Editorial

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Biographical notes: Dr Hanqi Zhuang's research interests are in the areas of computer vision, robotics, network communications and biometric applications. He has published more than 50 referred papers and has given numerous presentations. He has guided about nine PhD and 17 MS students to completion. His recent research activities include conducting a project with DOD DIS on secure telecommunication using biometric means. He was appointed for two terms as an Associated Editor of IEEE Transactions on Robotics and Automation. He is now an Associate Editor of *Int. J. Computer Applications* and is on the editorial board of *Int. J. Biometrics*.

Dr Ying Bai is an Associate Professor in the Department of Computer Science and Engineering at Johnson C. Smith University located at Charlotte, North Carolina in USA. His special interests include: computer architecture, software engineering, mix-language programming, database programming, fuzzy logic controls and robot calibrations. His industry experience includes positions as software and senior software engineers at companies such as Motorola MMS, Schlumberger ATE Technology, Immix TeleCom and Lam Research. Since 2003, He published more than 20 academic research papers in IEEE Trans. journals and international conferences. He also published six books with publishers such as Prentice Hall, CRC Press LLC, Springer and Cambridge University Press. Most books are about software programming, serial port programming, database programming and fuzzy logic control technologies in industrial applications. His 7th book entitled: *Practical Database Programming with Visual C#.NET* is under the contract with Wiley IEEE Press and will be published in 2009.

Automatic biometrics, which uses an individual's physiological or behavioural characteristics to recognise a person automatically, is becoming the foundation of reliable identification and personal verification solutions for various applications. This special section includes one paper on fingerprint recognition, one on face tracking and two on face recognition, representing some of the state-of-art development in these research areas.

In the first paper, the authors present a new approach for fingerprint liveness detection. In the proposed approach, fingerprint features are first captured with a combination of the Gabor filter and grey level co-occurrence probability algorithm. The dimensionality of the feature vectors is then reduced by a principal component analysis (PCA) algorithm. A number of classifiers are applied to the reduced feature vectors and further fused with the 'Max rule'. Experimental studies confirm the superiority of the proposed approach against the existing methods.

In the second paper, a new face search and tracking algorithm is presented, in which particle swarm optimisation (PSO), a swarm-intelligence based method, is employed. Particles, representing potential solutions for the problem undertaken in a high dimension, are driven by PSO rules to search for better solutions. The face, represented by a multi-feature model, is tracked when the particles reach convergence. Experimental results demonstrate the efficiency and robustness of the proposed face tracking algorithm under dynamic environments with real-time performance.

The last two papers in this special section focus on face recognition. In the third paper, the Pyramidal Gabor Eigenface (PGE) algorithm is proposed. Gabor facial features are first extracted using a set of 1D filters. The dimensionality of the feature vectors is then reduced by the Eigenface (a variation of the PCA) algorithm. The last paper presents a method for effectively extracting face features in the frequency domain. Face images are first mapped to the DCT domain, and variations of PCA operators are then applied to the top-left quadrant of the resulting DCT images to extract facial features. Experimental results given in both papers show that the new methods are superior in terms of computational complexity and recognition rate, in comparison with their respective conventional counterparts.