Preface

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Biographical notes: Khalid Saeed received the BSc Degree in Electrical and Electronics Engineering in 1976 from Baghdad University in 1976, the MSc and PhD Degrees from Wroclaw University of Technology, in Poland in 1978 and 1981, respectively. He received his DSc Degree (Habilitation) in Computer Science from Polish Academy of Sciences in Warsaw in 2007. He is a Professor of Computer Science with AGH University of Science and Technology in Poland. He has published more than 130 publications – edited 17 books, Journals and Conference Proceedings (7 written text and reference books). He supervised about 100 MSc and 13 PhD theses. His areas of interest are biometrics, image analysis and processing and computer information systems. He gave 24 invited lectures and keynotes in different universities in Europe, China, India, South Korea and Japan. The talks were on *Biometric Image Processing* and *Analysis*. He received about 15 academic awards. Khalid Saeed is a member of 9 editorial boards of international journals and conferences. He is an IEEE Senior Member and he is the Editor-in-Chief of *International Journal of Biometrics* with Inderscience Publishers.

Dear Reader, the issue you have in your hands this time, presents the results of the efforts made by Dr. Qinghan Xiao, Defence Scientist at the Defence Research and Development, Canada, Ottawa. Among a large number of submitted papers for reviewing and after a long careful two-cycle reviewing, he had selected the best five of them. Each paper was refereed by three experts who had indeed put their great efforts to make the papers accepted by the level of the *International Journal of Biometrics*.

The topics covered in this issue are as follows. I am giving a general description of their very interesting contents.

The first paper entitled *Multispectral Palmprint Recognition using Image-Based Linear Discriminant Analysis* concerns the palmprint biometrics. The author gives a detailed study on the palmprint recognition showing how it is a promising biometric technology and has been successfully used in secure access control and time and attendance applications. In this paper, an Image-Based Linear Discriminant Analysis (IBLDA) was presented, which employs a methodology similar to LDA, but is applicable to biometric data in the image form, to extract the palmprint features. A palmprint was captured under the red, green, blue, and near infrared illuminations to create a four-band multispectral image. A score-lever fusion was performed to generate a final matching score for this palmprint image. The proposed method was tested with a dataset collected from 250 subjects. Four experiments were conducted to test different scenarios, such as single band image, fusion with matrix-based complex PCA (MCPCA), and fusion with

the proposed method. The experimental results demonstrated that the proposed method outperformed the LDA method and MCPCA method.

The second, however, deals with *Learning Vector Quantisation Based Recognition of Offline Handwritten Signatures* and is entitled so. The paper presents an off-line verification algorithm to recognise both Arabic and English handwritten signatures. The signatures are matched based on features extracted with an adaptive Learning Vector Quantisation (LVQ) neural network which is a supervised neural network and related to the Self-Organising Map (SOM). A dataset was created that contained 945 signatures from 35 persons (27 signatures for each person collected over a period of time). The network classifier is trained on the random training samples to perform recognition task on the input signature image. The experiments showed that the proposed method was effective on recognising mixed Arabic and English handwritten signatures.

Block-based Deep Belief Networks for Face Recognition is the title of the third paper where a novel artificial intelligent technique, Deep Belief Networks (DBN), has been successfully applied to different image recognition and audio classification tasks as an alternative to typical feature-extraction methods. This paper presented a research on using DBN for facial recognition. First, a conventional DBN with three layers was trained using whole images. The experiments showed promising results in terms of face expression variation, but not illumination variation. Thus, a block-based DBN was presented to improve the accuracy of facial recognition under varying illumination conditions. The proposed method was tested with YaleB database and AR-illumination test set. Compared with the conventional DBN (Yale = 79.1%, AR-Illumination = 28.5%), the proposed block-based DBN obtained a significant improvement on AR-illumination test set as the recognition rate increased from 28.5% to 76%.

The fourth paper has the title *An Improved Hybrid Approach to Face Recognition by Fusing Local and Global Discriminant Features* and presents a hybrid approach for facial recognition, which performed a feature-level fusion on local and global facial features. In this paper, several CI-based methods were exploited to achieve higher recognition rates than the conventional methods that performed recognition based on global features only. First, Principal Component Analysis (PCA) was applied to reduce the dimension of the combined feature set. Then, Fisher's Linear Discriminant (FLD) method was performed to extract the features with strong discriminability. Next, a multi-class Support Vector Machine (SVM) was applied on the final feature vector for facial recognition. The proposed method was evaluated with three popular facial recognition databases – Pose, Illumination, and Expression (PIE) database, Facial Recognition Technology (FERET) database, and AR (Aleix Martinez and Robert Benavente) face database. The experiments demonstrated that although the local features alone did not contain sufficient discriminating information, combined with global features, the fusion results were consistently superior to the conventional global feature-based methods.

A Comprehensive Approach for Skin Recognition is the title of the fifth paper which is dealing with the characteristics of the skin tissue, referred to as textures. This is the basis of the authors' biometric features for recognition of individuals. The skin textures can be measured on any skin surface across different regions of the body such as face, lag, and finger. This paper presented a method that used skin texture biometrics for recognition of individuals. A segmentation method was developed to automatically detect the eyes and segment the skin area. The eyes were identified by an adaptive thresholding method through discovering the glare area nearby or inside the pupil. The skin area under

the eyes were extracted as the region of interest, referred to as left and right skin areas. One dimensional Log-Gabor filter was adopted to extract skin features, while Hamming Distance was used for matching skin patterns. Two score fusion approaches, kernel-based and quality-based, were used to fuse left and right skin matching scores. The proposed method was tested on CASIA-Iris-Distance data set and demonstrated superior performance when compared to three facial recognition methods – PCA, MPCLDA and RBFKernel.

I would indeed like to thank Dr. Qinghan Xiao for his careful selection of papers and subjects and for his great efforts to make this issue another success.

I would also express my indebtedness to my friend the Associate Editor Dr. Kevin Jia for his steady help to the Guest Editor.

My gratitude also goes to the reviewers who have put their best efforts and patience to referee the papers after both the primary and the final submission.