

Preface

As technology plays an ever increasing role in business and education, multimedia applications are becoming ever more popular. They make Web sites more interesting, presentations more impressive, and software more useable. However, understanding how to effectively design multimedia applications, utilize information with these applications and maintain them so they are able to keep up with other technological advances can prove to be a difficult challenge. In order to best use and develop these emerging technologies, academicians, practitioners and researchers must have access to the most current findings in multimedia practice and theory. The chapters in this book, all written by experts in the field of multimedia technologies, describe best practices and theories related to this emerging field. The chapters of this book cover a wide range of topics from how to manage multimedia content and the design of associated retrieval systems to multimedia applications in education. This book can be used as a valuable resource for all those who want to improve their computing experience through the use or design of multimedia technologies.

Chapter 1 entitled, “Media Content Management” by Nevenka Dimitrova of Phillips Research, Yong Rui of Microsoft Research and Ishwar Sethi of Oakland University (USA) surveys the techniques that employ methods of data management beyond traditional databases. The chapter discusses existing research prototypes and some commercially available systems. The systems described enable applications that facilitate effective access, interaction, browsing and display of complex and heterogeneous information consisting of images, video and audio.

Chapter 2 entitled, “Design and Evaluation of a Content-Based Image Retrieval System” by David Squire of Monash University-Melbourne (Australia), Henning Muller, Wolfgang Muller, Stephane Marchand-Maillet and Theirry Pun of the University of Geneva (Switzerland) investigates the use of a query-by-example paradigm as a base paradigm for the development of a content-based image retrieval system. The chapter evaluates the capabilities of the most up-to-date computer vision techniques in contributing to the realization of such a system. The authors further show that the amount of data involved in the process of describing image content should be considered as an important issue. The chapter also offers a practical example of the concepts discussed.

Chapter 3 entitled, “A Multimedia Document Retrieval System Supporting Structure- and Content-Based Retrieval” by Jae-Woo Chang and Du-Seok Jin of Chonbuk National University (Korea) explores the design of index structures to

support structure-based retrieval. The chapter then implements those structures by using the o2store storage system. The authors implement high-dimensional index structure for color and shape features based on X-tree. Finally, the authors do a performance evaluation of their multimedia document retrieval system in terms of system efficiency and system effectiveness.

Chapter 4 entitled, “Semantic Content-Based Retrieval for Video Documents” by Lilac Al-Safadi (Saudi Arabia) and Janusz Getta of the University of Wollongong (Australia) studies the development of a content-based retrieval system for video documents based on their semantic content. The chapter develops a video semantic model based on the story-line structure of video, which encompasses objects, activity, events and story. The chapter proposes architecture for a computer-aided analyzer, which plays a central role in the semantic indexing of video documents. The chapter presents a conceptual model for both video semantic representation and acquisition.

Chapter 5 entitled, “Educational Multimedia and Teacher Competencies” by Claus Witfelt of the Danish University of Education (Denmark) establishes a multimedia didactic for compulsory school. The chapter reviews findings from the European PEdACTICE project, which deals with these issues. The chapter focuses on describing central teachers’ competencies, related to the use of educational multimedia in a compulsory school.

Chapter 6 entitled, “Cognition Research Basis for Instructional Multimedia” by Juhani E. Tuovinen of Monash University (Australia) describes the structure of human cognitive architecture from an information processing perspective and introduces the cognitive load theory. The chapter suggests a theoretical foundation for multimedia instruction and describes a number of practical implications for educational multimedia, planning, design and use from current literature.

Chapter 7 entitled, “Cheap Production of Multimedia Programs” by Pavel Slavik, Marek Kulvejt, David Hromas and Josef Novak of the Czech Technical University (Czech Republic) presents two systems that allow the creation of interactive multimedia programs, both in a CD-ROM environment and in a network environment. The multimedia programs described were created from already existing videotapes that were digitized and enhanced with interactive features.

Chapter 8 entitled, “Multimedia Copyright Protection” by Josef Pieprzyk of Macquarie University (Australia) discusses the basic tools for copyright protection and the general concepts and vocabulary used in copyright protection. The authors then present the taxonomy, fingerprinting and watermarking techniques. Specifically, the chapter illustrates the generic watermarking schema with three specific examples: collision-free watermarking, spread spectrum watermarking and software fingerprinting.

Chapter 9 entitled, “Software Reuse in Hypermedia Applications” by Mario Boichichio and Roberto Paiano of the University of Lecce (Italy) presents two applications built around a run-time engine and based on the need for hypermedia software to be flexible and powerful, to support naïve users. The authors discuss the requirements for such applications and the circumstances that lead to their development

and design. Specifically, they look at how these applications must be inexpensive with respect to content, content independent and application independent.

Chapter 10 entitled, “A Flexible Framework for the Knowledge-Based Generation of Multimedia Presentations” by Katja Reinhardt and Heidrun Schumann of the University of Rostock and Bodo Urban of Fraunhofer Institute of Computer Graphics presents an approach for the knowledge-based multimedia presentation generation. The authors introduce an approach for modeling information and its characteristics and describe how these characteristics can be used for presentation generation. Finally, the authors describe a multimedia information system based on these principles.

Chapter 11 entitled, “Remote Control Videoconferencing” by Marcia Perry and Deborah Agarwal of the Ernest Orlando Lawrence Berkeley National Laboratory (USA) discusses the design, implementation and deployment of a camera control system (devserv and camclnt) and a conference controller (confcntl) that provide remote control capabilities for videoconferencing over the Internet. The chapter illustrates how the remote control capabilities offered by these tools have changed the videoconferencing paradigm to one of telepresence.

Chapter 12 entitled, “A Collaborative Design-by-Sketching Conceptual Design Tool for Multimedia Application Development” by K.-Y. R. Li, T. Ong and R.J. Willis of Monash University (Australia) presents a computer assisted design-by-sketching tool to help with the conceptual design of multimedia applications. The tool helps sponsors to define their requirements incrementally and the design team to prototype their ideas interactively and collaboratively. The tool also enables the reusability of the designed components in future projects and the maintainability of the application that has been developed.

Chapter 13 entitled, “Principles for Supporting and Enhancing User Navigation of Digital Video in Video Browsers” by Harry Agius of Brunel University (United Kingdom) applies a general framework for navigation proposed by Spence and considers existing proposals for video browsers made within the recent literature. The authors then use this analysis to derive a number of principles that reflect the requirements for supporting and enhancing the user in the digital video navigation task.

Chapter 14 entitled, “A Linguistically Sortable Bengali Coding System and Its Application in Spell Checking: A Case Study of Multilingual Applications” by M. Manzur Murshed of Monash University (Australia), Mahbubur Rahman Syed of Minnesota State University (USA), and M. Kaykobad of Bangladesh University of Engineering and Technology (Bangladesh) presents the basic properties of Bengali script and some results and algorithms on sorting Bengali texts in linguistic order. The chapter then discusses various issues of developing an efficient primary coding scheme independent spell checking application based on the authors’ solution to linguistically sorting Bengali texts.

Chapter 15 entitled, “Design of a CBIR System Supporting High Level Concepts” by M.V. Ramakrishna of Monash University, S. Nepal, S. Sumanasekara and S.M.M. Tahaghoghi of RMIT University (Australia) describes the design of the

CHITRA CBIR system developed at RMIT and Monash Universities. The system uses a four-level data model and supports definition querying of high-level concepts such as MOUNTAIN and SUNSET. These advanced capabilities are supported by a powerful graphical query mechanism and a high-dimensional indexing structure based on linear mapping.

Chapter 16 entitled, “A New Encryption Algorithm for High Throughput Multimedia” by Xun Yi, Chik How Tan and Chee Keong Siew of Nanyang Technological University (Singapore) and Mahbubur Rahman Syed of Minnesota State University proposes a fast encryption algorithm for high throughput multimedia data, called FEA-M, which is based on Boolean matrix theory. The plaintext and ciphertext are 64 x 64 Boolean matrices while the secret key is also a 64 x 64 matrix. The structure of FEA-M is chosen to provide confusion and diffusion and to facilitate both hardware and software implementation.

Chapter 17 entitled, “Video Performance in Java” by Mark Claypool, Tom Coates, Shawn Hooley, Eric Shea and Chris Spellacy of Worcester Polytechnic University (USA) presents experiments that measure the multimedia performance of MPEG-1 client in Java. The authors report that Just-In-Time compilation, local media access and processor type significantly affect multimedia performance, while the choice of operating system, Java virtual machine and garbage collection have a negligible effect on multimedia performance.

The chapters in this new book represent a spectrum of applications of multimedia technologies in education, software development, Web page design and business presentations. The effective use of multimedia technology requires efficient retrieval systems and use of tools and applications. From the complex theoretical and mathematical tools needed to design multimedia information systems to the practical applications of these systems in education and business, this book has the most up-to-date research and practice in the field of multimedia technologies. It is a must read for researchers and academics who want to understand the complexities of multimedia systems and for the student and practitioner who want to understand how to more effectively utilize these systems.

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