EDITORIAL

Guest editorial: bio-inspired information hiding

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Welcome to this Special Issue on Bio-Inspired Information Hiding. Research in information hiding started in the early 1990s. With the widespread use of Internet and wireless networks, and the blooming growth in consumer electronic devices and advances in multimedia compression techniques, multimedia streams are easily acquired nowadays. Hence, how to achieve copyright protection of the above-mentioned multimedia contents, and how to effectively hide additional data into such digital contents as another means for protecting the intellectual property, has become an important issue.

People learn a lot from Mother Nature. Applying the analogy to biological systems, we are able to handle the challenges in the algorithm and application for information hiding. As we know, there are several parameters that need to be carefully selected when designing an information hiding algorithm. These parameters, to cite some, include: the quality of the multimedia content with hidden data embedded, the number of bits that can be hidden, the security for delivering the multimedia content, and the capability to withstand the intentional or unintentional signal processing, called attacks. These parameters have their own limitations, and they might have conflict to one another. For instance, hiding more bits into the digital contents may degrade the perceptual quality to some extent. Based on this observation, bio-inspired

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optimization techniques, including evolutionary algorithms (EA) and neural networks (NN), are employed to help solve the problem relating to information hiding.

The main objective of this Special Issue is to provide the Soft Computing Journal readers with a focused set of peer-reviewed articles to reflect recent advances in state-of-the-art algorithms as well as successful implementations of bio-inspired information hiding techniques. This Special Issue also serves as a forum for researchers to exchange their latest findings, and we hope that it will stimulate further research and development in this area.

This Special Issue contains nine papers that address several important issues in the research of bio-inspired information hiding. These papers provide various aspects from the theoretical derivations of data hiding algorithms with the aid of soft computing techniques, to the design and implementation of data hiding applications for images, video, and audio signals.

We give a brief sketch of each of the eight articles as follows.

The first paper, "A Data Embedding Scheme for Color Images Based on Genetic Algorithm and Absolute Moment Block Truncation Coding," by Chang et al., considers the problem of optimized data embedding schemes for color images. The absolute moment block truncation coding (AMBTC) is applied. With the aid of genetic algorithm, both the satisfactory image quality and a higher embedding capacity can be obtained.

The next paper, "The Optimized Copyright Protection System with Genetic Watermarking," by Huang et al., focuses on finding the optimized correlation among the watermarking requirements, including watermarked image quality, the capability for resisting attacks, and the number of bits embedded. The watermarking algorithm is an improvement over existing ones by modifying coefficients in the discrete cosine

transform (DCT) domain. Using genetic algorithms, the optimized results illustrate that better outcome can be obtained over those presented in literature.

The third paper, "A Differential Evolution Based Algorithm for Breaking the Visual Steganalytic System," by Shih and Edupuganti, makes use of Differential Evolution (DE) technique for breaking the visual steganalytic system. Experimental results demonstrate that the DE based steganography is superior to the genetic algorithm based steganography, and both the imperceptibility and robustness can be enhanced.

The fourth paper, "A New Watermarking Approach Based on Probabilistic Neural Network in Wavelet Domain," by Wen et al., proposes a novel scheme of image watermarking based on the combination of dual-tree wavelet transform (DTCWT). By making use of the probabilistic neural network for embedding the watermark into the edge and texture characteristics of the image, the proposed approach could survive against a variety of attacks.

The next paper, "Genetic Algorithms for Optimality of Data Hiding in Digital Images," by Maity and Kundu, investigates the usage of genetic algorithms for optimality of data hiding in images. Two spatial domain data hiding methods are offered to cope with the improvement in watermark detection, and the imperceptibility of the image quality with hidden data. Using genetic algorithms, optimal results can be obtained.

The sixth paper, "A Fast SVD Based Video Watermarking Algorithm Compatible with MPEG2 Standard," by Wu et al., employs the watermarking methods to video contents based on singular value decomposition (SVD). Since the beginning of watermarking research, the formats of the contents for watermarking are mainly concentrated on images, and then video signals. Experimental results point out that the algorithm is very robust against MPEG-2 compression and other commonly employed attacks.

The seventh paper, "Genetic Fingerprinting for Copyright Protection of Multicast Media," by Huang and Chen, introduces a novel fingerprinting scheme for multicast media data. The fingerprints, corresponding to different users, are embedded into multimedia contents. The scrambling and de-scrambling keys are generated with genetic algorithms. The user with the correct key has the ability to decode the higher-quality image and video. Effective transmission for protected multimedia contents can be observed.

The eighth paper entitled "A PM1 Steganography in JPEG Images using Genetic Algorithm," by Yu et al., utilizes an applicable scheme for image steganography. With the aid of genetic algorithm, the blocking effects in JPEG can be minimized, while the capacity and security of embedded data can be enhanced. Results demonstrate that the proposed scheme outperforms a variety of steganographic methods reported in the literature.

The final paper entitled "Spiking Neural Network and Wavelets for Hiding Iris Data in Digital Images" by Hassanien et al., introduces an efficient approach to protect the ownership by hiding the iris data into a digital image for authentication purposes. The idea is to secretly embed an iris code data into the content of the image, which identifies the owner. Using several bio-inspired techniques, simulation results illustrate the effectiveness and efficiency of the proposed approach.

Papers for this special issue were selected from the IEEE Second International Conference on Intelligent Information Hiding and Multimedia Signal Processing (IIH-MSP 2006), which was held in California, USA. Based on the recommendation by three independent reviewers, we finally accepted 9 papers for this special issue. We thank all the authors for their contributions and express our deepest gratitude to the reviewers for their time and effort in providing valuable feedback to the authors, without which this Special Issue would not have been possible. We also express our sincere appreciation to the Editor-in-Chief, Dr. Vincenzo Loia, for providing the opportunity to develop this Special Issue.