Real-time multimedia computing

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Published online: 13 April 2013

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1 Introduction

This special issue provides an opportunity for academic and industry professionals to discuss the latest issues and progress in the area of RTMC (real-time multimedia computing). In addition, the special issue publishes high quality papers which are closely related to the various theories and practical applications in RTMC. Furthermore, we expect that its publications will be a trigger for further related research and technology improvements in this important subject. This RTMC represents an interdisciplinary field with roots in Multimedia Computing and Real-time systems with application in computing environments including multimedia and game technology, multimedia visualization, and other applications. It aims to solve the various problems of advanced embedded systems and software processing using RTMC.

This special issue is intended to bring together diversity of international researchers, experts and practitioners who are currently working in the area of multimedia computing and multimedia applications. This special issue is a collection of original papers that cover a wide range of topics from embedded systems and multimedia software engineering. As a whole, this special issue contains a diverse collection of high-quality papers authored by eminent researchers in the field. There were total 18 submissions from several countries

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around the world and through a rigorous peer-review process, only 7 submissions got final acceptance for the publication.

2 Related works

The first paper by Um et al. [7] investigates a dynamic resource control mechanism to efficiently deliver NGN multimedia services while supporting quality of service (QoS) requirements and bandwidth flexibility in next generation networks (NGN). The proposed resource control aims to realize the dynamic and automatic setup and release of multimedia resource sessions across heterogeneous transport networks including IP, SONET/SDH, and WDM technologies. It can also provide not only low cost operations but also flexibility for multimedia resource control.

The second paper by Chilamkurti et al. [2] presents a Delay-sensitive Multipath Forward Error Correction (DM-FEC) mechanism involving an estimation of available bandwidth and a mathematical analytical model with which the appropriate transmission rate, the FEC block length, and the FEC redundancy on each path in a multipath environment can be determined to solve previous problems. The DM-FEC mechanism not only selects the appropriate transmission rate and FEC redundancy on each path but also adaptively adjusts the FEC block length and concurrently sends data over multiple paths to overcome burst packet losses which otherwise can cause the video frame to be unplayable and impede the timely recovery of video information.

The third paper by Seo et al. [6] presents an interactive painterly rendering with artistic error correction. An artist's painting is affected by factors, such as how he observes objects, his skill in using a brush and materials, and the experience that allows him to correctly apply the skills. The process inevitably results in mistakes contrary to the painter's original intention. This is a distinguishing factor between painting and photography, but this is the essence of the beauty of painting. The inadequacy of a human being to make a painting exactly as he pleases (as a photograph creates a direct representation of itself) is the starting point of creating a creative work. This paper explains the algorithm that reproduces human errors, as well as the stroke data collection method. Although the results of this research are mainly stylized renderings of modern oil paintings, they have unlimited scalability, in that they can play the role to perform a basic framework. These allow the experimentation with many painting styles through the modification of input data and error generation algorithms.

The fourth paper by Cheng et al. [1] focuses on the channel assignment problem for links in the mesh networks and aims at minimizing the overall network interference. The problem is proved to be NP-hard. The paper has first formulated an approach based on the Particle Swarm Optimization (PSO) algorithm, which can be used to find the approximate optimized solution in small-size networks and as a baseline that other algorithms can be compared with. It has also presented a centralized heuristic as well as a distributed heuristic algorithm for the channel assignment problem. Extensive simulation results have demonstrated that the proposed schemes perform well in both dense and sparse networks compared with related works.

The next paper by Rho et al. [5] presents a new scheme for a situation-aware/user-adaptive music recommendation service in the semantic web environment. They first discuss utilizing knowledge for analyzing and retrieving music contents semantically, and a user adaptive music recommendation scheme based on semantic web technologies that facilitates the development of domain knowledge and a rule set. Based on this discussion, they describe a Context-based Music Recommendation (COMUS) ontology for modeling the user's musical preferences and

contexts, and supporting reasoning about the user's desired emotions and preferences. Basically, COMUS defines an upper music ontology that captures concepts on the general properties of music such as titles, artists and genres. In addition, it provides functionality for adding domain-specific ontologies, such as music features, moods and situations, in a hierarchical manner, for extensibility. Using this context ontology, they believe that logical reasoning rules can be inferred based on high-level (implicit) knowledge such as situations from low-level (explicit) knowledge. As an innovation, their ontology can express detailed and complicated relations among music clips, moods and situations, which enable users to find appropriate music. They present experimental results for music recommendation.

The sixth paper by Kim et al. [3] presents a new authentication protocol to authenticate IPTV users. The proposed protocol is based on RFID (Radio-Frequency Identification) and USIM (Universal Subscriber Identity Module) technologies. In the proposed protocol, USIM performs highly personalized authentication, and the authenticated subscriber's RFID tags can have a temporary authority to execute authentication. These RFID tags become Agent Tags authorized to authenticate subscribers. Agent Tags identify and authenticate themselves to RFID readers in the set-top box, thereby simplifying the authentication process.

The last paper by Li and Zhong [4] presents a brand-new motion characteristic differentiated error concealment (MDEC) method based on motion field transfer. Firstly, the FMO checker-board pattern is used at the encoder, so as to prevent MBs of a large area getting lost. Then at the decoder, Greedy Spread Motion Region Extraction (GSMRE) method is used to distinguish low-motion regions from high-motion regions in each frame based on different motion characteristics, and apply different strategies to recover regions with different characteristics, respectively. Simulation results show that the proposed algorithm reconstructs the lost frame with both a better visual quality and a higher PSNR, compared to other error concealment methods, including Joint Model, boundary matching, inpainting, and block motion vector extrapolation.

3 Conclusions

We would like to express thanks to all the people who have contributed their time and efforts in making this special issue a success. We would like to specially thank the Editor-in-Chief, Prof. Borko Furht, for his encouragement and strong support during the preparation of this special issue.

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