metrics may work well in some cases, but they cannot capture query similarity. If the user is multitasking means, more than one tab opens in his browser. Then we can follow the co-retrieval method as follows,

(3.1.3) Co-Retrieval

$$Sim_{cor}(S_c,S_i) = \frac{|retrieved(q_c) \cap retrieved(q_i)|}{|retrieved(q_c) \cup retrieved(q_i)|}$$

$Sim_{cor}(S_c,S_i)$ is defined set of retrieved pages retrieved (q_c) and (q_i)

3.2 Query Relevance Using Search Logs

Let us know about, how to define the query relevance based on web search logs, means that relevance is aimed at capturing two important properties of relevant queries. Let us know how we can use these graphs to calculate query weight and how we can integrate the click.

Search behavior graphs:

Three types of graphs from the search logs of a commercial search engine. They are

(3.2.1) Query reformulation graph (QRG)

This represents, the correlation between a pair of queries that possible reformulation of each other.

Query reformulation graph, is one way to identify relevant queries that are typically found within the query logs of a search engine. If two queries that are issued repeatedly by the several users happen repeatedly, then they are likely to reformulations of each other[5]. Sim_{time} is a time based metric between two queries and which makes use of the distance between the time stamps of the queries within the users search history. Based on the query logs, we create the query reformulation graph, QRG = $(v_{Q,} \sum_{QR})$ and set of edges $\sum_{QR.}$ Every pair (q_i,q_j), where q_i is issued before q_j and we count number of such occurrences across all users daily activities, denotes $count_r$ (q_i,q_j). If the two pairs are not relevant[6], then we filter out infrequent pairs and include only the query pairs whose counts exceed a threshold value, Tr. For each (q_i,q_j) with $count_r$ (q_i,q_j) >_ Tr, we add a direct edge from q_i to q_j to $\sum_{QR,}$ the edge weight w_r (q_i,q_j),

$$w_r(q_i,q_j) := \frac{count_r(q_i,q_j)}{\sum_{q_i,q_k \in \sum QR} count_r(q_i,q_j)}$$

(3.2.2) Query click graph (QCG)

This represents the correlation between two queries repeatedly lead to clicks on related URLs.

One way to capture relevant queries from the search logs are to be consider queries that are likely to induce users to click frequently on the same set of URLs. First start by considering a bipartite click through graph, CG = (V_q V_u , $\sum_c$) used by fuxman. CG has two different set of nodes related to queries, V_q, and URLs, $V_{u,}$ extracted from the click logs[7]. The edge $(q_i.u_k) \in \sum_{c,}$ if query q_i was issued and URL u_k was clicked by the users. We weight each edge $(q_{i,} u_k)$ by number of times q_i was issued and u_k was clicked, $count_c$ $(q_{i,} u_k)$. the weight edge (q_i,q_j) in QCG, w_c (q_i,q_j) is defined as follows,

$$W_c(q_i,q_j) := \frac{\sum_{u_k} \min(count_c(q_i,u_k), count_c(q_c,u_k))}{\sum_{u_k} count_c(q_i,u_k)}$$

(3.2.3) Query fusion graph (QFG)

This merges the queries in the earlier two graphs. These three graphs have the same set of vertices V_Q, but those edges are defined differently.

We combine both the query reformulation graph and query click graph within QRG and query click information $\sum_{QF}$ the weight of edge(q_i,q_j) in

within QCG into a single graph QFG = (v_q ,) that we refer as the fusion graph.
QRG, $w_f(q_i,q_j)$ and taken to be a linear sum of the edge weights, $w_r(q_i,q_j)$ in E_{QR} and $w_c(q_i,q_j)$ in E_{QC}, as follows:

$$w_f(q_i,q_j) = \alpha * w_r(q_i,q_j) + (1-\alpha) * w_c(q_i,q_j)$$

The relative contribution of the two weights is controlled by[7] α , and we denote a query fusion graph constructed with a particular value of α as QFG (α).

Algorithm for calculate the query relevance
Input:

(1) Query fision graph , QFG
(2) The jump vector, g
(3) The damping factor, d
(4) Total number of random walks, numRWs
(5) The size of neighbourhood, maxHops
(6) The given query, q

Output:

(0) Initialize rel $_q^F$ =0
(1) Numwalks=0; numvisit=0
(2) While numwalks<numRWs
(3) numHops=0;v=q
(4) while v ≠ NULL ∩ numHops < maxHops
(5) numHops ++
(6) rel $_q^F$ (v)++; numvisits++
(7) v=selectnext node to visit(v)
(8) numwalks++
(9) for each v, normalize rel $_q^F$ (v)= rel $_q^F$ (v)/numvisits

SELECT NEXT NODE TO VISIT:
Algorithm for selecting next node to visit
Input:

(1) the query fusion graph, QFG
(2) the jump factor, g
(3) the damping factor, d
(4) the current node, v

Output:

(0) if random()<d
(1) v={q_i|(v,q_i) ∈ $\sum_{QF}$}
(2) pick a node q_i∈v with probability w_f (u,q_i)
(3) else
(4) v={q_i|g(q_i)>0}
(5) pick a node q_i ∈ v with probability g(q_i)
(6) return q_i

IV. Conclusion

In this paper, we show how such queries are stored in the search history while searching in the online. And we used reformulation graph and click graphs, which contains useful data on use behavior when searching online. We have seen how the historical queries into groups in a active and automatic manner. Frequently identifying query groups are compassionate to the number of users. In addition, we are enhancing security; provide the security to the query group, in an organization security is more important to secure the data or information. The security plays a key role for providing security to the user's data. With no security, data will be losses by the unofficial users. Security, it will provide the data, if we were authenticated otherwise it will not provide anything.

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Selecting the correct Data Mining Method: Classification & InDaMiTe-R

Prof.Thakur Ritesh [1], Mr. Adsure Sharad [2] , Miss. Ashwini G. Sagade[3]
[1](Associate Professor, Computer Engineering, IOKCOE,Pune University, India)
[2](Computer Engineering, IOKCOE,Pune University, India)
[3](Computer Engineering, IOKCOE,Pune University, India)

Abstract : *One of the most difficult tasks in the whole KDD process is to choose the right data mining technique, as the commercial software tools provide more and more possibilities together and the decision requires more and more expertise on the methodological point of view. Indeed, there are a lot of data mining techniques available for an environmental scientist wishing to discover some model from her/his data. This diversity can cause some troubles to the scientist who often have not a clear idea of what are the available methods, and moreover, use to have doubts about the most suitable method to be applied to solve a concrete domain problem. Within the data mining literature there is not a common terminology. A classification of the data mining methods would greatly simplify the understanding of the whole space of available methods. In this work, a classification of most common data mining methods is presented in a conceptual map which makes easier the selection process. Also an intelligent data mining assistant is presented. It is oriented to provide model/algorithm selection support, suggesting the user the most suitable data mining techniques for a given problem.*

Keywords: *Knowledge Discovery from Databases, Data Mining, Intelligent Decision Support System case - Base Reasoning.*

I. INTRODUCTION

The classical scheme of Knowledge Discovery refers the following steps to complete the high level process of KDD, very often also called simply Data Mining:

- Developing and ***understanding the domain***, capturing relevant prior knowledge and the goals of the end-user.
- Creating the ***target data*** set by selecting a proper set of variables or data samples.
- ***Data cleaning and preprocessing***. Quality of result strongly depends on the quality of input data, and therefore the preprocessing step is crucial (Gibert et al 2008b).
- ***Data reduction and projection***: Depending on the problem, it may be convenient to simplify the considered set of variables. The aim here is to keep a relevant set of variables describing the system adequately and efficiently (Gibert et al 2008b).
- ***Choosing the data mining task***, with reference to the goal of the KDD process. From clustering to time series forecasting, many different techniques exist for different purposes, or with different requirements.
- ***Selecting the data mining algorithm/s***: once the task is decided and goals are codified, a concrete method (or set of methods) needs to be chosen for searching patterns in the data. Depending on the choice of techniques, parameter optimization may or may not be required
- ***Data mining:*** Searching for patterns in data. This will be significantly improved if previous steps were performed carefully.
- ***Interpreting mined patterns***. This is crucial if the discovered patterns have to support effective improvement of expert's knowledge about the analyzed phenomenon or further decision-making (Gibert et al 2010, Gibert et al 2008). If results look inconsistent possible further iteration of previous steps may be required to refine the analysis.
- ***Consolidating discovered knowledge***: Documenting and reporting results, or using them inside the target system.

Most of the commercial Data Mining systems provide collections of several preprocessing, data mining and support-interpretation tools, which have to be properly combined by the data miner itself to build a correct KDD process for every particular application. One of the most difficult tasks is to choose the right data mining technique, as the commercial software tools provide more and more possibilities together and the decision requires more and more expertise on the methodological point of view.

In (Gibert et al 2008b) a high level description of a number of Data Mining techniques was presented in order to

provide elements to environmental scientists to decide what to do in front a real problem. In that case I presented the techniques that I presumed could be more used for making environmental KDD, and I presented them grouped by technical proximity between them. However, in the past years I have been experiencing that either experts or data miners choose the data mining technique by using two main parameters which have nothing to do with technical characteristics of the choice. After these experiences, I strongly belief that the final choice depends basically on:

- The main goal of the problem to be solved.
- The structure of the available data.

However, providing a conceptual map of data mining techniques regarding the parameters used by human beings to decide on the right technique for a particular application, is of great help on:

- Modeling the decision process itself.
- Helping non-expert data miners to improve their decisions.
- Building technical data miner recommenders that in the future can be included at a higher level in Data Mining systems.

In this work, I present a classification of most common Data Mining techniques oriented to support the decisional problem of choosing the right one in real applications and the advantage of using it as a reference on the construction of *intelligent data mining techniques recommenders (InDaMiTe-R)* is discussed. In the second part of the paper a first proposal on InDaMiTe-R is presented and evaluated. Finally, conclusions and future work are discussed.

II. Classification Of Data Mining Techniques Oriented To Decision-Making

As I said before, I observed that main parameters taken into account by humans to choose the proper data mining technique in a real application are:

- The main goal of the problem to be solved.
- The structure of the available data.

According to that, I elaborated the classification displayed in Fig. 1. which includes some of the most popular data mining techniques useful for environmental scientists.
The higher level division is taking into account the basic distinction between having or not a reference variable to be explained (response variable). Left part refers to *non-supervised* methods, without response variable, in where the main goal is a better *cognition* of the target phenomenon and description is enough as a result. Whereas right part refers those *supervised* models oriented to *re-cognition*, where a response variable is to be explained and prediction is pretended.

At a second level, for methods oriented to description, the main division regards the interest of describing relationships between objects (raws of data matrix), which are labeled as *descriptive methods*, or describing relationships between variables (columns of data matrix), labeled as *associative methods*.

For methods oriented to prediction, here the main distinction regards the nature of the response variable: while *discriminant methods* explain or predict qualitative variables, the classical *predictive methods* refer to quantitative response variables.

Because of variety, discriminant models include a further level of subdivision. *Rule-based reasoning methods* group methods providing explicit knowledge model, which can be expressed by formal rules or not, to be applied for further prediction; in *case-based reasoning methods* the predictive model is implicit in historical data; the third option is a mixture between prior explicit knowledge model and iterative refinements based on future data (*Bayesian learning*).

Finally, in the presented conceptual map of Data Mining techniques, different colors have been used for methods coming from the field of Artificial Intelligence or Statistics, and additional information about more recent multi disciplinary proposals which can be classified in the intersection AI&Stats is also provided. As discussed in previous works (Gibert et al 2008b, Gibert et al 2010) these hybrid techniques use to be more powerful for modeling very complex domains, as environmental systems are.

It is presented here a very brief description of all the methods included in this classification, just providing the minimum information to make the final choice.

- Conceptual clustering: Provides grouping of homogeneous objects. Requires hypothesis about the number of classes to be found. Results are directly understandable. Usually do not work with very big data sets.
- Statistical clustering: Provides grouping of homogeneous objects. Might not require the number of classes. Can be efficient with big data sets. Sometimes difficult to understand the meaning of grouping provided.
- Clustering based on rules: Provides grouping of homogeneous objects. Do not require number of classes as input. Can introduce prior expert knowledge as semantic bias. Guarantee interpretability of results and coherence with prior expert knowledge.
- Association rules: Provides patterns of associated values of variables and frequencies of appearance.
- Model-based reasoning: Provides formal model of the causal relationships among the domain variables, by providing models for the dependencies among variables.
- Qualitative reasoning: Provides qualitative model of the causal relationships among the domain variables, by representing which variables increase or decrease values as a consequence of modifications in the values of other variables.
- Principal component analysis: Provides graphical representation to see numerical variables which behave associated or not. Extra work required to interpret results.
- Simple correspondence analysis: Provides graphical representation to see modalities of two qualitative variables which behave associated or not. Extra work required to interpret results.
- Multiple correspondence analysis: Provides graphical representation for associations among modalities of various qualitative variables. Extra work required for interpretation.
- Bayesian networks: Provides graphical interpretation of causal relationships between variables together with conditional probabilities.
- Instance-based learning: Uses historical data to classify a new instance of a problem in a predefined set of classes.
- Rule-based classifiers: Provide a set of classification rules that can be used later to evaluate a new case and classify in a predefined set of classes.
- Decision trees: Provide a graphical representation of a tree with conditions associated to nodes that permit to classify a new instance in a predefined set of classes. Problems with very big data sets. It works with qualitative variables.
- Discriminant analysis: Provides an algebraic discriminant function and a cut-off as the rule to decide between two groups for a new instance. Only for numerical variables, two predefined classes and works only under linear separably classes.
- Support Vector Machines (SVMs): They can provide discriminant functions to distinguish between two predefined classes that can be non-linearly separable.
- Box plot-based induction rules: Provide a set of probabilistic classification rules that can be used later to classify a new instance in a predefined set of classes.
- Regression-trees: Provide decision trees for prediction of numerical values. Each leaf has a numerical value, which is the average of all the training set values that the leaf, or rule, applies to.
- Model trees: Provide regression trees combined with regression equations. The leaves of these trees contain regression equations rather than single predicted values. A model tree approximates continuous functions by several linear sub models.
- Naïve Bayes classifier: Provides an adaptative classifier that can improve initial knowledge-based predictions for the class of a new instance by refining the model on the basis of the evidences provided by the whole history of processed cases.
- Connexionist models: Include all artificial neural networks models. Permit to predict the value of one or more variables for a new instance on the basis of non-linear combination of the values of several input variables and intermediary layers.
- Simple linear regression: Predicts the value of a quantitative variable for a new instance as a linear equation of a single numerical variable. Requires normality & linearity.
- Multiple linear regression: Predicts the value of a quantitative variable for a new instance a s a linear equation of several numerical variables. Requires normality, linearity and independence
- Analysis of Variance: Predicts the value of a quantitative variable for a new instance as a linear combination of one or two qualitative variables. Requires conditional normality, linearity and independence.
- Generalized Linear Models: Predicts the value of a quantitative variable for a new instance as a linear combination of several numerical and qualitative variables.

- Time series: Predict the value of a quantitative variable for a future instance as a linear combination of past values of the same variable.
-

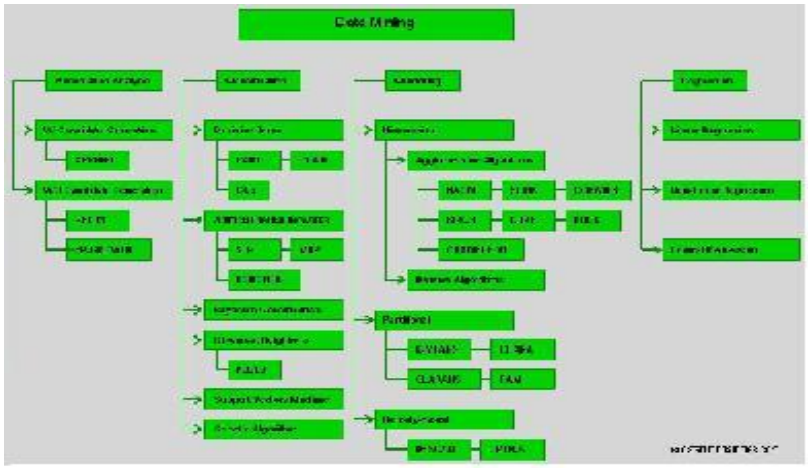

Figure 1: Classification of Data Mining Techniques

III. An Intelligent Data Mining Recommender

As evidenced in the previous section, there are many difficult and technical decisions that the data miner has to face in order to obtain the best outcome for a given dataset and user's goals. Selecting the machine learning or statistical method more appropriate, once a family of methods is found, deciding which training parameters are most appropriate or which particular technique is more convenient are some examples. Furthermore, most data mining commercial software tools either do not provide intelligent assistance for addressing the data mining process or tend to do so in the form of rudimentary "wizard-like" interfaces that make hard assumptions about the level of background knowledge required by a user in order to effectively use the system.

At a first sight, it seems that building some knowledge-based system including as decision- rules some translation of the conceptual map presented in previous section should be the better option for building an intelligent assistant to choose the right data mining technique to be used in a specific application.

However, it is obvious that, being that map a non-exhaustive classification of data mining techniques, but the most common ones in environmental sciences, as the tendencies or needs change in the future, new refinements of the map will be required, with the consequent modifications on the assistant. Also, the number of data mining techniques available grows incredibly fast every day and this means that the knowledge-based approach is constrained to continuous reviews and upgrades. On the other hand, the number of decisions made by an expert data miner to find the right subfamily of techniques (hierarchical clustering, or partitioned or fuzzy), the right parameters of execution (once decided hierarchical clustering, choose the algorithm, the metric, the aggregation criterion, sometimes, weight on the metrics) in a particular case is so complex that it becomes difficult to make explicit in a conceptual map.

That is the reason why I propose to move to a case-based reasoning approach, much more flexible to changes in the future on the methodological framework and using implicitly the expertise of data miners by means of past experiences. In fact, a key characteristic that any intelligent data mining assistant should possess is the capacity to learn from past user's experiences, so the system can help the user to avoid the repetition of mistakes and motivates the knowledge reuse, and on the other hand, to adapt to new possibilities by including them in the system easily. Thus, a non-expert data miner could take advantage of the experiences of others users facing similar problems [Charest *et al*., 2006]. And
an expert can propose new solutions based on more recent trends.

IV. Case Study

An example of use is presented for illustration. A certain data miner (Maria) wants to conduct a classification for a given dataset (D1). She wonders the better DM classification algorithm and configuration parameters for D1, and she starts the DM assistant.

First of all, Maria is asked to provide the type of task, that in this case it consists of a classification problem. After that, the system automatically extracts the most relevant metadata from D1 taking into account that the user's goal is a classification task. Some examples of metadata information that may be obtained in this case would be the number of classes, the entropy of the classes and the percent of the mode category of the class. Then, the user is asked to provide some application restriction, and in this case, the restrictions of Maria

are that the model has to be as accurate as possible and interpretable. With all this information the system generates a recommendation consisting of two DM algorithms: the ID3 (decision tree type) and the CN2 (rule induction type). Maria executes the two proposed algorithms with the predefined configuration parameters and validates the results. As the evaluation of the ID3 is not satisfactory enough, Maria decides to execute again the ID3 but

with different parameters. Now the results are much better and Maria is satisfied with the obtained results. Finally, she saves her work and logs out the system. At this point, the system learns the new experience with its corresponding solution: the ID3 algorithm with the parameters defined by Maria and the CN2 with the default parameters. In figure 2 can be observed some screenshots of the DM assistant interface.

fig.2(a)

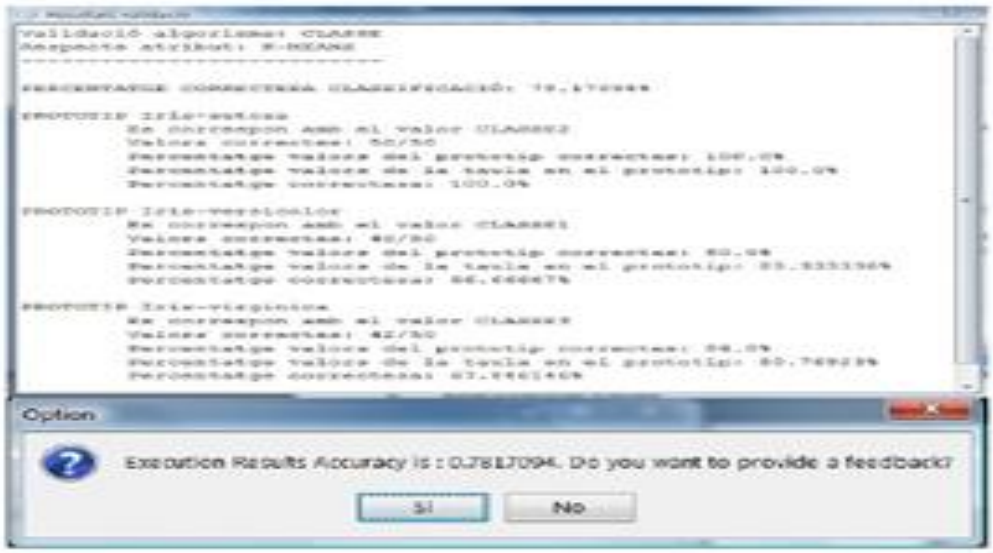

fig.2(b)

Figure 2. *(a)* screenshot of the DM assistant with an algorithm suggestion; *(b)* results evaluation results after some algorithm run and, asking to the user for explicit feedback.

4.1 Evaluation

A small-scale evaluation was carried out with 5 data miners that knew the original system without the DM assistant integrated. The experiment consisted of each user trying to solve 3 classification problems (P1, P2, P3), quite similar in terms of dataset characteristics, in different user's sessions and in a sequential manner (i.e. first all users had to solve P1, then P2 and finally P3). Doing it so, all users should be able to reuse the past experiences of others users or/and their own experiences during the small experiment.

After the execution of the experiment the users provided us some feedback about the usefulness of the assistant. In general, the user's opinions were satisfactory, especially in users that were the last ones solving some of the problems, since they could take more advantage of the past experiences of the rest of users. The

results shown that the assistant is able to refine the case solutions over time, Therefore are gradually better giving support to the users that try to solve problems similar to the ones that have been solved previously.
However, the strong limitation of the system, usual in CBR, is the need of a number of varied past experiences before the assistant provides appropriate support to most users.

V. Conclusion And Future Work

Choosing the proper data mining method is one of the most critical and difficult tasks in the KDD process. In this paper, a conceptual map of the most common data mining techniques has been proposed. There is not a unique and consensual classification of data mining methods in the literature. First main decisional criteria used by human experts in real decisions have been identified and the conceptual map is organized based on them. The proposal helps environmental data miners in the conceptual organization and rational understanding of the broad scope of data mining methods; also helps non-expert data miners to improve decisions in real applications. Finally, this provides formal expert knowledge representation to be transmitted to automatic intelligent recommenders, contributing to approach the integral conception of KDD system.

Additionally, an intelligent data mining techniques recommender is being developed based on same decisional criteria, in order to automatically provide recommendations on the best data mining technique. In order to gain flexibility and adaptability to new methods, a pure case-base reasoning approach has been used.

In the future, the deployment of the recommender would be more reliable in a shared environment (e.g. distributed Web system), where multiple data miners could contribute to the enrichment of the knowledge base reducing so the learning/training time of the DM assistant.

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Securing Image Steganogarphy Based on Visual Cryptography And Integer Wavelet Transform

Yasir Ahmed Hamza
Department of Computer Science, Computer and IT Faculty, Nawroz University, Duhok, Iraq

Abstract : *The increased use of internet communication has given rise to the field of image steganography and made it necessary to secure digital content. Current image steganography techniques lack novelty and are based on using traditional cryptography solutions for secret image that is embedded in cover image. This research paper proposed and implemented a new method to secure embedded secret image using visual cryptography. A two level integer wavelet transformation technique was applied on the cover image to obtain the coefficients which were used later during the secret image embedding process. The experimental results indicated that high invisibility was achieved for secret image and the ability to embed more than one secret image within the cover image. Also, the use of visual cryptography eliminated the need for permutation process which would otherwise be required for secret image.*
Keywords: *Cryptography, Image Steganography, Integer wavelet transform, Stego-image, Visual Cryptography.*

I. INTRODUCTION

Data communication is one the essential function of the Internet, because of the ease of data transportation and the capability of transferring data over long distances. In spite of the numerous benefits offered by the Internet, there are still many challenges associated with data communication. One of the toughest challenges is data intrusion where adversaries would change content and manipulate data. Therefore, a number of solutions have been implemented to maintain the confidentiality of data. One of which is data encryption. Encryption involves converting human-readable data to unreadable form using one of cryptographic algorithms. An intruder trying to access data, would need to know the encryption algorithm used along with secret key.

On the other hand, there is another way to protect data by embedding data within other data which is known as hidden writing or steganography. In this method, one of the multimedia elements are used (e.g. image, text, video or audio) as a cover media and use a special algorithm to embed confidential data within it. The cover is then sent to the other party. This, in turn, is the process of extracting confidential data through the use of an extraction algorithm.

The word steganography is originally a Greek word; *stegos* means cover and *grafia* means writing [1, 2]. When words are gathered, the result is covered writing or hidden writing. Historically, steganography has been used by Greeks. So when someone wants to send a secret message to his son-in-law, he shaved the head of one of the trusted slaves and put the secret message as a tattoo on his head and waited until his hair grew; then he would send him to the destination with the secret message [1, 2]. Secret (Invisible) ink is another way of steganogrphy where ancient Romans found a way to write between lines using a secret ink [2]. Secret ink was also used during the World War II.

Steganography differs from cryptography in that cryptographic techniques are designed to preserve the secrecy of data; while steganography techniques are used to maintain the existence of confidential data [1, 2, 3]. According to [1] steganography can be made more powerful by combining it with cryptographic techniques. Nowadays, there are a lot of algorithms proposed for data hiding due to an unprecedented amount of research carried out in this area.

In this research study, I will propose a novice method based on using visual cryptography and steganography. The proposed method will be applied on digital color images to build a system that is capable of maintaining data confidentiality within cover image. For this purpose, I will be using a confidential image and embed it within a cover image. Before embedding the confidential image, I will apply an algorithm called (2 out 2 share) which involves inputting an image, splitting it to two secret share, and then split each secret share into two shares. The process involves breaking down the cover image into three layers (Red, Green, and Blue). I will then apply a method called two level integer wavelet transform (IWT) on the blue layer. The result of this application is four sub-bands (Low-low sub-band (LL), High-low sub-band (HL), Low-high sub-band (LH), and High-high sub-band (HH)). Then each share will be embedded within each sub-band. The end result for this process will be stego-image.

On the other side, the extraction process requires taking the stego-image as an input, split into three channels (Red, Green, Blue), and then take blue layer and apply two level integer wavelet transform on it. As

mentioned previously, the result will be four sub-bands; those four sub-bands will be used to extract the secret shares. Then I will combine these shares with each other which will result in a confidential image as output.

II. IMAGE STEGANOGRAPHY

Images have become the most frequently used object in the field of data hiding [1, 2]. This is due to the possibility of random access to any pixel within the image. In addition, images can preserve the secret content and make it difficult for the naked eye to distinguish manipulation in cover image that used during embedding process [2]. Therefore, the usage of images in the field of data hiding can be considered as one of the hot topics. To hide the secret content within the cover image there are several methods used, the most important are [1, 2, 4]:

2.1 Spatial Domain (Least Significant Bit): it is the simplest method to embed secret data in the cover image [1]. This method is based on using one or more of the bits that represent the least significant bits of the cover image pixel value. Therefore, we can embed one bit form the secret data in each pixel value of the cover image. For example, if we have a color image, we can divide it into three channels (red, green, and blue), and then embed one bit of secret data within each color pixel value separately. The disadvantage of this method is that when the cover image falls in adversary's hands, he/she can easily extract each least significant bit form cover image pixel value and determine the content of embedded confidential data.

2.2 Transform Domain: in this method, secret data embedding process is done in image frequency domain [2]. Therefore, transformation is applied on cover image to obtain the coefficients of cover image. Some or all of these coefficients can be used during the secret data embedding process. This method can be used to design a more powerful image steganography system. One advantage of this method is that it keeps confidential data in the area of the cover image that are susceptible to image processing attacks (e.g. cropping, image compression…etc). There are different types of image transformation that are used (e.g. Discrete Fourier Transform (DFT), Discrete Cosine Transform (DCT), and Discrete Wavelet Transform (DWT)). Another type of transformation that maintains the reversibility of the cover image is called Integer Wavelet Transform (IWT).

2.3 Spread Spectrum: in radio communications, spread spectrum is used to transfer data under the noise level for any given frequency [2]. In order to use this method in the data hiding field, the spread treats cover image as noise or trying to add pseudo-noise to it [2]. Therefore, the secret data is spread through the cover image secretly, which makes it difficult to detect [1]. During the embedding process, the confidential data is embedded within noise and then it's combined with the cover image. The power of confidential data as signal is less than that of the cover image. Therefore, without accessing the original image, embedded confidential data cannot be visible to the human eyes or by computer analysis [1].

There are four main objectives that need to be considered when designing a steganography system [3, 5]:

- Imperceptibility: it means preventing the naked eye to detect the presence of other data included in the cover image.
- Security: in the event that the cover image suffers an attack, the system to protect confidential data from the attack.
- Embedding Payload: the amount of data that can be concealed within the cover image without affecting the quality of the cover.
- Robustness against attack: the possibility of maintaining the confidential data in the event that the cover image suffers image processing operations such as filtering, compression, rotating…,etc.
-

III. Visual Cryptography

This cryptographical method is used to encrypt writing materials (e.g. typed text, handwritten notes or pictures .... etc.) visually [6]. This method maintains the confidentiality of such data optimally. During the encryption process data is converted into a set of transparent images that are called shares. During the deciphering process, shares are stacked one above the other to obtain the original image. Therefore, the deciphering process is performed using the human visual system. One advantage of this method is that it does not need complex computations.

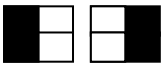
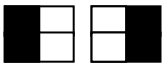
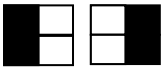
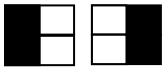
Decipher Algorithm [7]: Suppose that we have a binary (Black and White) image and we want to apply a (2 out 2 share) visual cryptography on it. We need to perform the following steps:

- Determine the number of shares, in this algorithm need to generate two secret shares..
- Take each pixel form the original image and check the pixel color:
  - If pixel color is white, then randomly choose a pair of pixels and place it into the first share and the offset is placed in the second share. As shown in Table 1.
  - If pixel color is black, then randomly choose a pair of pixels and place it into the first share and the offset is placed in the second share. As shown in Table 1.
- Repeat the above steps until taking all the values of the original image.

- The result of this algorithm will be two secret shares.

Each one of them is not given any information about the original image, but when you stack those secret shares together we get the original image. Note that all white colors are represented by a pair of pixels (one white and one black).Whereas, all the black colors are represented by a pair of pixels (one Black and one Black).

Table 1: Construction of (2 out 2 share) Visual Cryptography

Pixel	White		Black	
Probability	50%	50%	50%	50%
Share-1				
Share-2				
Stack Share-1 and Share2				

IV. Integer Wavelet Transform

According to [3], they proposed a steganography technique used to embed multiple confidential images with its keys in cover image. This technique is based on using IWT. As a result of this method no visual difference between stego-image and cover image existed. Also peak signal-to-noise ratio (PSNR) was very good. [4] Proposed a data hiding technique based on using IWT. During the embedded process, the secret image hides in IWT coefficients of cover image by using LSB. The result was high invisibility in stego-image. In [8] a reversible steganography method implemented that was dependent on using IWT and histogram shifting which preserved the visual quality of stego-image. In addition, it kept recovery process lossless. A new technique was proposed by [9] which were based on using combination of DWT and IWT. This method maintained invisibility, high security and robustness.

Typically, wavelet transform cannot reach the reversibility well, due to the transformation process that is based on floating point values [8] . During the decomposition process, it is likely that some of the values of the reconstructed image will change. Therefore, this research has used integer wavelet transform, depending on the concept of the integer to integer mapping that operates on the principle of lifting. This method is similar to the discrete wavelet transform and has the same performance. It is a transformation from a non-linear type [9]. When we apply this transformation on the image, we will obtain four (low-low, high-low, low-high, and high-high) sub-bands. The approximation LL sub-band is close to the original image.

If the original cover image (*CI*) and the value of each pixel at (i,j) is denoted by CIi,j. The IWT sub-bands can be obtained by applying the following equations [3, 4]:

$$LL_{i,j} = \lfloor (CI_{2i,2j} + CI_{2i+1,2j})/2 \rfloor \quad (1)$$

$$HL_{i,j} = CI_{2i+1,2j} - CI_{2i,2j} \quad (2)$$

$$LH_{i,j} = CI_{2i,2j+1} - CI_{2i,2j} \quad (3)$$

$$HH_{i,j} = CI_{2i+1,2j+1} - CI_{2i,2j} \quad (4)$$

The inverse IWT can be obtained by applying the following equations:

$$CI_{2i,2j} = LL_{i,j} - \lfloor HL_{i,j}/2 \rfloor \quad (5)$$

$$CI_{2i,2j+1} = LL_{i,j} + \lfloor (HL_{i,j+1})/2 \rfloor \quad (6)$$

$$CI_{2i+1,2j} = I_{2i,2j+1} + LH_{i,j} - HL_{i,j} \quad (7)$$

$$CI_{2i+1,2j+1} = I_{2i+1,2j} + HH_{i,j} - LH_{i,j} \quad (8)$$

Where, $1 \le i \le X/2$, $1 \le j \le Y/2$ and $\lfloor\ \rfloor$ denotes floor value.

V. The Proposed Algorithm

As mentioned previously, the proposed steganography algorithm is based on using IWT on the cover image. To increase the security of confidential image, (2 out 2 shares) visual cryptography technique is applied on secret image. The secret image that is used in embedding process has the size 128X128 whereas the cover image size is 512X512. The proposed embedding algorithm works as the following and it's also demonstrated in Fig.1.

5.1 Embedding Process:

- Input the secret image.

- Apply (2 out 2 shares) visual cryptography which will result in two secret shares. Each one has a new size of (128 X265).
- Divide each secret share into two sub-shares.
- Input the original color image as a cover image.
- Divide the cover image into three channels (red, green, and blue).
- Take the blue layer and apply 1st-level IWT which will result in four sub-bands (LL1, LH1, HL1, and HH1).
- Take the LL1 sub-bands and apply 1st-level IWT which will result in four sub-bands (LL2, LH2, HL2, and HH2).
- Embed each sub-share in each of (LL2, LH2, HL2, and HH2) sub-bands of LL1.
- Apply inverse IWT on (LL2, LH2, HL2, and HH2) sub-bands to obtain (LL1) sub-band.
- Apply inverse IWT on (LL1, LH1, HL1, and HH1) sub-bands to obtain the new blue layer.
- Combine the new blue layer with red and green layers to obtain the stego-image.

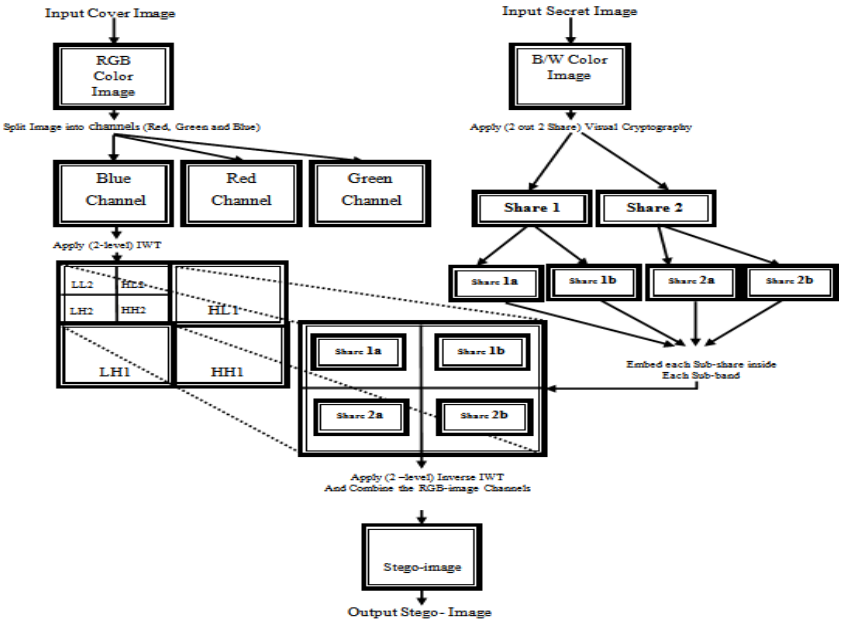


Figure (1): embedding process for the secret image.

5.2 Extraction Process:

To extract the secret image form stego-image, we only need the stego-image for the extraction algorithm. The extraction algorithm works on the principle of blind extraction without the need for the original image. Performing the extraction process requires the following steps and it's also demonstrated in Fig. 2.

- Input the stego-image.
- Divide the stego-image into three channels (red, green, and blue).
- Take the blue layer and apply 1st-level IWT which will result in four sub-bands (LL1, LH1, HL1, and HH1).
- Take the LL1 sub-bands and apply 1st-level IWT which will result in four sub-bands (LL2, LH2, HL2, and HH2).
- Extract each sub-share from each of (LL2, LH2, HL2, and HH2) sub-bands of LL1.
- Combine each sub-share to obtain the original two secret shares.
- Stack the two shares to obtain the secret image.

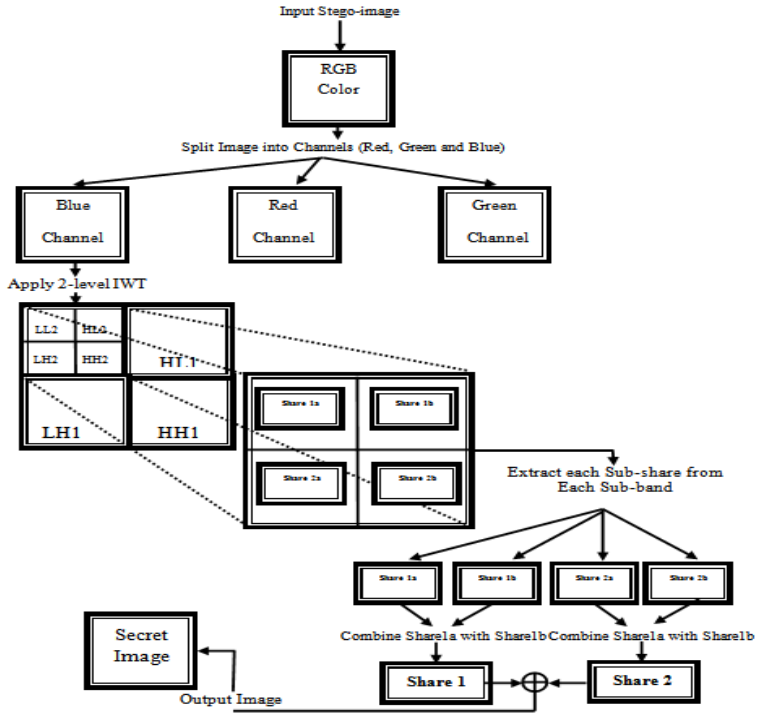
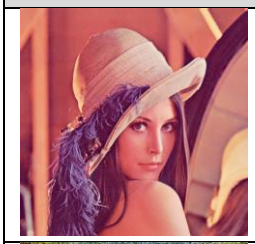
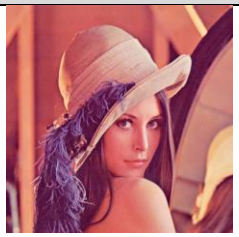
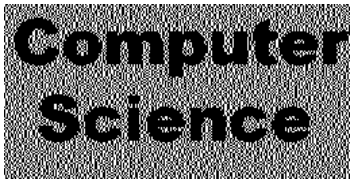
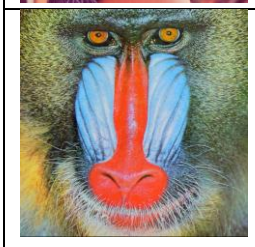
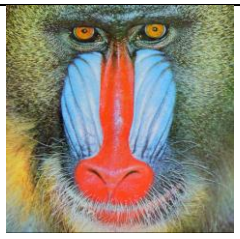


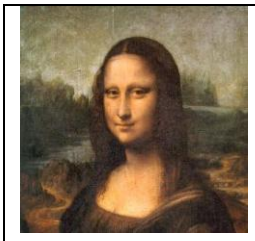
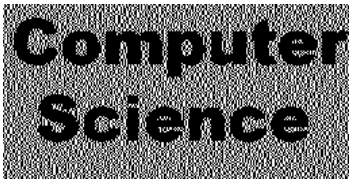
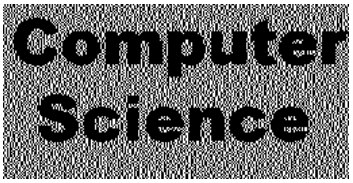
Figure (2): the secret image extraction process.

VI. EXPERIMENTAL RESULTS

The proposed algorithm has been implemented using Matlab R2009a. A graphical user interface was designed for embedding and extracting the secret image form cover image. Four frequently used images of size 512X512 (Lena, Baboon, Monalisa, and Peppers) were chosen to be tested for image steganography. These images are selected to be cover images. The secret image is black and white image of size 128X128, contains the expression "Computer Science". This secret image is embedded in each cover image. To test the quality of stego-image, two measurements were used; the first measurement is root mean square error (RMSE) while the second one is PSNR. The experimental results show that the tested stego-image maintains high invisibility even when more than one secret image was embedded according to PSNR values. Also, using visual cryptography makes the proposed algorithm not need to use secret key to perform permutations on secret image and this is what makes this method keyless. The test images, stego-images, extracted secret images, RMSE values, and PSNR values are shown in Table 2.

Table 2: Test Images with Their Respective RMSE and PSNR Values

Cover Image	Stego-image	Extract Secret Image	RMSE	PSNR
			1.411	45.140
			1.412	45.133

			1.413	45.127
			1.417	45.104

VII. CONCLUSION

This paper has integrated image steganography with visual cryptography to design and implement a new algorithm. This algorithm is based on using the integer wavelet to transform the cover image into transform domain for obtaining the cover image coefficients. These coefficients were used in secret image embedding process which the (2 out 2 share) visual cryptography was applied on it. The experimental results showed the proposed algorithm maintained high invisibility, high security, and low robustness for secret image. Also, the ability to embed multiple secret images within one cover image. The limitation of the proposed algorithm is that it could not maintain good robustness for secret image against image processing attacks (e.g. filtering, image compression, rotation, .etc) that target stego-image. This limitation can be addressed in future research.

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Multi-Cluster Based Approach for skewed Data in Data Mining

[1]Mr.Rushi Longadge, [2] Ms. Snehlata S. Dongre, [3]Dr. Latesh Malik
1,2,3 Department of Computer Science and Engineering G. H. Raisoni College of Engineering

Abstract: *In data mining difficulties are encounters when applying machine learning techniques to real-world data, which frequently show skewness properties. A typical example from industry where skewed data is an intrinsic problem is fraud detection in finance data, medical diagnosis on rare disease, finding network intrusion in network. This problem is also known as class imbalance problem. The class imbalance problem define as the sample of one class may be much less number than another class in data set. There are many technology developed for handling class imbalance. Basically designed approaches are divided into two types. First is designed a new algorithm which improves the minority class prediction, second modify the number samples in existing class, it also known as data pre-processing. Under-sampling is a very popular data pre-processing approach to deal with class imbalance problem. Under-sampling approach is very efficient, it only use the subset of the majority class. The drawback of under-sampling is that it removes away many useful majority class samples. To solve this problem we propose multi cluster-based majority under-sampling and random minority oversampling approach. Compared to under-sampling, cluster-based random under-sampling can effectively avoid the important information loss of majority class.*
Keyword: *Skewed data, Random under-sampling, class Imbalance problem, clustering, imbalance dataset.*

I. Introduction

Some real-life data mining problems involve learning classifiers from imbalanced data, which means that one of the classes called a minority class includes much smaller number of examples than the others classes called as majority classes. Typical such problems are medical diagnosing dangerous illness, analyzing financial risk, detecting oil spills in satellite images, predicting technical equipment failures or information filtering [1], [2]. Class imbalance constitutes a difficulty for most learning algorithms, which are biased toward learning and prediction of the majority classes. As a result, minority examples tend to be misclassified.

The information in the minority class is very less as compared to the majority class samples. It is easy to be overlapped by the information of the majority and lead to misclassification [3]. As a result, the performance of the classifier based on balanced data sets is far better than that based on the imbalanced ones.

Therefore, the traditional classification approaches and their evaluation criteria are not suitable for the imbalanced data set. The achievements in classifiers based on imbalanced data sets have been presented with different approaches. Sampling method based on the preprocessing of data, which reconstructs the data set artificially to reduce the degree of imbalance. Over-sampling is to increase the number of the minority, but it may lead to over-fitting because of the duplication of data, While, under-sampling [4] is to cut down the number of the majority class samples. But it may lose information of the majority and decrease the performance of classification. The other method focuses on the algorithm based approach, which introduces certain mechanism to handled the imbalance and make it suitable for the classification on imbalanced data sets. Examples of such techniques are: cost sensitive, support vector machines algorithm (SVM), and some ensemble methods.

There are many mechanisms in revising algorithms for imbalanced data mining. For example, the use of adjustment of cost function, the use of different values of weight, the change of probability density. Cost sensitive study algorithm uses the cost of each class to make classification decision. Its target is to cut down the overall cost instead of reducing the error rate as much as possible [5]. Support vector machine has been modified to process imbalanced data sets. One simple modification is to make a moderate skewing to the majority boundary. Thus, there will be fewer samples in the minority class to be misclassified [6].

To solve the problem of minority samples classification and avoid data lose of majority class in under-sampling in class imbalance problem we propose multi cluster-based majority random under-sampling and over-sampling techniques. Here we create multiple cluster of input dataset. Then we use the subset and all the samples of minority class as training data to improve prediction rates over minority and majority classes. Compared to under-sampling, cluster-based majority under-sampling can effectively avoid the information loss of majority class and oversampling will helps to balance data. Performance of classifier is evaluated by using Recall, Precision, F-measure and G-mean. Experimental results show that this hybrid approach improve the minority class prediction.

The rest of this paper is organized as follows. Section II represents the related work. Section III describes the multi-cluster based under-sampling approach and random over-sampling approach. Experiment

and results are conducted in section IV. The data set used for experiment is collect from UCI and KEEL repository. In section V we conclude the paper.

II. Related work

The most of research has been performed with respect to the class imbalance problem. The study found many methods for solving the problem of class imbalance, including data sampling and boosting. This methods are further categories into two parts first is data level and second is algorithmic level [7]. The first approach is also called as data preprocessing. It preprocess the data by under-sampling the majority instances i.e. remove the majority class sample or oversampling the minority instances i.e. adding or replicating minority class sample.

The simplest form of under-sampling is RUS. RUS randomly removes examples from the majority class until a desired class distribution is found. Over-sampling [8] is the opposite of under-sampling approach. It duplicates or generates new minority samples in the hope of reducing class imbalance. With over-sampling, the neighborhood of positive samples is assumed to be also positive as are the samples between two positive samples. Experimental results show that under-sampling produces better results than over-sampling in many cases. The belief is that although over-sampling does not lose any information about the majority class, it introduces an unnatural bias in favour of the minority class.

SMOTE (Synthetic Minority Oversampling Technique) was proposed by Chawla et al. to overcome the problem of imbalance by a special approach to generate new synthetic examples [10]. As the authors said, this method generates artificial examples based on the feature space similarities between original examples of the minority class. Its main idea is to take each example of the minority class and to introduce synthetic examples along the lines between it and it's selected nearest neighbors also from the minority class. Although SMOTE proved to be successful in the experiments it also has some shortcomings, which we further discuss. Firstly the way of identifying minority samples for over-sampling could be problematic [10].

Data cleaning techniques, such as Tomek links, have been effectively applied to remove the overlapping that is introduced from sampling methods. Generally speaking, Tomek links [11] can be defined as a pair of minimally distanced nearest neighbors of opposite classes. By removing overlapping examples, one can establish well-defined class clusters in the training set, which can, in turn, lead to well defined classification rules for improved classification performance. While sampling methods attempt to balance distributions by considering the representative proportions of class examples in the distribution, cost-sensitive learning methods consider the costs associated with misclassifying samples [12]. Instead of creating balanced data distributions through different sampling strategies, cost sensitive learning targets the imbalanced learning problem by using different cost matrices that describe the costs for misclassifying any particular data sample.

Fundamental to the cost-sensitive learning methodology is the concept of the cost matrix. The cost matrix can be considered as a numerical representation of the penalty of classifying examples from one class to another. For example, in a binary classification scenario, we define C *(Min, Maj)* as the cost of misclassifying a majority class example as a minority class example and let *C (Maj, Min)* represents the cost of the contrary case.

Typically, there is no cost for correct classification of either class and the cost of misclassifying minority examples is higher than the contrary case, i.e., *C (Maj, Min) > C (Min, Maj)*. The objective of cost sensitive learning then is to develop a hypothesis that minimizes the overall cost on the training data set. In regards to decision trees, cost-sensitive fitting can take three forms: first, cost-sensitive adjustments can be applied to the decision threshold; second, cost-sensitive considerations can be given to the split criteria at each node; and lastly, cost-sensitive pruning schemes can be applied to the tree. Pruning is beneficial for decision trees because it improves generalization by removing leaves with class probability estimates below a specified threshold. However, in the presence of imbalanced data, pruning procedures tend to remove leaves describing the minority concept. It has been shown that though pruning trees induced from imbalanced data can hinder performance, using un-pruned trees in such cases does not improve performance [13].

III. Multi cluster-based majority under-sampling

Under-sampling is an efficient strategy to deal with class imbalance. However, the drawback of under-sampling is that it lost many potentially useful data. In this section, we propose two strategies to explore the majority class examples ignored by under-sampling and generating balance training dataset. In order to achieve good prediction over minority class and avoid necessary information loss from the majority class, we use both K-means algorithm and random sampling approach.

Assume the size of the class imbalanced data set is N, which includes majority class samples $\mathbf{X_{Maj}}$ and minority class samples $\mathbf{X_{Min.}}$. For our multi-cluster-based majority under-sampling prediction algorithm, we first divide all the majority class samples in the data set into k clusters. In the experiments, we will study the performances for the under-sampling methods on different number of clusters. Let the number of majority class

samples in the ith cluster ($ki \leq \leq 1$) be $\mathbf{X_{Maj\_i.}}$. Therefore, the ratio of the number of majority class samples to all the number of majority class samples in the ith cluster is

$$\mathbf{Ri= X_{Maj\_}i / X_{Maj}} \quad 1 \leq i \leq k$$

The number of selected majority class samples in the ith cluster for under-sampling is computed as

$$\mathbf{Si= X_{min} * Ri} \qquad (1)$$

$$1 \leq i \leq k$$

The above equation determines that more majority class samples would be selected in ith cluster which has more majority class samples. When apply this method to highly imbalance data then the size training data that created after this process will contain less number of data of sample. To improve prediction rate of classifier over majority and minority class we have multiply the selected samples number (**Si)** by total number of cluster.

Algorithm:

Input: majority class samples, minority class samples.

Output: Balanced training set

step1: Cluster all the majority class samples into k clusters using k-means clustering.

step2: Compute the number of selected majority class samples in each cluster by using (1), and then select **Si** majority samples in ith cluster. This is achieved by selecting **Si** majority class samples in ith cluster randomly. Finally, we get majority sample subsets C

Step3: Combine C with all the minority class samples respectively to obtain the training set B.

IV. Experiments and result

It is now well-known that accuracy or error rate is the evaluation criterion for conventional classification. However, it is not an appropriate evaluation criterion when there is class-imbalance in dataset. In this paper, we use Recall, Precision, F-measure and G-mean as performance's evaluation measures. F-measure and G-mean are functions of the confusion matrix as shown in Table I. Recall, Precision, F- measure and G-mean are then defined as follows. Here, we take minority class as positive class.

$$\textbf{Sensitivity (Recall) = TP / (TP+FN)}$$

$$\textbf{Specificity=TN / (TN+FP)}$$

$$\textbf{Precision = TP / (TP+FP)}$$

$$\text{F-measure} = \frac{2 * \text{Recall} * \text{Precision}}{\text{Recall} + \text{Precision}}$$

$$\text{G-mean} = \sqrt{\text{Sensitivity} * \text{Specificity}}$$

Table 1 confusion matrix

Class Name	Predicted Positive Class	Predicted Negative Class
Actual Positive Class	TP(True Positives)	FN(False Negative)
Actual Negative Class	FP(False Positives)	TN(True Negatives)

In our experiments, we use these four criteria to evaluate the classification performance of the approaches. Recall measures the predicted accuracy of the positive samples (minority samples). Precision refers to the proportion of actual positive samples among all samples that are predicted as being positive while Recall is the proportion of actual positive samples that are correctly identified by the classifier, which is the same as Sensitivity. Generally, for a classifier, if the precision rate is high, then the recall rate will be low, that is, the two criteria are trade-off. If both precision, recall are larger then F-Measure is also larger. For unbalanced data sets, higher the recall lowers the precision. So increasing recall rates without decreasing the precision of the minority class is a challenging problem. F-Measure is a popular measure for unbalanced data classification problems [16]. F-Measure depicts the trade-off between precision and recall. Barandela et al. introduced the

metric called the geometric mean (GM) [17].This measure allows Barandela et al. to simultaneously maximize the accuracy in positive and negative examples with a favorable trade-off. So we use G-mean to maximize accuracy of majority samples and Recall with a favorable trade-off.

We tested our proposed approaches on UCI data sets. Information about these data sets are summarized in Table 2 .Here, for each data set, Number of attributes, Number of positive and negative sample and Ratio are depicted.

Table 2. The table below lists the UCI datasets

	Data Set	No of Attribute	Majority Class samples	Minority Class samples	Imbalance Ratio
1	Glass	9	333	53	6.28
2	Heart	13	127	10	12.7
3	led	7	348	58	6
4	Yeast	8	1146	41	27.96
5	ecoli	7	208	61	3.4

4.1 Result Analysis

For evaluation purpose we test our technique on two classifier, SVM and KNN classifier. Both classifiers implanted in MATLAB and tested on five different dataset, performance of Classifier measure as follow.

Sensitivity and specificity are statistical measures of the performance of classifier. Sensitivity also called the *true positive rate* or the recall rate in some field's measures the proportion of actual positives which are correctly identified as such (e.g. the percentage of sick people who are correctly identified as having the condition). Specificity measures the proportion of negatives which are correctly identified as such (e.g. the percentage of healthy people who are correctly identified as not having the condition, sometimes called the *true negative rate*). G-mean is tradeoff between sensitivity and specificity. If G-mean is nearly equal to one, it means that TP and TN rate are well balance. If G-mean if zero it means that all the positive samples are misclassified. From this we can conclude that if any classifier having high G-mean, it means this classifier is good than another one. In this paper we are compare two classifier. Following tables give the result values.

Table 3 Performance of SVM classifier on original dataset

Data Set	**Sensitivity**	**Precision**	**Specificity**	**G-mean**	**F-measure**
Glass	0.41	0.88	0.99	0.64	0.56
Heart	0.33	1	1	0.57	0.5
led	0	0	1	0	0
Yeast	0.46	0.15	0.90	0.64	0.22
Ecoli	0	0	1	0	0

Table 4 Performance of SVM classifier After MCMUS algorithm

Data Set	**Sensitivity**	**Precision**	**Specificity**	**G-mean**	**F-measure**
Glass	0.96	0.76	0.96	0.94	0.85
Heart	0.66	0.67	0.96	0.80	0.66
led	0.91	0.53	0.86	0.88	0.67
Yeast	0.68	0.16	0.87	0.77	0.26
Ecoli	0.95	0.71	0.88	0.91	0.81

Table 5 Performance of KNN classifier on original dataset

Data Set	Sensitivity	Precision	Specificity	G-mean	F-measure
Glass	0	0	1	0	0
Heart	0	0	0.99	0	0
led	0.2	1	1	0.45	0.34
Yeast	0.09	0.15	0.14	0.97	0.11
Ecoli	0.81	0.87	0.96	0.88	0.84

Table 6 Performance of KNN classifier After MCMUS algorithm

Data Set	Sensitivity	Precision	Specificity	G-mean	F-measure
Glass	0.90	0.09	0.57	0.71	0.17
Heart	0.6	0.13	0.68	0.64	0.21
led	0.98	0.59	0.88	0.93	0.74
Yeast	0.75	0.16	0.85	0.80	0.26
Ecoli	0.93	0.73	0.89	0.91	0.82

As we know sensitivity and specificity are the true positive rate and true negative rate respectively. Classifier is better than another if its sensitivity and specificity are both not less than of the other classifier's. Graph

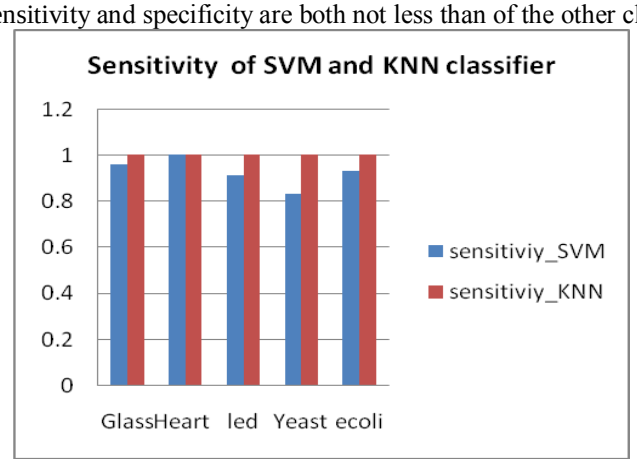

Fig1. Compare Sensitivity of SVM and KNN classifier

Form figure1 it is identified that sensitivity of KNN classifier is more than the SVM classifier.

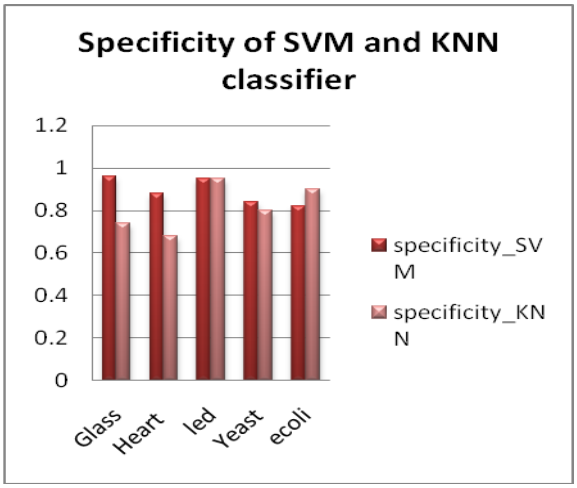

Fig2. Compare Specificity of SVM and KNN classifier

Form figure2 we can say that specificity of classifier is depends upon the size of dataset. Specificity of KNN for led, yeast and ecoli dataset is higher than other because size of this dataset is more than other while for Glass; heart Specificity of SVM is high.

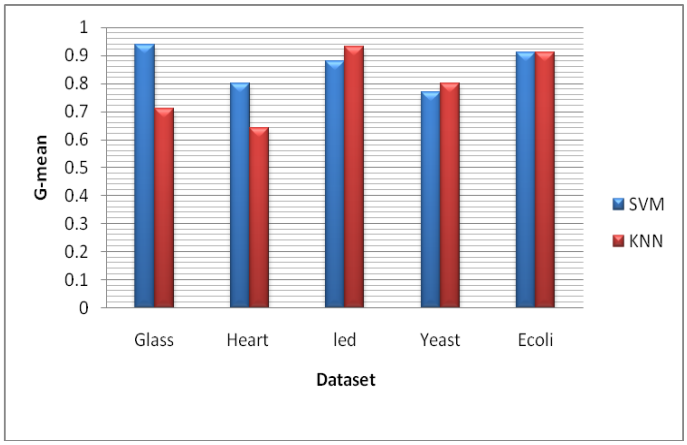

Fig3. G-mean for the datasets

G-means of classifier is also depends upon the size of samples. Figure3 indicate that G-mean of KNN classifier is higher than the SVM.

Table 7 the values of recall, precision, f- measure, g-mean on five imbalance using SVM classifier. The last rows AVG show the Average value.

Data Set	Sensitivity	Precision	Specificity	G-mean	F-measure
Glass	0.96	0.76	0.96	0.94	0.85
Heart	0.66	0.67	0.96	0.8	0.66
led	0.91	0.53	0.86	0.88	0.67
Yeast	0.68	0.16	0.87	0.77	0.26
Ecoli	0.95	0.71	0.88	0.91	0.81
AVG	0.832	0.566	0.906	0.86	0.65

Figure 4 show the performance of KNN classifier over the dataset after applying MCMUS algorithm.

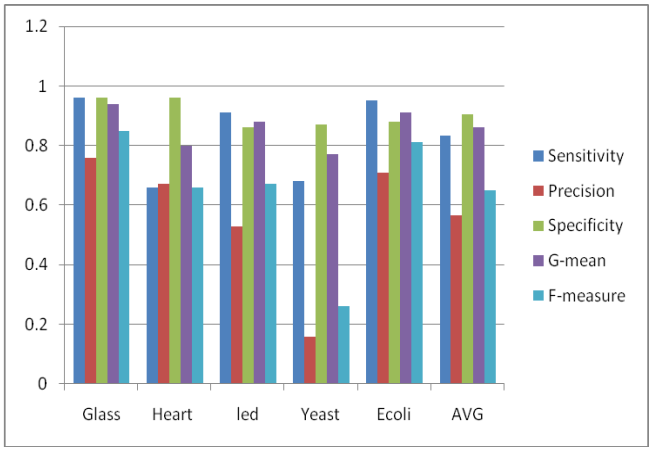

Fig.4. Sensitivity (Recall), Precision, F-measure, G-mean four approaches on five imbalance data sets using SVM classifier.

V. Conclusion

The result shows that Multi-clustered based majority under-sampling algorithm (MCMUS), it can improve the performance of classifiers for imbalanced datasets. In three out of five datasets MCMUS algorithm with K-NN classifier has the highest g-means as compared to SVM classifier. Comparison between F-measure of SVM classifier before and after applying MCMUS algorithm on dataset in chapter 5 conclude that, performance of classifier increase when preprocess data by MCMUS algorithm before applying classifier. K-means clustering algorithm used for clustering majority class samples in to k clusters. In this project k=3 used. Once data is clustered two methods are used to select the data samples from each clustered. These selected samples then combine with minority class sample and new training dataset will generate. The size of new training samples is small but helpful to classify the imbalance dataset. Comparison between SVM and KNN classifier demonstrates that performance of KNN classifier with MCMUS algorithm is better than SVM classifier. Although SVM classifier has good theoretical foundation in classification, performance will degrades as the class imbalance ratio increased.

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Concepts and Derivatives of Web Services

Atieh Khanjani and Wan Nurhayati Wan Ab. Rahman
Faculty of Computer Science and Information TechnologyUniversitiPutra Malaysia 43400 UPMSerdang, Selangor, Malaysia

Abstract:*Since the web services are growing rapidly in cloud, service consumers and providers are looking for a means to find better services that satisfy both parties. From both user's and developer's perspectives, discovering functional and non-functional characteristics of a web service is essentially considerable. Due to overcoming the above issues many research have been published to improve the usage of web services to satisfy customers. The paper reviews the literature of web services with respect to quality of service (QoS) or non-functional properties, to acquire better understanding of concepts and issues related to QoS web service selecting and discovering processes.*
Keywords *- web service, QoS, standards, UDDI, WSDL, SOAP, non-functional properties*

I. Introduction

As today, businesses are willing to make their solutions on the web services technology, the need to have more and more acceptable and reliable one seems clear and this may not be able except improving the quality of web services through adding non-functional properties and applying high quality standards to satisfy both customer and marketplace vendors.Web services are self-describing and modular components that can be advertised, published, located and discovered through the Internet by using such a standards and protocols as Simple Object Access Protocol (SOAP), Universal Description Discovery and Integration (UDDI) and Web Service Description Language (WSDL)[1]. Access to services over the internet has relied on the interaction between a web server and a browser through using the HTTP protocol. The programmatic way to access to the services over the internet, called web services [2].

An internet (web) application can request several services such as payment services which can invoke an authentication services. Such a system is identified as a composite web services which is established statistically or dynamically. Dynamic web service composition needs service consumer to discover service provider to cope with the given functional and non-functional requirements[3].The non-functional requirements are also known as Quality of Service (QoS) requirements. Traditional web sites fulfill all components required to perform user transactions such as user interface, business logic, and access to the data base while web services sites, give users the opportunity to access to some or all of these services through a user interface- programs that provide these services over the web[2]. However, with emerging and increasing number of web services on the Internet web investigating quality of web services is becoming more and more considerable.Different web service QoS characteristics can be categorized as:

- User-independent or certain properties such as price and popularity that advertised by provider side;
- User-dependentor uncertain QoS propertiessuch as failure, response time and throughput which is related to the users and can be influenced by the Internet connection and user environments[4].

The following part of the paper consists of history of web services discussed in section 2, QoS requirements for web services stated in section 3, web service life cycle in section 4, web service versus web application presented in section5, two perspectives of web services for QoS in section 6 and finally we have concluded our work.

II. The History Of Web Services

The term "web services" has been uttered for the first time by Bill Gates in 2000. However, web services did not come from only Microsoft and many firms are interested in building electronic marketplaces. Electronic Data Interchange (EDI) is the first effort for making a standard for e-businesses came on the scene 25 years ago. On that time, there have been a lot of efforts in the world for connecting business logic over the Internet such as Common Object Request Broker Architecture (CORBA), Java Remote Method Invocation (RMI) and Unix Remote Procedure Call (RPC). However, these standardsfailed to earnimportant market share or adequate force to succeed. EDI and CORBA (an OMG standard which enables software components interact with each other through multiple languages and platform) were difficult to implement because of their complexity,cost, lack of flexibility and industrysupport.

Previously, getting agreement from vendors for a network service transport protocol were impossible while with emergingweb this problem solved because the web representedan academic decision throughintro-

ducing the lower level transports (TCP/IP& HTTP) for standardized communication.During that time the web went in its mainstream in 1994, TCP/IP was a mature standard. Http, in 1997 is known as a universal business standard. With emerging HTTP and TCP/IP, the main work was regarding to messaging, data encapsulation and cooperation between vendors.

XML invention makes the way proper for web services. XML officially became a platform-independent and proper standard for deployment in applications in 1998. In December 1999, while the electronic marketplace was the hot topic. The Microsoft through having a meeting with IBM and other companies represented the SOAP 1.0 and its definition for being a standardized protocol based on XML for message-passing.

By year 2000, while the SOAP was gaining wider acceptance, the IBM and Microsoft merged their protocol proposals regarding contributed network accessible service specification language and WSDL and SOAP respectively and in the autumn they announced the merged WSDL.With SOAP and WSDL, companies could create and describe their web services. But what about the advertisement and locate of the services provided by service provider. However in March 2000, IBM, Microsoft, and Ariba started working on the way to place the services that was Universal Description, Discovery, and Integration (UDDI).UDDI 1.0 was introduced in September 2000.At the end of 2000 with working these three standards together (SOAP, WSDL, and UDDI), the defacto standards to develop web services had created[5].

III. QoSRequirementsfor Web Services

QoS that is a set of non-functional properties is an importantparameter to distinguish the web services. QoS is also one of the factors to enhance the adoption rate of web services and impact the quality of web services as well[6]. The need to consider QoS properties for web services is because of attracting more users and improving the quality of WS.In fact in terms of providing a service, when a service provider only considers to functional requirement, the provided services will not satisfy users at runtime.Moreover since WSDL only describes functional requirements of the system and is not able to describe non-functional properties, we need to consider QoS to satisfy customer[7].Some of the most important QoS properties are presenting as follows:

- Accuracy: represents the error rate which is produced by the service.
- Scalability: represents ability of web services to consistently fulfill the requests although there are numbers of request's volume.
- Capability: represents the numbers of requests handled by service [8].
- Performance:In [9]the authors stated that performance can be measured by throughput and latency. Good performance comes from lower latency and higher throughput. Besides, performance can be determined by the response time to make sure that the maximum time needed to fulfill a service request has been gotten.
  - Throughput: number of invokes that is served at a specified time period.
  - Latency: round-trip time tosend a request and receive the answer.
- Reliability: measures how the quality of web services performs through a specific time and network conditions. WS-Reliability guarantees that a message is delivered exactly one time [10].
- Availability:determines that the web services are ready for immediate use and a service is available or not. If the value is high it shows the service is ready to use while if it is small it means that the service can be used only in particular time[11].
- Flexibility: represents how a service can function correctly when the input is invalid, incomplete or conflict.
- Exception handling: represents how the service handles the exceptions (special cases or unanticipated possibilities) [6].
- Integrity:shows the capability of web services to maintain the correctness of the resource interaction.
- Regularity: is a quality factor that follows the rules and laws, compliance with standards and service level agreement.
- Stability: is the services' s attributes modification rate [8].
- Cost: represents how to measure the cost of service requesting usually based on the amount of request or the volume of data.
- Completeness: represents how to measure the difference between the specified and implemented set of features.
- Security:is the quality factor which can be measured by authenticating, encrypting and access control to messaging.
- Accessibility: represents capability to serve a request. Or probability that measuresrecognition of the success rate of service introduced at a point of time. Higher accessibility can be achieved by higher scalability of the system.
- Dependability: represents how to deliver a service that can justifiably be trusted[1].
- Compliance: is a property that determines whether the service is compatible with standards or not.

- Trustiness: depends on the experience of the users which use the system. It alsoevaluates the reliability of user reports.

IV. Web Service Life Cycle

In the fundamental web service life cycle process, there is three parts: service provider, service customer and UDDI registry; however in some cases there is no UDDI interfering, so the provider and user can communicate directly to each other[12],[13]. Figure1 indicates the process of web services. The service providers publish their service to UDDI registry through the IP address or an identification key. The client asks for the services from UDDI, the registry then checks in the data base and returns back the service to the user. The client may invoke directly the service from provider as well. But the problem is that in this model the user does not know about the quality of web services. To solve such a problem, some researchers proposed models regarding considering QoS properties while finding a web service [12],[14],[15],[16].

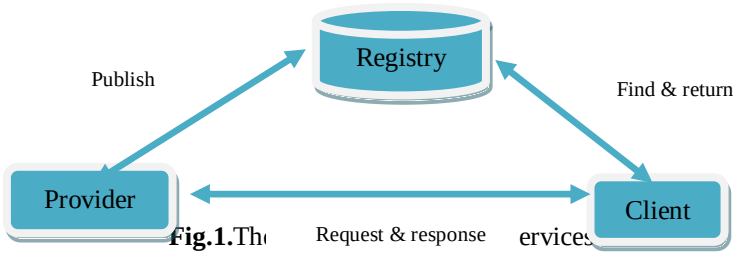

Fig.1. Th ervices

Ran [6] proposed a web service registration and discovery model that applied a certifier to verify non-functional properties (QoS) of web services. Another research [17] suggested a web service broker to interaction between client, provider and UDDI. In some researches, they added the QoS to the registry - UDDI [18]or extend the WSDL file to support the non-functional properties as well [19]. In [20], they proposed an approach for service selection based on authenticity of QoS and user confidence. Regarding to discovering web services another research performed by using AI methods (Neural Network) to find a best solution [21]. The same authors in another article added a QoS manager to web service selection which enables users to control the process of service discovery [22]. In [23], they proposed a web service selection model based on the QoS properties (WSSM-Q) to provide QoS support for publishing and searching the web services considering a rank for the services to be selected with high quality.The authors in [24] completed the previous work by adding a threshold value for QoS properties and practically examined the model by creating insurance application.An efficient discovery model based on QoS and meta data presented in [25]. In another paper they proposed six dimensional (agreed, expected, transmitted, statistic, delivered and perceived) QoS framework to access quality of web services[26]. A work on QoS ontology for service discovery to solve the problems of syntax service discovery has been done when there are a large number of developers and user exist [27]. Similar works related to the QoS ontology for web service selection performed by [28], [29], and [8]. To evaluate web services and access quality of web services also a lot of researches has been done using common criteria [30], choice-making method [31], unified model [32], agents [33],[34],[35]and adaptive algorithm [36]to predict web service QoS.Table 1 indicates the comparison between fundamental models of web services life cycle process which consider QoS.

Table 1. Comparison between QoS models

Models	Author	Year	Benefits	Limitations
Broker [35]	Rajendran and Balasubramanie	2010	Optimal and agent based dynamic service discovery architecture, add certifier	User perspective
Certifier [6]	Ran	2003	Used certifier to rank	User perspective
Extend UDDI [8]	Yin et al.	2010	QoS framework with ontology, OWL-S/UDDI translator (both numerical & semantic)	Did not mention to certification and ranking of QoS
WSSM-Q [23]	Liu et al.	2009	Ranking	User perspective
QoS Threshold [34]	Raj and Sasipraba	2010	Completed [35] with threshold	User perspective
Six-dimensional [26]	Nanet al.	2008	Six-dimensional QoSW framework to describe in SLA, monitor and assess. Both user and provider side.	Not evaluated.
Q-WSDL [19]	D'Ambrogio	2006	Extension of WSDL by introducing the metamodel to enable QoS for WSDL when registering or establish SLA	Not evaluated
AI methods (Neural Network) [21]	Al-Masri and Mahmoud	2009	Apply ANN nodes and the performance is 95% success to find the desired web service	User perspective/discovery phase

WS Relevancy Function (WsRF) & WS-QoS Manager [22]	Al-Masri and Mahmoud	2007	Measuring therelevancy ranking of a Web service based on QoS& user preferences.	User perspective/discovery phase
Broker [17]	Tian	2003	Agent to support & manage QoS keeps the information up to date. Remove the expired offer from the catch. Extension for WSDL file to support QoS	There is no ranking and weighting for the QoS selection.

The result of the comparison illustrates that most of the researches currently are focusion user perspective, discovery phase and description phase while there is still a huge lack of work on provider perspective and development phase.

V. Web Services Versus Web Applications

Web applications are more widely than web services, a web service can be a part of web application but web application may not be a web service.Moreover, when you look at a web page you have to use a web browser (Internet Explorer or Firefox) to query a web server for viewing the web page while in web services because of using SOAP technology, you are able to use your application to query a server and run a program.

Consider thatsuch a kind of things in web pages standards or HTML is impossible. An example for better understanding of the differences between web pages and web services can be the online banking or hotel booking services.In online banking service, if we apply web pages we have to access to the bank account (e.g. to transfer money), bill paying and a page related to manage the credit cards. Although these three applications are separate, it means while paying the bills cannot view the account balance and this is because they reside on different platform and run by different servers. But when we are using web services through SOAP protocol this problem will be solved because SOAP is not rely on the platform and language[37]. In the other word a web service is an online service available through the internet via HTTP for interaction with the other programs.

Against web pages that user should interact through a GUI, in web services there is no GUI for interaction. Because it uses XML document and need a client-side parser. As a matter of fact, the web services are mostly like application components that can be used by another application. Furthermore the main goal of service discovery is quite different from web searches. Usually users search for the web pages to find a source or specific interested topic while consumer search for the web services to find an interesting domain to integrate to their systems. Moreover client not only looks for the web services to meet the requirement but the founded services need to consider a degree of QoS as well [38].

VI. QoSWeb Services Perspectives

There are two perspectives for considering QoS in web services: users and providers. Both perspectives are trying to enhance the quality of web services by considering QoS as one of the essential factors for improving the quality of web services. From the user side perspective, it is important to attend the level of satisfaction and consistency of QoS parameters with the user's desire. However there are some QoS parameters that should be consider through user preference with filling up the forms and voting process at the execution time of the web services to show how much they were satisfy from the web services and with which specific QoS because some of the QoS parameters are domain-relevant and should be consider only to that specific services. Reputation is one of the most famous QoS attribute related to the user side perspective. Furthermore enabling clients for customizing their own discovery process is one of the challenging issues in recent research works(Al-Masri and Mahmoud, 2007). From the other side provider perspective is to consider QoS aspects of web services at the beginning stage and to publish and advertise web services to the registries (like UDDI). In this perspective provider tries to improve the quality of their web services by incorporating the QoS in the design stage (like predicting QoS).Most of the recent researchers concentrated on client side to incorporate the user preference for selecting and discovering the best web services. Table 2 shows the QoS attributes for two perspectives of WS which is the user and provider. However, as it is clear some attributes can be affected by both perspectives**.**

Table 2. The QoS attributes from web service perspectives

User perspective	Provider perspective
Reputation	Time-to-market
Availability	Availability
Performance	Performance
Accessibility	Failure rate
Speedy	Compliance
Scalability	Conceptual integrity
Privacy	Security
Reliability	Reliability

Table 2 shows the most important and common attributes of QoS among two perspectives.As it is clear from the table some of these attributes can be consider only from one side such as reputation which usually consider only from user perspective and some of them should be consider for both perspective such as reliability.

VII. Conclusion

Web services came to solve many problems of the life. Each service is to solve one or more problem. However, what if there are two or more similar web services available for one problem. Therefore, the QoS of the web service is an important consideration. Thus, to have a successful web services that satisfy both consumers and providers, the consideration of QoS issues seems critical and vital. Since QoS for web services is still a new topic there been extensive researches in finding a suitable and viable wayhow to improve the quality of web services. The paper reviews the concepts and fundamental aspects of QoS web services to acquire better understanding how the web services works under QoS parameters. The paper shows how the process of considering QoS in web service life cycle is improving by the comparison between four fundamental models. In addition, the paper has highlighted the lacked of QoS parameters consideration especially at the provider side.

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Improvement of Image Deblurring Through Different Methods

A. Anusha[1] , Dr. P. Govardhan[2.]
[1]*computer Science /Vardhaman College Of Engineering /India*
[2]*information Technology/ Vardhaman College Of Engineering /India*

Abstract: *In this paper, we analyze the research on this topic both theoretically and experimentally through different methods the deterministic filter; Bayesian estimation, the conjunctive deblurring algorithm (CODA),and alpha tonal correction method which performs the deterministic filter and Bayesian estimation in in a conjunctive manner. We point out the weakness of the deterministic filter and unify the limitation latent in two kinds of Bayesian estimators. .The proposed algorithm, alpha tonal correction methods, which gives better performance than the deterministic filter and sharp image estimation. We point out the weaknesses of the deterministic filter and unify the limitation latent in two kinds of image estimation methods. I further explain proposed alpha correction method which can able to handle quite large blurs beyond deterministic filter and image estimation. Finally, I demonstrate that our method outperforms state-of-the-art methods with a large margin.*

Key words *-Blind image DE convolution, image sharpening, alpha Tonal correction and deterministic filter.*

I. Introduction

Recovery of a sharp image from a blurred one is a chronic ill proposed problem for many scientific applications, such as astronomical Imaging and consumer photography. Generally, there are many properties of a camera and a scene that can lead to blur, i.e., spatially uniform defocus blur dependent on depth, spatially varying defocus blur due to focal length variation over the image plane, spatially uniform blur due to camera translation, spatially varying blur due to camera roll, yaw and pitch motions, and spatially varying blur due to object movements. In this paper, Our goal is to reveal the limitations and potentials of recent methods when dealing with quite large blurs and severe noise. What are the main challenges and what are the key components that make handling quite large blurs and severe noise possible? What should attract further research efforts in the future additionally; additionally we design a novel deblurring method to handle various large blurs and significant noise. I consider the research on this topic has evolved mainly through two paradigms
1) The deterministic sharpening filter 2)sharpening image Bayesian estimation using blind DE convolution method. in this paper I focus on third paradigm the alpha tonal correction method in next review these Three paradigms by reveling the latent limitations.

.**Alpha Rooting**

Alpha rooting is a transform based enhancement algorithm [7]. It works by performing some orthogonal transform, such as the Fourier Transform; modifying the coefficients with the phase kept invariant, and performing the inverse transform. The coefficient magnitudes are modified as follows:

$$O(p,s) = X(p,s) \times \left|X(p,s)\right|^{\alpha-1}$$

II. Different Deblurring Techniques

The deterministic filter can be modeled as deterministic func-tionof the input blurred image , with denoting

The output sharp image. The leftmost flowchart in Fig. 1illustrates the first paradigm. One of the most well-known approachesin this paradigm is unsharp masking, of which the basic idea is to reduce the low frequency first, and then highlightthe high-frequency components. The performance varies according to the adopted high-pass filters and the adaptive edge weights

Fig.1 Example for Image deblurring

This approach assumes that the blurred edges do not drift too far away from the latent sharp edges; thus, it can handle only the defocus blurs and very small motion blurs. For very large blurs, the image narrow edges or details are severely damaged and very difficult to restore. Apractical solutionis to detect and restore large step edges explicitly or implicitly,which we call the step-edge-based filter (SEBF). Explicit SEBFfirst locates the step edge and then propagates the local intensity extrema toward the edge . Implicit SEBF performs edge detection and restoration in a single step, based on zero crossings of high-pass filters. Commonly used implicit SEBFs include the shock filter , the backward diffusion ,the morphologica lfiltering ,the fuzzy operator and many other adapted versions. Compared with the second paradigm, i.e., Bayesian estimation, the SEBF has the following advantages: 1) The SEBF can handle various blurs without adaptation because it is independent of the blurring processes (blur models), and 2) The per-formance of the SEBF is not constrained by the sample number(SN) because it depends on image local features rather than sufficient samples.The first advantage has been noticed by Joshi *et al*. They propose a novel SEBF to handle complex but small natural blurs.

2.1 Limitations of the first paradigm

The deterministic filter have been widely used in sharpening small blurs. The SEBF can handle very large blur kernels. We take the shock filter as an example, i.e.

$$I^{(t+1)} = I^{(t)} - sign(\Delta I^{(t)} \parallel \nabla I^{(t)} \parallel_1 dt)$$

where $I^{(t)}$ is an image at time , Δ is Laplacian operator, and *dt* is the time step for a single evolution. The shock filter sharpens image at infection points (zero crossings of the second derivative), thus depending on image local features rather the SN.The local extreme of remain unchanged in the evolutions. Fig. 2 gives two small images blurred by large kernels. Although it is intuitively correct that Bayesian estimation can handle most blurred images, experiments of the aforementioned MAP estimators have shown that the performance is not always stable, sometimes even worse than the deterministic filters. The unstable performance gain is due to the following reasons:

1) A Bayesian estimator is built for a specific blur model and cannot handle other types of blurs without adaptation.

2) The performance highly depends on the SNs and statistics.

2.2 Bayesian Estimation

In this paradigm, both the kernel and image are taken as samples from some probability spaces. The goal is to solve for the unknowns that minimize the expected value of a loss function. The most commonly used loss function is the Dirac delta function, which yields the maximum a posterior (MAP) estimator. The center flow chart in Fig.1shows such a second-paradigm approach. Bayesian estimation has been recently hotly discussed because it has led to great progress. The success of it stems from the use of various image priors and estimators. In the MAP (L, K) case, which solves for both the kernel and image simultaneously, and a MAP (L, K) case, which solves for the kernel alone. It has been pointed out that naive a MAP (L,K) estimator fails to yield the desired result since the sparse priors prefer no-blur explanations. Current MAP estimators avoid the trivial solution by integrating many additional components, such as sharp edge detection iterative likelihood update and sparse representation under frame let and curve let system. By contrast, the MAP (L, K) estimator is well constrained and can accurately recover the true kernel if the image size is much arger than the kernel size Compared. With the first paradigm, Bayesian estimation has the following advantages:

1) The approach is not sensitive to local narrow edges because it depends on statistics,

2) It is not sensitive to image noise if the noise is not too much to change the statistics.

Limitations of Bayesian Estimation

Fig. 2 demonstrates that the MAP and MAP estimators have very similar performance with respect to the same SN. They both belong to Bayesian estimation and should have similar properties. The estimation states that theory states that when the SN is small , the Bayesian estimation will be "biased" toward the prior mean, which, however, is not the true solution in the blind de- convolution case. From the perspective of the energy function to understand this limitation.

2.3.Blind deconvolution in image processing

In image processing and applied mathematics, blind deconvolution is a deconvolution technique that permits recovery of the target scene from a single or set of "blurred" images in the presence of a poorly determined or unknown point spread function (PSF). Regular linear and non-linear deconvolution techniques utilize a known PSF. For blind deconvolution, the PSF is estimated from the image or image set, allowing the deconvolution to be performed. Researchers have been studying blind deconvolution methods for several decades, and have approached the problem from different directions

III. Alpha Rooting

Alpha rooting is a transform based enhancement algorithm [7]. It works by performing some orthogonal transform, such as the Fourier Transform; modifying the coefficients with the phase kept invariant, and performing the inverse transform. The coefficient magnitudes are modified as follows:

$$O(p,s) = X(p,s) \times \left|X(p,s)\right|^{\alpha-1}$$

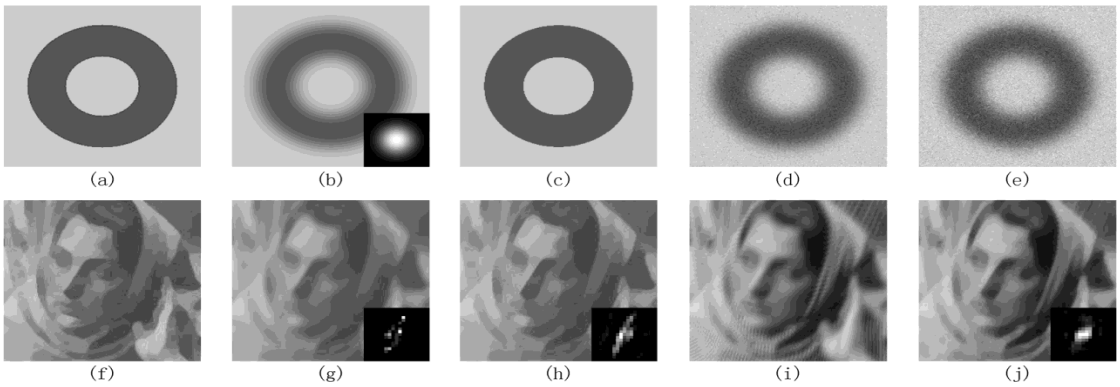

Fig.2. (a)Original sharp image. (b) The blurred image without noise. The Gaussian kernel is producedby MATLAB with special ("Gaussian", 61, 11). (c) The recovered image from (b) by the shock filter. (d) The blurred image with large noise. (e) The recovered image from (d) by the shock filter. (f) The original sharp image without narrow edges. (g) The blurred image and the kernel. (h) The recovered image from (g) by the shockk filter. PSNR

Where *O(p,s)* is the 2-D Fourier Transform of the output image, *X(p,s)* is the 2-D Fourier transform of the input image, and the range of alpha is *0 = á = 1*. As alpha rooting reduces the magnitude of the transform coefficients, it naturally compresses the range of an image. Also, as the phase data remains unchanged, image edges are preserved. Because of this, it is understandable that this would be used to process the smoothed image.

Figure 5 shows sample results for the method in figure 2, using alpha rooting to process the smoothed image. These resulting images have good contrast and show the important image objects without sacrificing detail.The goal of image enhancement is to improve the image quality of the de-blurred image so that the resultant image is better than the original image for a specific application or set of objectives. Proposed are new contrast measure and novel image enhancement algorithms. The contrast measure is derived from Michelson's law of the human visual system and is used in spatial domain. Proposed algorithms performances are quantitatively compared the one of the best transform based image enhancement algorithm: **α – rooting.** The fundamental advantages of these algorithms are

a) They perform "better" than modified α –rooting

b) They can be used for enhancement of images in the decompression stage.

c) They can be used for automatically choosing the best enhancement method, and the best parameters

A simple multi-scale image enhancement algorithm for compressing image dynamics and enhancing image details in the Fourier transform domain is presented. First, an image is separated into illumination and reflectance components. Next, the illumination component is manipulated adaptively for image dynamics by using a content measure. The content measure using the energy distribution of the coefficients is defined directly

in each block of an image. Then, the reflectance component is altered by a multi-scale α-rooting method for enhancing image details based on human visual perception. The main advantage of the proposed algorithm enhances the details in the dark and the bright areas with low computations without boosting noise information and affecting the compressibility of the original image since it performs on the images in the compressed domain. In order to evaluate the proposed scheme, several base-line approaches can be described and compared using enhancement quality measures.

3.1alpha Tonal Correction

The adaptive tonal correction algorithm presented here uses the low- exposure or darker looking image as its input and enhances its appearance via tonal correction by making use of the mean (brightness) and variance (contrast) of the original blurred image in an adaptive manner. The main contribution here thus consists of an automatic process by which the tonal correction is done. The following tonal curve equation is considered in our algorithm is:

$$f(X) = \frac{\log(ax - x + 1)}{\log x}$$

Whereas x denotes pixel values of the input image, and the α is a parameter altering the brightness α s level. The optimal value of α is considered to be the one that makes the brightness of the enhanced image equal to the brightness of the blurred image This correction also improves the image contrast. To further improve the contrast, a second tonal correction curve can be used to match the contrast of the blurred image. Among various possible curve functions.

$$g(x) = \frac{\arctan(\beta(f(x) - 0.5)) + 0.5)}{2\tan(\beta/2)} - (3)$$

Whereas β a parameter altering theContrast level. The optimum value of β is taken to be the one that makes the contrast of the enhanced image equal to the contrast of the blurred image.To obtain the optimum parameter values in a computationally efficient manner, the binary search approach is used.

IV. Conclusion

Recovery of the sharp image from a blurred one is an important and long- standing problem for many applications. In this paper, we have rest analyzed the potentials and limitations latent in recent methods when handling quite large blurs and significant noise. While our method.out performs state-of-the-art methods both in robustness to noise and the capability of handling quite large blurs, it is still limited by the images dominated by narrow edges. Recovering the totally damaged narrow edges is still a very challenging problem faced by state-of-The-art methods and should attract further research methods.

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A Heart Disease Prediction Model using Decision Tree

Atul Kumar Pandey[1],Prabhat Pandey[2],K.L. Jaiswal[3],Ashish Kumar Sen[4]
[1]*Assistant Professor of Computer Science, Department of Physics, Govt. PG Science College, Rewa(M.P.)-India,*
[2]*OSD, Additional Directorate, Higher Education, Division Rewa (M.P.)-India,*
[3]*Assistant Professor and In charge of BCA, DCA & PGDCA, Department of Physics, Govt. PG Science College, Rewa(M.P.)-India-486001,*
[4]*Assistant Professor, Department of Mathematics & Computer Science, Govt. PG Science College, Rewa(M.P.)-India,*

Abstract—*In this paper, we develop a heart disease prediction model that can assist medical professionals in predicting heart disease status based on the clinical data of patients. Firstly, we select 14 important clinical features, i.e., age, sex, chest pain type, trestbps, cholesterol, fasting blood sugar, resting ecg, max heart rate, exercise induced angina, old peak, slope, number of vessels colored, thal and diagnosis of heart disease. Secondly, we develop an prediction model using J48 decision tree for classifying heart disease based on these clinical features against unpruned, pruned and pruned with reduced error pruning approach.. Finally, the accuracy of Pruned J48 Decision Tree with Reduced Error Pruning Approach is more better then the simple Pruned and Unpruned approach. The result obtained that which shows that fasting blood sugar is the most important attribute which gives better classification against the other attributes but its gives not better accuracy.*

Keywords—*Data mining, Reduced Error Pruning, Gain Ratio and Decision Tree.*

I. Introduction

The diagnosis of heart disease in most cases depends on a complex combination of clinical and pathological data; this complexity leads to the excessive medical costs affecting the quality of the medical care [1]. According to the statistic data from WHO, one third population worldwide died from heart disease; heart disease is found to be the leading cause of death in developing countries by 2010. It shows one third American adult have one or more types of heart diseases based on American Heart Association report. Computational biology is often applied in the process of translating biological knowledge into clinical practice, as well as in the understanding of biological phenomena from the clinical data. The discovery of biomarkers in heart disease is one of the key contributions using computational biology. This process involves the development of a predictive model and the integration of different types of data and knowledge for diagnostic purposes.

Furthermore, this process requires the design and combination of different methodologies from statistical analysis and data mining [2,3].

In the past decades, data mining have played an important role in heart disease research. To find the hidden medical information from the different expression between the healthy and the heart disease individuals in the existed clinical data is a noticeable and powerful approach in the study of heart disease classification. Heart disease classification provides the critical basis for the therapy of patients. Statistics and machine learning are two main approaches which have been applied to predict the status of heart disease based on the expression of the clinical data [4,5].

Data mining (DM) is the core stage of knowledge discovery in databases (KDD), which is a "nontrivial extraction of implicit, novel, and potentially useful information from data" [6]. It applies machine learning and statistical methods in order to discover areas of previously unknown knowledge. As a rule, the KDD process involves the following steps: data selection, data pre-processing, transformation, DM (induction of useful patterns), and interpretation of results. Several data mining techniques are used in the diagnosis of heart disease such as naïve bayes, decision tree, neural network, kernel density, bagging algorithm, and support vector machine showing different levels of accuracies.

One of the most common classification models is the decision tree, which is a tree-like structure where each internal node denotes a test on a predictive attribute and each branch denotes an attribute value. A leaf node represents predicted classes or class distributions [7]. An unlabeled object is classified by starting at the topmost (root) node of the tree, then traversing the tree, based on the values of the predictive attributes in this object. Decision-tree techniques assume that the data objects are described by a fixed set of attributes, where each predictive attribute takes a small number of disjoint possible values and the target (dependent) variable has discrete output values, each value representing a class label.

There are several known algorithms of decision tree induction: ID3 - which uses information gain with statistical pre-pruning, C4.5, an advanced version of ID3, and probably the most popular decision-tree algorithm [8], ART, which minimizes a cost-complexity function, See5 - which builds several models and uses unequal misclassification costs, and IFN – Info-Fuzzy Network which utilizes information theory to minimize the number of predictive attributes in a decision-tree model [9] [10]. In [9], the IFN algorithm is shown empirically to produce more compact models than C4.5, while preserving nearly the same level of classification accuracy.

II. Methods

A. Data sources

In this paper, we use the heart disease data from machine learning repository of UCI [11]. We have total 303 instances of which 164 instances belonged to the healthy and 139 instances belonged to the heart disease. 14 clinical features have been recorded for each instance.

B. Features description

Table 1 shows the 14 clinical features and their description.

. Table 1- Clinical features and their description

Clinical features	Description
Age	Instance age in years
Sex	Instance gender
Cp	Chest pain type
Trestbps (mmHg)	Resting blood pressure
Chol (mg/dl)	Serum cholesterol
Fbs	Fasting blood sugar
Restecg	Resting electrocardiographic results
Thalach	Maximum heart rate achieved
Exang	Exercise induced angina
Oldpeak	ST depression induced by exercise relative to rest
Slope	The slope of the peak exercise ST segment
Ca	Number of major vessels (0-3)colored by flourosopy
Thal	3 = normal; 6 = fixed defect; 7 = reversible defect
Num	Diagnosis of heart disease

In Table 1, there are 14 attributes used in this system, including 8 symbolic and 6 numeric: age (age in years), sex (male, female), Chest pain type (typical angina, atypical angina, non-angina pain, asymptomatic), Trestbps (resting blood pressure in mm Hg), cholesterol (serum cholesterol in mg/dl), fasting blood sugar < 120 mg/dl (true or false), resting electrocardiographic results (normal, having ST-T wave abnormality, showing probable or definite left ventricular hypertrophy by Estes' criteria), max heart rate, exercise induced angina (true or false), oldpeak (ST depression induced by exercise relative to rest), slope (up, flat, down), number of vessels colored by fluoroscopy (0-3), thal (normal, fixed defect, reversible defect), and class (healthy, with heart-disease).

III. Decision Tree

The decision tree type used in this research is the gain ratio decision tree. The gain ratio decision tree is based on the entropy (information gain) approach, which selects the splitting attribute that minimizes the value of entropy, thus maximizing the information gain [15]. Information gain [12] is the difference between the original information content and the amount of information needed. The features are ranked by the information gains, and then the top ranked features are chosen as the potential attributes used in the classifier. To identify the splitting attribute of the decision tree, one must calculate the information gain for each attribute and then select the attribute that maximizes the information gain. The information gain for each attribute is calculated using the following formula [14, 15]:

$$\mathbf{E} = \sum_{i=1}^{k} \mathbf{Pi}\ \mathbf{log_2 Pi}$$

Where k is the number of classes of the target attributes Pi is the number of occurrences of class i divided by the total number of instances (i.e. the probability of i occurring). To reduce the effect of bias resulting from the use of information gain, a variant known as gain ratio was introduced by the Australian academic Ross Quinlan [15]. The information gain measure is biased toward tests with many outcomes. That is, it prefers to select attributes having a large number of values [13]. Gain Ratio adjusts the information gain for each attribute to allow for the breadth and uniformity of the attribute values.

Gain Ratio = Information Gain / Split Information

Where the split information is a value based on the column sums of the frequency table [15].

IV. Results and Discussion

We demonstrate here the usefulness of the prediction model to the clinical data of heart disease where training instances 200 and testing instances 103 using split test mode.

Table 2- summarizes the results generated from different approches.

	J48 Unpruned tree	J48 Pruned tree	J48 Reduced Error Pruning
Percent Correct	72.82	73.79	75.73
Number Correct	75	76	78
IR Precision	0.68	0.72	0.74
No. of Rules	14	33	11
Tree Size	24	56	17
F Measure	0.78	0.77	0.79

After extracting the decision tree rules, reduced error pruning was used to prune the extracted decision rules. Reduced error pruning is one of the fastest pruning methods and known to produce both accurate and small decision rules [16]. Applying reduced error pruning provides more compact decision rules and reduces the number of extracted rules.

```
thal = fixed_defect
|  ca <= 0: <50 (6.12/2.06)
|  ca > 0: >50_1 (6.0)
thal = normal
|  exang = no: <50 (93.56/15.0)
|  exang = yes
|  |  cp = typ_angina: <50 (2.0)
|  |  cp = asympt
|  |  |  ca <= 0: <50 (5.56/2.55)
|  |  |  ca > 0: >50_1 (7.0)
|  |  cp = non_anginal: <50 (2.0)
|  |  cp = atyp_angina: <50 (2.0)
thal = reversable_defect
|  cp = typ_angina: >50_1 (5.0/2.0)
|  cp = asympt: >50_1 (50.39/4.0)
|  cp = non_anginal
|  |  slope = up: <50 (4.39/1.0)
|  |  slope = flat: >50_1 (10.0/4.0)
|  |  slope = down: <50 (1.0)
|  cp = atyp_angina: <50 (7.0/3.0)
```

Fig 1- J48 pruned tree with reduced error pruning approach

V. Conclusion

This work will provide better diagnosis the heart patients than the previous. We develop a heart disease prediction model that can assist medical professionals in predicting heart disease status based on the clinical data of patients. Firstly, we select 14 important clinical features, i.e., age, sex, chest pain type, trestbps, cholesterol, fasting blood sugar, resting ecg, max heart rate, exercise induced angina, old peak, slope, number of vessels colored, thal and diagnosis of heart disease. Secondly, we develop a prediction model using J48 decision tree for classifying heart disease based on these clinical features against unpruned, pruned and pruned with reduced error pruning approach. Finally, the accuracy of Pruned J48 Decision Tree with Reduced Error Pruning Approach is more better then the simple Pruned and Unpruned approach. The result obtained that which shows that fasting blood sugar is the most important attribute which gives better classification against the other attributes but its gives not better accuracy.

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Implementation of Secure Cloud Storage Gateway using Symmetric Key Algorithm

Vijayalakshmi M.M.[1], Prof. Sharayu pradeep [2]
[1,2]*Dept. of CSE CIT, Gubbi, Tumkur, Karnataka, INDIA,*

Abstract: *Focusing on engineering computing and optimization tasks, this paper investigates secure outsourcing of widely applicable linear programming (LP) computations. In order to achieve practical efficiency, our mechanism design explicitly decomposes the LP computation outsourcing into public LP solvers running on the cloud and private LP parameters owned by the customer. The resulting flexibility allows us to explore appropriate security/ efficiency tradeoff via higher-level abstraction of LP computations than the general circuit representation. In particular, by formulating private data owned by the customer for LP problem as a set of matrices and vectors, we are able to develop a set of efficient privacy-preserving problem transformation techniques, which allow customers to transform original LP problem into some arbitrary one while protecting sensitive input/output information. To validate the computation result, we further explore the fundamental duality theorem of LP computation and derive the necessary and sufficient conditions that correct result must satisfy. Such result verification mechanism is extremely efficient and incurs close-to-zero additional cost on both cloud server and customers. Extensive security analysis and experiment results show the immediate practicability of our mechanism design.*
Keywords*: cloud customer, cloud server,fully homomorphic encryption (FHE), linearprogramming,*

I. Introduction

Cloud Computing has great potential of providing robust computational power to the society at reduced cost. It enables customers with limited computational resources to outsource their large computation workloads to the cloud, and economically enjoy the massive computational power, bandwidth, storage, and even appropriate software that can be shared in a pay-per-use manner. Despite the tremendous benefits, security is the primary obstacle that prevents the wide adoption of this promising computing model, especially for customers when their confidential data are consumed and produced during the computation.

On the one hand, the outsourced computation workloads often contain sensitive information, such as the business financial records, proprietary research data, or personally identifiable health information etc. To combat against unauthorized information leakage, sensitive data have to be encrypted before outsourcing so as to provide end to- end data confidentiality assurance in the cloud and beyond. However, ordinary data encryption techniques in essence prevent cloud from performing any meaningful operation of the underlying plaintext data, making the computation over encrypted data a very hard problem. On the other hand, the operational details inside the cloud are not transparent enough to customers. As a result, there do exist various motivations for cloud server to behave unfaithfully and to return incorrect results, i.e., they may behave beyond the classical semi honest model.

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II. Problem Statement

2.1 System and Threat Model

We consider a computation outsourcing architecture involving two different entities, thecloud customer, who has large amount of computationally expensive LP problems to be outsourced to the cloud; the cloudserver (CS), which has significant computation resources and provides utility computing services, such as hosting the public LP solvers in a pay-per-use manner. The customer has a large-scale linear programming

problem_ (to be formally defined later) to be solved. However, due to the lack of computing resources, like processing power, memory, and storage etc., he cannot carry out such expensive computation locally. Thus, the customer resorts to CS for solving the LP computation and leverages its computation capacity in a pay-per-use manner. Instead of directly sending original problem _, the customer first uses a secret K to map _ into some encrypted version _K and outsources problem _K to CS. CS then uses its public LP solver to get the answer of _K and provides a correctness proof , but it is supposed to learn nothing or little of the sensitive information contained in the original problem description _. After receiving the solution of encrypted problem _K, the customer should be able to first verify the answer via the appended proof. If it's correct, he then uses the secret K to map the output into the desired answer for the original problem _.

2.2. Design Goals

To enable secure and practical outsourcing of LP under the aforementioned model, our mechanism design should achieve the following security and performance guarantees.

1)**Correctness**: Any cloud server that faithfully follows the mechanism must produce an output that can be decrypted and verified successfully by the customer.
2)**Soundness**: No cloud server can generate an incorrect output that can be decrypted and verified successfully by the customer with non-negligible probability.
3)**Input/output privacy**: No sensitive information from the customer's private data can be derived by the cloud server during performing the LP computation.
4)**Efficiency**: The local computations done by customer should be substantially less than Solving the original LP on his own. The computation burden on the cloud server should be within the comparable time complexity of existing practical algorithms solving LP problems.

2.3. Background on Linear Programming

An optimization problem is usually formulated as a mathematical programming problem that seeks the values for a set of decision variables to minimize (or maximize) an objective function representing the cost subject to a set of constraints. For linear programming, the objective function is an affine function of the decision variables, and the constraints are a system of linear equations and inequalities. Since a constraint in the form of a linear inequality can be expressed as a linear equation by introducing a non-negative slack variable, and a free decision variable can be expressed as the difference of two non-negative auxiliary variables, any linear programming
Problem can be expressed in the following standard form,

Minimize $c^T x$ subject to $Ax = b, x \geq 0.$ (1)

Here x is an n×1 vector of decision variables, A is an m×n matrix, and both c and b are n×1 vectors. It can be assumed further that $m \leq n$ and that A has full row rank; otherwise, extras rows can always be eliminated from A.

In this paper, we study a more general form as follows,

Minimize $c^T x$ subject to $Ax = b, Bx \geq 0.$ (2)

In Eq. (2), we replace the non-negative requirements in Eq. (1) by requiring that each component of Bx to be non-negative, where B is an n × n non-singular matrix, i.e. Eq. (2) degenerates to Eq. (1) when B is the identity matrix. Thus, the LP problem can be defined via the tuple _ = (A,B, b, c) as input, and the solution x as output.

III. Module Description

1. Mechanism Design Framework
2. Basic Techniques
3. Enhanced Techniques via Affine Mapping
4. Result Verification

3.1. Mechanism Design Framework:

We propose to apply problem transformation for mechanism design. The general framework is adopted from a generic approach, while our instantiation is completely different and novel. In this framework, the process on cloud server can be represented by algorithm ProofGen and the process on customer can be

organized into three algorithms (KeyGen, ProbEnc, and ResultDec). These four algorithms are summarized below and will be instantiated later.
• KeyGen (1k) → {K}. This is a randomized key generation algorithm which takes a system security parameter k, and returns a secret key K that is used later by customer to encrypt the target LP problem.
• ProbEnc (K,_) → {_K}. This algorithm encrypts the input tuple _ into _K with the secret key K. According to problem transformation, the encrypted input _K has the same form as _, and thus defines the problem to be solved in the cloud.
• ProofGen (_K) → {(y, □)}. This algorithm augments a generic solver that solves the problem _K to produce both the output y and a proof □. The output y later
Decrypts to x, and □ is used later by the customer to verify the correctness of y or x.
• Result Dec (K, _, y, □) → {x,⊥}. This algorithm may choose to verify either y or x via the proof □. In any case, a correct output x is produced by decrypting y using the secret K. The algorithm outputs ⊥when the validation fails, indicating the cloud server was not performing the computation faithfully.

3.2. Basic Techniques

Before presenting the details of our proposed mechanism, we study in this subsection a few basic techniques and show that the input encryption based on these techniques along may result in an unsatisfactory mechanism. However, the analysis will give insights on how a stronger mechanism should be designed. Note that to simplify the presentation, we assume that the cloud server honestly performs the computation, and defer the discussion on soundness to a later section.
1) Hiding equality constraints (A, b): First of all, a randomly generated m × m non-singular matrix Q can be part of the secret key K. The customer can apply the matrix to Eq. (2) for the following constraints transformation,
$Ax = b \Rightarrow A'x = b'$
where $A' = QA$ and $b' = Qb$.

3.3. Enhanced Techniques via Affine Mapping

To enhance the security strength of LP outsourcing, we must be able to change the feasible region of original LP and at the same time hide output vector x during the problem input encryption. We propose to encrypt the feasible region of _ by applying an affine mapping on the decision variables x. This design principle is based on the following observation: ideally, if we can arbitrarily transform the feasible area of problem _ from one vector space to another and keep the mappingfunction as the secret key, there is no way for cloud server to learn the original feasible area information. Further, such a linear mapping also serves the important purpose of output hiding.

3.4. Result Verification

Till now, we have been assuming the server is honestly performing the computation, while being interested learning information of original LP problem. However, such semihonest model is not strong enough to capture the adversary behaviors in the real world. In many cases, especially when the computation on the cloud requires a huge amount of computing resources, there exist strong financial incentives for the cloud server to be "lazy". They might either be not willing to commit service-level-agreed computing resources to save cost, or even be malicious just to sabotage any following up computation at the customers. Since the cloud server promises to solve the LP problem $_K = (A', B', b', c')$, we propose to solve the result verification problem by designing a method to verify the correctness of the solution y of _K. The soundness condition would be a corollary thereafter when we present the whole mechanism in the next section. Note that in our design, the workload required for customers on the result verification is substantially cheaper than solving the LP problem on their own, which ensures the great computation savings for secure LP outsourcing.

The LP problem does not necessarily have an optimal solution. There are three cases as follows.
• Normal: There is an optimal solution with finite objective value.
• Infeasible: The constraints cannot be all satisfied at the same time.
•Unbounded: For the standard form in Eq. (1), the objective function can be arbitrarily small while the constraints are all satisfied.

IV. Conclusion and future work

In this paper, for the first time, we formalize the problem of securely outsourcing LP computations in cloud computing, and provide such a practical mechanism design which fulfills input/output privacy, cheating resilience, and efficiency. By explicitly decomposing LP computation outsourcing into public LP solvers and private data, our mechanism design is able to explore appropriate security/efficiency tradeoffs via higher level LP computation than the general circuit representation. We develop problem transformation techniques that

enable customers to secretly transform the original LP into some arbitrary one while protecting sensitive input/output information.

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Green Computing and Energy Consumption Issues in the Modern Age

Masood Anwar, Syed Furqan Qadri and Ahsan Raza Sattar
*Department of Computer Science, University of Agriculture Faisalabad **38000**, PAKISTAN*

Abstract: *Green computing concept is to improve environmental condition. The main aim of green computing is to reduce toxic materials. We systematically analyze its energy consumption which is based on types of services and obtain the conditions to facilitate green cloud computing to save overall energy consumption in this system. Today it is the major issue to prepare such equipments by which we achieve efficient energy and to minimize of e-waste and use of non toxic chemicals/materials in preparation of e-equipments. We can implement green computing in computer's fields as CPU servers and other peripheral devices (mobile devices). By using green computing we can reduce resources consumption and disposal of electric waste (e-waste). It has been seen that computers and other electronics devices are increasing day by day, so the amount of electricity consumed by them is also increasing. In this way the percentage of co_2 in the atmosphere is also increasing. The other toxic materials which are used in computer/electronics industry are also harmful for environment. In this paper, we will elaborate comprehensively survey the concepts and architecture of green computing, as well as its heat and energy consumption issues. Their pros and cons are discussed for each green computing strategy with its friendly approach towards atmosphere. Green computing can facilitate us to safe, secure place and healthy environment all over in the world. This paper will help us to take some initiatives currently under in the field of computers/electronics industry and new ways to save vast amounts of energy which is wasted in very large scale.*

Keywords: *Green Computing, toxic material, e-waste, e-equipments, peripheral devices*

I. Introduction

The green computing technologies can reduce energy consumption. The temperature of global world is increasing very quickly. There are many factors but computers/electronics industry causes over emission of green house gas and use much energy consumption which is the main root cause of current global warming. The energy consumption may be reduced by introduction of green computing. We can prepare and manufacture such devices which take low energy, give out low heat and gases. Air stream, weather, medicine, transportation, agriculture uses machines which take much amount of power, money and consumption of energy. It has been seen that there are three main areas which affect our daily life, air which we breathe, water which we drink and food which we eat and the soil on which we live. The data centers use a large amount of power/energy and release a lot of amount of heat and gases. In our daily life we use AC's. Refrigerators, inverters, UPS and computers. These items take a large amount of energy and evolve heat and gases. These gases are very harmful our lives. It has been seen that AC and refrigerators release CFC type gases. The battery of inverters release also harmful chemicals like lead. It causes lungs type diseases like cancers, asthma. The large amount of heat destroy green houses gases like CO_2 which create global warming. A large amount of heat create floods, melting of glaciers, drought and increase the temperature of the earth. Many companies are trying to resolve these problems. Companies are trying to establish such devices which can take low consumption of energy and release low amount of heat.[1]

II. Main Problem and issues

As we know that today the main issue is that the manufactures are preparing such devices which are however more efficient and accurate but they use more energy and evolve very toxics, dangerous gases and chemicals. Many electronics companies especially in computer use lead, mercury, cadmium and other toxics chemicals. It has been calculated that during manufacturing of computers can 4 to 8 pounds of lead alone. According to a new research it is estimated that computers and other electronics devices make up two-fifth of all lead in land-fills on the earth. Due to this reason pollution is increasing very rapidly. Data center servers use 50 times more the energy per square foot as in office. Data centers are the main energy consumption sources. In a survey in America energy consumed by data center in USA and all over the world will be doubled in next few years.

III. Existing works in Green computing

Today all manufactures companies are trying to establish such data center which are cheap and use low energy/power.

In America in 1992 introduced a energy star program. Its main aim was given awarded to those computing products which use minimum energy and give maximum efficiency in its working. In Energy star program were included such product as computer monitor, television sets, refrigerator ,air conditioning and other electronics devices. All these products may be friendly green computing.[2]

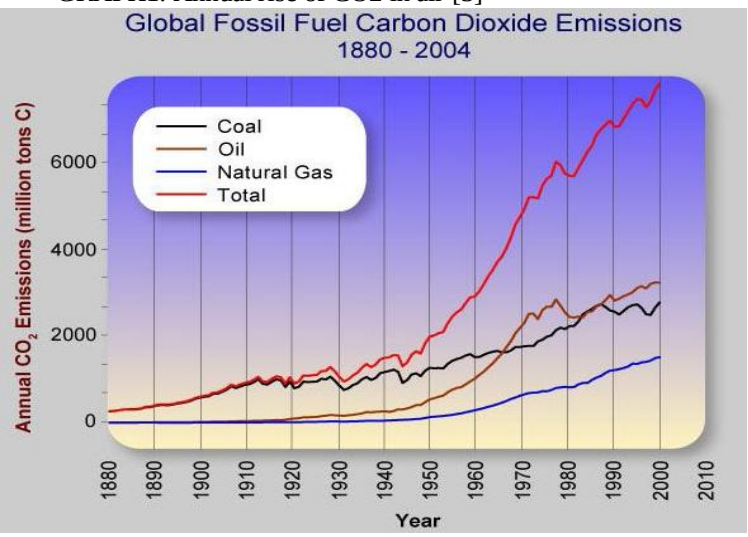
EPEAT (Electronic Products Environmental Assessment Tool) check the product's standard. All product which are registered are better to protect human health and these item can be easily upgraded and recycled. These products have reduced the percentage of lead, mercury and cadmium. These products are more efficient in energy and reduce the environmental impact.

IBM also has also contributed these issues.IBM has helped the clients to purchase the products according to green computing. According to the research of the IBM in 1990, He saved 4.6 billion KWh of electricity and also prevented3 million metric tones of CO_2 emission.

Google is trying to establish its data centre building on Oregon's Columbia River to tap hydroelectric power.

Microsoft company is also trying to establish its data centre building near Washington for hydroelectric power. Financial services company (HSBC) is preparing its building of data centre near Niagra falls for cooling and low energy consumption. In data center the servers evolve a large amount of heat so for their cooling company establish fully air conditioning equipments. The more powerful equipment of servers and then more cooling is required from overheating and secure working accurately. According to the report of staff scientists Jonathan Koomey of Lawrence Berkely National Laboratory and AMD which was released in 2005 to cool and power the servers 1.2% of total USA electricity is required. In 2010 according to Gartner the 2000 Global companies will spend more energy on data centers on servers than hardware's of the computers. Kumar says that energy costs is now 10% of the average IT budget of the world will increase 50% in next few years. The percentage of CO_2 is increasing very quickly. The annual rise of the CO_2 in air is given in graph,

GRAPH1. Annual rise of CO2 in air [3]



The graph shows that annual emission of CO_2 in past years , the black, blue and brown lines show the rise of CO_2 due to cool, natural gas and oil respectively and the red line shows the total emission of CO_2 including all such factors that also includes electronics.

If we see the energy consumption during the actual use of the product and during the stand by mode we observe that during the standby mode the energy consumption ratio is more. e.g. Ink jet printer use 12 watts during use while printing and take 5 watt during idle state. The given below table shows the facts and figure clearly.

Appliance	Hours per day	Watt when on	Annual cost of use	Watts on stand by	Annual cost on standby	% wasted
TV	2	75	$7.12	14	$14.61	67%
VCR	1	15	$0.07	8	$9.07	99%
Computer	2	60	$5.69	13	$13.57	70%
Micro wave	25	1700	$20.17	24	$27.05	57%
Battery charger	6	12	$3.41	10	$3.79	53%
Total cost			$49.36		$104.50	

Table 1 The annual power wastage and cost [3]

Different electronics products use different energy consumption. In this table it is seen that if we switch off the product after using, we can save a large amount of energy which can be utilized other purposes. By this way we can decrease our budget annually and provide better environment to the world.
Intel Published a report about green computing in which they showed that components of computer use energy especially monitor or display consume a large amount of energy.

If we switch off of the laptop when it is idle state. We can save energy and money. The computer architecture are trying to set up such design in which display unit consume less energy/power. In the figure 2 it has been seen that in laptop all parts consume energy but display unit consume much energy which is one third (1/3) of the total energy consumed by a laptop. Most part of the energy is wasted during processing in the form of heat which is the loss of energy and sources.

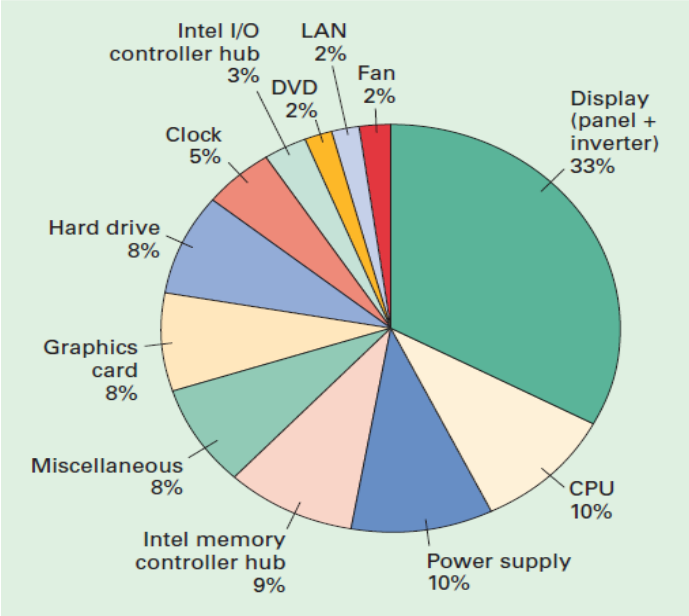


Fig.2.Power Consumption of average lap top [4]

In the above figure it is cleared that display unit of the laptop is consuming much energy that is 33% of the total energy consumed by a laptop. It has been that the laptop is very beautiful but its battery charging efficiency is not good. The performance of the CPU depends upon the battery of the laptop.

IV. Work in Green Computing

Today computers play very important role in our lives. Computers are the wealth of knowledge of internet. It is very fast in communication and to share other peoples. These are its good qualities but it takes a lot of energy to create, package, store and move data from one place to other When technology changes then the computer are dumped in a landfill. It is a major problem and it create pollution. When manufacturer company prepare computers, then these use lead, cadmium, mercury and other toxic materials. It has been estimated that 4 to 8 pounds of lead alone is used in a single computer. Computers and other electronics make two fifth (2/5) of all lead in landfill. Owing to this reason it is realizing that green computer should introduce. In the beginning in computers it was given attention their speed, price and cost. But now it is tried that these devices use less and less energy. Now such material is developed which is more green and toxic material is replacing by them.

It has been guessed that co_2 emission, global warming and climate changes are getting hotter to hotter. It is estimated that out $250 billion power per year is spent in which 15% of that power is spent on computing. Faster processor use more energy and slower or inefficient processor may also use double power which is the

wastage of energy in form of heat which create pollution in our environment. The waste heat also cause reliability problems in CPU as it may crash due to much temperature. Similarly the power supply which are used in computer are inefficient. It

has been estimated that these are 47% of total supply. But now power supply technology has been changed, because it is accepted that all parts of computer depend on power supply. so the efficient and low energy consumption are introduced. Now 80% supply are more efficient. Software which manage power are also help the computers to sleep or log of or hibernate when computer is not in use.

V. Green computing, issues and Benefits

1. In computer technology virtualization is very important effective tools. It is cost effective, green energy and efficient computing. In this tool the main server is divided into multiple virtual machines that help the server to run different applications. By using this technique companies can enhance their server utilization rates.
2. The companies should manufacture such processors which use low energy. Intel, Sun and Advance Micro Devices (AMD) are now trying to manufacture such processor. Sun has designed multicore processors which are very efficient relating to fuel.
3. In computers power option setting is also helpful, in which sleep mode is active, when the system is not working. It is a good practice. This option can be set through PC's control panel. It takes PC's in standby mode and turn off the monitor, when PC is in idle mode.

Fig.3.a Log off mode

Fig.3 b Stand by mode

Fig 3.c Turn off mode

4. It is also observed that flat monitor use less energy than cathode ray tube (CRT) monitor. Liquid crystal display (LCD) use very low energy than conventional monitor.
5. Hard disk drives take less power than other physical parts of computer. Now solid state drives as flash memory or DRAM are used to store data. They take less energy because they have no moving part, so the energy consumption may be reduced as compared to the hard disk.
6. We should use print paper only when we need. We can read soft copy. If we want hard copy (print copy), we should use such type of printers which have the capacity to print the paper both side. It reduces paper consumption and energy consumption. Recycled used ink in powder form and toner of the printer can be used again.
7.Screen savers are active when system is in idle state, if we allow the monitor to go to standby mode during idle state of the computer. It will also decrease energy consumption.
8. Computer manufacturer should designed such type of computer which can be powered from non conventional sources of energy like Sun energy, air energy, pedaling a bike, turning a hand crank etc.
9. In computer some devices are also important. Video card, graphic card, 3D performance software take a very large amount of energy. If we use older video card, these card use little power. In these cards there are no heat sink and fan.

Green Computing can help us to secure and safe place for us in the world. If each person try to safe the environment then our mother earth will healthy and happy for survival. Here are given some benefits of green computing,
It helps us to reduce the amount of pollution in air or surrounding.
It saves the power consumption and decreases the amount of heat which evolved the products.
It also reduces the pressure on paper industry which is a main issue.
Renewable resources are encouraged to use again.
Green computing help to promote the effective utilization of natural resources.
It also promotes us to avoid such products which destroy Green computing.

VI. Green Computing Eco friendly

It was realized that the conventional computers take much energy and produce heat. So the manufacturer of the computer designed laptop, desktop and note book type computers. The main aim of the manufacturer is to reduce the e-waste in the environment. In these computers hazardous material such as PVC's Brominated flame-retardants and heavy metals such as Cadmium, Mercury and Lead are not used like commonly used computers. In laptop computers and other electronics industry Lead-Tin solder is used. It has some qualities i.e. ideal shock absorber. Now its replacement is being taken the alloy of the Tin/Copper/ Silver.
Some precautions may be taken to make future computers more eco friendly.[4]

- Computer Company manufactures such parts of computers which use low energy consumption.
- Petroleum filled plastic may be replaced by Bioplastic (plant based polymers) which require less oil and energy. Bioplastic materials made computer are more secure and cool.
- E-waste is also a big problem; it can be controlled by avoiding discarding the computer. Replacement and upgrading their devices is also helpful. In this way we can save energy, pollution and materials for dumping.
- Traditional monitors are also power sucking displays. These monitors can be replaced with green light display made of OLED or Organic light emitting diodes or LCD or Liquid crystal display.
- Lead is a toxic material, (it is expensive and time consuming) which is used in computer may be replaced by silver and copper making devices of computers.
- Use smaller monitor/LCD- a 14-inch display uses 40 percent less energy than a 17-inch one.
- When you are not using monitor, power off it.
- Remote control is used on/off the products. During off in remote control. The product is still consuming energy. So it is advised to plug off the switch.

VII. Carbon free computing

It has been estimated that the concentration of CO_2 is increasing day to day very quickly. The other gases which affect the greenhouse are methane (CH_4), nitrous oxide (NO_2) and fluorocarbons (CCl_4). These gases are able to increase the temperature of the earth, which causes to lead the drought and floods and rising the sea level. These also affect the life on earth. In 1997 Kyoto in USA tried to reduce the emission of CO_2 from electronic devices and other devices. These devices are manufactured in such way that they take less energy.

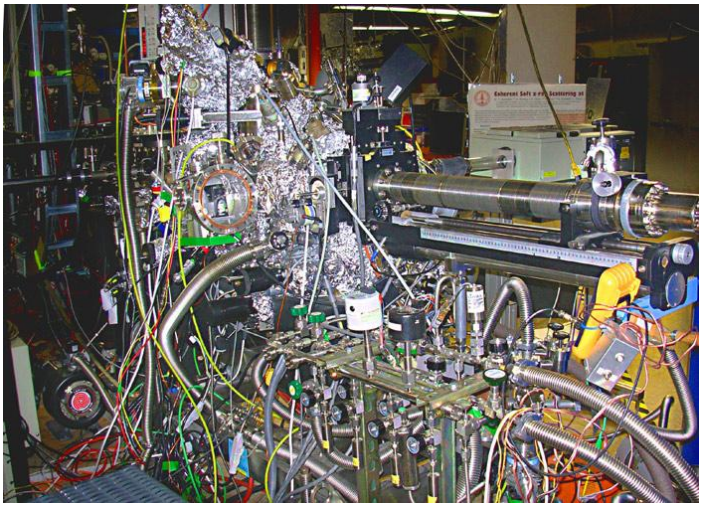


Fig:4 Emission of CO2 in a lab. [5]

It has been estimated that it is to see that these devices how much energy consume and how much heat is evolved. To reduce the percentage of CO_2 in atmosphere to grow a plant to against each product after manufactured. It has been estimated that 4 to 6% are of planted tree can absorb 20 to 25 % area CO_2. Different companies are now working on this issue very keenly. Dell is working on worldwide product-recycling program. In this program Dell company allows to customers to pay an extra $2 to $4, for grow a plant against each product AMD, a global microprocessor manufacturer, is also working toward to reduce energy consumption in its products without toxic material and echo free product.[6]

VIII. Solar energy Computing

Solar energy is also playing important role in green computing. In this technology the emission of heat and different gases especially CO_2 during producing energy is very low. In solar computing cells are used in large panel. Solar cells require very little maintenance throughout the life after installation. There is no further cost many years. So such solar powered devices are manufactured that are totally non polluted, efficient, silent and highly reliable.

Fig:4 Solar Panel Power computing [7]

Solar energy is echo friendly during the production of this energy no toxic material or gases are evolved which harm atmosphere.

IX. Data centers

In data centers (in wireless sensors networks) many devices are used which are servers, laptops, desktops, printers, wireless APs, fax machines, routers, switches and other electronics devices. These all devices emit heat and CO_2.Here we see only two devices laptop and desktop. It has been estimated that desktop computer take 100 watts and laptop take only 17 watt. The ratio is about 6:1.It is estimated that data centers use a large amount of energy and emit a very huge amount of heat. It is shown in the given below table in which different peripheral are attached with one another.

Category	Power drawn
Computing	588 KW
UPS and distribution losses	72 KW
cooling for computing and UPS losses	420 KW
MV transformers/other	38 KW
Total	1127 W

Table 2 Energy usage of 5,000 sq-ft data center[8]

Owing to this reason we can easily compare the efficiency and energy consumption.

Fig;4 Host upon Network and Data center USA [9]

The efficiency of the laptop may be observed as the following key points,[10]

9.1 Energy Cost

Laptop use very low energy and reduce energy costs.

9.2 Save Energy

However the laptops has more price than desktop, but due to low consumption of energy laptop compensate its high price in a year.

9.3 Software

Software also play a vital role in energy consumption. Such software should be developed which can take low energy in their booting process and data consolidation.

9.4 Computer Hardware

Other peripherals devices such as networks, LCD screen and computer cluster should focus in energy consumption and emission of CO_2.

10. Conclusions and Future Work

Green computing techniques and issues which were discussed in this paper help us to reduce power consumption and heat which is evolved during processing. Power consumption in computer can be managed such as the sleep mode, hibernate mode, standby mode are very effective in it because computers may be automatically go into low power states,, when a computer is in an idle state without human interest or interfere.

Techniques such as unplugging a computer, using LCD and using of flash drives may be adopted to reduce energy consumption. Likewise control panel play important role to control the computer as shut down stand by or hibernate. In the future such devices or parts of computer will be designed and manufacture which take very low energy and give out very low heat. Many governments have now tried to take initiative steps in energy management programs like Energy Star. Now it is realized that such standards should be adopted for energy efficient electronic equipments. In USA the United States Environmental Protection Agency [11] and other countries these standards has been adopted and implemented. There are lot of techniques in green computing. The techniques which were suggested in this paper will be applied in future in real world. By using these techniques we can save energy, emission of CO_2, air pollution and toxic materials. Green computing is not about going out but designing new products in this way to reduce energy consumption. Green computing in future will also help in recycling E-waste and scrap computers..

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Author's Profile:

Masood Anwar received MCS degree from Sarhad University Peshawar and MS (CS) from university of Agriculture Faisalabad. He has an experience of 12 years working in Networks and Communication. He is teaching in Govt. College for Elementary Teachers Faisalabad Pakistan computer Literacy and ICT. His research area is security and threats in networks and green computing.

Syed Furqan Qadri received M.Sc (Computer Science) degree in 2011 and MS (CS) degree from University of Agriculture, Faisalabad (UAF) in 2013. His current research interests are in green computing, topological scenarios suitability for wireless body area network (WBAN) using IEEE 802.15.4/zigbee standard, bandwidth allocation, admission control, and fade countermeasure systems in terrestrial wireless and satellite multi-service networks

He is an Assistant Professor, Department of Computer Science, Faculty of Sciences in UAF Faisalabad Pakistan

Research Interests: We present a simple image-based method of generating novel visual appearance in which new image is synthesized by stitching together small patches of existing images. We call this process image quilting. First, we use quilting as new, fast, yet very simple texture synthesis algorithm which produces surprisingly good results for a wide range of textures. Second, we extend the algorithm to perform texture transfer {rendering an object with a texture taken from a direct object. More generally, we demonstrate how an entire image can be re-rendered in the style of a direct image. The method works directly on the images and does not require 3D information. My current interests are focused to create/use new technologies of image enhancement, image information gathering. Decision support system based on image processing.