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## : GUEST EDITORIAL

**IEEE ACCESS SPECIAL SECTION EDITORIAL:  
EMOTION-AWARE MOBILE COMPUTING**

With the rapid development of smart phones and wireless technology, mobile services and applications in the world are growing rapidly. Advanced mobile computing and communications greatly enhance users' experience by the notion of "carrying small while enjoying large", which have brought a huge impact to all aspects of people's lifestyles in terms of work, social, and economy. Although these advanced techniques have extensively improved users' quality of experience (QoE), it is not adequate to provide affective services without efficient mechanisms of emotion-aware mobile computing, which includes various unique aspects, e.g., mobile data sensing and transmissions; sentiment analysis and emotion recognition; affective interaction. Under the new service paradigm, novel mobile services and innovative applications need to be extensively investigated to gain the great potentials brought by emotion-aware mobile computing.

The progress in this area will be made by applying and extending well-founded formal models and techniques from multiple domains of computer science, such as affective computing, mobile computing, human-computer interactions, etc. Therefore, this Special Section in IEEE ACCESS aims to theme innovative research achievements in the field of related techniques, applications, services, architectures and systems for emotion-aware mobile computing.

This Special Section includes 13 high quality papers contributed by academic and industrial researchers to identify and discuss technical challenges and recent results related to emotion-aware mobile computing. To meet the requirements of emotion-aware mobile computing, more comprehensive data sensing, more efficient data transmission, more effective data mining, affective computing and machine learning, more humanized interaction, new concepts and design approaches are in great need. This topic discusses how to improve mobile users' QoE through emotion-aware mobile computing.

The currently available human-machine interaction systems often support the interaction between human and robot under the line-of-sight (LOS) propagation environment, while most communications in terms of human-to-human and human-to-machine are non-LOS (NLOS). In order to break the limitation of the traditional human-machine interaction system, M. Chen et al., in the invited paper (Emotion communication system), propose the emotion communication system based on NLOS mode, and design a pillow robot speech emotion communication system.

It is a great challenge to encode the color information for Reduced-Reference Image quality assessment (RR-IQA). In the work (Image quality assessment using regularity of color distribution) by F. Li *et al.*, a novel reduced-reference computational model is proposed to measure the difference of the color distribution regularity between the reference image and the distorted one.

Stereo matching is one of the most important and challenging subjects in the field of stereo vision. In the work (Local stereo matching based on support weight with motion flow for dynamic scene) by H. Song *et al.*, a dynamic scene-based local stereo-matching algorithm is proposed, which integrates a cost filter with motion flow of dynamic video sequences. In contrast to the existing local approaches, the proposed algorithm puts forward a new computing model, which fully considers motion information in dynamic video sequences and adds motion flow to calculate suitable support weight for accurately estimating disparity.

Service requests of intra-datacenter networks (intra-DCNs) are different from traffic demands of traditional transport networks. To address the routing and spectrum/IT resource assignment (RSIA) issue, in the work (Virtual-pod-assisted routing and resource assignment in elastic all-optical intra-datacenter networks) by L. Peng *et al.*, an integer linear programming (ILP) model is developed to address the static RSIA problem and efficient heuristic algorithms are proposed to address the dynamic RSIA issues, subject to the intra-DCNs' limited network resources.

On social media, images usually have an incomplete or noisy set of social tags provided by the mobile users. Addressing the issue of social image tagging using practical vocabulary for mobile users on the social media, in the work (Non-linear matrix completion for social image tagging) by X. Xu *et al.*, a novel approach based on non-linear matrix completion (NLMC) is proposed for image tagging task with defective tags.

In the context of Industry 4.0, it is necessary to meet customization manufacturing demands on a timely basis. Based on the related concepts of Industry 4.0, the work (Mobile services for customization manufacturing systems: An example of industry 4.0) by C. Zhang *et al.*, intends to introduce mobile services and cloud computing technology into the intelligent manufacturing environment. The article presents a customization manufacturing system consisting of manufacturing device layer, cloud service system layer, and

mobile service layer, to meet the demands of personalization requests and flexible production mechanisms.

Emotion recognition represents the position and motion of facial muscles. It contributes significantly in many fields. In the work (Facial emotion recognition based on biorthogonal wavelet entropy, fuzzy support vector machine, and stratified cross validation) by Y. Zhang *et al.*, a new emotion recognition system based on facial expression images is proposed. The proposed approach chooses the biorthogonal wavelet entropy and fuzzy multiclass support vector machine. The strict statistical analysis showed the superiority of the method to other three state-of-the-art methods.

Real-time public mood tracking over microblogs becomes necessary for further studies with low-latency requirements. In the work (Real-time public mood tracking of Chinese microblog streams with complex event processing) by D. Jin *et al.*, a hierarchical framework is proposed for public mood time series tracking over Chinese microblog streams using complex event processing, which is able to handle high-speed and high-volume data streams.

Underwater images are degraded due to scattering and absorption, resulting in low contrast and color distortion. Y. Li *et al.* in the work (Underwater image super-resolution by deconvolution and fusion), presented super resolution (SR) method for recovering distorted images in high turbid water of underwater images, and applied the proposed convex fusion rule to recover the final high resolved (HR) image.

The problem of malicious activities in online social networks, such as Sybil attacks and malevolent use of fake identities, can severely affect the social activities in which users engage while online. The work by M. S. Hossain (Sybil defense techniques in online social networks: A survey), provides a comprehensive survey of literature from 2006 to 2016 on Sybil attacks in online social networks and use of social networks as a tool to analyze and prevent these attack types.

Emotional health plays very vital role to improve people's quality of lives, especially for the elderly. Negative emotional states can lead to social or mental health problems. To cope with emotional health problems caused by negative emotions in daily life, M. M. Hassan *et al.*, in the work (Facial expression recognition utilizing local direction-based robust features and deep belief network), propose efficient facial expression recognition system to contribute in emotional healthcare system, where a novel feature extraction method consisting of local directional position pattern (LDPP), principal component analysis (PCA), and generalized discriminant analysis (GDA) has been investigated. The proposed method consists of tolerance against illumination variation and extracts salient features by utilizing prominent directional strengths of the pixels by considering the highest strength directional position and the signs of the strengths.

Emotion-aware mobile applications have been increasing due to their smart features and user acceptability. To realize such an application, an emotion recognition system should be in real time and highly accurate. In the work (An emotion recognition system for mobile applications) by M. S. Hossain *et al.*, a high performance emotion recognition is proposed for mobile applications. In the proposed system, facial video is captured by an embedded camera of a smart phone. Some representative frames are extracted from the video, and a face detection module is applied to extract the face regions in the frames. The Bandlet transform is realized on the face regions, and the resultant subband is divided into non-overlapping blocks. Local binary patterns' histograms are calculated for each block, and then are concatenated over all the blocks. The Kruskal-Wallis feature selection is applied to select the most dominant bins of the concatenated histograms. The dominant bins are then fed into a Gaussian mixture model-based classifier to classify the emotion.

Emotion-aware computing can recognize, interpret, process, and simulate human affects. These programs in this area are compute-intensive applications, so they need to be executed in parallel. In the work (Toward emotion-aware computing: A loop selection approach based on machine learning for speculative multithreading) by S. Li *et al.*, a novel loop selection approach based on machine learning (ML-based) is proposed for selecting the profitable loops and paralleling them on multi-core by speculative multithreading (SpMT). This includes establishing sufficient training examples, building and applying prediction model to select profitable loops for speculative parallelization.

In the end, we would like to thank all the authors who submitted their research work to this Special Section. We also appreciate the contribution of many experts in the field who have participated in the review process and provided constructive suggestions to the authors to improve the contents and presentations of the articles. We would in particular like to thank Professor Michael Pecht, the Editor-in-Chief, and Staff Members, for their support and helpful suggestions during the very delicate stages of concluding the Special Section in IEEE ACCESS.

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