Special Issue on Emerging Technologies

Guest Editorial

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Research in emerging technologies involves collaborative and co-operative research from many areas and perspectives in computer science and information systems research. This special issue tries to provide a snapshot of leading-edge research in the field of multimedia systems. For this purpose, we have invited a number of prominent and well-respected multimedia figures to contribute papers for this special issue, as well as soliciting papers from the general multimedia research community. The response was overwhelming and all of the work submitted was of a high standard, but, unfortunately, as is the case with Special Issues, we just did not have space for everyone whose work was worthy of the audience. This Special Issue comprises thirteen papers, six of which were invited.

Wirag and Rothermel's paper discusses the importance of multimedia documents in a wide range of application areas, such as education, training, advertising and entertainment. Since multimedia documents may comprise continuous media, such as audio and video, the presentation of those documents may require a significant amount of processing and network resources. The amount of resources available during a presentation depends on the system configuration and the current system load. Hence, it can happen that there are not enough resources to render a multimedia document according to the specification, resulting in a reduced presentation quality, if the presentation is possible at all. To cope with those situations, different versions of the same document can be specified, one for each potential configuration or probable load situation. A better approach is to have only one document that can be adapted to different system configurations and load conditions. To enable this approach, multimedia documents have to be specified flexibly so that different presentations can be compiled depending on the resource situation. In this paper, the authors analyse the adaptivity of multimedia documents and investigate to what extent existing document models support this type of adaptivity.

Furht, Westwater and Ice present several techniques for broadcasting multimedia data (audio and video) over the Internet. Internet broadcasting (Webcasting) techniques have become very important in applications such as Internet (or Web) radio and television, real-time broadcasting of critical data (such as stock prices), distance learning, video conferencing, and many others. The authors describe the current Internet broadcasting techniques including IP Unicast and IP Multicast, and introduce a new technique IP Simulcast. The IP Simulcast approach is based on the hierarchical, binary structure of receivers, which at the same time become data senders or repeaters.

Gemmell and Schooler have developed a scalable and reliable multicast architecture for delivering one-to-many tele-presentations. Whereas the transport for interactive real-time audio and video is concerned with timely delivery, other media, such as slides, images and animations require reliability. Gemmell and Schooler propose to support reliability by combining multicast with forward error correction (FEC), as well as additional techniques depending on the nature of the data. Two related but distinct protocols are used for dynamic and persistent session data. For dynamic session data, the authors use erasure-correcting scalable reliable multicast (ECSRM), an enhanced version of SRM by Floyd et al. that is based on NACK suppression, but improves scalability and rate control. Session-persistent data is delivered using Fcast, a protocol that combines FEC and data carouseling with no back-channel from receiver to sender. The presented approach is scalable to large heterogeneous receiver sets, and supports late-joining receivers. The authors have

implemented that approach in a layered, multicast version of Microsoft PowerPoint, the graphical slide presentation tool.

Dustdar's paper discusses critical issues in communication and collaboration using desktop video conferencing tools. He suggests to video conferencing software builders a number of actual software mechanisms that could implement culturally-aware floor control policies. Finally, he presents some guidelines for conduct to people who will be involved in desktop video conferences as participants.

Angelides also considers video conferencing, this time presenting a framework for examining desktop video conferencing within organisations. The framework is used to consider the milestones for implementation, maintenance, and use of these emerging multimedia systems.

Ahanger and Little propose a grammar and associated production constraints necessary to facilitate automatic video composition in the news domain. The grammar encompasses composition based on content as well as structure of a newscast as necessary to facilitate retrieval and composition. The authors demonstrate how the language assists automatic information manipulation and composition of a newscast, specifically when data are required from various sources and delivered under limited esources.

The paper by *Agius* surveys semantic content-based multimedia models hat seek to capture the semantic content of audio-visual information within a multimedia information system.

Complementary to this is the paper by *Tong*, which discusses how to develop a multimedia-based intelligent tutoring system and the requirements for semantic content-based modelling therein. The paper is a purposeful illustration of the integration of the intelligent tutoring architecture within a multimedia learning environment for teaching young children basic zoology.

In a similar fashion, *Matravers* investigates the use of multimedia interfaces for educational systems. She analyses the factors of usability and explores communications issues in current interface technologies, arguing that, on the basis of those factors, multimedia represent the most suitable interface for educational systems.

Inman presents another multimedia-based system for learning, one for teaching written Japanese. The system stems from an initiative by the Japanese Education Ministry to improve Japan's international standing.

Vella and Vella continue the educational sub-theme, by questioning whether tele-learning has now come of age, or is simply a myth in search of a reality. They illustrate their discussion with reference to Cyclops, an early remote learning system developed and used by the Open University in the UK.

Duan, Burrell, and Heinanen present an intelligent multimedia interview system based on the expert systems paradigm. The system is used for psychological assessment. Through the discussion pertaining to the system's architecture, the authors discuss the issues associated with the integration of multimedia with expert systems.

Finally, *Whitley and Scothern* have undertaken an empirical investigation of mediated and face-to-face communication for creating and maintaining obligations with emerging technologies. Their paper describes the study they undertook, which is based on the concept of speech acts in communication and the resulting sense of obligation. They reflect on the differences between face-to-face interaction and electronic communication.

It is our great regret that all of these papers could not appear within this issue of the journal. Due to page constraints the articles by Tong, Inman and Duan, Burrell and Heinanen will appear in a future issue of CIT.

We would like to extend our thanks to all our contributors and all those who submitted papers. Special thanks go to the Editors of the Journal and the support staff in the Editorial Offices. We trust you will find this Special Issue as interesting to read as it was to prepare!

London & Linz, 30 June 1998