Multimedia Technologies
(Book Review)

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Multimedia Technologies
Ashok Banerji & Ananda Mohan Ghosh
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Overview

The volume “Multimedia Technologies” is about the foundational technologies related to applications that integrate computer graphics, video, and audio content and interfaces. The authors, Ashok Banerji and Ananda Mohan Ghosh, are multimedia applications professional and distinguished professor in computer science and engineering. The book has two objectives: (1) to provide a comprehensive foundation knowledge resources about multimedia technologies in one single volume; (2) to provide a suitable model to teach this subject with particular emphasize on field practice and active experimentation (p. xiii).

Target readers are undergraduate students or professionals studying CS or IT programs. As a text, each chapter of the book contains several pedagogical features including graphical representation of the content, chapter objectives, exercises, questions, and a list of further readings.

Despite the title, the book has a strong reference to a human-computer interaction model that depicts processes of encoding, decoding, interpreting, sending and receiving messages. The same model, with some variations, is shown in most chapters to justify or position the content of the chapters.

Summary

The authors employ a built-up approach to organize the content in six logically sequenced sections: foundation topics, visual media, audio media, audio-visual media, media integration, and future direction.

Section 1, foundation topics, covers an introduction in four chapters. Chapter 1 introduces the notion of multimedia studies according to the understanding of the authors. It lays down the scope of the book and introduces the use of Human-Computer Interaction model as reference model. Chapter 2 introduces the uses, or applications, of multimedia technologies. Chapter 3 explains the technological environment of multimedia applications with emphasizes on various input devices. Chapter 4 brings the readers back to the foundation of multimedia data representation, coding, and compression. Basic ideas of lossless and lossy compression algorithms are covered. Commonly used algorithms, such as DCT transformation and Wavelet transformation, are explained in more details to demonstrate the state-of-the-art of compression techniques.

Section two, visual media, deals with static visual technologies. Chapter 5 is a particularly interesting chapter that explains the visualization of texts and characters. Chapter 6 explains image processing technologies. Due to the ubiquity, JPEG compression techniques are explained in more details. Chapter 7 covers common topics usually found in the study of Computer Graphics such as anti-aliasing and transformation. This chapter also introduces the use of a graphic editing tool called GIMP.
Section three, *audio media*, has only one chapter that covers basic audio compression techniques, including modulation, quantization, and psychoacoustics.

Section four, *audio-visual media*, covers motion pictures and animation. Chapter 9 explains the basics of various MPEG protocols to demonstrate motion pictures compression strategies. Chapter 10 introduces the use of Flash to demonstrate animation production and editing tools.

Section five, *media integration*, deals with design, development, and integration of multimedia applications projects. Chapter 11 introduces software engineering and project management techniques. Chapter 12 explains the general Internet environment, starting from OSI model to various layers of Internet protocols.

The last section, *future direction*, contains only one chapter that looks forward into the future. It introduces distributed models, virtual and augmented reality, and probable areas of research and development.

There are two appendixes that explain an interactive, matrix-based software system called MATLAB, and a tutorial on HTML codes.

**Discussion**

The authors define multimedia as “the technical facility for creating, presenting and controlling communication of information through a variety of media in an integrated way … a multimedia system thus involves: generation, representation, storage, transmission, search & retrieval, and delivery of multimedia information” (p. 9). The design and implementation of multimedia applications involves multiple disciplines. With a compact size of only 314 pages, the book is an ambitious endeavor to provide the audience comprehensive and foundational knowledge. Not surprisingly, about half of the book covers common multimedia technologies themes, including compression algorithms, still pictures, video and audio compression techniques, with an uncommon but interesting chapter on texts. The other half integrates Human-Computer Interaction (mainly Chapters 1, 3, 11 and 13), Computer Graphics and an editing tool (Chapter 7), Software Design and Project Management (Chapter 11), Internet and Networking fundamentals (Chapter 12), and an animation production tool (Chapter 10).

It is unrealistic to expect details of each of the disciplines discussed. As noted in the preface (p. xiii - xiv), the authors aim to cover 20% of kernel concepts of multimedia technologies. However, what constitutes the “kernel”

Within the core topics of multimedia technologies, again the depth and breadth of discussion is debatable. Considering the objective to provide comprehensive foundational knowledge to the audience, the discussion of multimedia networking is limited. Although the authors devote a chapter to the general foundations of WWW and the principles of designing WWW applications, the issues of delivery multimedia content remain untouched. The concept of Quality of Service (QoS), for example, is important to multimedia applications especially on the heterogeneous wireless networking marketplace (Hussain, Hamid, & Khattak, 2006). QoS parameters for multimedia applications distributed through a network are multiple, and may at least include throughput, delay, jittering, other time sensitivity requirements, and the consistency of overall quality among different communication sessions (Burgstahler et al., 2003). Given the relevance of human-computer interaction model in the text, the human aspect, or perceived QoS, is also important (Serif, Gulliver & Ghinea, 2004). For example, the perception of real time gaming, high resolution images, or MP3 audio will be different even if the packet lost rate and jittering rate is the same.

The relevance of the inclusion of graphics and animation editing tools seems interesting. Certainly no single volume may cover all genres of multimedia tools and applications. Again the selection rationale should be based on the kernel multimedia concepts. After video compression techniques and protocols are explained in Chapter 9, for
example, the relevance of Flash video production explained in Chapter 10 should be established, and be constituted as part of kernel video technology concepts.

The book is an excellent attempt to integrate the various disciplines in CS and IT to the support of multimedia professionals and students. Audience who would like to know the necessary skills and techniques to the development and design of multimedia applications would find the book valuable, and would develop an interest and foundation in pursuing further discussion in the discipline of multimedia technologies.

References

