**ICB2019 Special Session Proposal on**

**Large-Scale Soft Biometrics**

Soft biometrics, such as gender, skin color, height, ethnicity, gait, action, and tattoo, are physiological and behavioral characteristics that provide not necessarily unique but semantic interpretation about an individual. Such soft biometric attributes offer middle-level characteristics of a person to bridge the gap between low-level machine features and high-level human descriptions. The produced middle-level characteristics are particularly useful in large-scale biometric identification applications, such as human-machine interaction, visual tagging/indexing, and person re-identification. In the last several years, deep learning methods have demonstrated great success for learning discriminative feature representation. However, in order to handle the data with noise and large intraclass variations, the large amounts of training data are essential for deep learning methods. Thus, deep learning method for soft biometric learning and recognition from big data has become a very active inter-disciplinary research area, involving computer vision, machine learning and biometrics. The goal of the special session is to disseminate recent research findings for researchers on a focused platform, discuss how deep learning methods can benefit the field of large-scale biometrics, and explore potential collaborations.

Papers addressing soft biometrics and related topics based on deep learning are invited. The topics include, but are not limited to:

* Recognition on age, gender, ethnicity, hair color, etc.
* Soft biometric feature extraction
* Soft biometric feature evaluation
* Soft biometric feature reduction and classification
* Soft biometric system
* Studying the reliability of soft biometric characteristics
* Soft biometric information capture system
* Databases for evaluating methods on soft biometric
* Soft biometric security classification
* Novel soft biometric traits
* Fusion of primary and soft biometric information
* Application of soft biometric

**Organizers:**

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Biography: Yongxin Ge is currently an Associate Professor with the School of Big Data & Software Engineering, Chongqing University, China. He received the B. Eng. degree in information and computing science, the M.S. degree in operations research and control theory and the Ph.D. degree in computer science and technology from the Chongqing University, Chongqing, China, in 2003, 2006 and 2011, respectively. From Sep. 2008 to Sep. 2009, he was an exchange PhD student in the department of Computer Science, University of Alberta, Canada, under the support of the China Scholarship Council. His research interests include image processing, pattern recognition and computer vision. He has published over 20 technical papers in international journals and conferences such as IEEE T-CSVT, IEEE ACCESS, ICME, ICB and ICIP. He co-organized several special sessions at some international conferences including VCIP 2015 and WACV 2017. He is a member of the IEEE.

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Biography: Haibin Yan is currently an Associate Professor with the School of Automation, Beijing University of Posts and Telecommunications, Beijing, China. She received the B. Eng. and M.Eng degree from the Xi’an University of Technology, and the Ph.D degree from the National University of Singapore, in 2004, 2007 and 2013, respectively. Her current research interests include computer vision and service robotics. She has authored/co-authored over 20 scientific papers in these areas in some international journals and conferences such as IEEE T-CYB, T-IFS, PR, PRL, ICRA and VCIP. She serves as a reviewer for some international journals and conference such as IEEE T-PAMI, T-TIP, T-CSVT, T-IFS, PR, PRL, ICME and VCIP. She is a member of the IEEE.

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Biography: Qijun Zhao is currently an associate professor in the College of Computer Science at Sichuan University. He obtained his B.Sc. and M.Sc. degrees in computer science both from Shanghai Jiao Tong University, and his Ph.D. degree in computer science from the Hong Kong Polytechnic University. He worked as a post-doc research fellow in the Pattern Recognition and Image Processing lab at Michigan State University from 2010 to 2012. His research interests lie in biometrics, particularly, fingerprint recognition, face perception and affective computing, with applications to forensics, intelligent video surveillance, mobile security, healthcare, and human-computer interactions. Dr. Zhao has published more than 60 papers in academic journals and conferences, and participated in many research projects either as principal investigators or as primary researchers. He served as a program committee co-chair in organizing the 11th Chinese Conference on Biometric Recognition (CCBR 2016) and the 2018 IEEE International Conference on Identity, Security and Behavior Analysis (ISBA 2018), and an area co-chair for the 9th IEEE International Conference on Biometrics: Theory, Applications, and Systems (BTAS 2018). He is a member of the IEEE.

**Invited Papers**:

1. **Title: Deep Metric Learning for Video-based Kinship Verification**

**Authors:** Shiwei Wang

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Abstract: In this paper, we propose a structural preserving deep metric learning method for video-based kinship verification. Specifically, we train a deep neural network to learn a set of hierarchical nonlinear transformations to project face pairs into the same latent feature space, under which the distance of each positive pair is reduced and that of each negative pair is enlarged, and the structural information of each video can also be preserved. Experimental results are presented to demonstrate the efficacy of our method.

1. **Title: 3D Two-stream Network with Common-specific Framework for Multi-Modality Action Recognition**

**Authors:** Xiaolei Qin, Liuwei Zhan, Yidan Chen, and Dan Yang

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Abstract: This paper presents a novel end-to-end network with 3D convolution to complete the task of multi-modality action recognition in video. Excepting RGB information, depth information is very helpful to action recognition for it can well express the relationship between body parts, so it is also used as input in our framework. Despite the nature of two modalities is quite different, they have consistent semantic information and extracting the common and specific features is very meaningful for action recognition. Unlike most recent and past works which obtain temporal information by optical flow, our approach utilizes 3D convolution to build the model, extracts temporal information and common-specific feature simultaneously, which enhancement accuracy and reduce quantity of computation. We experiment on two challenge datasets and the results prove efficacy of the proposed method.

1. **Title: An Algorithm of Fast Palmprint Image Mosaic Based on the Binary Tree**

**Authors:** Zhong Qu, Xueming Wei, and Yanfei Chen

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Abstract: To achieve the goal of improving the splicing speed and creating a high-quality palmprint image panorama, a new fast palmprint image mosaic algorithm based on the binary tree is proposed in this paper. The proposed algorithm accelerates the process of feature point extraction and image registration, reduces the distortion of panoramic images, and improves the mosaic quality of panoramic images. Experimental results show that the proposed splicing algorithm speeds up the process of image splicing and greatly reduces the distortion of the panorama after splicing multiple palmprint images. With the increase of stitching sequence and image resolution, the proposed algorithm is more and more excellent in time efficiency and palmprint image panorama quality.

1. **Title: Discriminative Frame Analysis for Human Action Recognition**

**Authors:** Xiaofeng Zhao, Caijie Zhou, Jianyu Yang, and Chunping Liu

**Corresponding Author:** Jianyu Yang ([jyyang@suda.edu.cn](mailto:jyyang@suda.edu.cn) )

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Abstract: Analysis of frame-level information is critical for human action recognition. In this paper, we propose a new approach to extract key frames from RGBD video with discriminative information and exploit it into human action recognition. The main idea is that the common frames exist in different actions have low discrimination while the discriminative frames exist in few actions. Therefore, the common frames have lower contribution for classification, and the discriminative frames have different weight for respective actions. We employ the Gaussian Mixture Model (GMM) to cluster the feature vectors of all frames in all classes of actions, and quantify the discrimination of each frame and its contribution to each action class from the clustering results. The quantification of all the frames in each action is counted for human action recognition. The proposed method is validated on three benchmark human action datasets, and the experimental results show good performances of the proposed method.

1. **Title: Learning Age Progression Patterns for Accurate Age Estimation**

**Authors:** Cunjian Chen, Arun Ross

**Corresponding Author:** Arun Ross [(rossarun@cse.msu.edu](mailto:(rossarun@cse.msu.edu))

**Affiliation:** Department of Computer Science and Engineering, Michigan State University, East Lansing, MI, U.S.A.

**Abstract:** Age progression is regarded as a complex and non-linear transformation for modeling human aging process. In this paper, we propose to utilize the age progression cues to perform the age estimation. First, a generative model is used to learn the mapping relationship between the input and target aging patterns. An auxiliary age predictor is coupled with the discriminator to better discriminate the fake and real images. Then, the intermediate features are extracted from the generative model which are transferred for age estimation purpose. Experiments conducted on Morph and FG-NET datasets show that the proposed method can effectively explore the use of age regression patterns for the task of age estimation.

1. **Title: Hunt for Fashion via Large Scale Soft Biometrics Analysis**

**Authors:** Xiaoyuan Wang, Li Lu, Kurban Ubul

**Corresponding Author:** Li Lu [(luli@scu.edu.cn](mailto:(luli@scu.edu.cn))

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**Abstract:** Fashion analysis has gained increasing attention thanks to its immense potential in fashion industry, precision marketing, and sociological analysis, etc.. While a lot of fashion analysis work has been done for clothing and makeup, few of them address the problem from the perspective of large scale soft biometrics. In this paper, we focus on soft biometric attributes on human faces, particularly lip color and hair color, based on the analysis of which using a large scale data set we aim to reveal the fashion trend of lipstick color and hair color. To this end, we first perform the following steps on each image: face detection, occlusion detection, face parsing, and color feature extraction from the lip and hair regions. We then perform clustering based on the extracted color features on the given large scale data set. In the experiments, we collect from the Internet more than 14,000 occluded face images to train an effective occlusion detector such that noisy face images with occluded mouths/hairs are excluded from the subsequent fashion analysis, and more than 20,000 face images for analyzing the fashion trend of lipstick and hair colors. Our experimental results on the collected large scale data set prove the effectiveness of our proposed method.