

## Preface

### **A Special Issue of Swarm Intelligence and Its Applications in Fuzzy Systems for the International Journal of Fuzzy Systems**

This special issue is a collection of selected papers authored by prominent researchers and professionals working in the areas of swarm intelligence, fuzzy systems, and computational intelligence. This special issue receives attentions from researchers in many countries; however, some of the good quality papers received are not quite related to the theme of this special issue. The theme was Swarm Intelligence and Its Applications in Fuzzy Systems. Fuzzy systems and their applications have been an interesting and challenging task for many years. With the rapid advancement of digital computing platforms, Swarm Intelligence, Fuzzy Logic, Fuzzy Systems, Clustering Algorithms, Rough-Neural Computing, Genetic Algorithms, Genetic Programming, Artificial Immune Systems, and Artificial Intelligence have been the predominant approaches to build intelligent systems. Computational intelligence may be employed to be an umbrella to cover these disciplines. The focus of this issue is on the applications of swarm intelligence and fuzzy logic on image analysis and pattern recognition. Papers published in this issue represent the current research trends in the computing techniques and methodologies and their applications in practice. Due to the limited space, we only are able to select ten papers for publication. These papers span a wide spectrum of different research areas.

The first paper “A Hybrid of Immune Algorithm and Particle Swarm Optimization for Neuro-Fuzzy Classifiers” by Lin et. al. describes an efficient immune-based particle swarm optimization (IPSO) for neuro-fuzzy classifiers. Then, the proposed classifier is then used to solve the skin color detection problem. The next paper “An Efficient Human Detection System Using Adaptive Neural Fuzzy Networks” by Lin and Siana proposes a human detection system using adaptive neural fuzzy networks. The system was tested on thousands of images and compared with other detection systems. The paper “A PSO-Based Decision Aid for Multi-Aircraft Combating Situations” by Su et. al. proposes a PSO-based decision aid for aircraft assignments. The greedy algorithm and the proposed PSO-based algorithm were compared based on the experimental results. The comparison shows that the PSO-based algorithm is much more efficient than the greedy approach if the number of aircrafts (our side) is larger than a threshold value. In “A Novel Fuzzy Weighted C-Means Method for Image Classification” by Li et. al. proposes a fuzzy weighted C-Means algorithm for image classification. Cluster centers in the traditional fuzzy C-Means (FCM) are modified using the concept of weighted means in nonparametric weighted feature extraction (NWFE). Experimental results show that the proposed algorithm performs better than the FCM and the fuzzy compactness and separation algorithm.

In “Hybrid Methods of Spatial Credibilistic Clustering and Particle Swarm Optimization in High Noise Image Segmentation” by Wen. Et al. presents the particle swarm optimization (PSO) for optimal solutions search in the fuzzy C-Means algorithm (FCM) and Credibilistic Clustering algorithm (CCA). These optimized algorithms then used for high noise image segmentation. They demonstrate that the proposed algorithms perform better than those algorithms without the help of PSO. In addition, the paper shows that the CCA performs better than the FCM based on the experimental results. In “Swarm Intelligence Based Fuzzy C-Means Clustering for Motion Vector Selection in Video Watermarking” by Lin and Liao develops a video watermarking system in which the swarm intelligence based fuzzy C-Means algorithm is used to determine the motion vectors and the positions of the watermarks. Several CIF format video clips were tested for the proposed system. The comparison of video quality based on the PSNR measure shows that the proposed algorithm outperforms other algorithms including the K-Means, FCM and Thresholding-FCM algorithms. In “Application of SOMO Based Clustering in Building Renovation” by Chen et. al. creates a mapping between all the related factors and corresponding costs by applying the self-organizing feature map method to building renovation. This research will benefit the construction practitioners to learn more about the renovation based on buildings’ history and features.

In “Application of Hardware Architecture of Genetic Algorithm for Optimal Packet Scheduling” by Tseng et. al. describes a hardware architecture of genetic algorithms and its application in optimal packet scheduling. A Matlab simulation is also provided for the superiority of genetic algorithms in packet scheduling. The paper “Land Cover Classification Based on General Type-2 Fuzzy Classifiers” by Lucas et. al. proposes a type-2 fuzzy classifier for multispectral image classification. Experimental results show that the type-2 fuzzy classifier performs better than that of the type-1 fuzzy classifier, however, not better than that of the maximum-likelihood classifier. The last paper, “Unsupervised Clustering Algorithms for Image Segmentation Using Particle Swarm Optimization” by Liu et. al. applies the particle swarm optimization (PSO) to the fuzzy C-Means, possibilistic clustering, and generalized possibilistic clustering algorithms for improvement in their performance. Experimental results show that the PSO help to increase the number of better segmentation results.

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