
Preface

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Biographical notes: Qun Jin is a Professor of Networked Information Systems in the Department of Human Informatics and Cognitive Sciences, Faculty of Human Sciences, Waseda University, Japan. He has been engaged extensively in research works on Computer Science, Information Systems, and Social and Human Informatics. His recent research interests include human information behaviour, sustainable information environments, human-centric U-services (universal/ubiquitous services), human-computer interaction, and computing for well-being. He seeks to exploit the rich interdependence between theory and practice in his works with interdisciplinary and integrated approaches. He is a member of ACM and IEEE. See www.f.waseda.jp/jin/ for additional information.

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Qing Li is a Professor at the Department of Computer Science, City University of Hong Kong. Concurrently, he is a Guest Professor of the University of Science and Technology of China (USTC) and Zhong Shan (Sun Yat-Sen) University, and a Guest Professor (Software Technology) of the Zhejiang University (Hangzhou, China). His current research interests include object modelling, multimedia databases, web services and e-learning. He has edited many books and published over 280 technical papers and book chapters in these areas. In addition, he has been serving as an organiser/co-organiser of numerous international conferences. He is an Associate Editor of the ACM Transactions on Internet Technology, World Wide Web (Springer), and the IEEE Transactions on Knowledge and Data Engineering. He is the current chairperson of the Hong Kong Web Society, and serves as a councillor of the Database Society of Chinese Computer Federation, a councillor of the Computer Animation and Digital Entertainment Chapter of Chinese Computer Imaging and Graphics Society; in addition, he is in the Steering Committees of DASFAA, ICWL, WAIM, and the international WISE Society.

Multimedia technologies have been broadening software applications. With the growing popularity of wired and wireless internet, mobile multi-media network systems and applications are changing our daily lives and social activities. Research contributions to solve communication, compression, synchronisation, and other difficulties in

distributed multi-media systems make multi-media network applications possible. Yet, it is becoming increasingly important to develop useful and attractive applications, such as multi-media web services, collaborative systems, mobile e-learning, and online community tools.

The 11 papers included in this special issue have been selected through two rounds of peer reviews from 40 submitted papers. The special issue focuses on addressing innovative mobile multimedia network technologies, and development of advanced mobile multimedia systems and applications.

The first paper in this special issue, entitled 'Important scene analysis model using result importance and situation importance' is presented by T. Hashimoto et al. Their work focuses on a new model for services that distribute multimedia information (for example, extracting and delivering important scenes to cellular phones for a sports live that undergoes situational changes). In this context, this paper takes the approach that scene changes in sports games can be presented as state transitions, and devises an important scene analysis model using both result importance and situation importance, in which result importance represents each situation's actual result importance in a game progress, while situation importance represents the degree of a chance at the start of each situation. Analysing scenes where an important result is achieved and scenes that are likely to bring good results, it becomes possible to dynamically judge the importance of a scene whether the actual results are good or not, thus increasing the accuracy and effectiveness of scene extraction. Based on this model, a commercial professional baseball information distribution system has been constructed. The system features not only digest distribution of a game result but also a function that distributes situations that are likely to become interesting. Experimental results show that the proposed approach can extract important scenes and is very promising.

In 'Anonymous communication protocol for sensor networks' by A. Durresi et al., the authors present a novel anonymous communication protocol that hides the location of nodes and obscures the correlation between event zones and data flow from snooping adversaries. As we know, ensuring anonymity in sensor networks is a major security goal. Using traffic analysis, the attacker can compromise the network functionality by correlating data flow patterns to event locations/active areas. In this paper, they divide the network into rings and use the concept of tokens and rings to achieve anonymity. Routes are chosen and frames are scheduled to traverse these routes. Each frame is assigned a token and a node can send a message through a frame only if the token is free. In this way, the proposed protocol can prevent traffic analysis from revealing a node's information, including its location. The anonymity strength of the protocol is quantified by introducing a new anonymity metric: Degree of Exposure Index. In addition, this paper presents the tradeoffs between the overhead imposed and ring sizes, and shows that higher anonymity comes at a cost – either higher communication/energy overhead or at higher latency.

The third paper is entitled 'Heterogeneous clock group protocol for causally ordered delivery of messages' and is written by S. Kawanami et al. The authors propose a new protocol for efficient message delivery in peer processes.

The problem is that the vector clock widely used in traditional group protocols is not scalable to a large group due to communication and computation overheads. In order to reduce the overheads, the authors introduce a hierarchical grouping mechanism. Processes in each sub-group are interconnected in the local or personal area network. Sub-groups are then interconnected in the wide-area network. Processes in local sub-groups are synchronised by physical and linear clocks while processes in the wide-area network are synchronised by the vector clock. How to causally deliver messages by using local synchronisation mechanisms of each sub-group is also discussed in the paper. Even if messages are causally ordered in a sub-group, the messages can be causally concurrent. The protocol is compared with the protocol of the vector clock by evaluating the number of ordered messages.

In the fourth paper entitled 'An adaptive ARQ timeout approach for audio streaming over Bluetooth', L.-J. Chen et al. show a new mechanism for audio streaming under the Bluetooth environment. Streaming audio is a very popular form of media on the Internet. As wireless personal area networks are now targeted to support multimedia traffic, streaming audio over these networks will give rise to interesting applications. In this paper the authors focus on the solution in a Bluetooth environment and propose an enhancement to the Bluetooth link layer ARQ mechanism to compensate for channel degradation in order to better support audio streaming. Specifically, the scheme adaptively sets the ARQ timeout value based on current channel conditions. It is shown through simulation and test bed experiments that the adaptive ARQ improves the streaming quality significantly compared to the 'vanilla' link layer of Bluetooth, especially in a noisy environment. The proposed approach is simple to implement and can actually be extended to the link layer of any wireless technologies.

The fifth paper, co-authored by T.M. Ng and H.K. Garg, is entitled 'A maximum a-posteriori identification criterion for wavelet domain watermarking'. In this paper, the authors proposed a maximum a-posteriori probability (MAP) detector in the discrete wavelet transform domain. It is based on modelling the wavelet coefficients by a generalised Gaussian distribution. A detector based on MAP criterion has been introduced for identifying image watermark in the discrete cosine transform domain. This type of detector has been shown to be optimum and robust to common image processing operations.

The sixth paper entitled 'Hierarchical network architecture for layered video streaming' is authored by W.-F. Poon et al. The authors investigate the performance of a hierarchical on-demand video streaming system using layered videos in a heterogeneous network environment. To efficiently utilise the limited capacity in a proxy server, a new proxy replacement algorithm called Simple Count (SC) is developed. The proposed SC algorithm aims at maintaining the most popular video layers at the proxy by using a newly defined popularity measure that can

accurately keep track of the change of video access pattern. Simulation results show that the SC method performs better than some existing methods in a dynamic network environment. An analytical model is also developed to further investigate the performance of the system in terms of blocking probability. Using layered videos, it is shown that more number of customers can be supported by the system but some of them may receive videos with a quality lower than what they originally request.

In the seventh paper entitled 'Duplex narrowcasting operations for multipresent groupware avatars on mobile devices', M. Cohen et al. explored interactive multi-media, especially for virtual and mixed reality groupware systems. They showed that the apparent paradoxes of multi-presence, having avatars in multiple places or spaces simultaneously, are resolvable by an 'autofocus' feature, which uses reciprocity, logical exchangeability of source and sink, to project overlaid sound-scapes and simulate precedence effect to consolidate the audio display. An interface for narrowcasting (selection) functions is developed for a networked mobile device deployed in a collaborative virtual environment (cve). Featuring a variable number of icons in a '2.5d' application, the interface can be used to control motion, sensitivity, and audibility of avatars in a teleconference or chatspace. The interface is integrated with other (cve) clients through a 'servent' (server/client hybrid) http→tcp/ip gateway, and interoperates with a heterogeneous groupware suite to interact with other clients, including stereographic panoramic browsers and spatial audio backends and speaker arrays.

The eighth paper entitled 'A mobile intelligent negotiation agent embedded and hybrid architecture based online purchasing system' is co-authored by R. Huang, T. Yamazaki and J. Ma. The authors proposed a *mobile intelligent negotiation agent embedded and hybrid architecture based online purchasing system (MineAgeHops)* with three emphases: agent mobility, intelligent negotiation, and hybrid architecture. Like in the physical world, a buyer agent can travel over the internet to a remote e-shop for obtaining information about a product and negotiating on the product with a seller. As human negotiation is a complex process, their evolutionary negotiation model makes an effort to reflect different negotiation levels of human with increasing knowledge and experience as time goes. It is shown that a hybrid of centralised and decentralised architecture can overcome the network bottleneck problem as well as improve purchasing efficiency by enabling agent mobility and flexibility.

In the ninth paper which is entitled 'Content-based scene segmentation scheme for efficient multimedia information retrieval', S. Rho and E. Hwang address the problem of parsing audio-visual data for content-based multi-media information retrieval, and propose a novel scheme for determining video scenes by analysing both audio and video data. While current approaches for segmenting or classifying audiovisual data are mostly focused on visual information, audio information can also

play an important role in the content parsing for many applications. In the scheme proposed by the authors, audio segments are automatically classified into six categories based on its acoustic features. To show its effectiveness, they have implemented a prototype system and performed several preliminary experiments.

The tenth paper 'Performance evaluation of selective-border-casting zone routing protocol for ad-hoc networks' is presented by L. Barolli et al. Many routing protocols for ad-hoc networks have been proposed lately. The performance of the proposed protocols depends on the networks scale and the topology change. One of the well-known routing protocols for ad-hoc networks is the Zone Routing Protocol (ZRP). The performance of ZRP is better than other protocols. However, many useless control packets are sent in the network, which increases the network load and degrades the network performance. In this paper, the Selective Bordercasting Zone Routing Protocol (SBZRP) is proposed to reduce the network load by limiting the number of control packets when the protocol searches for a new route. The evaluation via simulations shows that SBZRP has a better performance than ZRP.

The last paper by R. Risueño et al. is entitled 'On the effect of handover mechanisms on the performance of video communications in WATM networks'. A large number of handover mechanisms for wireless ATM networks (WATM) have been reported in the literature. In this paper, the authors carry out a comprehensive QoS performance study of the handover mechanisms in the literature and a performance evaluation of various buffer management schemes used to compensate for service disruption caused during the handover phase. A detailed simulation model is developed, allowing the users to set up parameters such as the speed and the motion path of the mobile terminal. The performance metrics of interest are the overall response time of the handover mechanism, the length of the disruption time caused by the handover mechanism, and the number of lost packets caused by the handover mechanism. In the simulation, MPEG-2 video sources are used for the evaluation. The video is encoded using a layered coding scheme. Under the scenario, the handover using the multicasting mechanism and the push-out buffer management mechanism exhibit the best results.

Taking this opportunity, we would like to thank all the authors who have contributed their papers to the MNSA2004 Workshop and this special issue, all the referees who have been involved in the review process for the workshop and this special issue as well. Our special thanks go to MNSA2004 General Co-Chairs, Professor Jianhua Ma of Hosei University, Japan, and Professor Yoshitaka Shibata of Iwate Prefectural University, Japan, members of the Steering Committee, Professor Timothy K. Shih of Tamkang University, Taiwan, and Professor Makoto Takizawa of Tokyo Denki University, Japan, all the members of the Program Committee for their dedication in organising the workshop. Our thanks also

go to Dr. Tomoya Enokido of Tokyo Denki University, Japan, and members of Professor Makoto Takizawa's lab for their great efforts and support in the review process of the workshop and this special issue. Finally, we would like

to thank the Editor-in-Chief of the *International Journal of Wireless and Mobile Computing (IJWMC)*, Professor Laurence T. Yang to give us the opportunity to publish this special issue.