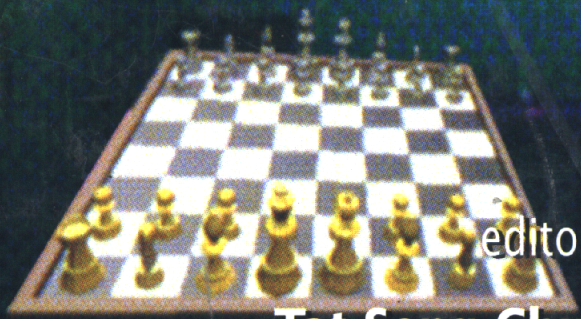
MULTIMEDIA MODELING

Towards Information Superhighway



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Preface

Effective human face-to-face communication uses a variety of senses, including aural, visual, mental abstraction, touch and feels. Our model of the world is also multi-sensory. Our interaction with our environment often involves recalling, relating and understanding information of multiple medium types and senses. Computers were originally designed to process only alpha-numeric data, which covers a small aspect of human communication system. Over the years, the computers were improved to work with graphics, image and, more recently, audio and video. Virtual reality added touch and feels to the human-computer interface. The process of integrating multiple senses and media into computer systems accelerated recently, following the development of higher resolution graphics adapters, faster processors, high-speed networks, large capacity storage devices, and better multimedia information processing techniques. These developments lead to the emergence of interactive multimedia systems that encompass the fields of computing, telecommunication and broadcasting. This has broaden the applications of multimedia from the traditional areas of information organization, presentation and learning, to the new fields of simulation and virtual reality. Applications that have benefited from the introduction of multimedia include: training, demonstration of products for sales or inventory, education, computer-aided design and engineering, medicine, weather, and entertainment.

The term "multimedia" is used to denote the integration of information of multiple medium types, including text, image, graphics, video and audio. Up until now, multimedia technology has been focused on processing the "atoms" (or "forms") of the media, rather than their semantic contents. Most such systems emphasize on the presentation, transmission, storage and processing of raw multimedia data, where everything is converted into streams of low-level bits and bytes. Such systems lack capabilities for users to perform high-level tasks on the media, such as the analysis and manipulation of the medium contents. The media used in this form are known as passive media.

In contrast, an active medium permits the users to interact and manipulate its contents to carry out useful tasks such as the retrieval of additional information, and the control of real-world entities. An active medium must encode, in addition to its raw data, a model describing its semantic contents. The model can be mapped to the reality by direct mapping. With such mapping, we are able to interact directly with objects appearing in, say, a video display to interrogate their semantic contents, and to control other related tasks. The concept of an active medium offers significant improvement in information communication and processing. However, it places stringent requirements on multimedia information systems.

Current multimedia systems are far from the ideal, where all media are active, first class entities. We know little about representation, indexing, interaction and retrieval of non-textual media, especially for images, audio and video. Little is even known about the basic semantic units that characterize non-textual media. Without such knowledge, it is difficult to develop consistent model to represent the contents of these media for the purpose of analysis, indexing and retrieval. It is also difficult to develop effective content analysis techniques to discover their contents. The integration of multimedia and computer graphics to create a simulated world of real and synthetic objects also requires the development of new techniques and models.

This volume is devoted to the discussion of effective modeling of multimedia information and systems for a wide range of applications. It aims to provide common modeling frameworks for integrating the diverse field of multimedia information. The volume contains 28 technical articles. The articles are grouped into 10 chapters. The first chapter contains 3 articles covering issues of next generation multimedia systems. It sets the direction for the rest of the articles. The remaining 9 chapters cover major issues of current research interests. They are: Modeling Multimedia Systems and Standards; Image Retrieval; Interactive Multimedia; Multimedia Synchronization; Networked Multimedia; Music Analysis and Performance System; JEPG and Model-based Image Coding; 3D Geometric Modeling; and, Multimedia Systems and Applications.

The majority of the articles describe, in various levels of details, the modeling issues of multimedia information and systems. It is perhaps the only book that devotes entirely to this important but much neglected topic. It is hoped that this volume will help propel research towards this rich and exciting field.

All articles contained in this volume were selected, after vigorous peer reviews, for presentation at the second international conference on Multi-Media Modeling (MMM'95) held in Singapore on 14-17 November 1995. The conference brought together researchers from the fields of multimedia, computer graphics, computer vision, database, information retrieval and computer communication. Future MMM conferences are planned on an annual basis in France (1996) and Singapore (1997).

We are grateful to the authors for submitting the papers, and the reviewers for their considerable efforts in reviewing the papers on time. We would also like to acknowledge the supports of our sponsors and co-organizers for making this conference possible. Finally, special thanks are due to conference organizing committee, and in particular, Mrs Veronica Ho, for helping to put this conference together.

T.S. Chua
H.K Pung
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