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SOFT COMPUTING FOR COPYRIGHT PROTECTION

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In today's digital age, the creation, transmission and manipulation of digital media content, such as images, audios and videos, are made simply through digital processing tools that are easily and widely available. As a consequence, piracy that copies, tampers and retransmits the media content is becoming increasingly easier and more popular now. This eventually concurs a great deal of loss to content producers or service providers. Thus, developing the copyright protection technologies that are able to detect, prevent and authenticate the media content's copyrights becomes extremely urgent.

In the past decade, some means have been proposed and used for copyright protection, such as digital watermarking for ownership protection, multimedia authentication for tampering detection, digital fingerprinting for traitor tracing, perceptual hash for copy tracking and piracy search, etc. In these means, soft computing techniques, such as Fuzzy Logic, Neural Networks, Evolutionary Computing, Rough Sets and other similar techniques, play an important role. Their capabilities of learning, adaptation, recognition and classification have been proved effective in forgery detection, copy detection, pirate copy index, multi-mode user authentication, etc.

The aim of this special issue is to present a collection of high-quality research papers that report the latest research advances in the area of soft computing based copyright protection techniques. In this special issue, we selected 7 papers, which can demonstrate advanced works in this field. All the papers submitted to the special issue were reviewed by at least three anonymous referees each and had two rounds of improvement. A detailed overview of the selected works is given below.

The first two papers are related with Digital Rights Management (DRM). Among them, the first one, entitled "Game-Theoretic Analyses and Simulations of Adoptions of Security Policies for DRM in Contents Sharing Scenario" (Zhiyong Zhang, Qingqi Pei, Jianfeng Ma and Lin Yang), analyzes the relationship between two DRM stakeholders, i.e., providers and sharers. The game theory is introduced to model the mutual influence of adoptions of trusted computing enabled security policies on benefits of the two stakeholders. Although it is still an open issue, the paper's work will bring some innovative information to DRM system designers or operators. The

second article, entitled "On the Secure Watermark Embedding Scheme Based on Selective Encryption" (Xi Chen and Shiguo Lian), investigates some secure multimedia content distribution schemes, especially the one joint fingerprint embedding and decryption, analyzes their security flaws, and proposes some improved means to strengthen the schemes. The reported results are expected to provide valuable information to researchers or engineers working in this field.

The second two papers are about watermarking-based copyright protection. The one, entitled "A New Robust Watermarking Scheme Based on Shuffled Frog Leaping Algorithm" (Xia Li, Lingjun Liu, Na Wang and Jeng-Shyang Pan), presents a robust watermarking method based on the shuffled frog leaping algorithm and quantization index modulation (QIM). The shuffled frog leaping algorithm is utilized to find out the optimal embedding position and adaptive quantization step for embedding watermark into a carrier image. It is reported to exhibit satisfactory robustness against a wide variety of attacks such as amplitude scaling, filtering, noise addition, cropping and JPEG compression. Another one, entitled "Reversible Visible Watermarking with Lossless Data Embedding Based on Difference Value Shift" (Xinpeng Zhang, Shuozhong Wang and Guorui Feng), proposes a lossless data-hiding method by adjusting the pixel pairs' gray levels, and constructs a visible watermarking algorithm based on the lossless embedding operation. This algorithm has some properties suitable for ownership protection.

The following three papers are about image forgery and authentication. The one, entitled "Hierarchical Fragile Watermarking Scheme for Image Authentication" (Shinfeng D. Lin and Zong-Lin Yang), presents a hierarchical fragile watermarking scheme for image authentication. The important features and parity bits of an image are embedded by modifying the pixel value of the host image. Once an image is tampered by other users or corrupted by transmission, the parity bits and important features can be used to detect and recover the image. The method is reported effective to confirm the accuracy of damaged location and the quality of recovered image. The second one, entitled "An Efficient Block-based Fragile Watermarking System for Tamper Localization and Recovery" (Venkata Gopal Edupuganti, Frank Y. Shih, and I-Cheng Chang), presents a block-based fragile watermarking system for tamper localization and recovery of images. It applies the Cyclic Redundancy Checksum (CRC) to authenticate the feature of a block stored in a pair of mapping blocks. It can be applied on grayscale and color images, and shows some prior properties compared with existing methods. The third one, entitled "Image Forgery Using Enhanced Bayesian-based Matting Algorithm" (I-Cheng Chang and Chieh-Jung Hsieh), presents a method to construct a tampered image based on the matting approach. It adopts a new nearest-neighbor sampling method to extract color information, analyzes the color variations and shading effect and then adjusts the extracted foreground object to blend with the new background. It is reported that the resulting images are difficult to be detected using normal forgery detection algorithms.

In conclusion, this issue offers a groundbreaking view into the recent advances in Soft Computing for Copyright Protection. Finally, we would like to express our gratitude to the Editor-in-Chief, Prof. Mo Jamshidi, for his advice, patience, and encouragements since the beginning until the final stage. Special thanks go to Mag. Sandi Keeton during the production. We thank all anonymous reviewers who spent much of their precious time in reviewing all the manuscripts. Their timely reviews and comments greatly helped us select the best papers in this special issue. We also thank all authors who have submitted their papers for consideration for this issue. We hope you will enjoy reading the great selection of papers in this issue.

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