

Editorial: recent advances in communication networks and multimedia technologies

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To successfully support multimedia applications, it is necessary to improve the state-of-the-art multimedia technologies and multimedia transmissions over communication networks in order to provide quality-of-service (QoS) guarantees between end-users and to achieve a high quality-of-experience for end-users. The accepted papers in this special issue deal with a wide range of important aspects and challenging issues of communication networks and multimedia technologies, and the contents are built on analytical modelling, experimental and simulation studies. The contributions of these papers are outlined below.

With the development of wireless access and multimedia compression technologies, much attention has been devoted to wireless video communications. Wan, Xiong and Yang propose an integrated routing metric to evaluate path quality taking the hop count, congestion bottleneck and other parameters of a path into account. They design the traffic assignment and traffic adjustment modules to make the routing scheme flexible to the changing environments, and present an enhanced link layer scheduling algorithm. Simulation results show that compared to commonly used schemes, the proposed network layer scheme always provides better performance with various traffic modes; combined with link layer scheduling algorithm, the performance could be further improved.

High speed and quality multimedia and data transmission requirements exist widely in wireless networks. Wang et al. investigate the performance of opportunistic scheduling in wireless multimedia and data networks based on popular stochastic network calculus (SNC). The authors firstly bound the traffic arrival process using the exponentially bounded burstiness traffic model of SNC and establish a stochastic arrival curve, and then propose a new wireless opportunistic scheduling, i.e., modified proportional fairness (MPF) scheduling algorithm, which can provide better fairness for input traffic to guarantee QoS performance, and obtain a stochastic service curve. The numerical results show that the proposed stochastic model and MPF scheduling algorithm can provide better QoS performance.

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To address the rate-performance-complexity trade-off of multiple-input multiple-output orthogonal-frequency-division multiplexing wireless communication systems, Mao et al. investigate the partial interference cancelation (PIC) group decoding for the space-frequency/space-time-frequency (SF/STF) codes to help achieve full diversity when signals are transmitted and processed by a linear receiver in a frequency-selective environment. They derive a design criterion for the SF/STF codes to achieve full diversity with the PIC decoding in terms of the pair-wise error probability (PEP) performance. Simulation results demonstrate that the proposed SF/STF codes perform well in terms of the PEP performance as well as the decoding complexity when the PIC group decoding is applied at the receiver.

Solid State Drives (SSD), which are based on NAND Flash technology, offer fast random-access disk I/O and therefore appear to fit well with the environment of cloud computing, especially for the clouds providing video streaming services. However, by investigating a practical virtual desktop system under video streaming workloads, Li et al. find that importing these kinds of SSDs into a virtualized system is not as simple as merely a mechanical replacement. The authors investigate and analyze these problems based on a practical virtual desktop system, and propose a tailor-made method to relieve the problem. By evaluating realistic user workloads and several typical benchmarks, the results show that the proposed method can effectively alleviate these problems in the virtualized SSD system.

The observed data vectors of many real-world applications such as multimedia data management, face image recognition and information retrieval often lie in high-dimensional space. Feature extraction is a preliminary and important technique used to extract the most useful low-dimensional features from these data, and it can help accomplish the task of classification and visualization at low computational cost. Recently, locality sensitive discriminant analysis (LSDA) has been proposed as an efficient feature extraction approach. Yi et al. present an improved LSDA (ILSDA), by integrating the intra-class scatter matrix into the algorithm, to preserve the local discriminant neighbourhood structure of the data and pull the outlier samples closer to the center of the class. Extensive experimental results on several publicly available image datasets show the feasibility and effectiveness of ILSDA.

With the rapid development of multimedia and Internet technology, there is an exponentially increasing amount of image data. Automatic image scene detection is a crucial step for various tasks in multimedia applications. Xie et al. present a novel and efficient scene detection method based on local invariant features. Experimental results show that the proposed method can achieve accurate and robust scene detection results with reduced computational complexity, by using a radial basis kernel function to construct classifiers and extract features, to select the top n key points.

Kernel sparse representation-based classifier (KSRC) is well-known to have good representation and classification performance on face image data. Zhang, Zhou and Li develop the KSRC ensemble (KSRCe) which does not need to consider the effect of random projection and kernel Gram matrix on KSRC. Experimental results on three face datasets show that KSRCe is very promising and outperforms the existing schemes: sparse representation-based classifier (SRC), sparse representation-based classifier ensemble (SRCE) and KSRC.

Parameterization technique has had an important role in the computer graphics community for decades. As a natural extension of surface parameterization, volumetric parameterization is becoming more and more popular and exhibiting great advantages in several applications such as medical image analysis, hexahedral meshing etc. Lin et al. present an efficient volume parameterization algorithm based on harmonic 1-form. The simulation results demonstrate the power of the technique by introducing a new application to transfer the interior structure during the morphing of two given shapes.

The Web has shifted towards Web 2.0 services, e.g., blogs, social networking sites (SNS), and online video-sharing platforms. SNS has become popular with online users mainly because SNS is based on user-generated contents and possesses powerful functions to help users to interact with their families, friends, and even strangers on the Internet. Jang, Chang and Chen investigate customers' acceptance toward SNS sites built by retailers for promoting their products and services, and evaluate how SNS can be integrated into multi-channel retailing strategies to help click-and-mortar retailing stores achieve their goals of enhancing their sales and marketing performance in today's fast-changing and highly competitive business environment.

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