Guest Editorial
Introduction to the Special Section of Best Papers From the 2007 Biometrics: Theory, Applications, and Systems Conference

THE SYSTEMS, Man, and Cybernetics Society sponsored the IEEE First International Conference on Biometrics: Theory, Applications, and Systems, or "BTAS 07," held on September 27–29 in the Washington DC area. Participation in BTAS 07 was truly international—there were papers from authors in Austria, England, France, Germany, India, Italy, Korea, The Netherlands, Norway, the Peoples Republic of China, Portugal, Scotland, Spain, Switzerland, Taiwan, and, of course, the U.S. Participation also cut across industry (with authors and speakers from Sagem Sécurité, Philips Research, Booz Allen Hamilton, IBM, Thales Research & Technology, ID Technology, France Telecom, GE Global Research, . . .), government (with authors and speakers from the National Institute of Standards and Technology (NIST), Department of Homeland Security, FBI Academy, Intelligence Technology Innovation Center, and Naval Research Laboratory, . . .), and academia. Corporate supporters of the BTAS 2007 conference were, in alphabetical order, General Electric, Honeywell, L1 Identity Systems, Motorola, Sagem-Morpho, SAIC, and Ultra-Scan. Information on the BTAS 2009 conference is available at http://www.cse.nd.edu/BTAS_09/.

Over 100 papers were submitted to BTAS 07. All submissions received at least two and as many as four reviews. The papers accepted for BTAS 07 that received uniformly strong positive reviews were invited to submit a revised version of the paper to be considered for this special section of IEEE TRANSACTIONS ON SYSTEMS, MAN, AND CYBERNETICS—PART A. The submissions to SMC-A were reviewed and revised again based on these reviews. The final result of this process is the set of five papers that appear in this special section.

We are particularly fortunate in the way that the five papers in this special section illustrate the breadth of activities in current biometrics research. Face, fingerprint, iris, voice, handwriting, and multimodal biometrics are all represented. We are also fortunate in the way that these papers illustrate the important systems nature of much of the best research in biometrics.

The paper titled "Meta-Analysis of Third-Party Evaluations of Iris Recognition" is authored by Elaine Newton and P. Jonathon Phillips of NIST in the U.S. Meta-analyses are rare in biometrics, as well as in computer vision and pattern recognition more generally; therefore, this paper is quite novel even on this count alone. Newton and Phillips analyze the results of three different iris biometrics performance studies, performed by the International Biometric Group, Authenti-Corp, and NIST. The conclusion, possibly surprising to many in the field, is that the three studies are in general agreement. Researchers concerned with iris biometrics will want to be sure to read this paper and to carefully evaluate its results, methodology, and implications.

The paper titled "Identifying Noncooperative Subjects at a Distance Using Face Images and Inferred 3-D Face Models" is authored by Gerard Medioni, Jongmoo Choi, Cheng-Hao Kuo, and Douglas Fidaleo of the University of Southern California in the U.S. They consider one of the most important problems in biometric surveillance, the recognition of noncooperative persons from observation in a video stream. "Noncooperative" here is meant in the weaker sense of the person not making any specific effort to cooperate with acquisition, rather than the stronger sense of the person intentionally trying to defeat the system. Using a high-resolution video camera, their system constructs a 3-D model of the face from the 2-D video frames and then matches 3-D shape models of the face. This paper should be of interest to all researchers working in face recognition from video and to those working in construction of 3-D face models from video.

The paper titled "Combining Handwriting and Speech Modalities for User Authentication" is authored by Andreas Humm, Jean Hennebert, and Rolf Ingold of the University of Fribourg in Switzerland. This paper considers an interesting

Digital Object Identifier 10.1109/TSMCA.2008.2008003

1083-4427/$25.00 © 2008 IEEE

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and novel problem in multimodal biometrics, the combination of near-simultaneously signing and speaking a name. The term "spoken handwriting" is used here to refer to someone speaking what he/she is writing. They obtain interesting results on this problem that has, to date, received relatively little work, but seems destined to attract more attention.

The paper titled "Gait Feature Subset Selection by Mutual Information" is authored by Baofeng Guo and Mark Nixon of the University of Southhampton in the U.K. This work is in the area of recognizing people from the appearance of them walking in a video. In this paper, Guo and Nixon are concerned with the problem of finding the most useful subset of the available features. This is important because the raw dimensionality can be quite high. Their work on using mutual information analysis for feature selection suggests that the dimensionality can be reduced substantially with no appreciable loss in recognition performance. Researchers interested in gait recognition will want to look at this result.

The paper titled "Unification of Evidence Theoretic Fusion Algorithms: A Case Study in Level-2 and Level-3 Fingerprint Features" is authored by Afzel Noore, Mayank Vatsa, and Richa Singh of West Virginia University in the U.S. Fingerprints contain several types of information, including patterns of ridges, minutia points, and skin pores. The minutia points are level-2 information and the skin pores are level-3 information. This work looks at methods of fusing information about image quality, minutia features, and pore features into an overall decision. This work should be of interest to all researchers working in fingerprint image analysis and is potentially relevant to other multibiometric modalities as well.

We sincerely hope that you enjoy reading the papers in this special section and that you will find them useful and a good representation of the state of the art in biometrics. Thanks to the referees and to the authors for promptly completing reviewing tasks and revisions of papers, respectively. Thanks also to the Editor-in-Chief of SMC-A, Witold Pedrycz, and the editorial manager, Tina Scheman-Moje, for their help in shepherding this special section through the editorial channels.

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