ROBUST DENSITY MODELLING USING THE STUDENT'S *T*-DISTRIBUTION FOR HUMAN ACTION RECOGNITION

Zia Moghaddam and Massimo Piccardi

Faculty of Engineering and Information Technology, University of Technology, Sydney (UTS), Australia
{ziam,massimo}@it.uts.edu.au

ABSTRACT

The extraction of human features from videos is often inaccurate and prone to outliers. Such outliers can severely affect density modelling when the Gaussian distribution is used as the model since it is highly sensitive to outliers. The Gaussian distribution is also often used as base component of graphical models for recognising human actions in the videos (hidden Markov model and others) and the presence of outliers can significantly affect the recognition accuracy. In contrast, the Student's *t*-distribution is more robust to outliers and can be exploited to improve the recognition rate in the presence of abnormal data. In this paper, we present an HMM which uses mixtures of *t*-distributions as observation probabilities and show how experiments over two well-known datasets (*Weizmann*, *MuHAVi*) reported a remarkable improvement in classification accuracy.

Index Terms— Observation density modelling, Student's *t*-distribution, Gaussian mixture model, hidden Markov model, human action recognition.

1. INTRODUCTION

Human action recognition is a very active research area in computer vision with main applications to video surveillance, human-computer interaction and so on. The goal of automatic action recognition is the classification of a given image sequence as one of pre-defined action classes. It requires the classification of a set of measurements extracted from the video depicting the action. Various human action recognition approaches can be categorised in two main groups [1]: 1) direct classification of spatio-temporal features using either a discriminative classifier, e.g. the support vector machine (SVM), or the *k*-Nearest Neighbour (*k*NN) classifier; 2) using temporal state-space models for action classification, either by recognising the actions directly in the time domain, e.g. dynamic time warping (DTW); or exploiting graphical models, e.g. hidden Markov model (HMM) [2-4] and conditional random fields (CRFs). Sequential classifiers such as HMM can naturally classify sequences of arbitrary length and have shown good performance in adjusting to temporal variations in the duration of instances of a same action. Hence, in this paper we decided to exploit HMM for action classification.

Prior to action classification, the HMM parameters need to be estimated to fit the model to the training observation sequences. The distribution of continuous observations in each HMM state is usually modelled by a Gaussian mixture model (GMM). However, the sequential data modelling may encounter the presence of unusual data (outliers) that cannot be fit by the normal tails of GMM. The covariance of the normal Gaussian usually has to be stretched to cover the outliers and leads to improper mixture fitting. Another alternative is to have many Gaussian components in the mixture, but that would affect computational efficiency of model training significantly.

To tackle the outlier problem in density estimation, the Student's *t*-distribution – which has a longer tail compared to the Gaussian density - has been exploited in many papers in the last few years [5-7]. For example, Chatzis *et al.* in [6] exploited the Student's *t*-mixture model (SMM) for sequential observation modelling of HMM states' densities to recognise the gestures of the American Sign Language. The obtained recognition error rate using SMM is 5.96% compared to 11.44% with GMM. For this reason, in this paper we apply a similar model to the problem of human action recognition.

The rest of the paper is organized as follows. Section 2 offers a review of the Student's *t*-distribution and its mixture (SMM). In Section 3, SMM is utilised as observation probability density in HMM, and the expectation-maximisation (EM) algorithm is exploited for maximum likelihood estimation (MLE) of its parameters. The experiments to explore the effectiveness of action classification using SMM density modelling in HMM are presented in Section 4. Finally, conclusions are given.

2. THE STUDENT'S *t*-DISTRIBUTION

The Student's *t*-distribution could be considered as an infinite mixture of scaled Gaussians with the same mean but variable variance (or covariance) produced by a prior Gamma distribution. In the case of an *F*-dimensional multivariate random variable x, with mean μ and inner product matrix ψ, this mixture can be written as [8]:

$$St(x|\mu,\psi,\nu) = \int_0^\infty \mathcal{N}\left(x\middle|\mu,\frac{\psi}{\eta}\right) Gamma\left(\eta\middle|\frac{\nu}{2},\frac{\nu}{2}\right) d\eta \quad (1)$$

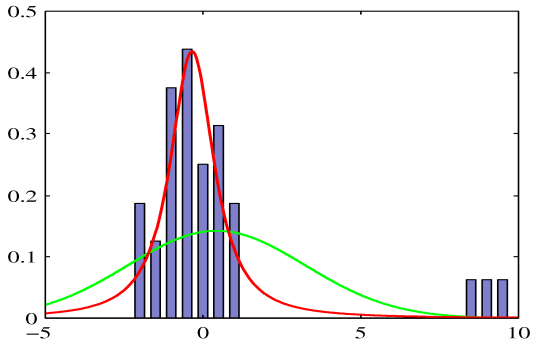

Fig. 1. Outliers impact on Gaussian compared to *t*-distribution [8].

The variable precision η enables the *t*-distribution to give less weight to abnormal observations in the mixture parameter calculation which makes it more robust to outliers. Fig. 1 shows how the presence of the outliers can stretch the Gaussian distribution (green curve) and deform it, while the *t*-distribution (red curve) is influenced negligibly. The tail of the *t*-distribution is controlled by parameter ν (*degrees of freedom*); larger values of ν make the tail shorter and with $\nu \to \infty$ the *t*-distribution becomes a normal Gaussian distribution. The probability density function (pdf) of the *t*-distribution is given by [8]:

$$St(x|\mu,\psi,\nu) = \frac{\Gamma\left(\frac{\nu}{2}+\frac{F}{2}\right)|\psi|^{-\frac{1}{2}}}{\Gamma\left(\frac{\nu}{2}\right)(\pi\nu)^{\frac{F}{2}}}\left[1+\frac{\delta(x,\mu;\psi)}{\nu}\right]^{-\frac{\nu}{2}-\frac{F}{2}} \quad (2)$$

where, δ is the Mahalanobis distance between x and the mean, μ,with respect to ψ.

Like GMM, a set of E independent multivariate data $X = \{x_e\}_{e=1}^{E}$ could be generated by a mixture of M Student's *t*-distribution components (SMM) [5]. Peel and McLachlan in [5] exploited the EM algorithm to estimate parameters of an SMM by derivation of the model's complete data log-likelihood function.

3. THE HIDDEN MARKOV MODEL (HMM) WITH SMM OBSERVATION DENSITY MODELLING

With sequential data, e.g. a time-sequence data, the order of observations is important. Hence, to model the sequential data, a sequential probabilistic model, like HMM, is required. HMM is a temporal graphical model in which the modelled system has observed outputs (observations), and a set of hidden states [9]. In the case of continuous observation, the observation distribution for each state in HMM is usually modelled by a GMM (HMM-GMM). However, the SMM can also be utilised to model the HMM observation to tackle the outlier issue [6]. Let us assume that observation sequence $O=\{o_1,...,o_t,\ldots,o_T\}$ of length T is generated by an N-state HMM. Furthermore, let us assume [10]that the observation probability for each state s_i, i=1...N, is modelled by an M-component SMM (HMM-SMM) as follows. For i=1…N and t=1…T:

$$b_i(o_t) = p(o_t|q_t = s_i) = \sum_{l=1}^{M} c_{il}\, St(o_t|\mu_{il},\psi_{il},\nu_{il}) \quad (3)$$

where $\{c_{il}\}_{l=1}^{M}$ are the mixing weights for the SMM of state s_i such that $\sum_{l=1}^{M} c_{il} = 1$. μ_{il}, ψ_{il} and ν_{il} are the parameters of the l^{th} component of SMM for state s_i.

3.1. ML parameter estimation of an HMM-SMM

Recalling from the EM algorithm for HMM-GMM [11], sequential data $O = \{o_1,...,o_t,\ldots,o_T\}$ is considered incomplete and for each given o_t, it is assumed that two unobserved data exist whose values indicate the state value and the component index. In addition, similar to a single *t*-distribution and an SMM [5, 12], the precision scale η is the third hidden variable in an HMM-SMM. As first step, we need to infer the conditional state posterior $\gamma_i(t)$, and the conditional component posterior $\tau_{il}(t)$ defined as follows. For i=1…N, l=1…M and t=1…T:

$$\gamma_i(t) = p(q_t = s_i|O,\lambda) \quad (4)$$

$$\tau_{il}(t) = p(z_{ti} = l|q_t = s_i, o_t, \lambda) \quad (5)$$

Furthermore, we define $u_{il}(t)$ as the conditional posterior expectation of precision scale for sample o_t given that it is generated by the l^{th} component of the i^{th} mixture:

$$u_{il}(t) = E(\eta_t|z_{ti} = l, o_t, \lambda) \quad (6)$$

At iteration (k+1) of the EM algorithm:

E-step: The HMM observation density has no effect on the probability $\gamma_i(t)$, hence, it is same as the case of an HMM-GMM [11]. The probability $\tau_{il}(t)$ is also similar to that of HMM-GMM, except replacing the Gaussian by the *t*-distribution. The solution for $u_{il}(t)$ is similar to that provided in [5] for a single SMM and just needs adding the index for the i^{th} mixture.

M-step: The estimation formulas for HMM-SMM can be inferred by considering the influence of u_{el} (the conditional posterior expectation of precision scale) in the EM solution for SMM in [5] and comparing it to the EM solution for GMM in [11]. From [5], we can see that the mixture weight c_l has the same formula as the GMM case. However, in SMM the posterior probability of precision scale η will appear in the numerator and denominator of mean μ_l, and in the numerator of precision ψ_l (but not in its denominator). Hence, we can infer the following estimation formulas for HMM-SMM by putting together the corresponding formulas from [5] and [11]:

$$c_{il}^{(k+1)} = \frac{\sum_{t=1}^{T}\gamma_i(t)\,\tau_{il}(t)}{\sum_{t=1}^{T}\gamma_i(t)} \quad (7)$$

$$\mu_{il}^{(k+1)} = \frac{\sum_{t=1}^{T} \gamma_i(t)\, \tau_{il}(t)\, u_{il}(t)\, o_t}{\sum_{t=1}^{T} \gamma_i(t)\, \tau_{il}(t)\, u_{il}(t)} \quad (8)$$

$$\psi_{il}^{(k+1)} = \frac{\sum_{t=1}^{T} \gamma_i(t) \tau_{il}(t) u_{il}(t) \left(o_t - \mu_{il}^{(k+1)}\right)\left(o_t - \mu_{il}^{(k+1)}\right)^T}{\sum_{t=1}^{T} \gamma_i(t)\, \tau_{il}(t)} \quad (9)$$

Chatzis *et al.* in [6] obtained the same formulas by derivation of the complete data log-likelihood function. Nevertheless, similar to the single component *t*-distribution and SMM cases, $\nu_{il}^{(k+1)}$ does not have a closed form solution, and it requires to be computed iteratively through the following equation, where $\Phi(x)$ is the digamma function:

$$1 - \Phi\left(\frac{\nu_{il}}{2}\right) + \ln\left(\frac{\nu_{il}}{2}\right) + \Phi\left(\frac{\nu_{il}^{(k)} + F}{2}\right) - \ln\left(\frac{\nu_{il}^{(k)} + F}{2}\right) + \frac{\sum_{e=1}^{E}\sum_{t=1}^{T_e} \gamma_i^e(t)\, \tau_{il}^e(t) \left[\ln\left(u_{il}^e(t)\right) - u_{il}^e(t)\right]}{\sum_{e=1}^{E}\sum_{t=1}^{T_e} \gamma_i^e(t)\, \tau_{il}^e(t)} = 0 \quad (10)$$

4. EXPERIMENTS ON ROBUSTNESS USING THE *t*-DISTRIBUTION

In this section, we explore the robustness of action recognition by exploiting HMM-SMM in lieu of HMM-GMM. For this purpose, we modified Kevin Murphy's HMM toolbox [13] to include HMM with SMM density modelling.

For the experiment, we exploited two action video datasets: 1) the popular *Weizmann* dataset [14] that includes 10 actions performed by 9 subjects for a total of 93 videos sequences; 2) the more recent *MuHAVi* dataset [10] that contains videos from 17 action classes performed several times by 7 different subjects and captured by 8 cameras simultaneously. To the best of our knowledge, MuHAVi is the most challenging and comprehensive public action dataset to date in terms of combined number of action classes, subjects and cameras. Amongst the other popular datasets, KTH [15] has only 6 action classes.

In order to separate issues raised by recognition and foreground segmentation, the authors of the MuHAVi dataset aimed to make manually annotated silhouettes available (MuHAVi-MAS). However, manual segmentation proved overly time consuming and the current number of manually-segmented sequences is rather limited. Furthermore, using manually-generated masks for training or validation would provide an optimistic estimate of a method's accuracy compared to a real application where segmentation must be automated. Hence, we decided to use the original videos directly and extract the object masks automatically from the *camera4* viewpoint, resulting in 398 sample sequences [16]. The quality of the obtained masks is rather good, yet not as that of manual segmentation, making results more significant and general.

As validation approach, we have used the "leave-one-subject-out" cross validation method; i.e. in each run we leave one subject out during training and we use it for testing. This validation procedure is realistic since in real applications subjects would not have been seen during training. The final accuracy result is the average over the various subjects (7 folds). Since the number of HMM states, *N*, and the number of components per state, *M*, are hyperparameters in the Baum-Welch algorithm and cannot be determined by maximum likelihood, we decided to experiment over range {1...6} for *N* and *M*, and choose the best combination based on cross-validation accuracy.

Another choice required to complete the recognition approach is that of the feature set. Given the tight real-time constraints of video surveillance, for our experiments we have chosen to compare two simple and computationally lightweight feature sets: the first is the well-known projection histograms [17] (our implementation is in [16]) and the second is our own "*sectorial extreme points*" feature set, explained in details in [4].

4.1. Experiments with HMM-SMM and estimated ν

In the first experiment, we compared the classification accuracy between HMM-SMM density modelling with maximum likelihood-estimated *v* and HMM-GMM. For this experiment, parameter *v* is initialised with an arbitrary value (10 in the experiment), and is updated at each M-step iteration. To prevent *v* from tending towards 0 or infinite on occasions, we also placed a minimum and a maximum threshold for the updated values of *v*: 0.1 and 200, respectively. Table 1 reports the average and best classification accuracies obtained over 6 different runs from random initial parameters for both HMM-GMM and HMM-SMM with estimated *v* using MuHAVi as dataset and the projection histograms as feature set. The achieved results show considerable improvements in accuracy when using HMM-SMM for all combinations of *N* and *M*. The increase in highest accuracy is over 6% (from 80.7% to 86.9%). It seems that the main reason for this improvement is the significant presence of outliers in the observation data using this feature set on the MuHAVi dataset.

We repeated the experiment with the other feature set, the sectorial extreme points, on both the Weizmann and MuHAVi datasets. Table 2 summarises the average and best accuracies over the 6 runs for various values of *N* and *M*. While the achieved improvement over MuHAVi was limited with this feature set (likely because of the lack of significant outliers), over the Weizmann dataset HMM-SMM reached the maximum possible accuracy of 100% (not one single misclassification).

Given the apparent sensitivity of the ML-estimate of *v*, we compared accuracy also with fixing *v* to an arbitrary value (0.1 in this case); the feature set is the projection histograms and the dataset is MuHAVi, with results reported in Table 3. Comparison of results in Tables 1 and 3 shows that the classification accuracy using HMM-SMM with fixed $v = 0.1$ was comparable with that of HMM-SMM with estimated *v*.

Table 1: Classification accuracy (%) for HMM-GMM and HMM-SMM with estimated v using the projection histograms feature set.

HMM-GMM, Avr. of 6 runs

	M=1	M=2	M=3	M=4	M=5	M=6
N=1	64.1	70.4	73.5	74.2	74.3	74.5
N=2	67.6	71.8	72.4	72.2	72.2	72.7
N=3	73.1	74.8	74.5	75.2	74.9	74.4
N=4	76.3	76.3	76.2	77.3	77.3	78.0
N=5	76.4	78.5	78.1	77.3	77.8	77.8
N=6	77.1	78.7	**78.9**	77.8	77.8	78.3

HMM-SMM, Avr. of 6 runs

	M=1	M=2	M=3	M=4	M=5	M=6
N=1	83.7	85	84.1	84.5	84.5	**85.1**
N=2	84.7	84.8	83.9	84.6	84.4	83.7
N=3	84.4	83.9	84.1	84	83.6	84.1
N=4	84.3	84.4	83.9	83.5	83.1	83.8
N=5	84.5	84.2	83.5	84.0	84.0	83.3
N=6	84.3	84.2	84.0	83.9	83.3	82.7

HMM-GMM, Best of 6 runs

	M=1	M=2	M=3	M=4	M=5	M=6
N=1	64.1	71.1	74.4	74.6	74.6	74.6
N=2	69.1	73.1	74.1	73.9	73.9	74.4
N=3	74.4	79.6	76.6	76.6	76.4	75.6
N=4	77.6	77.6	77.4	79.9	78.6	79.6
N=5	77.9	**80.7**	80.2	79.4	79.1	79.1
N=6	78.4	79.9	80.2	78.9	79.4	79.9

HMM-SMM, Best of 6 runs

	M=1	M=2	M=3	M=4	M=5	M=6
N=1	83.7	85.7	84.9	85.7	84.9	**86.9**
N=2	86.2	86.2	84.4	86.2	85.4	84.9
N=3	84.9	85.9	84.9	85.4	84.4	85.4
N=4	85.2	85.4	85.2	85.2	85.2	84.9
N=5	86.2	85.4	84.2	85.2	84.9	85.4
N=6	85.4	85.7	84.7	86.2	83.9	83.9

Table 2: Classification accuracy (%) for HMM-GMM and HMM-SMM with estimated v using the sectorial extreme points feature set.

Dataset	**HMM-GMM**		**HMM-SMM**	
	Average of 6 runs	Best of 6 runs	Average of 6 runs	Best of 6 runs
Weizmann	94.6	96.8	97.6	100
MuHAVi	92.4	94.0	93.0	94.5

Table 3: Classification accuracy (%) for HMM-SMM with estimated v and fixed v using the projection histograms feature set.

HMM-SMM with estimated *v*		**HMM-SMM with fixed *v*=0.1**	
Avr. of 6 runs	Best of 6 runs	Avr. of 6 runs	Best of 6 runs
85.1	86.9	85.3	86.4

Table 4: Classification accuracy (%) for HMM-SMM with various fixed v using the projection histograms feature set.

	$v = 3$	$v = 5$	$v = 7$	$v = 10$
Average of 6 runs	86.2	85.5	84.9	83.5
Best of 6 runs	87.7	86.9	86.9	85.2

4.2. Experiments with HMM-SMM and various fixed values of v

To confirm the usability of a fixed v, we measured the recognition accuracy with various fixed values of $v = \{3, 5, 7, 10\}$; results are shown in Table 4. Such results confirm the effectiveness of SMM density modelling with fixed v since maximum accuracy reaches 87.7% (with $v = 3$). A relatively small search over values of v is therefore capable of delivering cross-validation accuracies greater than that of the ML-estimated case (86.9%). Therefore, estimation of v could be avoided altogether in applications.

5. CONCLUSIONS

The longer tails in the Student's *t*-distribution (compared to the Gaussian distribution) makes density modelling more robust in the presence of outliers in the observation data. In this paper, we have utilised a mixture of *t*-distributions (SMM) to model the observation probabilities in an HMM in lieu of the usual GMM for application to human action recognition in videos. The EM algorithm was exploited to estimate the HMM-SMM parameters with a maximum likelihood objective. The experiments conducted over two significant video action datasets have proved the effectiveness of using HMM-SMM, with accuracy improvements in the order of 6÷7% over the conventional Gaussian mixture models.

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Robust density modelling using the student's t-distribution for human action recognition

Moghaddam, Z. ; Piccardi, M. ;
Fac. of Eng. & Inf. Technol., Univ. of Technol., Sydney, NSW, Australia

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ABSTRACT

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INDEX TERMS

- **IEEE Terms**
  Accuracy , Data models , Hidden Markov models , Histograms , Humans , Robustness , Videos
- **INSPEC**
  - **Controlled Indexing**
    Gaussian distribution , feature extraction , hidden Markov models , image recognition , video signal processing
  - **Non Controlled Indexing**
    Gaussian distribution , HMM , hidden Markov models , human action recognition , human feature extraction , robust density modelling , student t-distribution , videos
- **Author Keywords**
  Gaussian mixture model , Observation density modelling , Student's t-distribution , hidden Markov model , human action recognition

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Monday, September 12

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Aous T. Naman (University of New South Wales, Australia); Duncan Edwards (University of New South Wales, Australia); David Taubman (University of New South Wales, Australia)
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Zihong Fan (University of Southern California, USA); Antonio Ortega (USC, USA)
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Thomas Maugey (Ecole Polytechnique Fédérale de Lausanne, Switzerland); Pascal Frossard (Swiss Federal Institute of Technology - EPFL, Switzerland)
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Xiaoyu Xiu (Simon Fraser University, Canada); Gene Cheung (National Institute of Informatics, Japan); Jie Liang (Simon Fraser University, Canada)
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Adaptive pixel/patch-based Synthesis for Texture Compression
Fabien Racape (Technicolor Research & Innovation & Institut Electronique Telecommunications de Rennes, France); Simon Lefort (Technicolor Research & Innovation, France); Edouard Francois (Technicolor, France); Marie Babel (IETR / INSA Rennes, France); Olivier Deforges (IETR / INSA Rennes, France)
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Pauline Trouvé (Onera & DGA, France); Frédéric Champagnat (ONERA, France); Guy Le Besnerais (ONERA, France); Jérôme Idier (IRCCyN, France)
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Rafael Grompone von Gioi (CMLA, ENS-Cachan, France); Pascal Monasse (IMAGINE, LIGM-Universite Paris Est, France); Jean-Michel Morel (CMLA, ENS-Cachan, France); Zhongwei Tang (CMLA, ENS-Cachan, France)
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Dũng Trung Võ (Samsung Information Systems America (Samsung Electronics US R&D Center), USA); Surapong Lertrattanapanich (Digital Media Solutions Lab, Samsung Electronics US R&D Center, USA); Yeong-Taeg Kim (Samsung SISA, USA)
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Mohammad Rahman (University of Texas at Dallas, USA); Nasser Kehtarnavaz (University of Texas at Dallas, USA); Siamak Yousefi (University of Texas at Dallas, USA)
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Xiaoming Deng (Institute of Software, Chinese Academy of Sciences, P.R. China); Fuchao Wu (NLPR, P.R. China); Yihong Wu (Chinese Academy of Sciences, P.R. China); Liang Chang (Beijing Normal University, P.R. China); Wei Liu (ISCAS, P.R. China); Hongan Wang (Chinese Academy of Sciences, P.R. China)
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Huixian Duan (Chinese Academy of Sciences, P.R. China); Yihong Wu (Chinese Academy of Sciences, P.R. China)
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Yulin Xie (Dalian University of Technology, P.R. China); Huchuan Lu (Dalian University of Technology, P.R. China)
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High Resolution Biologically Inspired Salient Region Detection
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Albert Torrent (University of Girona, Spain); Xavier Lladó (University of Girona, Spain); Jordi Freixenet (University of Girona, USA); Antonio Torralba (Massachusetts Institute of Technology, USA)
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Xue Li (Harbin Institute of Technology, P.R. China); Hongxun Yao (Harbin Institute of Technology, P.R. China); Xiaoshuai Sun (Harbin Institute of Technology, P.R. China); Rongrong Ji (Columbia University, P.R. China); Xianming Liu (Harbin Institute of Technology, P.R. China); Pengfei Xu (Harbin Institute of Technology, P.R. China)
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Piotr Koniusz (University of Surrey, United Kingdom); Krystian Mikolajczyk (University of Surrey, United Kingdom)
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Huu-Giao Nguyen (Institut Telecom / Telecom Bretagne / Labsticc, France)
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David Picard (ETIS - ENSEA, France); Philippe H Gosselin (CNRS, ENSEA, UniversityCergy-Pontoise, France)
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Dimitrios Zarpalas (Informatics and Telematics Institute, Greece); Georgios Kordelas (Informatics and Telematics Institute, Greece); Petros Daras (Informatics & Telematics Institute, Greece)
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Stanley Chan (University of California, San Diego, USA); Truong Nguyen (University of California in San Diego, USA)
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Chao Jia (The University of Texas at Austin, USA); Brian L Evans (The University of Texas at Austin, USA)
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Variational Image Restoration Based on Poisson Singular Integral and Curvelet-Type Decomposition Space Regularization
Lili Huang (Nanjing University of Science and Technology, P.R. China); Liang Xiao (Nanjing University of Science and Technology, P.R. China); Zhihui Wei (Nanjing University of Science and Technology, P.R. China); Zhengrong Zhang (Nanjing University of Science and Technology, P.R. China)
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Mikael Carlavan (INRIA, France); Laure Blanc-Féraud (CNRS, France)
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A Convex Minimization Model in Image Restoration Via One-Dimensional Sobolev Norm Profiles
Yunho Kim (University of California Irvine, USA); John Garnett (University of California Los Angeles, USA); Luminita Vese (University of California, Los Angeles, USA)
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Ruiqin Xiong (Peking University, P.R. China)
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Zafer Dogan (Ecole Polytechnique Federale de Lausanne, Switzerland); Stamatios Lefkimmiatis (Ecole Polytechnique Federale de Lausanne, Switzerland); Aurélien Bourquard (Ecole Polytechnique Federale de Lausanne, Switzerland); Michael Unser (EPFL, Switzerland)
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MP.L6: Biomedical Image Shape Segmentation (Lecture)

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Ronald W. K. So (Hong Kong University of Science and Technology, Hong Kong); Albert C. S. Chung (The Hong Kong University of Science and Technology, Hong Kong)
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A Probabilistic Framework for Automatic Prostate Segmentation with a Statistical Model of Shape and Appearance
Soumya Ghose (Université de Bourgogne & Universitat de Girona, France); Arnau Oliver (University of Girona, Spain); Robert Marti (University of Girona, Spain); Xavier Lladó (University of Girona, Spain); Jordi Freixenet (University of Girona, USA); Joan Vilanova (Clinica Girona, Spain); Fabrice Meriaudeau (University of Bourgogne, France)
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A New Shape Based Segmentation Framework Using Statistical and Variational Methods
Melih Aslan (CVIP Lab, University of Louisville, USA); Hossam Abdelmunim (Faculty of Engineering, Ain Shams University, ?); Aly Farag (University of Louisville, USA); Ben Arnold (Image Analysis, Inc., USA); Eslam Mostafa (University of Louisville, USA); Ping Xiang (Image Analysis, Inc., USA)
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Segmenting Human Knee Cartilage Automatically From Multi-contrast MR Images Using Support Vector Machines and Discriminative Random Fields

Kunlei Zhang (Nanyang Technological University, Singapore); Jun Deng (Nanyang Technological University, Singapore); Lu Wenmiao (Nanyang Technological University, Singapore)

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A Fuzzy Framework with Prior Information Unifying Registration, Segmentation, and Bias Field Correction of Brain MRI

Moumen El-Melegy (Assiut University, Egypt); Aly Farag (University of Louisville, USA)

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Elastic Shape Registration Using an Incremental Free Form Deformation Approach with the ICP Algorithm

Hossam Abdelmunim (Faculty of Engineering, Ain Shams University, ?); Aly Farag (University of Louisville, USA)

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MP.L7: Reduced-Complexity Video Coding (Lecture)

HEVC ALF Decode Complexity Analysis and Reduction

Madhukar Budagavi (Texas Instruments, USA); Vivienne Sze (Texas Instruments, USA); Minhua Zhou (Texas Instruments, USA)

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Low Complexity Deblocking Filter Perceptual Optimization for the HEVC Codec

Matteo Naccari (British Broadcasting Corporation - Research and Development, United Kingdom); Catarina Brites (IST - IT, Portugal); Joao Ascenso (ISEL & IT, Portugal); Fernando Pereira (IST-IT, Portugal)

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Complexity-Aware Adaptive Spatial Pre-Processing for Roi Scalable Video Coding with Dynamic Transition Region

Dan Grois (Ben-Gurion University of the Negev, Israel); Ofer Hadar (Ben-Gurion University of the Negev, Israel)

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Video Compression Complexity Reduction with Adaptive Down-Sampling

Diogo Garcia (Universidade de Brasília, Brazil); Tiago da Fonseca (Universidade de Brasília, Brazil); Ricardo L de Queiroz (University of Brasil, Brazil)

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A Multi-Level Dynamic Complexity Reduction Scheme for Multiview Video Coding

Bruno Zatt (Federal University of Rio Grande do Sul, Brazil); Muhammad Shafique (Karlsruhe Institute of Technology (KIT), Germany); Sergio Bampi (Federal University of Rio Grande do Sul & Microelectronics Group at UFRGS, Brazil); Jörg Henkel (Universität karlsruhe (TH), Germany)

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Reduced-complexity Entropy Coding of Transform Coefficient Levels Using Truncated Golomb-Rice Codes in Video Compression
Tung Nguyen (Fraunhofer HHI, Germany); Detlev Marpe (Fraunhofer Institute for Telecommunications - Heinrich Hertz Institute, Germany); Heiko Schwarz (Fraunhofer HHI, Germany); Thomas Wiegand (Fraunhofer Institute for Telecommunications - Heinrich-Hertz-Institute, Germany)
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Zhan Ma (Samsung Telecommunications America, USA); Andrew Segall (Sharp Labs, USA)
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MP.L8: Face Recognition (Lecture)

Locality-constrained Group Sparse Representation for Robust Face Recognition
Yu-Wei Chao (Academia Sinica, Taiwan); Yi-Ren Yeh (Research Center for Information Technology Innovation, Academia Sinica, Taipei, Taiwan); Yu-Wen Chen (National Taiwan University, Taiwan); Yuh-Jye Lee (National Taiwan University of Science and Technology, Taiwan); Yu-Chiang Frank Wang (Academia Sinica, Taiwan)
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Face Recognition Using Multi-Scale Local Phase Quantisation and Linear Regression Classifier
Muhammad Atif Tahir (University of Surrey & University of Northumbria, United Kingdom); C. H. Chan (University of Surrey, United Kingdom); Josef Kittler (University of Surrey, United Kingdom); Ahmed Bouridane (Northumbria University, United Kingdom)
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MAP-MRF Based Lip Segmentation Without True Segment Number
Yiu-ming Cheung (Hong Kong Baptist University, Hong Kong); Meng Li (Hong Kong Baptist University, Hong Kong)
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3D Facial Expression Recognition Using Zernike Moments on Depth Images
Nicholas Vretos (Aristotle University of Thessaloniki, Greece); Nikos Nikolaidis (Aristotle University of Thessaloniki & Informatics and Telematics Institute, CERTH, Greece); Ioannis Pitas (Aristotle University of Thessaloniki, Greece)
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Illumination Robust Dictionary-based Face Recognition
Vishal Patel (University of Maryland, USA); Tao Wu (University of Maryland, USA); Soma Biswas (University of Notre Dame, USA); P. Jonathon Phillips (NIST, USA); Rama Chellappa (University of Maryland, USA)
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Face Tracking in Low Resolution Videos Under Illumination Variations
Wilman W.W. Zou (Hong Kong Baptist University, Hong Kong); Rama Chellappa (University of Maryland, USA); Pong C Yuen (Hong Kong Baptist University, Hong Kong)
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Color HOG-EBGM for Face Recognition
David Monzo (Universidad Politecnica de Valencia, Spain); Alberto Albiol (Universidad Politecnica de Valencia, Spain); Antonio Albiol (Universidad Politecnica Valencia, Spain); Jose M. Mossi (Polytechnic University of Valencia, Spain)
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Feature Selection Via Simultaneous Sparse Approximation for Person Specific Face Verification
Yixiong Liang (Central South University, P.R. China); Lei Wang (Central South University, P.R. China); Shenghui Liao (Central South University, P.R. China); Beiji Zou (Central South University, P.R. China)
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David Tschumperlé (Laboratoire GREYC (CNRS UMR 6072) & Equipe Image, France)
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Pattern Recognition by Affine Legendre Moment Invariants
Hui Zhang (University of Windsor, Canada); Jonathan Wu (University of Windsor, Canada)
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Ljiljana Platiša (Ghent University, Belgium); Bruno Cornelis (Vrije Universiteit Brussel, Belgium); Tijana Ružic (Ghent University, Belgium); Aleksandra Pižurica (Ghent University, Belgium); Ann Dooms (Vrije Universiteit Brussel, Belgium); Maximiliaan Martens (Ghent University, Belgium); Marc De Mey (The Flemish Academic Centre for Science and the Arts, Belgium); Ingrid Daubechies (Princeton University, USA)
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Junqiang Wang (Beijing University of Posts and Telecommunications, P.R. China); Huadong Ma (Beijing University of Posts and Telecommunications, P.R. China)
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Federico Tombari (University of Bologna, Italy); Samuele Salti (University of Bologna, Italy); Luigi Di Stefano (Universita' di Bologna, Italy)
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Marwen Nouri (University of Paris Descartes & Alcatel-Lucent Bell Labs France, France); Emmanuel Marilly (Alcatel Lucent Bell Labs France, France); Nicole Vincent (Université Paris 5, France)
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Image Analysis Using Separable Two-Dimensional Discrete Orthogonal Moments
Hongqing Zhu (East China University of Science and Technolog, P.R. China)
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Li Liu (National University of Defense Technology, P.R. China); Paul Fieguth (University of Waterloo, Canada); Gangyao Kuang (National University of Defense Technology, P.R. China)
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LSP: Local Similarity Pattern, a New Approach for Rotation Invariant Noisy Texture Analysis
Hamid Reza Pourreza (Ferdowsi University of Mashad, Iran); Mina Masoudifar (Sabzevar Tarbiat Moallem University, Iran); MohammadMahdi ManafZade (Ferdowsi University, Iran)
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Yonggang He (Huazhong University of Science and Technology, P.R. China); Nong Sang (Huazhong University of Science and Technology, P.R. China); Rui Huang (Huazhong University of Science and Technology, P.R. China)
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Fast Facial Landmark Detection Using Cascade Classifiers and a Simple 3D Model
Ang Liu (Peking University, P.R. China); Yangzhou Du (Intel China Research Center, P.R. China); Tao Wang (Intel China Research Center, P.R. China); Jianguo Li (Intel China Research Center, Beijing, P.R. China); Eric Li (Intel China Research Centre, Intel Corp., P.R. China); Yimin Zhang (Intel China Research Center, Canada); Yong Zhao (Peking University, P.R. China)
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Amir Said (Hewlett Packard Laboratories, USA)
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Carlos Ricolfe-Viala (Universidad Politecnica Valencia, Spain); Antonio-Jose Sanchez-Salmeron (Universidad Politecnica Valencia, Spain)
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Liang Wang (Beijing University of Technology, P.R. China)
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Kambiz Rahbar (Young Researchers Club, Islamic Azad University, Tehran Center, Iran); Karim Faez (Amirkabir University of Technology, Iran)
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Raymond Phan (Ryerson University, Canada); Richard J Rzeszutek (Ryerson University, Canada); Dimitri Androutsos (Ryerson University, Canada)
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Zhaoyin Jia (Cornell University, USA); Yao-Jen Chang (Cornell University, USA); Tzung-Han Lin (Industrial Technology Research Institute, Taiwan); Tsuhan Chen (Cornell University, USA)
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Sungho Suh (Seoul National University, Korea); Minsik Lee (Seoul National University, Korea); Chong-Ho Choi (Seoul National University, Korea)
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Wolfgang Waizenegger (Fraunhofer Heinrich-Hertz-Institut, Germany); Nicole Atzpadin (Fraunhofer Heinrich-Hertz-Institut, Germany); Oliver Schreer (Fraunhofer Heinrich-Hertz-Institut, Germany); Ingo Feldmann (Fraunhofer Heinrich-Hertz-Institut, Germany)
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Weilan Luo (University of Tokyo, Japan); Toshihiko Yamasaki (The University of Tokyo, Japan); Kiyoharu Aizawa (University of Tokyo, Japan)
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Juarez Silva Junior (University of Brasilia, Brazil); Dibio L Borges (University of Brasilia, Brazil); Flavio Vidal (University of Brasilia, Brazil)
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Mohammad Rouhani (Computer Vision Center, Spain); Angel D. Sappa (Computer Vision Center, Spain)
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Norihiko Kawai (University of California at Berkeley, USA); Avideh Zakhor (University of California at Berkeley, USA); Tomokazu Sato (Nara Institute of Science and Technology, Japan); Naokazu Yokoya (Nara Institute of Science and Technology, Japan)
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Zhebin Zhang (Institute of Computing Technologies, Chinese Academy of Science, P.R. China); Yizhou Wang (Peking University, P.R. China); Tingting Jiang (Peking University, P.R. China); Wen Gao (Peking University, P.R. China)
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Ali El Essaili (Munich University of Technology, Germany); Eckehard Steinbach (Munich University of Technology, Germany); Daniele Munaretto (University of Padova, Italy); Srisakul Thakolsri (DoCoMo Euro-Labs, Germany); Wolfgang Kellerer (DOCOMO Communications Laboratories Europe, Germany)

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Gianluca Cernigliaro (Universidad Politécnica de Madrid, Spain); Matteo Naccari (British Broadcasting Corporation - Research and Development, United Kingdom); Fernando Jaureguizar (Universidad Politécnica de Madrid, Spain); Julián Cabrera

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Michael H.F. Wilkinson (University of Groningen, The Netherlands)
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Wassima Aitfares (LAAS-CNRS, Université Paul Sabatier, France); Ariane Herbulot (LAAS-CNRS & University of Toulouse, France); Michel Devy (LAAS-CNRS, France); Houssine Bouyakhf (Université Mohammed V Agdal, Morocco); Fakhita Regragui (Mohammed V Agdal University, Morocco)
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A Robust Parametric Active Contour Based on Fourier Descriptors
Tao Li (INRIA Rennes-Bretagne Atlantique & EPI LAGADIC, France); Alexandre Krupa (INRIA Rennes-Bretagne Atlantique, France); Christophe Collewet (INRIA Rennes-Bretagne Atlantique, France)
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Xiaojin Gong (Zhejiang University, P.R. China); Jilin Liu (Zhejiang University, P.R. China)
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Yi Tang (University at Buffalo, The State University of New York & Center of Excellence for Document Analysis and Recognition, USA); Sargur Srihari (Cedar Buffalo, USA)
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Thanh Duc Ngo (The Graduate University for Advanced Studies, Japan); Duy-Dinh Le (National Institute of Informatics, Japan); Shin'ichi Satoh (National Institute of Informatics, Japan)
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Mayssaa Al Najjar (University of Louisiana at Lafayette, USA); Swetha Karlapudi (University of Louisiana at Lafayette, USA); Magdy Bayoumi (University of Louisiana, USA)
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Thiago Souza (Universidade Federal de Ouro Preto, Brazil); Eduardo Mapa (Prefeitura Municipal de Ouro Preto, Brazil); Kayran Santos (Universidade Federal de Ouro Preto, Brazil); David Menotti (Universidade Federal de Ouro Preto, Brazil)
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Efficient Quantization of Color Sift for Image Classification
Xiao Zhou (Hefei Normal University, P.R. China); Cai-Zhi Zhu (National Institute of Informatics, Japan); Shin'ichi Satoh (National Institute of Informatics, Japan)
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Donny Danudirdjo (The University of Tokyo, Japan); Akira Hirose (The University of Tokyo, Japan)
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Qiuwen Zhang (Shanghai University & School of Communication and Information Engineering, P.R. China); Ping An (School of Communication and Information Engineering, ShanghaiUniversity, P.R. China)
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Shireen Elhabian (University of Louisville, USA); Ham Rara (University of Louisville, USA); Aly Farag (University of Louisville, USA)
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Yu Huang (Huawei Technologies, USA); Qiang Hao (Western Virginia University, USA); Heather Yu (Huawei Technologies (USA), USA)

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Kun Zeng (Sun Yat-Sen University, P.R. China); Liang Lin (Sun Yat-Sen University, P.R. China)
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Face Sketch-Photo Synthesis Based on Support Vector Regression
Jiewei Zhang (Xidian University, P.R. China); Nannan Wang (Xidian University, P.R. China); Xinbo Gao (Xidian University, P.R. China); Dacheng Tao (University of Technology, Sydney, Singapore); Xuelong Li (Xi'an Institute of Optics and Precision Mechanics, Chinese Academy of Sciences, P.R. China)
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Efficient Face Hallucination by Using Shape and Texture Dependency
Aydin Akyol (Istanbul Technical University, Turkey); Muhittin Gökmen (Istanbul Technical University & Faculty of Computer and Informatics, Turkey)
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Adaptive KPCA-Based Missing Texture Reconstruction Approach Including Classification Scheme Via Difference Subspaces
Takahiro Ogawa (Hokkaido University, Japan); Miki Haseyama (Hokkaido University, Japan)
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MP.PG: Interpolation, Resizing and Super-resolution (Poster)

Isotropic Huber MRFs for Structure Super-Resolution
Youngjin Park (Seoul National University, Korea); Suk Yoo (Seoul National University, Korea)
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Single Image Super Resolution with High Resolution Dictionary
Guangwu Mu (Xidian University, P.R. China); Xinbo Gao (Xidian University, P.R. China); Kaibing Zhang (Xidian University, P.R. China); Xuelong Li (Xi'an Institute of Optics and Precision Mechanics, Chinese Academy of Sciences, P.R. China); Dacheng Tao (University of Technology, Sydney, Singapore)
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Super-Resolution Interpolation with a Quasi Blur-Hypothesis
Takahiro Saito (Kanagawa University, Japan); Ken-ichi Ishikawa (Kanagawa University, Japan); Takashi Komatsu (Kanagawa University, Japan)
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Adaptive Incremental Video Super-Resolution with Temporal Consistency
Heng Su (Tsinghua University, P.R. China); Ying Wu (Northwestern University, USA); Jie Zhou (Tsinghua University, P.R. China)
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Superfast Superresolution
Filip Šroubek (Institute of Information Theory and Automation, Czech Republic); Jan Kamenický (Institute of Information Theory and Automation, Czech Republic); Peyman Milanfar (University of California, Santa Cruz, USA)
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Video Coding with Wavelet Image Size Reduction and Wavelet Super Resolution Reconstruction
Yasutaka Matsuo (NHK (Japan Broadcasting Corporation), Japan); Toshie Misu (NHK (Japan Broadcasting Corporation), Japan); Shinichi Sakaida (NHK, Japan); Yoshiaki Shishikui (NHK, Japan)
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Single Image Super Resolution Via Texture Constrained Sparse Representation
Haitao Yin (Hunan University, P.R. China); Shutao Li (Hunan University, P.R. China); Jianwen Hu (Hunan University, P.R. China)
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Fast Edge-Filtered Image Upsampling
Shantanu H Joshi (UCLA & UCLA, USA); Antonio Marquina (University of Valencia, Spain); Stan Osher (University of California Los Angeles, USA); Ivo Dinov (UCLA, USA); Arthur Toga (UCLA, USA); John Van Horn (UCLA, USA)
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A Structure-guided Conditional Sampling Model for Video Resolution Enhancement
Ying Liu (University of Waterloo, Canada); Alexander Wong (University of Waterloo, Canada); Paul Fieguth (University of Waterloo, Canada)
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Bayesian Frame Interpolation by Fusing Multiple Motion-compensated Prediction Frames
Hongbin Liu (Harbin Institute of Technology, P.R. China); Ruiqin Xiong (Peking University, P.R. China)
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Similarity Modulated Block Estimation for Image Interpolation
Jie Ren (Peking University, P.R. China); Jiaying Liu (Peking University, P.R. China); Wei Bai (Peking University, P.R. China); Zongming Guo (Peking University, P.R. China)
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Springs-based Simulation for Image Retargeting
Roberto Gallea (Università degli Studi di Palermo, Italy); Edoardo Ardizzone (University of Palermo, Italy); Roberto Pirrone (University of Palermo, Italy)
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Fast and High Quality Learning-based Super-Resolution Utilizing TV Regularization Method
Tomio Goto (Nagoya Institute of Technology, Japan); Shotaro Suzuki (Nagoya Institute of Technology, Japan); Satoshi Hirano (Nagoya Institute of Technology, Japan); Masaru Sakurai (Nagoya Insitute of Technology, Japan); Truong Nguyen (University of California in San Diego, USA)
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A Hidden Markov Model-based Methodology for Intra-field Video Deinterlacing
Amin Behnad (University of Toronto, Canada); Konstantinos N Plataniotis (University of Toronto, Canada); Xiaolin Wu (McMaster University, Canada)
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Transform Domain Semi-Super Resolution
Edson Hung (Universidade de Brasilia, Brazil); Diogo Garcia (Universidade de Brasília, Brazil); Ricardo L de Queiroz (University of Brasil, Brazil)
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Efficient Super-Resolution Driven by Saliency Selectivity
Nabil Sadaka (Arizona State University, USA); Lina Karam (Arizona State University, USA)
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A Block-adaptive Skip Mode for Inter Prediction Based on Parametric Motion Models
Alexander Glantz (Technische Universität Berlin, Germany); Michael Tok (Technische Universität Berlin, Germany); Andreas Krutz (Technische Universität Berlin, Germany); Thomas Sikora (Technische Universität Berlin, Germany)
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Fast Encoding Algorithms for Geometry-Adaptive Block Partitioning
Philippe Bordes (Technicolor, France); Edouard Francois (Technicolor, France); Dominique Thoreau (Technicolor, France)
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Efficient Coding of Video Sequences by Non-Local In-Loop Denoising of Reference Frames
Eugen Wige (University of Erlangen-Nuremberg, Germany); Gilbert Yammine (University of Erlangen-Nuremberg, Germany); Peter Amon (Siemens, Germany); Andreas Hutter (Siemens Corporate Technology, Germany); Andre Kaup (University of Erlangen-Nuremberg, Germany)
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Generalized Interpolation for Motion Compensated Prediction
Haricharan Lakshman (Fraunhofer HHI, Germany); Heiko Schwarz (Fraunhofer HHI, Germany); Thierry Blu (CUHK, Hong Kong); Thomas Wiegand (HHI/FhG, Germany)
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Picture-level Parameteric Motion Representation for Efficient Motion Compensation
Jaewon Sung (LG Electronics, Korea); Seung-Wook Park (LG Electronics, Korea); Joonyoung Park (LG Electronics, Korea); Byeong-Moon Jeon (LG Electronics, Korea)
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Bi-prediction Combining Template and Block Motion Compensations
Chung-Lin Lee (National Chiao Tung University, Taiwan); Chun-Chi Chen (National Chiao Tung University, Taiwan); Yi-Wen Chen (National Chiao-Tung University,

Taiwan); Mu-Hsuan Wu (National Chiao Tung University, Taiwan); Chung-Hao Wu (National Chiao Tung University, Taiwan)
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TA.L2: Sparse Representation and Sparse Coding (Lecture)

Learning Complex Image Patterns with Scale and Shift Invariant Sparse Coding
Xiaobing Liu (Tsinghua University, P.R. China); Bo Zhang (Tsinghua University, P.R. China)
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On Sparse Representations of Color Images
Xiaolin Wu (McMaster University, Canada); Guangtao Zhai (McMasster University, Canada)
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Hyperspectral Image Classification Via Kernel Sparse Representation
Yi Chen (Johns Hopkins University, USA); Nasser Nasrabadi (US Army Research Laboratory, USA); Trac D. Tran (Johns Hopkins University, USA)
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Improved Sparse Coding Using Manifold Projections
Karthikeyan Natesan Ramamurthy (Arizona State University, USA); Jayaraman Thiagarajan (Arizona State University, USA); Andreas Spanias (ASU / SenSIP Center / School of ECEE, USA)
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Learning Invariant Color Features with Sparse Topographic Restricted Boltzmann Machines
Hanlin Goh (Institute for Infocomm Research & Université Pierre et Marie Curie, Singapore); Łukasz Kuśmierz (Institute for Infocomm Research, Singapore); Joo-Hwee Lim (Institute for Infocomm Research, Singapore); Nicolas Thome (University Pierre et Marie Curie, France); Matthieu Cord (UPMC Paris 6, France)
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Learning Dictionary Via Subspace Segmentation for Sparse Representation
Jianzhou Feng (Shanghai Jiao Tong University, P.R. China); Li Song (Shanghai Jiao Tong University, P.R. China); Xiaokang Yang (Shanghai Jiao Tong University, P.R. China); WenJun Zhang (Shanghai JiaoTong University, P.R. China)
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TA.L3: Image Classification (Lecture)

CW-SSIM Based Image Classification
Yang Gao (University of Waterloo, Canada); Abdul Rehman (University of Waterloo, Canada); Zhou Wang (University of Waterloo, Canada)
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Tree Trunk Detection Using Contrast Templates
Yan Lu (University of Delaware, USA); Christopher Rasmussen (University of Delaware, USA)
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Human Skin Detection in Images by MSER Analysis
Lei Huang (Institute of Computing Technology, Chinese Academy of Sciences & Graduate University of Chinese Academy of Sciences, P.R. China); Tian Xia (Institute of Computing Technology, Chinese Academy of Sciences, P.R. China); Yongdong Zhang (Institute of Computing Technology, Chinese Academy of Sciences, P.R. China); Shou-Xun Lin (Institute of Computing Technology, Chinese Academy of Sciences, P.R. China)
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HMAX-S: Deep Scale Representation for Biologically Inspired Image Categorization
Christian Theriault (Pierre et Marie Currie University, France); Nicolas Thome (University Pierre et Marie Curie, France); Matthieu Cord (UPMC Paris 6, France)
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Stochastic Minimum Spanning Forest Approach for Spectral-Spatial Classification of Hyperspectral Images
Kévin Bernard (University of Iceland & Heriot-Watt University, United Kingdom); Yuliya Tarabalka (GIPSA-Lab, France); Jesus Angulo (MINES Paristech, France); Jocelyn Chanussot (Grenoble Institute of Technology, France); Jon Benediktsson (University of Iceland, Iceland)
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TA.L4: Image Analysis Using Multi-Scale and Hierarchical Methods (Lecture)

Optimized Butterfly-based Lifting Scheme for Semi-Regular Meshes
Aymen Kammoun (I3S-CNRS-University of Nice Sophia Antipolis, France); Frédéric Payan (I3S-CNRS-University of Nice Sophia Antipolis, France); Marc Antonini (I3S-CNRS-University of Nice Sophia Antipolis, France)
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Hyperspectral Image Segmentation Using Binary Partition Trees
Silvia Valero (Universitat Politecnica de Catalunya, Spain); Philippe Salembier (Universitat Politecnica de Catalunya, Spain); Jocelyn Chanussot (Grenoble Institute of Technology, France)
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Testing a Multivariate Model for Wavelet Coefficients
Roland Kwitt (University of Salzburg, Austria); Peter Meerwald (University of Salzburg, Austria); Andreas Uhl (Salzburg University, Austria); Geert Verdoolaege (Ghent University, Belgium)
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3D Facial Expression Analysis by Using 2D and 3D Wavelet Transforms
Sílvia Cristina Dias Pinto (University of Sao Paulo, Brazil); Jesús P. Mena-Chalco (University of Sao Paulo & Institute of Mathematics and Statistics, Brazil); Fabrício Martins Lopes (Federal University of Technology - Parana & UTFPR, Brazil); Luiz Velho (IMPA, Brazil); Roberto Cesar Junior (University of São Paulo, Brazil)
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Detecting Gestures in Medieval Images
Joseph Schlecht (University of Heidelberg, Germany); Bernd Carqué (University of Heidelberg, Germany); Björn Ommer (IWR - University of Heidelberg, Germany)
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Pose Estimation and Body Segmentation Based on Hierarchical Searching Tree
Li Shifeng (Dalian University of Technology, P.R. China); Huchuan Lu (Dalian University of Technology, P.R. China); Ruan (OMRON Corp., Japan); Yen-Wei Chen (Ritsumeikan University, Japan)
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TA.L5: Astronomy and Cosmology (Special Session)

Bayesian MAP Detection of Extragalactic Point Sources in Microwave Astronomical Images
Diego Herranz (Instituto de Fisica de Cantabria, Santander, Spain); Francisco Argüeso (Universidad de Oviedo, Spain); Emanuele Salerno (ISTI-CNR, Italy); Ercan Kuruoğlu (CNR, Pisa, Italy); Koray Kayabol (INRIA, France)
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Source Separation in Cosmology, From Global to Local Models
Jerome Bobin (CEA, France); Florent Sureau (CEA, France); Jean-Luc Starck (CEA, France)
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Data Augmentation for Galaxy Density Map Reconstruction
Francois-Xavier Dupé (CEA, France); Jalal Fadili (GREYC CNRS UMR 6072, ensicaen, France); Jean-Luc Starck (CEA, France)
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Image Processing Challenges in Weak Gravitational Lensing
Adam Amara (ETHZ, Switzerland)
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Scale Invariant Images in Astronomy Through the Lens of Multifractal Modeling
Pierre Chainais (INRIA Lille-Nord Europe & Clermont University, France); Véronique Delouille (Royal Observatory of Belgium, Belgium); Jean-François Hochedez (LATMOS UMR CNRS 8190, France)
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Compressed Sensing for Radio Interferometric Imaging: Review and Future Direction
Jason McEwen (Ecole Polytechnique Federale de Lausanne, Switzerland); Yves Wiaux (EPFL, Switzerland)
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TA.L6: High Dynamic Range Imaging and Compression (Lecture)

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Stephen Mangiat (University of California, Santa Barbara, USA); Jerry D Gibson (University of California, Santa Barbara, USA)
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Perception-Based High Dynamic Range Video Compression with Optimal Bit-depth Transformation
Yang Zhang (University of Bristol, United Kingdom); Erik Reinhard (University of Bristol, United Kingdom); David Bull (University of Bristol, United Kingdom)
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A Single Algorithm Combining Exposure and Focus Fusion
Azhar Sufi (SRI International & Rutgers University, USA); David C. Zhang (SRI International Sarnoff, USA); Gooitzen van der Wal (SRI International, USA)
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SDALA: Simultaneous Dynamic Range Compression and Local Contrast Enhancement Algorithm
Chi-Yi Tsai (Tamkang University, Taiwan)
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High Dynamic Range Imaging Under Noisy Observations
Renu Rameshan (Indian Institute of Technology Bombay & Amrita Vishwa Vidyapeetham, India); Subhasis Chaudhuri (Indian Institute of Technology, Bombay, India); Rajbabu Velmurugan (IIT Bombay, India)
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De-ghosting of HDR Images with Double-credit Intensity Mapping
Zijian Zhu (Institute for Infocomm Research, Singapore); Zhengguo Li (Institute for Inforcomm Research, Singapore); Susanto Rahardja (Institute for Infocomm Research, Singapore); Pasi Fränti (University of Eastern Finland, Finland)
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Kwok-Wai Hung (The Hong Kong Polytechnic University, Hong Kong); Wan-Chi Siu (The Hong Kong Polytechnic University, Hong Kong)
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Israa Amro (Al-Quds Open University, Palestine); Javier Mateos (University of Granada, Spain); MIguel Vega (University of Granada, Spain)
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Learning Context-Aware Sparse Representation for Single Image Super-Resolution
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Multi-scale Non-Local Kernel Regression for Super Resolution
Haichao Zhang (Northwestern Polytechnical University & University of Illinois at Urbana-Champaign, USA); Jianchao Yang (UIUC, USA); Yanning Zhang (Northwestern Polytechnical University, P.R. China); Thomas S Huang (University of Illinois at Urbana-Champaign, USA)
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Mohamed M. Fouad (Military Technical College, Egypt); Richard Dansereau (Carleton University, Canada); Anthony Whitehead (Carleton Universty, Canada)
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Mahmoud Ghoniem (Université de Caen Basse-Normandie, France); Abderrahim Elmoataz (Université de Caen Basse-Normandi, France); Olivier Lezoray (Université de Caen Basse-Normandie & Greyc UMR CNRS 6072, France)
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On the Efficiency of Proximal Methods in CBCT and PET
Sandrine Anthoine (Université Aix-Marseille, LATP, CNRS, France); Jean Francois Aujol (Université Bordeaux 1, IMB, France); Yannick Boursier (Aix Marseille University & CPPM, CNRS/IN2P3, France); Clothilde Mélot (Aix Marseille University, LATP / CNRS, France)
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A Discrete-Continuous Bayesian Model for Emission Tomography
Mame Diarra Fall (Université Paris-Sud 11, France); Eric Barat (CEA, France); Claude Comtat (Service Hospitalier Frédéric Joliot, France); Thomas Dautremer (CEA, France); Thierry Montagu (CEA, France); Ali Mohammad-Djafari (Centre national de la recherche scientifique (CNRS), France)
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Bayesian Data Fusion and Inversion in X-ray Multi-Energy Computed Tomography
Caifang Cai (Commissariat a Energie Atomique, France); Ali Mohammad-Djafari (Centre national de la recherche scientifique (CNRS), France); Samuel Legoupil

(Commissariat a Energie Atomique (CEA), France); Thomas Rodet (University of Paris Sud & L2S - UMR 8506 Supelec, CNRS, University Paris Sud, France)
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Jun Feng (Sichuan University, Chengdu University of Technology, P.R. China); Jian-Zhou Zhang (Sichuan University, P.R. China)
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Elena Gil-Rodrigo (Consejo Superior de Investigaciones Científicas, Spain); Javier Portilla (Consejo Superior de Investigaciones Científicas, Spain); David Miraut (Universidad Rey Juan Carlos, Spain); Ricardo Suarez-Mesa (Universidad Rey Juan Carlos, Spain)
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Jacinto C. Nascimento (Instituto de Sistemas e Robotica, Portugal); Jorge S. Marques (Instituto Superior Técnico & Instituto de Sistemas e Robotica, Portugal); João Lemos (Instituto Superior Técnico, Portugal)
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Georgios K Ouzounis (European Commission, Joint Research Centre, Italy); Lionel Gueguen (JRC - European Commission, Italy)
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Xinting Gao (Institure for Infocomm Research, Singapore); Huiqi Li (Institute for Infocomm Research (I2R), Singapore); Joo-Hwee Lim (Institute for Infocomm Research, Singapore); Tien Yin Wong (Singapore Eye Research Centre, Singapore)
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Apostolos Axenopoulos (University of Thessaly, Department of Computer & Communication Engineering & Informatics & Telematics Institute, Greece); Petros Daras (Informatics & Telematics Institute, Greece); Georgios Papadopoulos (University of Thessaly - Department of Biochemistry & Biotechnology, Greece); Elias Houstis (University of Thessaly, Department of Computer & Communication Engineering, Greece)
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Bálint Antal (University of Debrecen, Hungary); Andras Hajdu (University of Debrecen, Hungary)
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Xi Wang (Institute Of Computing Technology, Chinese Academy of Sciences, P.R. China); Li Su (Graduate School of Chinese Academy of Sciences, P.R. China); Qingming Huang (Graduate School of Chinese Academy of Sciences, P.R. China); Chunxi Liu (Graduate University of Chinese Academy of Sciences, CAS, P.R. China)
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Shiqi Wang (Institute of Digital Media, School of Electronic Engineering and Computer Science, Peking University & Department of Electrical and Computer Engineering, University of Waterloo, Canada); Abdul Rehman (University of Waterloo, Canada); Zhou Wang (University of Waterloo, Canada); Siwei Ma (University of Southern California, USA); Wen Gao (ICT-ISVISION Joint R&D Laboratory for Face Recognition, CAS, P.R. China)
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TA.PF: Color/Multispectral Imaging and Rendering (Poster)

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Makoto Shohara (Japan Advanced Institute of Science and Technology, Japan); Kazunori Kotani (JAIST, Japan)
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Mohammad Aghagolzadeh (Michigan State University, USA); Abdolreza Abdolhosseini Moghadam (Michigan State University, USA); Mrityunjay Kumar (Eastman Kodak Company, USA); Hayder Radha (Michigan State University, USA)
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High Resolution Subpixel and Subframe Rendering for Color Flatpanel and Projector Displays
Keigo Hirakawa (University of Dayton, USA); Jing Gu (Kingway Technology Shanghai Ltd., P.R. China)
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Jin-Young Kim (Purdue University, USA); Yung-Yao Chen (Purdue University, USA); Mani Fischer (Hewlett-Packard Laboratories, Israel); Omri Shacham (Hewlett-Packard Indigo, Israel); Carl Staelin (Hewlett-Packard Laboratories, Israel); Jan Allebach (Purdue University, USA)
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TA.PG: Applications of Image & Video Interpretation and Understanding (Poster)

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Lei Wang (Xidian University, P.R. China); Hongbing Ji (School of Electronic Engineering, Xidian University, P.R. China); Ya Shi (Xidian University, P.R. China)
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A Non-Temporal Texture Driven Approach to Real-time Fire Detection
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Temporal Trimap Propagation for Video Matting Using Inferential Statistics
Muhammad Sarim (University of Surrey, United Kingdom)
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A Biologically Inspired System for Fast Handwritten Digit Recognition
Zhe Wang (Beijing Jiaotong University, P.R. China); Yaping Huang (Beijing Jiaotong University, P.R. China); Siwei Luo (Beijing Jiaotong University, P.R. China); Liang Wang (Beijing Jiaotong University, P.R. China)
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Joint Optimization of Background Subtraction and Object Detection for Night Surveillance
Congcong Li (Cornell University, USA); Chih-Wei Lin (Industrial Technology Research Institute, Taiwan); Shiaw-Shian Yu (Industrial Technology Research Institute, Taiwan); Tsuhan Chen (Cornell University, USA)
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Automatic Bandwidth Estimation Strategy for High-Quality Non-Parametric Modeling Based Moving Object Detection
Carlos Cuevas (Universidad Politécnica de Madrid, Spain); Narciso García (Universidad Politécnica de Madrid, Spain)
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Face Recognition Through Regional Weight Estimation
Daniel Yule (University of Northern British Columbia, Canada); Liang Chen (University of N. British Columbia, Canada)
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Ultrasound Video Analysis for Understanding Infant Breastfeeding
Gianluca Monaci (Philips research, The Netherlands); Mike Woolridge (University of Leeds, United Kingdom)
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Exploiting Feature Correspondence Constraints for Image Recognition
Linbo Wang (Nanjing University, P.R. China); Feng Tang (Hewlett-Packard Laboratories, USA); Yanwen Guo (Nanjing University, P.R. China); Suk Hwan Lim (HP Labs, USA); Nelson L. Chang (Hewlett-Packard Laboratories, USA)
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Sparse Cost-sensitive Classifier with Application to Face Recognition
Jiangyue Man (Nanjing University of Posts and Telecommunications, P.R. China); Xiaoyuan Jing (College of Automation, Nanjing University of Posts and Telecommunications & State Key Laboratory for Software Engineering, Wuhan University, P.R. China); David Zhang (The Hong Kong Polytechnic University, Hong Kong); Chao Lan (Nanjing University of Posts and Telecommunications, P.R. China)
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Hierarchical Bag-of-Features for Hand Posture Recognition
Yuelong Chuang (Zhejiang University, P.R. China)
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Context-driven Moving Object Detection in Aerial Scenes with User Input
Christophe Guilmart (ENS Cachan & Onera, France); Stéphane Herbin (Onera, France); Patrick Perez (Technicolor, France)
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Human Face Classification Based on Localized Blur Descriptors
Abdul Adeel Mohammed (University of Waterloo, Canada); Jonathan Wu (University of Windsor, Canada); Maher Sid-Ahmed (University of Windsor, Canada)
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Combining Global and Local Features for Food Identification in Dietary Assessment
Marc Bosch (Purdue University, USA); Fengqing Zhu (Purdue University, USA); Nitin Khanna (Purdue University, USA); Carol Boushey (Purdue University, USA); Ed Delp (Purdue University, USA)
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Human Detection Using Multi-camera and 3D Scene Knowledge
Chengbin Zeng (Beijing University of Posts and Telecommunications, P.R. China); Huadong Ma (Beijing University of Posts and Telecommunications, P.R. China)
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Multimodal Learning for Multi-Label Image Classification
Yanwei Pang (Tianjin University, P.R. China); Zhao Ma (Tianjin University, P.R. China); Yuan Yuan (Chinese Academy of Sciences, P.R. China); Xuelong Li (Xi'an Institute of Optics and Precision Mechanics, Chinese Academy of Sciences, P.R. China); Kongqiao Wang (Nokia Research Center, P.R. China)
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TP.L1: Distributed Compression: Multimedia Applications (Special Session)

Distributed Compression: Overview of Current and Emerging Multimedia Applications
Lina Stankovic (University of Strathclyde, United Kingdom); Vladimir Stankovic (University of Strathclyde, United Kingdom); Samuel Cheng (University of Oklahoma, USA)
pp. 1801-1804

Quality-Controlled View Interpolation for Multiview Video
Mina Makar (Stanford University, USA); Yao-Chung Lin (Stanford University, USA); Ngai-Man Cheung (Stanford University, USA); Derek Pang (Stanford University, USA); Bernd Girod (Stanford University, USA)
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A Comparison of the Error Resiliency of Bit-Plane Based and Symbol Based Pixel-Domain Distributed Video Coding
Hu Chen (Technische Universität München, Germany); Eckehard Steinbach (Munich University of Technology, Germany); Chang Wen Chen (State University of New York at Buffalo, USA)
pp. 1809-1812

Distributed Coding of Endoscopic Video
Nikos Deligiannis (Vrije Universiteit Brussel – IBBT, Belgium); Frederik Verbist (Vrije Universiteit Brussel – IBBT, Belgium); Joeri Barbarien (Vrije Universiteit Brussel,

Belgium); Jürgen Slowack (Ghent University, Belgium); Rik Van de Walle (Ghent University - IBBT, Belgium); Peter Schelkens (Vrije Universiteit Brussel, Belgium); Adrian Munteanu (Vrije Universiteit Brussel, Belgium)
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Wyner-Ziv Coding for Depth Maps in Multiview Video-Plus-Depth
Giovanni Petrazzuoli (Télécom ParisTech, France); Marco Cagnazzo (TELECOM ParisTech, France); Frederic Dufaux (Telecom Paristech & CNRS, France); Beatrice Pesquet-Popescu (Télécom ParisTech, France)
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Distributed Compression of Zerotrees of Wavelet Coefficients
Yige Wang (MERL, USA); Shantanu Rane (Mitsubishi Electric Research Laboratories, USA); Petros T Boufounos (MERL & Rice University, USA); Anthony Vetro (Mitsubishi Electic Research Laboratories, USA)
pp. 1821-1824

Distributed Source Coding for Securing a Hand-Based Biometric Recognition System
Mauricio Ramalho (Instituto de Telecomunicações, Portugal); Paulo Lobato Correia (Instituto Superior Tecnico - Universidade Tecnica Lisboa & Instituto de Telecomunicacoes, Portugal); Luis Ducla Soares (I.S.C.T.E. / I.T. - Lisbon, Portugal)
pp. 1825-1828

Distributed Transforms for Efficient Data Gathering in Arbitrary Networks
Javier Trufero (University of Southern California, USA); Sunil K. Narang (University of Southern California, USA); Antonio Ortega (USC, USA)
pp. 1829-1832

TP.L2: Image and Noise Models for Restoration (Lecture)

Resolution-invariant Separable ARMA Modeling of Images
Aurélien Bourquard (Ecole Polytechnique Federale de Lausanne, Switzerland); Hagai Kirshner (EPFL, Switzerland); Michael Unser (EPFL, Switzerland)
pp. 1833-1836

CONDY: Ultra-Fast High Performance Restoration Using Multi-Frame L2-Relaxed-L0 Sparsity and Constrained Dynamic Heuristics
Javier Portilla (Consejo Superior de Investigaciones Científicas, Spain); Elena Gil-Rodrigo (Consejo Superior de Investigaciones Científicas, Spain); David Miraut (Universidad Rey Juan Carlos, Spain); Ricardo Suarez-Mesa (Universidad Rey Juan Carlos, Spain)
pp. 1837-1840

Sparsity-based Image Deblurring with Locally Adaptive and Nonlocally Robust Regularization
Xin Li (West Virginia University, USA); Weisheng Dong (Xidian University, P.R. China); Guangming Shi (Xidian University, P.R. China); Lei Zhang (The Hong Kong Polytechnic University, Hong Kong)
pp. 1841-1844

Patch Similarity Under Non Gaussian Noise
Charles-Alban Deledalle (Telecom ParisTech & Institut Telecom, CNRS LTCI, France); Florence Tupin (Télécom Paris, France); Loïc Denis (Centre de Recherche Astrophysique de Lyon, France)
pp. 1845-1848

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Generalized Subspace Based High Dimensional Density Estimation
Karthikeyan Shanmuga Vadivel (University of California Santa Barbara, USA); Mehmet Emre Sargin (Google Inc., USA); Swapna Joshi (UCSB, USA); Bangalore Manjunath (UCSB, USA); Scott Grafton (UCSB, USA)
pp. 1849-1852

Ising Field Parameter Estimation From Incomplete and Noisy Data
Jean-François Giovannelli (IMS, UMR CNRS 52 18, Université Bordeaux 1, France)
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Noise Estimation Using Statistics of Natural Images
Guangtao Zhai (McMasster University, Canada); Xiaolin Wu (McMaster University, Canada)
pp. 1857-1860

Hazy Image Modeling Using Color Ellipsoids
Kristofor Gibson (University of California San Diego, USA); Truong Nguyen (University of California in San Diego, USA)
pp. 1861-1864

TP.L3: Motion Analysis and Object Tracking (Lecture)

A Fast Object Tracking Approach Based on Sparse Representation
Zhenjun Han (Graduate University of Chinese Academy of Sciences, P.R. China); Jianbin Jiao (Graduate University of Chinese Academy of Sciences, P.R. China); Qixiang Ye (Graduate University of Chinese Academy of Sciences, P.R. China)
pp. 1865-1868

Efficiently Selecting Spatially Distributed Keypoints for Visual Tracking
Steffen Gauglitz (University of California, Santa Barbara, USA); Luca Foschini (University of California, Santa Barbara, USA); Matthew Turk (University of California, Santa Barbara, USA); Tobias Höllerer (University of California, Santa Barbara, USA)
pp. 1869-1872

Simultaneous 3D Object Tracking and Camera Parameter Estimation by Bayesian Methods and Transdimensional MCMC Sampling
Raúl Mohedano (Universidad Politécnica de Madrid, Spain); Narciso García (Universidad Politécnica de Madrid, Spain)
pp. 1873-1876

Multi-person Tracking Based on Vertical Reference Lines and Dynamic Visibility Analysis
Xinghan Luo (Utrecht University, The Netherlands); Robby Tan (Utrecht University, The Netherlands); Remco C. Veltkamp (Utrecht University, The Netherlands)
pp. 1877-1880

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Local Complexity Adaptable Trajectory Partitioning Via Minimum Message Length
Charles Twardy (George Mason University, USA); Anthony Stefanidis (George Mason University, USA)
pp. 1881-1884

Fast TV-L1 Optical Flow for Interactivity
Emmanuel d'Angelo (EPFL & Signal Processing Lab 2, Switzerland); Johan Paratte (EPFL, Switzerland); Gilles Puy (EPFL, Switzerland); Pierre Vandergheynst (EPFL, Switzerland)
pp. 1885-1888

Co-occurrence Flow for Pedestrian Detection
Atsuto Maki (Toshiba Research Europe, United Kingdom); Akihito Seki (Toshiba Corporation, Japan); Tomoki Watanabe (Toshiba Corporation, Japan); Roberto Cipolla (University of Cambridge, United Kingdom)
pp. 1889-1892

Hierarchical Fusion of Descriptor Matching and L-K Optical Flow
Haibo Wang (Institute of Automation, Chinese Academy of Sciences, P.R. China); Chunhong Pan (Institute of Automation, Chinese Academy of Sciences, P.R. China); Franck Davoine (CNRS, P.R. China); ShaoGuo Liu (Institute of Automation, Chinese Academy of Sciences, P.R. China)
pp. 1893-1896

TP.L4: Sparse Image Recovery (Lecture)

Increasing Imaging Resolution by Covering Your Sensor
Michael Schöberl (University of Erlangen-Nuremberg, Germany); Jürgen Seiler (University of Erlangen-Nuremberg, Germany); Siegfried Foessel (Fraunhofer IIS, Germany); Andre Kaup (University of Erlangen-Nuremberg, Germany)
pp. 1897-1900

Inverse Problems with Poisson Noise: Primal and Primal-Dual Splitting
Francois-Xavier Dupé (CEA, France); Jalal Fadili (GREYC CNRS UMR 6072, ensicaen, France); Jean-Luc Starck (CEA, France)
pp. 1901-1904

Sparse Image Restoration Using Iterated Linear Expansion of Thresholds
Hanjie Pan (The Chinese University of Hong Kong, Hong Kong); Thierry Blu (EPFL, Switzerland)
pp. 1905-1908

Cutset Sampling and Reconstruction of Images
Ashish Farmer (University of Michigan, USA); Awlok Josan (University of Michigan, USA); Matthew Prelee (University of Michigan, USA); David L Neuhoff (University of Michigan, USA); Thrasyvoulos N. Pappas (Northwestern University, USA)
pp. 1909-1912

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A Graph Cut Method for Linear Inverse Problems

Ahmet Tuysuzoglu (Boston University, USA); Ivana Stojanovic (Boston University, USA); David Castanon (Boston University, USA); William Karl (Boston University, USA)

pp. 1913-1916

Convex Approaches to Model Wavelet Sparsity Patterns

Nikhil Rao (University Of Wisconsin Madison, USA); Rob Nowak (University of Wisconsin, Madison, USA); Stephen J Wright (University of Wisconsin, USA); Nick Geoffrey Kingsbury (University of Cambridge, United Kingdom)

pp. 1917-1920

Weighted Fidelity in Non-Uniformly Quantized Compressed Sensing

Laurent Jacques (University of Louvain, Belgium); David Hammond (University of Oregon, USA); Jalal Fadili (GREYC CNRS UMR 6072, ensicaen, France)

pp. 1921-1924

Refractive Index Estimation Using Photometric Stereo

Gule Saman (University of York, United Kingdom); Edwin Hancock (University of York, United Kingdom)

pp. 1925-1928

TP.L5: Image Forensics (Lecture)

Detection of Non-Aligned Double JPEG Compression with Estimation of Primary Compression Parameters

Tiziano Bianchi (University of Firenze, Italy); Alessandro Piva (University of Florence, Italy)

pp. 1929-1932

Identifying Computer Generated Graphics Via Histogram Features

Ruoyu Wu (Institute of Computer Science and Technology, Peking University, P.R. China); Xiaolong Li (Institute of Computer Science and Technology, Peking University, P.R. China); Bin Yang (Institute of Computer Science and Technology, Peking University, P.R. China)

pp. 1933-1936

Eye Specular Highlights Telltales for Digital Forensics: a Machine Learning Approach

Priscila Saboia (State University of Campinas, Brazil); Tiago Carvalho (University of Campinas (Unicamp), Brazil); Anderson Rocha (State University of Campinas, Brazil)

pp. 1937-1940

An Application of Sparse Code Shrinkage to Image Steganalysis Based on Supervised Learning

Michiharu Niimi (Kyushu Institute of Technology, Japan); Hideki Noda (Kyushu Institute of Technology, Japan)

pp. 1941-1944

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Modeling the EXIF-Image Correlation for Image Manipulation Detection
Jiayuan Fan (Nanyang Technological University, Singapore); Alex Kot (Nanyang Technological University, Singapore); Hong Cao (Nanyang Technological University, Singapore); Farook Sattar (University of Victoria, Canada)
pp. 1945-1948

Countering JPEG Anti-Forensics
Giuseppe Valenzise (Politecnico di Milano, Italy); Vitaliano Nobile (Politecnico di Milano, Italy); Marco Tagliasacchi (Politecnico di Milano, Italy); Stefano Tubaro (Politecnico di Milano, Italy)
pp. 1949-1952

Exploring Compression Effects for Improved Source Camera Identification Using Strongly Compressed Video
Wei-Hong Chuang (University of Maryland, USA); Hui Su (University of Maryland, USA); M Wu (University of Maryland, USA)
pp. 1953-1956

Passive Spread-Spectrum Steganalysis
Ming Li (State University of New York at Buffalo, USA); Michel Kulhandjian (State University of New York at Buffalo, USA); Dimitris A. Pados (State University of New York at Buffalo, USA); Stella N. Batalama (State University of New York at Buffalo, USA); Michael Medley (Air Force Research Laboratory, USA)
pp. 1957-1960

TP.L6: 3D Image Generation and Analysis (Lecture)

2D to 3D Conversion of Sports Content Using Panoramas
Lars Schnyder (Disney Research Zurich, Switzerland); Oliver Wang (Disney Research Zurich, Switzerland); Aljoscha Smolic (Disney Research Zurich, Switzerland)
pp. 1961-1964

Hole Filling with Random Walks Using Occlusion Constraints in View Synthesis
Sunghwan Choi (Yonsei University & Digital Image Media Laboratory, Korea); Bumsub Ham (Yonsei University, Korea); Kwang Hoon Sohn (Yonsei University, Korea)
pp. 1965-1968

A Triangular-Warping Based View Synthesis Scheme with Enhanced Artifact Reduction for FTV
Chao-Hsuan Li (National Chiao Tung University, Taiwan); Hsueh-Ming Hang (NCTU, Taiwan)
pp. 1969-1972

Super-Resolution Plane Sweeping for Free-Viewpoint Image Synthesis
Keita Takahashi (The University of Tokyo, Japan); Masato Ishii (NEC Corporation, Japan); Takeshi Naemura (Tokyo University, Japan)
pp. 1973-1976

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Depth Map Reconstruction Using Color-based Region Merging
Camilo Dorea (University of Brasilia, Brazil); Ricardo L de Queiroz (University of Brasil, Brazil)
pp. 1977-1980

Recovering Depth From a Single Image Using Spectral Energy of the Defocused Step Edge Gradient
Cheng-Wei Chen (National Taiwan University, Taiwan); Yung-Yaw Chen (National Taiwan University, Taiwan)
pp. 1981-1984

3D Surface Registration Using Z-SIFT
Lulu He (Northwestern University, USA); Sen Wang (Eastman Kodak Company, USA); Thrasyvoulos N. Pappas (Northwestern University, USA)
pp. 1985-1988

TP.L7: Lossless and Predictive Coding (Lecture)

L_2 Restoration of l_\infty-decoded Images with Context Modeling
Jiantao Zhou (McMaster University, Canada); Xiaolin Wu (McMaster University, Canada)
pp. 1989-1992

Image Similarity Using the Normalized Compression Distance Based on Finite Context Models
Armando J Pinho (University of Aveiro, Portugal); Paulo Ferreira (University of Aveiro, Portugal)
pp. 1993-1996

On Lossless Image Compression Using the Burrows-Wheeler Transform
Donald Adjeroh (West Virginia University, USA); Kalyan Bhupathiraju (West Virginia University, USA)
pp. 1997-2000

Exploitation of Context Classification for Parallel Pixel Coding in JPEG-LS
Simeon Wahl (University of Stuttgart, Germany); Haitham Tantawy (University of Stuttgart, Germany); Zhe Wang (University of Stuttgart, Germany); Philipp Werner (University of Stuttgart, Germany); Sven Simon (University of Stuttgart, Germany)
pp. 2001-2004

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Improved H.264/AVC Lossless Intra Compression Using Multiple Partition Prediction for 4X4 Intra Block
Sang Heon Lee (Seoul Nat'l University, Korea); Jewoong Ryu (Seoul National University, Korea); Nam-Ik Cho (Seoul National University, Korea)
pp. 2005-2008

Improved Lossless Coding Algorithm in H.264/AVC Based on Hierarchical Intra Prediction
Li-Li Wang (Hong Kong Polytechnic University, Hong Kong); Wan-Chi Siu (The Hong Kong Polytechnic University, Hong Kong)
pp. 2009-2012

Adaptive Least Squares Prediction for Stereo Image Coding
Luís Lucas (Polytechnic Institute of Leiria & Institute of Telecommunications, Portugal); Nuno Rodrigues (IPL/Institute of Telecommunications, Portugal); Eduardo Silva (UFRJ, Brazil); Sérgio M. M. Faria (Institute of Telecommunications & Polytechnic Institute of Leiria, Portugal)
pp. 2013-2016

TP.L8: Ultrasound and Microscopic Imaging (Lecture)

Elastographic Image Reconstruction: A Stochastic State Space Approach
Jun Wang (Zhejiang University, P.R. China)
pp. 2017-2020

Reducing the Training Set Using Semi-Supervised Self-Training Algorithm for Segmenting the Left Ventricle in Ultrasound Images
Jacinto C. Nascimento (Instituto de Sistemas e Robotica, Portugal); Gustavo Carneiro (Instituto de Sistemas e Robótica (ISR), Portugal)
pp. 2021-2024

Enhanced Classification of Focal Hepatic Lesions in Ultrasound Images Using Novel Texture Features
Sihyoung Lee (Korea Advanced Institute of Science and Technology, Korea); In A Jo (Korea Advanced Institute of Science and Technology, Korea); Kyung Won Kim (Seoul National University Hospital, Korea); Jae Young Lee (Seoul National University Hospital, Korea); Yong Man Ro (KAIST, Korea)
pp. 2025-2028

Realistic Log-Compressed Law for Ultrasound Image Recovery
Gonzalo Vegas-Sánchez-Ferrero (University of Valladolid, Spain); Diego Martín-Martínez (University of Valladolid, Spain); Pablo Casaseca-de-la-Higuera (University of Valladolid, Spain); Lucilio Cordero-Grande (University of Valladolid, Spain); Santiago Aja-Fernández (Universidad de Valladolid, Spain); Marcos Martín-Fernández (Universidad de Valladolid, Spain); Cesar Palencia (University of Valladolid, Spain)
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Compact Rotation Invariant Image Descriptors by Spectral Trimming
Maxime Taquet (Belgium & Computational Radiology Laboratory, Harvard Medical School, Belgium); Laurent Jacques (University of Louvain, Belgium); Benoit Macq (UCL, Belgium); Sylvain Jaume (Massachusetts Institute of Technology & Harvard Medical School, USA)
pp. 2033-2036

Modeling of PSF for Refractive Index Variation in Fluorescence Microscopy
Sameer Hiware (Indian Institute of Technology Bombay, India); Pradyot Porwal (Indian Institute of Management Bangalore & Indian Institute of Technology Bombay, India); Rajbabu Velmurugan (IIT Bombay, India); Subhasis Chaudhuri (Indian Institute of Technology, Bombay, India)
pp. 2037-2040

Image Filtering Using Anisotropic Structure Tensor for Cell Membrane Enhancement in 3D Microscopy

Sorin Pop (Institut Pasteur, France); Alexandre Dufour (Institut Pasteur, France); Jean-Christophe Olivo-Marin (Institut Pasteur, France)

pp. 2041-2044

ALL-IDB: The Acute Lymphoblastic Leukemia Image Database for Image Processing

Ruggero Donida Labati (Università degli Studi di Milano, Italy); Vincenzo Piuri (University of Milan, Italy); Fabio Scotti (Universita' degli Studi di Milano, Italy)

pp. 2045-2048

TP.L9: Object and Human Detection (Lecture)

Detecting Humans Under Occlusion Using Variational Mean Field Method

Thanh Duc Nguyen (University of Wollongong, Australia); Philip Ogunbona (University of Wollongong, Australia); Wanqing Li (University of Wollongong, Australia)

pp. 2049-2052

Local Binary Pattern Features for Pedestrian Detection At Night/Dark Environment

Yunyun Cao (Security & Safety Systems Development Office & Tokyo Research & Development Center, Panasonic Corporation, Japan); Sugiri Pranata (Panasonic Singapore Laboratories Pte Ltd, Singapore); Hirofumi Nishimura (Tokyo R&D Center, Panasonic Corporation, Japan)

pp. 2053-2056

Effective Discretization of Gabor Features for Real-time Face Detection

Feijun Jiang (Hong Kong University of Science and Technology, P.R. China); Bertram Shi (Hong Kong University of Science and Technology, Hong Kong); Mika Fischer (Karlsruhe Institute of Technology (KIT), Germany); Hazim Ekenel (Karlsruhe Institute of Technology (KIT), Germany)

pp. 2057-2060

Robust Crowd Counting Using Detection Flow

Junliang Xing (Tsinghua University, P.R. China); Haizhou Ai (Tsinghua University, P.R. China); Liwei Liu (Tsinghua University, P.R. China); Shihong Lao (OMRON Corporation, Japan)

pp. 2061-2064

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Direction-based Stochastic Matching for Pedestrian Recognition in Non- Overlapping Cameras

Xiaotang Chen (Institute of Automation, Chinese Academy of Science, P.R. China); Kaiqi Huang (Chinese Academy of Sciences, P.R. China); Tieniu Tan (NLPR, P.R. China)

pp. 2065-2068

Robust Shape-From-Image-Focus by 3-D Multivariate Statistical Analyses

Mathieu Fernandes (Ecole des Mines de Saint-Etienne, France); Yann Gavet (Ecole des Mines de Saint-Etienne, France); Jean-Charles Pinoli (Ecole Nationale Supérieure des Mines, France)

pp. 2069-2072

TP.PA: Image & Video Representations and Applications (Poster)

Robust View Transformation Model for Gait Recognition

Shuai Zheng (Institute of Automation, Chinese Academy of Sciences, P.R. China); Junge Zhang (Institute of Automation, Chinese Academy of Sciences, P.R. China); Kaiqi Huang (Chinese Academy of Sciences, P.R. China); Ran He (Institute of Antomation, Chines Academy of Sciences, P.R. China); Tieniu Tan (NLPR, P.R. China)

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Incremental Orthogonal Projective Non-negative Matrix Factorization and Its Applications

Dong Wang (Dalian University of Technology, P.R. China); Huchuan Lu (Dalian University of Technology, P.R. China)

pp. 2077-2080

Error Concealment Via 3-Mode Tensor Approximation

Dzung Nguyen (Johns Hopkins University & Johns Hopkins Univ, USA); Minh Dao (Johns Hopkins University, USA); Trac D. Tran (Johns Hopkins University, USA)

pp. 2081-2084

Relative Depth From Monocular Optical Flow

Enric Meinhardt-Llopis (Fundació Barcelona Media & Universitat Pompeu Fabra, Spain); Olivier D'Hondt (Barcelona Media, Spain); Gabriele Facciolo (Universitat Pompeu Fabra, Spain); Vicent Caselles (Universitat Pompeu Fabra, Spain)

pp. 2085-2088

Vector Field Analysis for Motion Pattern Identification in Video

Nandita Nayak (University of California, Riverside, USA); Ahmed T Kamal (University of California, Riverside, USA); Amit Roy-Chowdhury (University of California, Riverside, USA)

pp. 2089-2092

Video Resolution Enhancement by Using Complex Wavelet Transform

Hasan Demirel (Eastern Mediterranean University, Turkey); Gholamreza Anbarjafari (Cyprus International University, Turkey); Cagri Ozcinar (University of Surrey, United Kingdom); Sara Izadpanahi (Eastern Mediterranean University, Turkey)

pp. 2093-2096

Space-Time Template Matching for Human Action Detection Using Volume-Based Generalized Hough Transform

YungChi Lo (National Taiwan Ocean University & Lab 603, Taiwan); Po-Yen Lee (National Taiwan Ocean University, Taiwan); Shyi-Chyi Cheng (National Taiwan Ocean University, Taiwan)

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An Improved Depth Map Estimation for Coding and View Synthesis

Qiuwen Zhang (Shanghai University & School of Communication and Information Engineering, P.R. China)

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Csaba Benedek (MTA SZTAKI & Dept. of Electronic Technology, Budapest University of Technology and Economics, Hungary)
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Hao Feng (Beijing University of Aeronautics and Astronautics, P.R. China); Zhiguo Jiang (Image Processing Center, Beijing University of Aeronautics and Astronautics, P.R. China)
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Sarada Prasad Dakua (Indian Institute of Technology Guwahati, India)
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Andrea Giachetti (University of Verona, Italy); Khai Chin (University of Dundee, United Kingdom); Emanuele Trucco (University of Dundee, United Kingdom); Caroline Cobb (NHS Ninewells Hospital, Dundee, United Kingdom); Peter Wilson (NHS Ninewells Hospital, Dundee, United Kingdom)
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Amal Farag (University of Louisville, USA); Hossam Abdelmunim (Faculty of Engineering, Ain Shams University, ?); James Graham (University of Louisville, USA); Aly Farag (University of Louisville, USA); Salwa Elshazly (University of Louisville, USA); Sabry Al Mogy (Mansoura University, Egypt); Mohamed S. Al Mogy (Mansoura Scan Center, Egypt); Robert Falk (Jewish Hospital and 3DR, USA); Sahar Al-Jafarye (University of Louisville, USA); Hani Mahdi (Ain Shams University, Egypt); Rebecca Milam (University of Louisville, USA)
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Melih Aslan (CVIP Lab, University of Louisville, USA); Eslam Mostafa (University of Louisville, USA); Hossam Abdelmunim (Faculty of Engineering, Ain Shams University, ?); Ahmed Shalaby (University of Louisville, USA); Aly Farag (University of Louisville, USA); Ben Arnold (Image Analysis, Inc., USA)
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Katya Mkrtchyan (University of California, Riverside, USA); Damanpreet Singh (UCI, USA); Min Liu (UCR, USA); Venugopala Reddy (UCR, USA); Amit Roy-Chowdhury (University of California, Riverside, USA); Gopi M. (University of California, Irvine, USA)
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Li Chen (Wuhan University of Science and Technology, P.R. China); Yang Xiang (Wuhan University of Science and Technology, P.R. China); YaoJie Chen (Wuhan University of Science and Technology, P.R. China); XiaoLong Zhang (Wuhan University of Science and Technology, P.R. China)
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Lung Tumor Delineation in PET-CT Images Using a Downhill Region Growing and a Gaussian Mixture Model
Cherry Ballangan (University of Sydney, Australia); Xiuying Wang (University of Sydney, Australia); Michael Fulham (University of Sydney, Australia); Stefan Eberl (Royal Prince Alfred Hospital, Australia); Dagan Feng (The University of Sydney, Australia)
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Guy Nir (University of British Columbia, Canada); Allen Tannenbaum (Georgia Institute of Technology, USA)
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Peter Faltin (RWTH Aachen University, Germany); Kraisorn Chaisaowong (RWTH Aachen University, Germany); Thomas Kraus (University Hospital Aachen, Germany); Til Aach (RWTH Aachen University, Germany)
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Zhicheng Li (Shenzhen Institutes of Advanced Technology, Chinese Academy of Science, P.R. China); Jia Gu (Shenzhen Institutes of Advanced Technology, Chinese Academy of Science, P.R. China); Jacob Chakareski (EPFL, Switzerland); Lei Wang (Chinese Academy of Sciences, P.R. China)
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Wuxia Zhang (Chinese Academy of Sciences, P.R. China); Yuan Yuan (Chinese Academy of Sciences, P.R. China); Xuelong Li (Xi'an Institute of Optics and Precision Mechanics, Chinese Academy of Sciences, P.R. China); Pingkun Yan (Chinese Academy of Sciences, P.R. China)
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Ktawut Tappayuthpijarn (Technical University of Munich & Nomor Research GmbH, Germany); Thomas Stockhammer (Nomor Research GmbH, Germany); Eckehard Steinbach (Munich University of Technology, Germany)
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Joint Source-Channel Coding Optimization with Packet Loss Resilience for Video Transmission
Ching-Hui Chen (Academia Sinica, Taiwan); Wei-Ho Chung (Academia Sinica, Taiwan); Yu-Chiang Frank Wang (Academia Sinica, Taiwan)
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Joint Space-Time-View Error Concealment Algorithms for 3D Multi-View Video
Walid El Shafai (E-JUST University, Egypt); Branislav Hrušovský (Technical University of Košice, Slovakia); Mostafa El-Khamy (Egypt-Japan University of Science and Technology & Alexandria University, Faculty of Engineering, Egypt); Mohamed El-Sharkawy (Purdue School of Engineering and Technology, USA)
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Sajid Nazir (University of Strathclyde, United Kingdom); Vladimir Stankovic (University of Strathclyde, United Kingdom); Dejan Vukobratović (University of Novi Sad, Serbia)
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Tobias Tröger (University of Erlangen-Nuremberg, Germany); Andre Kaup (University of Erlangen-Nuremberg, Germany)
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Cristian Perra (University of Cagliari, Italy)
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Ângelo Arrifano (I3S-CNRS-University of Nice Sophia Antipolis & University of Beira Interior, Portugal); Marc Antonini (I3S-CNRS-University of Nice Sophia Antipolis, France); Manuela Pereira (University of Beira Interior, Portugal); Mario M. Freire (University of Beira Interior, Portugal)
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Luc Trudeau (École de Technologie Supérieure, Université du Québec, Canada); Stephane Coulombe (Ecole de technologie supérieure, Canada); Steven Pigeon (Ecole de technologie supérieure, Canada)
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Contribution-based Peer Selection for Packet Protection for P2P Video Streaming Over Mesh-based Networks
Chi-Wen Lo (National Tsing Hua University, Taiwan); Chia-Wen Lin (National Tsing Hua University, Taiwan); Yung-Chang Chen (National Tsing Hua University, Taiwan); Yu Jen-Yu (Industrial Technology Research Institute, Taiwan)
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Sylvain Marcelino (Universidade de Tras-os-Montes e Alto Douro / Instituto de Telecomunicacoes Leiria, Portugal); Pedro A. Amado Assuncao (Polytechnic Institute of Leiria / Instituto de Telecomunicacoes, Portugal); Sérgio M. M. Faria (Institute of Telecommunications & Polytechnic Institute of Leiria, Portugal); Salviano Soares (Universidade de Trás-os-Montes e Alto Douro, Portugal)
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An Exploration Framework for Segmentation Parameter Spaces
Sarra Ben Fredj (Creatis, France); Tristan Glatard (University of Lyon ; CREATIS-LRMN, France); Christopher Casta (CREATIS, France); Patrick Clarysse (CREATIS-LRMN, CNRS UMR 5220, INSERM U630, France)
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Matthew Brand (MERL, USA); Donghui Chen (Tufts University, USA)
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Tsun-Hsien Wang (National Tsing Hua University, Taiwan); Ching-Te Chiu (National Tsing Hua University, Taiwan)
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Towards a Diffusion Image Processing Validation and Accuracy Prediction Framework
Francesca Pizzorni Ferrarese (University of Verona, Italy); Alessandro Daducci (École Polytechnique Fédérale de Lausanne, Switzerland); Meritxell Bach Cuadra (Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland); Alia Lemkaddem (École Polytechnique Fédérale de Lausanne, Switzerland); Cristina Granziera (École Polytechnique Fédérale de Lausanne, Switzerland); Jean-Philippe Thiran (École Polytechnique Fédérale de Lausanne & Signal Processing Laboratory, Switzerland); Gloria Menegaz (University of Verona, Italy)
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A New Similarity Measure for Multi-Modal Image Registration
Mark Pickering (UNSW@adfa, Australia)
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Segmented Rapid Magnetic Resonance Imaging Using Structured Sparse Representations
Vimal Singh (University of Texas, Austin, USA); Dan Wang (University of Texas, Austin, USA); Ahmed Tewfik (University of Texas, Austin, USA)
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Sébastien Roujol (University of Bordeaux 2, France); Baudouin Denis de Senneville (University of Bordeaux 2, France); Silke Hey (University of Bordeaux 2, France); Chrit Moonen (University of Bordeaux, France); Mario Ries (Laboratory for Molecular and Functional Imaging, France)
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3D Automatic Approach For Precise Segmentation of the Prostate From Diffusion-Weighted Magnetic Resonance Imaging
Ahmad Firjani (University of Louisville, USA); Fahmi Khalifa (Bioimaging Laboratory & University of Louisville, Louisville, KY, USA); Ahmed Elnakib (Bioimaging Lab, USA); Georgy Gimel'farb (University of Auckland, USA); Mohamed Abo El-Ghar (University of Mansoura, Egypt); Adel S Elmaghraby (University of Louisville, USA); Ayman Sabry El-Baz, PhD (University of Louisville, USA)
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Ahmed Elnakib (Bioimaging Lab, USA); Garth Beache (Diagnostic Radiology Department, USA); Georgy Gimel'farb (University of Auckland, USA); Ayman Sabry El-Baz, PhD (University of Louisville, USA)
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Yookyung Kim (University of Arizona, USA); Mariappan Nadar (Siemens Corporation, Corporate Research, USA); Ali Bilgin (ECE Dept, The University of Arizona, USA)

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TP.PE: Tracking and Motion Detection (Poster)

Human Pose Tracking in Low Dimensional Space Enhanced by Limb Correction
Alexandros Moutzouris (Kingston University, United Kingdom); Jesus Martinez-del-Rincon (Kingston University, United Kingdom); Michal Lewandowski (Kingston University, United Kingdom); Jean-Christophe Nebel (Kingston University, United Kingdom); Dimitrios Makris (Kingston University, United Kingdom)
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Human Tracking by Structured Body Parts
Yingkun Xu (Chinese Academy of Sciences & Institute of Computing Technology, P.R. China); Lei Qin (Institute of Computing Tech, Chinese Academy of Science, P.R. China); Shuqiang Jiang (Institute of Computing Technology, Chinese Academy of Sciences, Beijing, P.R. China); Qingming Huang (Graduate School of Chinese Academy of Sciences, P.R. China)
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Real-Time Moving Object Segmentation and Tracking for H.264/AVC Surveillance Videos
Pei Dong (University of Sydney & Beijing University of Technology, Australia); Yong Xia (University of Sydney, Australia); Zhuo Li (Beijing University of Technology, P.R. China); Dagan Feng (The University of Sydney, Australia)
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Tracking Pedestrians Using Smoothed Colour Histograms in an Interacting Multiple Model Framework
Zhengqiang Jiang (The University of Western Australia, Australia); Du Huynh (The University of Western Australia, Australia); Bill Moran (University of Melbourne, Australia); Subhash Challa (The University of Melbourne, Australia)
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Contour Tracking Via On-line Discriminative Appearance Modeling Based Level Sets
Xin Sun (Harbin Institute of Technology, P.R. China); Hongxun Yao (Harbin Institute of Technology, P.R. China); Shengping Zhang (Harbin Institute of Technology, P.R. China)
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Lip Contour Tracking Using Multiple Dynamic Models on a Manifold
Jacinto C. Nascimento (Instituto de Sistemas e Robotica, Portugal); Jorge Silva (Duke University, USA)
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Tahir Nawaz (Queen Mary, University of London, United Kingdom); Andrea Cavallaro (Queen Mary, University of London, United Kingdom)

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Real-time Human Tracking Based on Switching Linear Dynamic System Combined with Adaptive Meanshift Tracker
Zheyuan Li (Peking University, P.R. China); Hong Liu (Peking University, P.R. China); Chao Xu (Peking University, P.R. China)
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A Structured Learning-based Graph Matching for Dynamic Multiple Object Tracking
Dayu Zheng (Shanghai Jiao Tong University, P.R. China); Hongkai Xiong (Shanghai Jiao Tong University, P.R. China); Yuan F. Zheng (Ohio State University, USA)
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Motion Detection in Old Film Sequences Using Adaptive Gaussian Mixture Model
Xiaoyong Zhang (Tohoku University, Japan); Masahide Abe (Tohoku University, Japan); Masayuki Kawamata (Tohoku University, Japan)
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Gradient Sparsity for Piecewise Continuous Optical Flow Estimation
Junyu Han (Xidian University, P.R. China); Fei Qi (Xidian University, P.R. China); Guangming Shi (Xidian University, P.R. China)
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Efficient Real-Time Local Optical Flow Estimation by Means of Integral Projections
Tobias Senst (Technische Universität Berlin, Germany); Volker Eiselein (Technische Universität Berlin, Germany); Michael Pätzold (Technische Universität Berlin, Germany); Thomas Sikora (Technische Universität Berlin, Germany)
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Video Motion Detection Algorithm Using Probabilistic Time Integrated Ransac
Tal Nir (Rafael, Israel); Orit Eden (Rafael, Israel)
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Identifying Salient Poses in Lecture Videos
John R Zhang (Columbia University, USA); John R. Kender (Columbia University, USA)
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Feature Selection with Geometric Constraints for Vision-Based Unmanned Aerial Vehicle Navigation
Maria E. Angelopoulou (Imperial College London, United Kingdom); Christos-Savvas Bouganis (Imperial College London, United Kingdom)
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TP.PF: Scene Analysis (Poster)

Two-phase Approach for Multi-view Object Extraction
Sungheum Kim (KAIST, Korea); Yu-wing Tai (KAIST, Korea); Yunsu Bok (KAIST, Korea); Hyeongwoo Kim (KAIST, Korea); In-So Kweon (Korea Advanced Institute of Science and Technology (KAIST), Korea)
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Alignment of Uncalibrated Images for Multi-View Classification
Sercan Ömer Arık (Bilkent University, Turkey); Elif Vural (Ecole Polytechnique Federale de Lausanne, Switzerland); Pascal Frossard (Swiss Federal Institute of Technology - EPFL, Switzerland)
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Dynamic Background Subtraction Using Moments
Romain Marie (MIS, France); Alexis Potelle (MIS, France); El Mustapha Mouaddib (MIS, France)
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Belief Propagation with Local Edge Detection-based Cost Aggregation for Stereo Matching
Fu He (Southeast University, P.R. China); Feipeng Da (Southeast University, P.R. China)
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Discrimination and Description of Repetitive Patterns for Enhancing Object Recognition Performance
Seong Jong Ha (Seoul National University, Korea); Sang Hwa Lee (Seoul National University, Korea); Nam-Ik Cho (Seoul National University, Korea)
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Sparse Regression Analysis for Object Recognition
Baochang Zhang (Beihang University, P.R. China); Shengping Zhang (Harbin Institute of Technology, P.R. China); Jianzhuang Liu (The Chinese University of Hong Kong, Hong Kong)
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Intelligent Filtering by Semantic Importance for Single-View 3D Reconstruction From Snooker Video
Philip Legg (Swansea University, United Kingdom); Matthew Parry (Swansea University, United Kingdom); David Chung (Swansea University, United Kingdom); Richard M. Jiang (Swansea University, United Kingdom); Adrian Morris (Swansea University, United Kingdom); Iwan Griffiths (Swansea University, United Kingdom); David Marshall (Cardiff University, United Kingdom); Min Chen (Swansea University, United Kingdom)
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Pattern Recognition Using Rotation-invariant Filter-driven Template Matching
Yi-Chong Zeng (Academia Sinica, Taiwan)
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3D Spatio-temporal Graph Cuts for Video Objects Segmentation
Zhiqiang Tian (Xi'an Jiaotong University, P.R. China); Jianru Xue (Xi'an Jiaotong University, P.R. China); Nanning Zheng (Xi'an Jiaotong University, P.R. China); Xuguang Lan (Xi'an Jiaotong University & Institute of Artificial Intelligence and Robotics, P.R. China); Ce Li (Xi‘an Jiaotong University, P.R. China)
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Hierarchical Invariant Sparse Modeling for Image Analysis
Leah Bar (Tel Aviv University, Israel); Guillermo Sapiro (University of Minnessotta, USA)
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Multi-scale Analysis of Color and Texture for Salient Object Detection
Ketan Tang (Hong Kong University of Science and Technology, Hong Kong); Oscar C. Au (HKUST, Hong Kong); Lu Fang (Hong Kong University of Science and Technology, Hong Kong); Zhiding Yu (Hong Kong University of Science and Technology & Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Hong Kong); Yuanfang Guo (Hong Kong University of Science and Technology, Hong Kong)
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Object Detection Using Discriminative Photogrammetric Context
Yuanliu Liu (Xi'an Jiaotong University, P.R. China)
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Severity Classification of Abnormal Traffic Events At Intersections
Omer Aköz (Yildiz Technical University, Turkey); Elif Karslıgil (Yildiz Technical University, Turkey)
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Soft Assignment of Visual Words as Linear Coordinate Coding and Optimisation of Its Reconstruction Error
Piotr Koniusz (University of Surrey, United Kingdom); Krystian Mikolajczyk (University of Surrey, United Kingdom)
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One Step Beyond Bags of Features: Visual Categorization Using Components
Jing Liu (Institute of Automation, Chinese Acadamy of Sciences, P.R. China); Chunjie Zhang (Institute of Automation, Chinese Academy of Sciences, P.R. China); Qi Tian (University of Texas at San Antonio, USA); Changsheng Xu (Institute of Automation, Chinese Academy of Sciences & China-Singapore Institute of Digial Media, P.R. China); Hanqing Lu (the Institute of Automation, Chinese Academy of Sciences, P.R. China); Songde Ma (Institute of Automation, Chinese Academy of Sciences, P.R. China)
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Linear SVM Classification Using Boosting HOG Features for Vehicle Detection in Low-Altitude Airborne Videos
Xianbin Cao (Beihang University, P.R. China); Changxia Wu (University of Science and Technology of China, P.R. China); Pingkun Yan (Chinese Academy of Sciences, P.R. China); Xuelong Li (Xi'an Institute of Optics and Precision Mechanics, Chinese Academy of Sciences, P.R. China)
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TP.PG: Image Retrieval (Poster)

Semantic Clusters Based Manifold Ranking for Image Retrieval
Ran Chang (Utah State University, USA); Xiaojun Qi (Utah State University, USA)
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Browsing Catalogue Graphs: Content Caching Supercharged!!
Jacob Chakareski (EPFL, Switzerland)
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MPEG-7 Compliant Generalized Structure Descriptor for Still Image Indexing
Constantin Vertan (University Politehnica of Bucharest, Romania); Marta Zamfir (Tessera Technologies, Inc., Romania); Alexandru Drîmbărean (Tessera Ireland, Ireland); Adrian Zamfir (Tessera Technologies, Inc., Romania)
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Key Frame Extraction From Consumer Videos Using Sparse Representation
Mrityunjay Kumar (Eastman Kodak Company, USA); Alexander Loui (Eastman Kodak Company, USA)
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On the Use of Conceptual Information in a Concept-Based Image Indexing and Retrieval Framework
Radi Jarrar (MONASH University, Malaysia); Mohammed Belkhatir (CNRS Lyon, France); Chris Messom (MONASH University, Malaysia)
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Improving Image Tag Recommendation Using Favorite Image Context
Wonyong Eom (Korea Advanced Institute of Science and Technology, Korea); Sihyoung Lee (Korea Advanced Institute of Science and Technology, Korea); Wesley Marcel De Neve (Korea Advanced Institute of Science and Technology (KAIST), Korea); Yong Man Ro (KAIST, Korea)
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Query Sensitive Dynamic Web Video Thumbnail Generation
Chunxi Liu (Graduate University of Chinese Academy of Sciences, CAS, P.R. China); Qingming Huang (Graduate School of Chinese Academy of Sciences, P.R. China); Shuqiang Jiang (Institute of Computing Technology, Chinese Academy of Sciences, Beijing, P.R. China)
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Graph-Based Multiple-Instance Learning with Instance Weighting for Image Retrieval
Fei Li (Fujitsu Research and Development Center Co., Ltd., P.R. China); Rujie Liu (Fujitsu Research & Development Co., Ltd, P.R. China)
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Image Database Categorization Using Robust Unsupervised Learning of Finite Generalized Dirichlet Mixture Models
Mohamed Ben Ismail (University of Louisville, USA); Hichem Frigui (University of Louisville, USA)
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Weakly Supervised Locality Sensitive Hashing for Duplicate Image Retrieval
Cao Yudong (Beijing University of Posts and Telecommunications, P.R. China); Zhang Honggang (Beijing University of Posts and Telecommunications, P.R. China); Jun Guo (BUPT, P.R. China)
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Fast Common Visual Pattern Detection Via Radiate Geometric Model
Lingyang Chu (Institute of Computing Technology, Chinese Academy of Science, P.R. China); Shuqiang Jiang (Institute of Computing Technology, Chinese Academy of Sciences, Beijing, P.R. China); Qingming Huang (Graduate School of Chinese Academy of Sciences, P.R. China)
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A Novel Image Importance Model for Content-Aware Image Resizing
Wonjun Kim (Korea Advanced Institute of Science and Technology (KAIST), Korea)
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Multi-Keyframe Abstraction From Videos
Ping Li (The Chinese University of Hong Kong, Hong Kong); Yanwen Guo (Nanjing University, P.R. China); H. Q. Sun (The Chinese University of Hong Kong, P.R. China)
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Select Informative Features for Recognition
Zixuan Wang (Stanford University, USA)
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A Balanced Semi-supervised Hashing Method for CBIR
Jianhui Zhou (Dalian University of Technology, P.R. China); Haiyan Fu (Dalian University of Technology, P.R. China); Xiangwei Kong (Dalian University of Technology, P.R. China)
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Wednesday, September 14

WA.L1: Recent Advances in Web-scale Image Annotation (Special Session)

Learning the Trip Suggestion From Landmark Photos on the Web
Rongrong Ji (Columbia University, P.R. China); Ling-Yu Duan (Peking University, P.R. China); Jie Chen (Peking University, P.R. China); Shuang Yang (Peking University, P.R. China); Hongxun Yao (Harbin Institute of Technology, P.R. China); Tiejun Huang (Peking University, P.R. China); Wen Gao (ICT-ISVISION Joint R&D Laboratory for Face Recognition, CAS, P.R. China)
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Online Vicept Learning for Web-Scale Image Understanding
Liang Li (Institute of Computing Technology, Chinese Academy of Sciences, P.R. China); Shuqiang Jiang (Institute of Computing Technology, Chinese Academy of Sciences, Beijing, P.R. China); Qingming Huang (Graduate School of Chinese Academy of Sciences, P.R. China)
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Fahmi Khalifa (Bioimaging Laboratory & University of Louisville, Louisville, KY, USA); Garth Beache (Diagnostic Radiology Department, USA); Georgy Gimel'farb (University of Auckland, USA); Ayman Sabry El-Baz, PhD (University of Louisville, USA)

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Fernando López-Mir (Universidad Politécnica de Valencia & Instituto Interuniversitario de Investigación en Bioingeniería y Tecnología Orientada al ser Humano, Spain); Valery Naranjo (Universidad Politecnica de Valencia, Spain); Jesus Angulo (MINES Paristech, France); Eliseo Villanueva (Universidad Politécnica de Valencia, Spain); Mariano Alcañiz (Universidad Politécnica de Valencia, Spain); Susana López-Celada (Hospital Clínica Benidorm, Unidad Resonancia Magnética, INNSCANER, Spain)

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Li Wei (NLPR, Institute of Automation, Chinese Academy of Sciences, P.R. China); Shiming Xiang (Institute of Automation, Chinese Academy of Sciences, P.R. China); Haibo Wang (Institute of Automation, Chinese Academy of Sciences, P.R. China); Chunhong Pan (Institute of Automation, Chinese Academy of Sciences, P.R. China)

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Kang Xue (Beijing Institute of Technology & Georgia Institute of Technology, P.R. China)
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Chen Wang (Nanyang Technological University & Temasek Lab @ NTU, Singapore); Kai-Kuang Ma (Nanyang Technological University, Singapore)
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ShaoGuo Liu (Institute of Automation, Chinese Academy of Sciences, P.R. China); Haibo Wang (Institute of Automation, Chinese Academy of Sciences, P.R. China); Jixia Zhang (Institute of Automation, Chinese Academy of Sciences, P.R. China); Franck Davoine (CNRS, P.R. China); Chunhong Pan (Institute of Automation, Chinese Academy of Sciences, P.R. China)
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Xiaobo Chen (Beijing University of Posts and Telcommunications, P.R. China); Ye Feng (Beijing university of Posts and telecommunications, P.R. China); Men Aidong (Beijing University of Posts and Telecommunication, P.R. China)
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Symeon Nikitidis (Aristotle University of Thessaloniki & CERTH ITI, Greece); Anastasios Tefas (Aristotle University of Thessaloniki, Greece); Nikos Nikolaidis (Aristotle University of Thessaloniki & Informatics and Telematics Institute, CERTH, Greece); Ioannis Pitas (Aristotle University of Thessaloniki, Greece)
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Sheng Li (Nanjing University of Posts and Telecommunications, P.R. China); Xiaoyuan Jing (College of Automation, Nanjing University of Posts and Telecommunications & State Key Laboratory for Software Engineering, Wuhan University, P.R. China); David Zhang (The Hong Kong Polytechnic University, Hong Kong); Yongfang Yao (Nanjing University of Posts and Telecommunications, P.R. China); Lusha Bian (Nanjing University of Posts & Telecommunications, P.R. China)
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Kernel Sparse Representation with Local Patterns for Face Recognition
Cuicui Kang (National Laboratory of Pattern Recognition, P.R. China); Shengcai Liao (Institute of Automation, Chinese Academy of Sciences, P.R. China); Shiming Xiang (Institute of Automation, Chinese Academy of Sciences, P.R. China); Chunhong Pan (Institute of Automation, Chinese Academy of Sciences, P.R. China)
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Discriminant Subclass-center Manifold Preserving Projection for Face Feature Extraction
Chao Lan (Nanjing University of Posts and Telecommunications, P.R. China); Xiaoyuan Jing (College of Automation, Nanjing University of Posts and Telecommunications & State Key Laboratory for Software Engineering, Wuhan University, P.R. China); David Zhang (The Hong Kong Polytechnic University, Hong Kong); Shiqiang Gao (Nanjing University of Posts and Telecommunications, P.R. China); Jingyu Yang (Nanjing University of Science and Technology, P.R. China)
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Ching-Te Chiu (National Tsing Hua University, Taiwan); Cyuan Jhe Wu (National Tsing Hua University, Taiwan)
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Raymond Ptucha (Rochester Institute of Technology, USA); Grigorios Tsagkatakis (Rochester Institute of Technology, USA); Andreas Savakis (Rochester Institute of Technology, USA)
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Haichao Zhang (Northwestern Polytechnical University & University of Illinois at Urbana-Champaign, USA); Nasser Nasrabadi (US Army Research Laboratory, USA); Thomas S Huang (University of Illinois at Urbana-Champaign, USA); Yanning Zhang (Northwestern Polytechnical University, P.R. China)
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Local Primitive Code Mining for Fast and Accurate Face Recognition
Li Jiangwei (Nokia Research Center, P.R. China); Lei Xu (Nokia Research Center, P.R. China); Kongqiao Wang (Nokia Research Center, P.R. China); Ma Yong (Nokia Research Center, P.R. China); Xiong Tao (Nokia Research Center, P.R. China)
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Mingyang Jiang (Peking University, P.R. China); Jufu Feng (Peking University, P.R. China)
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A Mixture of Gated Experts Optimized Using Simulated Annealing for 3D Face Recognition
Wael Ben Soltana (LIRIS ECL, France); Di Huang (Ecole Centrale Lyon, France); Mohsen Ardabilian (Ecole Centrale Lyon & LIRIS LAB-UMR 5205 CNRS, France); Liming Chen (EC Lyon, France); Chokri Ben Amar (University of Sfax, National School of Engineers, Tunisia)
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Semi-supervised Face Recognition with LDA Self-training
Xuran Zhao (EURECOM, France); Nicholas Evans (EURECOM, France); Jean-Luc Dugelay (Institut EURECOM, France)
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Robust Facial Expression Tracking Based on Composite Constraints AAM
Xuetao Feng (Samsung Advanced Institute of Technology, P.R. China); Xiaolu Shen (Samsung Advanced Institute of Technology, P.R. China); Mingcai Zhou (Samsung Advanced Institute of Technology, P.R. China); Hui Zhang (Samsung Advanced Institute of Technology, P.R. China); Jungbae Kim (Samsung Advanced Institute of Technology, Korea)
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Face Recognition Based on Local Uncorrelated and Weighted Global Uncorrelated Discriminant Transforms
Xiaoyuan Jing (College of Automation, Nanjing University of Posts and Telecommunications & State Key Laboratory for Software Engineering, Wuhan University, P.R. China); Sheng Li (Nanjing University of Posts and Telecommunications, P.R. China); David Zhang (The Hong Kong Polytechnic University, Hong Kong); Jingyu Yang (Nanjing University of Science and Technology, P.R. China)
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Expression Robust 3D Face Recognition Via Mesh-based Histograms of Multiple Order Surface Differential Quantities
Huibin Li (Ecole Centrale de Lyon, France); Di Huang (Ecole Centrale Lyon, France); Pierre Lemaire (Ecole Centrale de Lyon, France); Jean-Marie Morvan (Universite Claude Bernard, France); Liming Chen (EC Lyon, France)
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WP.I: Round Table on Reproducible Research

WP.L1: Analysis of Microscopy and Reconstructive Images for Applications in Medicine and Biology (Special Session)

3D Microscopic Imaging by Synchrotron Radiation micro/nano-CT
Francoise Peyrin (Universite de Lyon INSA Lyon & Inserm U1044 UMR CNRS 5220, France); Alexandra Pacureanu (Université de Lyon, France); Max Langer (Université de Lyon, France)
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The Formulation of a Non-Linear Hertzian Model in Order to Assess the Mechanical Strength of Human Cells Based on Data From an Atomic Force Microscope
David Burton (Liverpool John Moores University, United Kingdom); Mark Murphy (Liverpool John Moore University, United Kingdom); Francis Lilley (Liverpool John Moores University, United Kingdom); Munther A Gdeisat (Liverpool John Moores University, United Kingdom)
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A Novel Technique for the Restoration of Atomic Force Microscope Images Enabling an Approximation of AFM Impulse Response
Ahmed Ahtaiba (Liverpool John Moores University, United Kingdom); Munther A Gdeisat (Liverpool John Moores University, United Kingdom); David Burton (Liverpool John Moores University, United Kingdom); Francis Lilley (Liverpool John Moores

University, United Kingdom); Mark Murphy (Liverpool John Moore University, United Kingdom); Gary Johnston (Liiverpool John Moores University, United Kingdom)
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Analysis of Microscopy and Reconstructive Images for Applications in Medicine and Biology
Gary Johnston (Liiverpool John Moores University, United Kingdom); David Burton (Liverpool John Moores University, United Kingdom); Francis Lilley (Liverpool John Moores University, United Kingdom); Annette Doyle (Liverpool John Moores University, United Kingdom); Mark Murphy (Liverpool John Moore University, United Kingdom); Greg Madden (Liverpool John Moores University, United Kingdom); Munther A Gdeisat (Liverpool John Moores University, United Kingdom); Christopher Moore (The Christie NHS Foundation Trust, United Kingdom); Tom Marchant (The Christie NHS Foundation Trust, United Kingdom); Bogdan J Matuszewski (University of Central Lancashire, United Kingdom)
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Numerical Evaluation of Sampling Bounds for Near-Optimal Reconstruction in Compressed Sensing
Yoann Le Montagner (Institut Pasteur, France); Marcio Marim (Institut Pasteur, France); Elsa Angelini (Télécom ParisTech, France); Jean-Christophe Olivo-Marin (Institut Pasteur, France)
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Confocal Microscopy Segmentation Using Active Contour Based on Alpha-Divergence
Leila Meziou (ETIS UMR CNRS 8051, France); Aymeric Histace (ETIS UMR CNRS 8051 & University of Cergy-Pontoise, ENSEA, France); Frederic Precioso (LIP6 CNRS UMR 7606 & UPMC Paris 6, France); Bogdan J Matuszewski (University of Central Lancashire, United Kingdom); Mark Murphy (Liverpool John Moore University, United Kingdom)
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Segmentation of Cellular Structures in Actin Tagged Fluorescence Confocal Microscopy Images
Bogdan J Matuszewski (University of Central Lancashire, United Kingdom); Mark Murphy (Liverpool John Moore University, United Kingdom); David Burton (Liverpool John Moores University, United Kingdom); Tom Marchant (The Christie NHS Foundation Trust, United Kingdom); Christopher Moore (The Christie NHS Foundation Trust, United Kingdom); Aymeric Histace (ETIS UMR CNRS 8051 & University of Cergy-Pontoise, ENSEA, France); Frederic Precioso (LIP6 CNRS UMR 7606 & UPMC Paris 6, France)
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Quantifying Structure Regularity in Fluorescence Microscopy Cell Images Using a Novel Multi-Dimensional Approximate Entropy Metric
Tom Marchant (The Christie NHS Foundation Trust, United Kingdom); Mark Murphy (Liverpool John Moore University, United Kingdom); Greg Madden (Liverpool John Moores University, United Kingdom); Christopher Moore (The Christie NHS Foundation Trust, United Kingdom)
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WP.L2: Image Quality Assessment (Lecture)

No-reference Image Quality Assessment Based on Visual Codebook
Peng Ye (University of Maryland, College Park, USA); David Doermann (University of Maryland Institute for Advanced Computer Studies, USA)
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DCT Statistics Model-Based Blind Image Quality Assessment
Michele Saad (The University of Texas at Austin, USA); Alan C Bovik (University of Texas at Austin, USA); Christophe Charrier (Universite de Caen Basse-Normandie, France)
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Crowdsourcing Subjective Image Quality Evaluation
Flavio Ribeiro (University of São Paulo, Brazil); Dinei Florencio (Microsoft Research, USA); Vitor H Nascimento (USP, Brazil)
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Systematic Stress Testing of Image Quality Estimators
Frank Ciaramello (Cornell University, USA); Amy Reibman (AT&T Labs - Research, USA)
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Objective Metrics for Quality of Experience in Stereoscopic Images
Liyuan Xing (Q2S-NTNU, Norway); Junyong You (Norwegian University of Science and Technology, Norway); Touradj Ebrahimi (EPFL, Switzerland); Andrew Perkis (NTNU, Norway)
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Assessing the Quality of Compressed Images Using EEG
Lea Lindemann (TU Braunschweig, Germany); Marcus Magnor (TU Braunschweig, Germany)
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Image Quality Assessment of Endoscopic Panorama Images
Alexander Behrens (RWTH Aachen University, Germany); Michael Bommes (RWTH Aachen University, Germany); Sebastian Gross (RWTH Aachen University, Germany); Til Aach (RWTH Aachen University, Germany)
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Comprehensive Assessment of Iris Image Quality
Xingguang Li (University of Science and Technology of China, P.R. China); Zhenan Sun (Achinese Academy of Sciences, P.R. China); Tieniu Tan (NLPR, P.R. China)
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WP.L3: Video and Multichannel Segmentation (Lecture)

Towards Real-Time 3D Region-Based Segmentation: B-Spline Explicit Active Surfaces
Daniel Barbosa (Katholieke Universiteit Leuven, Portugal); Jan D'hooge (Cardiac Imageing Research, Belgium); Thomas Dietenbeck (CREATIS, France); Denis Friboulet (CREATIS, France); Olivier Bernard (Creatis, France)
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Segmentation by Temporal Detection Integration
Yi-Ying Wang (Hermes Microvision Inc, Taiwan); Chia-han Lee (Academia Sinica, Taiwan)
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Image Labeling by Multiple Segmentation
Quan Zhou (Department of Electronics and Information Engineering, Huazhong University of Science and Technology, P.R. China); Canxiang Yan (Huazhong University of Science and Technology, P.R. China); Yingying Zhu (Huazhong University of Science and Technology, P.R. China); Xiang Bai (Huazhong University of Science and Technology, P.R. China); Wenyu Liu (Huazhong University of Science and Technology, P.R. China)
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The Riverbed Approach for User-steered Image Segmentation
Paulo Miranda (University of Campinas & Institute of Computing, Brazil); Alexandre Falcão (Institute of Computing, University of Campinas, Brazil); Thiago Spina (University of Campinas, Brazil)
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Clothing Segmentation and Recoloring Using Background Subtraction and Back Projection Method
Susu Yao (Institute for Infocomm Research, Singapore); Ishtiaq Rasool Khan (A*STAR Institute for Infocomm Research, Singapore); Farzam Farbiz (A-Star Institute for Infocomm Research, Singapore)
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Harmonic Active Contours for Multichannel Image Segmentation
Virginia Estellers (Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland); Dominique Zosso (Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland); Xavier Bresson (City University of Hong Kong, Hong Kong); Jean-Philippe Thiran (École Polytechnique Fédérale de Lausanne & Signal Processing Laboratory, Switzerland)
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Automatic Fish Segmentation Via Double Local Thresholding for Trawl-Based Underwater Camera Systems
Meng-Che Chuang (University of Washington, USA); Jenq-Neng Hwang (University of Washington, USA); Kresimir Williams (National Oceanic and Atmospheric Administration, USA); Richard Towler (National Oceanic and Atmospheric Administration, USA)
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Automatic People Segmentation with a Template-Driven Graph Cut
Cyrille Migniot (Grenoble Institute of Technology & GIPSA-LAB, France); Pascal Bertolino (Grenoble Institute of Technology, France); Jean-Marc Chassery (Grenoble Institute of Technology & GIPSA-LAB, France)
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WP.L4: Color/Multispectral Imaging and Demosaicking (Lecture)

New Color Filter Arrays of High Light Sensitivity and High Demosaicking Performance
Jue Wang (Peking Univiersity, P.R. China); Chao Zhang (Peking University, P.R. China); Pengwei Hao (Queen Mary, University of London, United Kingdom)
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Multispectral Demosaicking Using Adaptive Kernel Upsampling
Yusuke Monno (Tokyo Institute of Technology, Japan); Masayuki Tanaka (Tokyo Institute of Technology, Japan); Masatoshi Okutomi (Tokyo Institute of Technology, Japan)
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Disregarding Spectral Overlap - a Unified Approach for Demosaicking, Compressive Sensing and Color Filter Array Design
Tripurari Singh (Image Algorithmics, USA); Mritunjay Singh (Image Algorithmics, USA)
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Correlation-based Joint Acquisition and Demosaicing of Visible and Near-Infrared Images
Zahra Sadeghipoor (EPFL, Switzerland); Yue M. Lu (Harvard University, USA); Sabine Süsstrunk (EPFL, Switzerland)
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Increasing Camera Dynamic Range Through In-Sensor Multi-Exposure White Balancing
Michael Schöberl (University of Erlangen-Nuremberg, Germany); Wolfgang Schnurrer (University of Erlangen Nuremberg, Germany); Siegfried Foessel (Fraunhofer IIS, Germany); Andre Kaup (University of Erlangen-Nuremberg, Germany)
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Multi-dimensional Earth Mover's Distance Active Contours
Carlos S. Mendoza (University of Sevilla, Spain); Germán Bohórquez-Ruiz (University of Sevilla, Spain); Begoña Acha (University of Sevilla, Spain); Carmen Serrano (University of Sevilla, Spain)
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Good Looking Green Images
Hadi Hadizadeh (Simon Fraser University, Canada); Ivan V. Bajic (Simon Fraser University, Canada); Parvaneh Saeedi (Simon Fraser University, Canada); Scott Daly (Dolby Laboratories, USA)
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Edge Detection in Multispectral Images Using the N-Dimensional Self-Organizing Map
Johannes Jordan (University of Erlangen-Nuremberg, Germany); Elli Angelopoulou (Friedrich-Alexander University Erlangen-Nuremberg, Germany)
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WP.L6: Hand and Iris-based Biometrics (Lecture)

Contact-Free Hand Geometry Identification System
Jing-Ming Guo (National Taiwan University of Science and Technology, Taiwan); Yun-Fu Liu (National Taiwan University of Science and Technology, Taiwan)
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Deformable DAISY Matcher for Robust Iris Recognition
Man Zhang (Chinese Academy of Sciences, Institute of Automation, P.R. China); Zhenan Sun (Achinese Academy of Sciences, P.R. China); Tieniu Tan (NLPR, P.R. China)
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Incorporating Color Information for Reliable Palmprint Authentication
Aythami Morales (Universidad de Las Palmas de Gran Canaria & University Las Palmas de Gran Canaria, Spain); Ajay Kumar (The Hong Kong Polytechnic University, Hong Kong); Miguel A. Ferrer (Las Palmas de Gran Canaria University, Spain)
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Feature-domain Super-Resolution for Iris Recognition
Kien Nguyen (Queensland University of Technology, Australia); Clinton Fookes (Queensland University of Technology, Australia); Sridha Sridharan (Queensland University of Technology, Australia); Simon Denman (Queensland University of Technology, Australia)
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A Novel Fingerprint Matching Algorithm Using Minutiae Phase Difference Feature
Chongjin Liu (Peking University, Beijing, P.R. China); Jia Cao (Peking University, Beijing, P.R. China); Xin Gao (Peking University, Beijing, P.R. China); Xiang Fu (Peking University, Beijing, P.R. China); Jufu Feng (Peking University, P.R. China)
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Fast and Accurate Iris Segmentation Based on Linear Basis Function and RANSAC
Kai Wang (Zhejiang University, P.R. China); Yuntao Qian (Zhejiang University, P.R. China)
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Front View Gait Recognition Using Spherical Space Model with Human Point Clouds
Jegoon Ryu (Waseda University, Japan); Sei-ichiro Kamata (Waseda University, Japan)
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Security Analysis of a Cancelable Iris Recognition System Based on Block Remapping

Stefan Jenisch (University of Salzburg, Austria); Andreas Uhl (Salzburg University, Austria)

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WP.L7: Video Streaming and Error-Resilient Coding (Lecture)

Fast Mode Decision for H.264 Video Coding in Packet Loss Environment

Yuan Zhang (Communication University of China & University of California, San Diego, USA); Pamela Cosman (University of California, San Diego, USA)

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A Unified Framework for Spectral Domain Prediction and End-To-End Distortion Estimation in Scalable Video Coding

Jingning Han (University of California Santa Barbara, USA); Vinay Melkote (Dolby Laboratories Inc., USA); Kenneth Rose (University of California, Santa Barbara, USA)

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Face Recovery in Conference Video Streaming Using Robust Principal Component Analysis

Wai-tian Tan (Hewlett-Packard, USA); Gene Cheung (National Institute of Informatics, Japan); Yi Ma (University of Illinois at Urbana-Champaign, USA)

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Enhanced Error Resiliency for Video with Cyclic Intra-Refresh Lines

Sandro Moiron (Instituto de Telecomunicações & University of Essex, Portugal); Mohammad Ghanbari (University of Essex, United Kingdom)

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Prioritized Packet Fragmentation for H.264 Video

Kashyap Kambhatla (University of California San Diego and San Diego State University, USA); Sunil Kumar (San Diego State University, USA); Pamela Cosman (University of California, San Diego, USA)

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Rate-distortion-optimized Content-adaptive Coding for Immersive Networked Experience of Sports Events

Haopeng Li (Royal Institute of Technology, Sweden); Markus Flierl (KTH Royal Institute of Technology, Sweden)

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A Robust Content-Based JPWL Transmission Over a Realistic MIMO Channel Under Perceptual Constraints

Julien Abot (University of Poitiers, France); Michael Nauge (XLIM-SIC CNRS, France); Clency Perrine (Université de Poitiers, France); Chaker Larabi (Université de Poitiers & XLIM-SIC, France); Cyril Bergeron (Thalès Communictaions, France); Yannis Pousset (XLIM-SIC CNRS, France); Christian Olivier (XLIM-SIC CNRS, France)

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Cross-Layer Design for Video Streaming with Dynamic Antenna Selection
Ching-Hui Chen (Academia Sinica, Taiwan); Wei-Ho Chung (Academia Sinica, Taiwan); Yu-Chiang Frank Wang (Academia Sinica, Taiwan)
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WP.L8: Human Behavior Analysis and Foreground/Background Separation (Lecture)

A Dataset for Workflow Recognition in Industrial Scenes
Athanasios Voulodimos (National Technical University of Athens, Greece); Dimitris Kosmopoulos (NCSR Demokritos, Greece); Georgios Vasileiou (NCSR Demokritos, Greece); Emmanuel S. Sardis (National Technical University of Athens - NTUA, Greece); Anastasios D. Doulamis (National Technical University of Athens, Greece); Vassilios Anagnostopoulos (National Technical University of Athens, Greece); Constantinos G Lalos (National technical University of Athens, Greece); Theodora Varvarigou (National Technical University of Athens, Greece)
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Active Learning for Human Action Recognition with Gaussian Processes
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On behalf of the ICIP 2011 Organizing Committee, we are warmly welcoming you to Brussels, the capital of the Kingdom of Belgium and the home to the European headquarters, a buzzing, influential city where history is made. The city is a key European commercial hub, a base for many major international companies. This cosmopolitan city that loves good food lives life its way and expresses itself in a style very much its own: sometimes rebellious and mischievous, sometimes thoughtful and composed, but always very likeable. Despite its European dimension and despite all the different languages spoken on the corner of every street, Brussels is still inspired by a very "village-like" spirit. Of course, it's well known for its Grand-Place, its Atomium, its Manneken-Pis, its Gueuze and its Kriek, its waffles and its chocolates... (don't miss them!). The Brussels-Capital region consists of 19 communes and covers a total surface area of 16,179 ha. The population has around 990,000 inhabitants. Roughly a quarter of the city's total population is foreign. Brussels has a temperate, maritime climate. The average temperature in September is around 16°Celsius (±60° Fahrenheit).

Brussels and Belgium, being at the crossroad of France, Germany and United Kingdom has been the place where Europe has been shaped. It is crossed by the border which separates Latin Europe from German Europe, which is the place where in 57 BC Julius Caesar stopped its first conquest of the Gaul. This line still separates today the two main communities of Belgium, the Flemish and the Walloon. Belgium nourishes diversity, creativity, art and technology. The Flemish textile industry came from the middle age, while the steel and glass industry made Belgium one of the main industrial countries at the beginning of the 20th century. These industrial golden ages of Belgium gave rise to art and science creativity, among which one can cite the Flemish school of Painting in the 15th century or the Solvay congresses in the beginning of the 20th century where all the key Physicists of the World, including Albert Einstein and Marie Curie, were shaping the modern Physics in Brussels under the sponsorship of Ernest Solvay. We are very proud to welcome ICIP in the continuity of this long tradition and spirit of modernity.

ICIP is the premier forum for the presentation of technological advances and research results in the fields of theoretical, experimental, and applied image and video processing. ICIP 2011, the 18th in the series that has been held annually since 1994, brings together leading engineers and scientists in image processing from around the world. As its previous editions ICIP 2011 targets an excellence level by selecting outstanding papers with the aid of an elaborate panel of experts that evaluated the papers. The Technical Program Chairs, Special Session Chairs and Tutorial Chairs supported by many collaborators managed this process while aiming at an acceptance rate of 40%. The three main 2011 themes, human computer interfacing, astronomy and cultural heritage, are reflected in the plenary talks and multiple lecture and poster sessions. This conference also awards best student papers and best papers via a meticulous process involving expert reviewers.

The conference center, the Square, is housed in the centre of Brussels in the extensive former Palais des Congrés, an elegant, architecturally significant building originally constructed for the 1958 World Expo. Many of the original features, including expansive murals by Paul Delvaux, René Magritte and Louis van Lint, have been carefully restored and are now juxtaposed with contemporary design conceived by a team of leading European designers. With its spectacular views over the Brussels skyline, Square is somewhere to inspire the mind to greater heights and ambition. Brussels is the thriving centre of Europe, and Square is right in the heart of it, just a short stroll from all of the historic city's major attractions.

The welcome reception takes place in the proximity of the square in the King's Gallery (Galerie du Roi), which is one of three galleries that are better known as the Saint-Hubertus Royal Gallery. The galleries housed some 70 luxury boutiques (54 today) and about 100 private flats, all of which have been rented out since 1850. The banquet is hosted by AutoWorld, one of the most important and complete exhibitions of automobiles in Europe with more than 350 vehicles offering an overview of the general history of the car industry since its very begins.

Organizing a conference like ICIP always involves many persons and addressing them individually in this word of thank would not be feasible, but we do want to mention a few people that played a key role in organizing this event. We would like to thank especially the Technical Program Chairs, Prof. Inald Lagendijk

and Prof. Pierre Moulin for their guidance and hard work putting together this year's technical program, and the Local Arrangement Chairs, Alasdair Grant and Dr.
Véronique Delouille, for managing the event's overall complexity and its smooth organization. They were assisted by Destrée Organisation as the Professional Congress Organizer (PCO) and by Carlson Wagonlit Travel to accommodate the social events and hotel reservations. Finally, we would like to express our gratitude to the IEEE staff and in particular to Lisa Schwarzbek for guiding us through this adventurous experience.

Evidently, we need also to thank our sponsors: IEEE and the IEEE Signal Processing Society, and our supporters: the Funds for Scientific Research in Flanders and Wallonie (FWO and FNRS), the Belgian Science Policy (BELSPO) project BCRYPT, INRIA, Hewlett-Packard, Huawei, Barco, Wiley-Blackwell, VisitBrussels and Duvel Moortgat.

It is an honor to host ICIP 2011 and we hope that attendees will have exciting and fruitful experience paving the way for future research and developments in the domain. We welcome you to Brussels and hope you will have a joyful stay!

Bienvenue à Bruxelles, Welkom in Brussel, Willkommen in Brüssel, Welcome to Brussels!
Prof. Benoit Macq, ***General Chair, ICIP 2011***
Prof. Peter Schelkens, ***General Co-Chair, ICIP 2011***

It is our pleasure to welcome you to the 2011 18th IEEE International Conference on Image Processing in Brussels, the world capital of beer and chocolate! Hopefully attending ICIP 2011 will stimulate both your palate as your intellect and will be an exciting, fruitful, and inspiring experience.

This year we have received 2245 paper submissions from 67 countries spread all over the globe. The Asia/Pacific region provided 44.4% of the authors, Europe, the Middle East and Africa 37.0%, North America 15.6%, and Latin America 3.0%.

The organizing committee had all submitted papers subjected to peer evaluation by 1113 volunteers who were selected based on their expertise area. They provided over 7,000 reviews, i.e., an average of about 3.2 per paper. The review process was managed per EDICS domain by 61 Area Chairs who are members of the Image, Video, and Multidimensional Signal Processing (IVMSP) Technical Committee of the IEEE Signal Processing Society, members of the Multimedia Signal Processing (MMSP) Technical Committee, or otherwise leading researchers within the IEEE Signal Processing Society Image Processing community. The Area Chairs monitored the review process and made recommendations for each paper. A total of 889 regular papers (40.6 %) have been accepted and are presented in 48 lectures and 42 poster sessions. We would like to sincerely thank everybody involved in the review process: your individual contributions have shaped the ICIP 2011 program.

The ICIP 2011 technical program includes three plenary lectures addressing the main themes of the conference: human computer interfacing, cultural heritage and astronomy. We are therefore delighted to announce the following plenary lectures at this year's ICIP conference:

- "Seeing and the Brain", by Prof. Brian Wandell from Stanford University, USA.
- "Sparsity and Astronomical Data Analysis", by Dr. Jean-Luc Starck from the Commission for Atomic Energy (CEA), France.
- "Distinguishing the 'Hand' of the Master?," by Prof. Ingrid Daubechies from Duke University, USA.

The conference kicks off on Sunday, 11th September, with 5 tutorials (3 in the morning and 2 in the afternoon). These tutorials were selected from 17 proposals submitted in response to the Call for Tutorials by a team of experts under the guidance of Prof. Jean-Philippe Thiran and Dr. Ton Kalker. The evaluation process resulted in the selection of the following state-of-the-art tutorials on vibrant research topics in image processing:

- "Convex Optimization Methods for Image Processing" by Xavier Bresson and Thomas Pock.
- "Image Analysis in Very High Resolution Optical Remote Sensing" by Jocelyn Chanussot.
- "Image and Video Analysis using Local Binary Pattern Variants" by Matti Pietikäinen and Janne Heikkilä.
- "Spatio-temporal Filtering for Multi-object Tracking in Image Sequences" by Andrea Cavallaro and Emilio Maggio.
- "ToF (Time of Flight) Depth Sensor Image Processing: from Principle to Applications" by Seungkyu Lee, Albert J.P. Theuwissen, Radu Horaud, Miles Hansard, Hwasup Lim and Seong-Jin Kim.

The ICIP 2011 program also offers 8 special sessions covering key research topics. The special sessions were selected after a meticulous reviews process of 12 submitted special session proposals in response to the Call for Special Sessions under the guidance of the Special Session Chairs, Prof. Edward Delp and Prof. Ferran Marques. Each paper in the special sessions was reviewed by, at least, four reviewers. The ICIP 2011 special sessions and corresponding organizers are:

- "Advances in Motion Representation for Video Coding", by Thomas Sikora, and Andreas Krutz.
- "Advances in Transforms for Video Coding", by Marta Mrak, and Robert Cohen.

- “Analysis of Microscopy and Reconstructive Images for Applications in Medicine and Biology”, by Laure Blanc-Feraud, Dave Burton, Aymeric Histace, Bogdan Matuszewski, Chris Moore, and Frederic Precioso.
- “Astronomy and Cosmology”, by Yves Wiaux.
- “Compression of High-Dimensional Media Data for Interactive Navigation”, by Gene Cheung, Pier Luigi Dragotti, and Vladan Velisavljevic.
- “Distributed Compression: Multimedia Applications”, by Vladimir Stankovic, Lina Stankovic, and Samuel Cheng.
- “Modern Shape from Shading and Beyond”, by Michael Breuß, Ariel Tankus, and Oliver Vogel.
- “Recent Advances in Web-scale Image Annotation”, by Clement Chia Nanyang, Yiqun Hu, and Jinjun Wang.

To recognize top research results, ICIP 2011 includes two types of awards:

- Best Paper Award, supported by Hewlett-Packard. After nomination by the Area Chairs and guided by the reviewers’ scores and comments, the nominated papers have been reevaluated by an independent panel of experts.
- Best Student Paper Awards, supported by Huawei, Barco and Wiley-Blackwell. For these awards the first author needs to be a student upon submission of the paper. ICIP 2011 has followed the process initiated at last year’s ICIP in Hong Kong, highlighting the importance of the paper presentation. Eight Best Student Paper Award candidates have been selected through a review process from a list of 50 top scoring papers nominated by senior researchers.
  The eight nominated papers are invited to present their work in a Best Student Paper Award Special Session. A jury composed by the Awards Chairs will score the candidates by considering all relevant reviewing criteria, including the quality of the oral presentation.

The award process was managed by the Awards Chairs, Prof. Pascal Frossard and Prof. Béatrice Pesquet-Popescu. They will present the awards during the conference banquet.

As Technical Program Chairs, we would like to thank the plenary speakers, tutorials presenters, reviewers, session chairs, and all authors and presenters for their contributions to ICIP 2011. In particular we would like to thank the Area Chairs for their instrumental support for building a high quality ICIP 2011 program. Finally, we would like to express our appreciation for the Destrée Organisation, in particular Nicolas Le Brun and his team, for their support in organizing ICIP 2011.

We look forward to welcoming you in Brussels,

Prof. Inald Lagendijk and Prof. Pierre Moulin
ICIP 2011 Technical Program Chairs

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