Editorial on Special Topic:
Quality of Experience for Emerging Video Communications

Guest Editor

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As 5G mobile communication is making its powerful progress towards full deployment in the near future, we have witnessed tremendous growth of smart mobile devices capable of various video streaming and sharing services. Mobile video services account for majority of the current Internet and wireless data services. Unlike other type of data services, the quality of video service is primarily governed by the end users who are watching videos on the receiving display terminals. The perception and experience of the end users should be the true criteria to assess the quality of the video services. For emerging video communication services, it is the quality of experience, or QoE in short, of the users that should be the most important measure for systematic design for next generation mobile communications.

To examine the state-of-the-art QoE for video communication and networking, we invited a distinguished group of researchers worldwide to present their most recent researches in this special issue. A wide range of topics related to QoE for video communications, from fundamental techniques in video quality assessment, to quality assessment and measurement strategies, to automating quality of service (QoS) and QoE evaluations, to QoE issues related to visual attention modeling, omnidirectional video, and haptic communications, have all been explored in this special issue. We hope such diverse topics related to QoE for video communications can bring the readers some fresh perspectives about how important the issue of QoE is and how the video communication users are best served with enhanced QoE through innovative design.

This special issue begins with the paper entitled "Recent Advances and Challenges in Video Quality Assessment." This paper gives an up-to-date review of video quality assessment (VQA) research and highlights the challenges to conduct VQA research. Both subjective study and common VQA databases, as well as various objective VQA methods are reviewed. The authors pointed out several challenges in VQA, including the impact of video content, the memory effects, the computational efficiency, and the personalized video quality prediction.

The second paper is entitled "Quality Assessment and Measurement for Internet Video Streaming." The authors point out that conventional video quality assessment methods have been

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designed for broadcasting mode of operations. Emerging Internet - based video services are fundamentally different from broadcasting mode and different assessment strategies must be adopted. Both subjective and objective metrics should be implemented and the measurement may be carried out at client side, server side and in-network to ensure an overall picture of the video service quality.

The third paper entitled "Automating QoS and QoE Evaluation of HTTP Adaptive Streaming Systems" presents a novel strategy of automating QoS and QoE evaluations for the emerging HTTP video streaming systems. For the HTTP streaming systems, the adaptation of video bitrate and possibly even the video resolution makes the assessment of the overall quality much more challenging. This paper presents a flexible and comprehensive framework to conduct objective and subjective evaluations of HAS systems in a fully automated and scalable way. Main features of the proposed approach include end-to-end evaluation of video streaming players deployed in industry, collection and analysis of objective streaming performance metrics, and subjective quality assessment utilizing crowdsourcing for QoE evaluation.

The next paper entitled "Quality of Experience Effects in Video Delivery" discusses the quality-of-experience effects in video delivery eco-system from the source, via complex networks, to the destination. One interesting aspect of this paper is its report on the investigation of the significant differences between the conventional QoS and QoE. Based on the investigation, end-to-end QoE effects have been studied and main conclusions are summarized. In particular, this paper presents the analysis of different types of impacting factors on the overall QoE of the current video communication systems.

The next three papers address service quality issues from different perspectives and for different applications. The first paper in this group is entitled "Visual Attention Modeling in Compressed Domain: From Image Saliency Detection to Video Saliency Detection." This paper explores the visual attention modeling in the compressed domain for both image and video

saliency detection. Saliency regions in compressed image or video play a significant role in the perception of compressed image and video and therefore are closely related to the quality of experience when viewing the received image and video. In particular, this paper introduces fusion strategies to combine spatial and temporal saliency maps to obtain the consistent result for video saliency map.

The second paper in this group entitled "Perceptual Quality Assessment of Omnidirectional Images: Subjective Experiment and Objective Model Evaluation" addresses the quality assessment of one emerging type of media, omnidirectional images and videos. This new class of media provides immersive experience of real-world scenes in virtual reality environments and special evaluation strategies are very much needed. The authors have established the first database of omnidirectional images for the study how such a new type of media data is different from conventional image quality assessment. Some insightful observations have been obtained through this interesting study.

Finally, we present a paper entitled "Quality-of-Experience in Human-in-the-Loop Haptic Communications" that addresses futuristic media application in haptic communication, one of the key use scenarios for 5G. One unique feature of this type of media application is its human-in-the-loop nature which makes the QoE more important than other 5G use scenarios. The QoE for haptic communications can be observed at user level, or at application level, and even at network level. This paper not only provides comprehensive review of the state-of-the-art QoE management strategies in haptic communications, but also shows technical challenges and research opportunities for seamless haptic communications in the future.

The Guest Editors would like to thank the Editorial Office of *ZTE Communications* for their continuous support throughout the submission and review process. The Guest Editors would also like to thank all the authors for accepting our invitation to contribute to this special issue and to the reviewers for their timely and professional review of these papers.