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## Foreword

### Special Issue on Technologies and Applications of Artificial Intelligence

An optimistic outlook has returned to the field of artificial intelligence (AI) 45 years after the pronouncement by computer scientist John McCarthy that a thinking machine could be created within a decade. Fueling the renewed optimism is rapid progress in AI technologies. The strides that AI has made in recent years are especially apparent in its applications, such as robotics, data mining, speech recognition, computer games, machine vision, future computing and mobile interfaces driven by artificial intelligence. This special issue is a collection of outstanding papers devoted to the state-of-the-art in artificial intelligence. Papers were submitted from open calls as well as recommended from TAAI 2010 conference. Each paper was rigorously reviewed by at least three reviewers. Overall, 13 of 31 papers were recommended to be included in the special issue.

Cheng-Hsuan Li, Hsin-Hua Ho, Yu-Lung Liu, Chin-Teng Lin, Bor-Chen Kuo and Jin-Shiuh Taur propose an automatic method to select the parameter of the normalized kernel function in support vector machine (SVM). For the parameter of  $C$  in SVM, it uses the cross validation method to tune it. The paper verifies through experiments that the proposed method can obtain more accurate or at least equal performance while reducing the time cost in seeking the optimal parameters by cross validation on grid search method.

Yih-Lon Lin and Wen-Lin Chen present a new method for fractal image compression by combining the Discrete Wavelet Transform (DWT) information and the Particle Swarm Optimization (PSO) algorithm. From the experimental results, it is observed that the computation time of the proposed method is faster than the other method with only little decay in the image quality. The experimental result demonstrates the effectiveness of the proposed method, yet the writing and organization needs to be improved.

Xue Gao And Lianwen Jin propose some methods to build a real-time processing system that could handle machine-printed Chinese postage envelopes in an automatic manner. The system efficiently recognizes about 4,590 printed Chinese characters, including 4,516 frequently used Chinese characters defined in the GB2312-80 standard, 62 alphanumeric characters, and 12 punctuation marks and symbols. Supported font styles include the Song, Fang Song, Kai, and Hei fonts. The results of an experimental trial of the system demonstrate that an envelope with an average of 32.9 characters

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can be processed and recognized within 81.38 milliseconds. The character recognition rate of postal addresses is 98.72%.

Yao Lu, Xiaojun Quan, Jingsheng Lei, Xingliang Ni, Wenyin Liu and Yinlong Xu propose a novel approach in identifying answer experts in user-interactive question answering (UIQA) services using graph-based semantic approaches. They construct the user question-answer relation graph through direct semantic links and latent links, which are extracted from the data of question sessions and user profiles in UIQA services. Experimental results on Yahoo! Answers dataset show that the extracted semantic information can effectively improve the accuracy of answer experts finding.

Peng Ding, Minghai Xu, and Dongliang Sun propose an improved gbest-PSO method to overcome the shortcoming of earlier convergence of classical gbest-PSO. The improved gbest-PSO is used to identify the unknown inlet temperature profile in a plate channel flow. The local refine mechanism introduced in the improved gbest-PSO increases the opportunity of finding the global optimum greatly, especially for high dimensional multimodal optimization problems. Accurate results are obtained even when the measurements contain 10% noise. Consequently, the inverse convection heat transfer problem is successfully solved by the improved gbest-PSO.

Meng-Lun Wu, Chia-Hui Chang, Rui-Zhe Liu and Teng-Kai Fan propose a heuristic clustering method for an online advertising application. The method is to utilize latent feature space to improve clustering results by solving the feature sparse problem. The latent feature space is conducted manually by the K-means clustering algorithm. Experimental results show that the proposed method is better than directly clustering the sparse features.

Yi-Chang Shan, I-Chen Wu, Hung-Hsuan Lin and Kuo-Yuan Kao strongly solve nine layer Triangular Nim, a common two-player game in Taiwan and China. Two versions are proposed. The first version requires four terabytes in memory and takes about 129.21 days aggregately. The second version is improved by reducing the memory by a factor of 5.72 and the computation time by a factor of 4.62.

Rei-Heng Cheng and Chiming Huang propose to use prediction-based mechanisms, which exploit mobility information in location service and destination searching. For location service, it is argued that by prediction-based mechanism, the frequency of nodes updating their locations can be reduced. For destination searching, a prediction-based searching scheme is presented with refining and backtracking mechanisms to improve the efficiency of finding destination nodes. The simulation results show that the proposed mechanisms can significantly reduce the control overhead of location updating and

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improve the successful rate of searching the destination nodes in the meantime.

Kuen-Han Lin, Chun-Hua Chang, Andreas Dopfer and Chieh-Chih Wang propose to use a 2D laser scanner and a stereo camera for accomplishing simultaneous localization and mapping (SLAM) in 3D indoor environments. In the environments, the 2D laser scanner is used for SLAM and the stereo camera is used for 3D mapping. The experimental results demonstrate that the proposed system is lower cost yet effective, and the obstacle detection rate is significant improved compares to using one 2D laser scanner for mapping.

Sai-Keung Wong and Shih-Wei Fang propose to train the neural network-based NPC controller by back propagation and the genetic algorithm (GA). Benefits of the proposed controllers and training approaches are examined in three types of mini-games. The experimental results show that the training approaches can help the NPC controllers to imitate simple human behaviors and achieve a goal of scoring. Besides, it also helps game designers to do experiments on skill balancing.

Wei-Guang Teng, Wei-Hsun Wen and Yue-Cen Liu propose an "immediacy of interest" indicator, measured in terms of information freshness, to evaluate the possible user interest in a web page contained in a search result. To address relevance in search sessions, the topic map is utilized in the proposed scheme. Empirical studies show that informational web searching tasks can be completed efficiently and effectively with the approach.

Show-Jane Yen, Chiu-Kuang Wang and Liang-Yuh Ouyang propose an algorithm for mining frequent patterns in database. The basic idea of the algorithm is to combine the advantages of two conventional skills: FP-tree and candidate generation. For each candidate generation, the algorithm only generates a small set of candidates, which can significantly reduce the search space. The experimental results show that their algorithm outperforms some earlier algorithms, in terms of time and search space.

Guo-Cheng Lan, Tzung-Pei Hong and Vincent S. Tseng propose an efficient average-utility mining approach based on the concept of projection technique from database system to speed up the execution and reduce the memory requirement in the mining process. The proposed approach can project relevant sub-databases for mining, thus avoiding some unnecessary checking. In addition, a pruning strategy is also designed to reduce the number of unpromising itemsets in mining. Finally, the experimental results on synthetic datasets and two real datasets show the superior performance of the proposed approach.

Many other individuals contributed to the success of this special issue. We

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would like to express our sincere gratitude to all authors and reviewers. We would also like to thank the Editor-in-Chief Dr. Wen-Lian Hsu and the Assistant Editor Ms. Chris Tseng. Without their help, this special issue would not be possible.

• Guest Editors •



**Chun-Nan Hsu (許鈞南)** is a research fellow at the Institute of Information Science, Academia Sinica, Taiwan and a computer scientist at the Information Sciences Institute (ISI) of the University of Southern California (USC), CA, USA. He has more than 14 years of academic research experience in the fields of Artificial Intelligence and Bioinformatics. His doctoral thesis research involved data mining, machine learning and information integration. In 1996, before he passed his doctoral oral exam, he was offered a position as Assistant Professor at the Department of Computer Science and Engineering at Arizona State University. He taught there for two years before returned to Taiwan in 1998. In 2005, he was awarded a grant to lead the IT team in the national bioinformatics core facility in the National Research Program for Genomic Medicine, where he applied innovative machine learning and information integration technologies to solve research problems in genomic medicine. His team developed widely used tools for functional analysis of gene variations, biological text mining, and cell image analysis. After moving to USC/ISI, he has been involved in genome-wide association study projects where he is working on text and data mining.



**Tsan-sheng Hsu (徐讚昇)** received his B.S. in Computer Science and Information Engineering from National Taiwan University (NTU), and M.S. in Computer Science and Ph.D. from University of Texas at Austin, and Ph.D., in 1985, 1990 and 1993, respectively. He is currently a research fellow of the Institute of Information Science, Academia Sinica, Taiwan. Dr. Hsu's research interest includes graph theory and its applications, theory and practice of computer games, data-intensive computing, data privacy, and the design, analysis, implementation and performance evaluation of algorithms. He is a mem-

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ber of ACM and ACM SIGACT, and a senior member of IEEE Computer Society. He is also a life member of IICM. Dr. Hsu is the first person to offer a graduate level course Theory of Computer Games in Taiwan and has been teaching the course since 2007 at NTU. More information about him can be found in the following URL: <http://www.iis.sinica.edu.tw/~tshsu>.



**Irwing King's (金國慶)** research interests include machine learning, social computing, web intelligence, data mining, and multimedia information processing. In these research areas, he has over 200 technical publications in journals and conferences. In addition, he has contributed over 20 book chapters and edited volumes.

Irwin is the Book Series Editor for "Social Media and Social Computing" with Taylor and Francis (CRC Press). He is also an Associate Editor of the IEEE Transactions on Neural Networks (TNN) and ACM Transactions on Knowledge Discovery from Data (TKDD). He is also served in the editorial board and also as guest editors for a number of international journals. He is also a member of the Board of Governors of INNS and a Vice-President and Governing Board Member of APNNA. He also serves INNS as the Vice-President for Membership in the Board of Governors.

Irwin is Professor at the Department of Computer Science and Engineering, The Chinese University of Hong Kong. He received his B.Sc. degree in Engineering and Applied Science from California Institute of Technology, Pasadena and his M.Sc. and Ph.D. degree in Computer Science from the University of Southern California, Los Angeles.



**Yuh-Jye Lee (李育杰)** received his Master degree in Applied Mathematics from the National Tsing Hua University, Taiwan in 1992 and PhD degree in computer sciences from the University of Wisconsin-Madison in 2001. He is an associate professor in the Dept. of Computer Science and Information Engineering, National Taiwan University of Science and Technology. His research interests are in machine learning, data mining, optimization and information security. Dr. Lee developed new algorithms for large data mining problems such as classification, anomaly detec-

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tion and dimensional reduction. These algorithms have been applied to many real world applications such as intrusion detection system, microarray gene expression data analysis and breast cancer diagnosis and prognosis.



**I-Chen Wu (吳毅成)** received his B.S. in Electronic Engineering from National Taiwan University (NTU), M.S. in Computer Science from NTU, and Ph.D. in Computer Science from Carnegie-Mellon University, in 1982, 1984 and 1993, respectively. He is currently a professor of the Department of Computer Science and the director of the Institute of Multimedia Engineering, at National Chiao Tung University. He introduced the new game, Connect6, a kind of six-in-a-row game in 2005. Since then, Connect6 has become a tournament item in Computer Olympiad. He also led a team developing many computer game programs, which won 14 gold and at least 20 other medals in computer game tournaments. Among them, a Connect6 program, named NCTU6, also won the latest three man-machine Connect6 championships. His research interests include artificial intelligence, Internet gaming, volunteer computing and cloud computing. He is a member of IEEE Computational Intelligence Society (CIS), and currently serves in the Games Technical Committee of IEEE CIS. More information about him can be found in the following URL: <http://java.csie.nctu.edu.tw/~icwu/>.

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