

## Preface

As multimedia technologies and their applications have witnessed explosive growth within the past two decades, information has become increasingly interactive and multidimensional. Traditional text-based data has been augmented and, in some cases, replaced by audiovisual content that is used to transform teaching styles, enhance business transactions, and promote cultural literacy. Researchers, students, and educators have benefited from and been challenged by increased access to multimedia data on the Internet, television, and even on their personal mobile devices. These technologies and their applications will continue to pervade and simplify our daily lives and, as a result, we must continue to understand, develop, and utilize the latest in multimedia research and exploration.

As the study of multimedia technologies and their applications has grown in both number and popularity, researchers and educators have devised a variety of techniques and methodologies to develop, deliver, and, at the same time, evaluate the effectiveness of their use. The explosion of methodologies in the field has created an abundance of new, state-of-the-art literature related to all aspects of this expanding discipline. This body of work allows researchers to learn about the fundamental theories, latest discoveries, and forthcoming trends in the field of multimedia technologies.

Constant technological and theoretical innovation challenges researchers to stay abreast of and continue to develop and deliver methodologies and techniques utilizing the discipline's latest advancements. In order to provide the most comprehensive, in-depth, and current coverage of all related topics and their applications, as well as to offer a single reference source on all conceptual, methodological, technical, and managerial issues in multimedia technology, Information Science Reference is pleased to offer a three-volume reference collection on this rapidly growing discipline. This collection aims to empower researchers, students, and practitioners by facilitating their comprehensive understanding of the most critical areas within this field of study.

This collection, entitled **Multimedia Technologies: Concepts, Methodologies, Tools, and Applications**, is organized into eight distinct sections which are as follows: 1) Fundamental Concepts and Theories, 2) Development and Design Methodologies, 3) Tools and Technologies, 4) Utilization and Application, 5) Organizational and Social Implications, 6) Managerial Impact, 7) Critical Issues, and 8) Emerging Trends. The following paragraphs provide a summary of what is covered in each section of this multi-volume reference collection.

Section One, **Fundamental Concepts and Theories**, serves as a foundation for this exhaustive reference tool by addressing crucial theories essential to understanding multimedia technologies. Opening this elemental section is "Fundamentals of Multimedia" by Palmer W. Agnew and Anne S. Kellerman, which defines the term "multimedia," provides an overview of end-user multimedia devices, and addresses some of the main issues and challenges within the field. Specific applications of multimedia technologies are discussed in selections such as "Core Principles of Educational Multimedia" by Geraldine Torrisi-Steele and "Introduction to Mobile Multimedia Communications" by Gour C. Karmakar, Laurence S.

Dooley, and Michael Mathew. Within the contribution “Multimedia Databases,” researcher Mariana Hentea explains the fundamental use and importance of multimedia databases in shaping on-demand television, medical systems, and even fashion design. Similarly, in “Multimedia Information Retrieval at a Crossroad,” Qing Li, Jun Yang, and Yueting Zhuang outline the main methods used for retrieving multimedia content and highlight both the current and emerging applications of such technology. The selections within this comprehensive, foundational section enable readers to learn from expert research on the elemental theories underscoring multimedia technologies.

Section Two, **Development and Design Methodologies**, contains in-depth coverage of conceptual architectures and frameworks, providing the reader with a comprehensive understanding of emerging theoretical and conceptual developments within the development and utilization of multimedia technologies. “Content-Based Multimedia Retrieval” by Chia-Hung Wei and Chang-Tsun Li suggests that content-based retrieval of multimedia content, as opposed to traditional text-based retrieval, makes database searching more efficient. Other selections, such as “Cognitively Informed Multimedia Interface Design” by Eshaa M. Alkhalifa, explain how cognitive psychology has helped to change the design of multimedia educational systems. The design of multimedia systems on mobile devices is explored at length in selections such as “Enabling Multimedia Applications in Memory-Limited Mobile Devices” by Raul Fernandes Herbster, Hyggo Almeida, Angelo Perkusich, and Marcos Morais; “Mobile Multimedia Collaborative Services” by Do Van Thanh, Ivar Jørstad, and Schahram Dustdar; and “Design of an Enhanced 3G-Based Mobile Healthcare System” by José Ruiz Mas, Eduardo Antonio Viruete Navarro, Carolina Hernández Ramos, Álvaro Alesanco Iglesias, Julián Fernández Navajas, Antonio Valdovinos Bardají, Robert S. H. Istepanian, and José García Moros. From basic designs to abstract development, chapters such as “Designing for Learning in Narrative Multimedia Environments” by Lisa Gjedde and “On a Design of SCORM-Compliant SMIL-Enabled Multimedia Streaming E-Learning System” by Sheng-Tun Li, Chu-Hung Lin, and Pao-Ta Yu serve to expand the reaches of development and design methodologies within the field of multimedia technologies.

Section Three, **Tools and Technologies**, presents extensive coverage of various tools and technologies and their use in creating and expanding the reaches of multimedia applications. The emergence of mobile devices and the potential for enabling multimedia content on these devices is the subject of articles such as “Multimedia for Mobile Devices” by Kevin Curran; “Multimedia Contents for Mobile Entertainment” by Hong Yan, Lara Wang, and Yang Ye; and “Multimedia Information Design for Mobile Devices” by Mohamed Ally. The new, multimedia-enabled face of distance education is explored throughout Hakikur Rahman’s pair of contributions, “Interactive Multimedia Technologies for Distance Education Systems” and “Interactive Multimedia Technologies for Distance Education in Developing Countries.” Throughout these selections, Rahman explains how multimedia technologies have transformed the physical classroom into the virtual classroom. Other technologies that are investigated within this section include digital watermarking, in the selections “Digital Watermarking for Multimedia Transaction Tracking” by Dan Yu and Farook Sattar and “Digital Watermarking Schemes for Multimedia Authentication” by Chang-Tsun Li, and communication systems on digital televisions, which are detailed in “Multimedia Communication Services on Digital TV Platforms” by Zbigniew Hulicki. These rigorously researched chapters provide readers with countless examples of the up-and-coming tools and technologies that emerge from or can be applied to the multidimensional field of multimedia technologies.

Section Four, **Utilization and Application**, explores the ways in which multimedia technologies and their applications have been practically employed in a variety of contexts. This collection of innovative research begins with “Integrated-Services Architecture for Internet Multimedia Applications” by Zhonghua Yang, Yanyan Yang, Yaolin Gu, and Robert Gay, which documents the emergence of multimedia applications on the Internet. As music retrieval has been an essential part of the multimedia revolution,

several selections, including “Interactive Multimedia MUSICNETWORK: An Introduction” by Kia Ng and Paolo Nesi and “Content-Based Music Summarization and Classification” by Changsheng Xu, Xi Shao, Namunu C. Maddage, Jesse S. Jin, and Qi Tian, document the classification and study of music-related multimedia technologies. Another application of multimedia technology, face recognition, is studied in “Face Recognition Technology: A Biometric Solution to Security Problems” by Sanjay K. Singh, Mayank Vatsa, Richa Singh, K. K. Shukla, and Lokesh R. Boregowda. As this section concludes, some of the more novel applications of multimedia technologies are surveyed. “Location-Based Multimedia Services for Tourists” by Panagiotis Kalliaras, Athanasios-Dimitrios Sotiriou, P. Papageorgiou, and S. Zoi presents a particular system that aims to provide its users with personalized, tourism-related multimedia information. From established applications to forthcoming innovations, contributions in this section provide excellent coverage of today’s global community and demonstrate how multimedia technologies impact the social, economic, and political fabric of our present-day global village.

Section Five, **Organizational and Social Implications**, includes a wide range of research pertaining to the organizational and cultural implications of multimedia technologies. Introducing this section is “Multimedia as a Cross-Channel for Cultures and Languages” by Ramesh C. Sharma and Sanjaya Mishra, a selection that identifies multimedia’s role in both preserving and transmitting culture. One of the most widely researched topics in multimedia research—the impact of multimedia technologies upon the modern-day educational system—is explored at length in chapters such as “Teaching, Learning and Multimedia” by Loreen Marie Butcher-Powell, “Planning for Multimedia Learning” by Patrick J. Fahy, and “Web-Based Synchronized Multimedia Lecturing” by Kuo-Yu Liu and Herng-Yow Chen. Other contributions, such as “Web-Based Multimedia Children’s Art Cultivation” by Hao-Tung Lin and Herng-Yow Chen and “Student-Generated Multimedia” by Mathew Mitchell, explore the ways in which multimedia authoring among students has been an asset to their overall educational experience. Overall, the discussions presented in this section offer insight into the integration of multimedia technologies into society and the benefit these technologies have provided.

Section Six, **Managerial Impact**, presents contemporary coverage of the applications and implications of multimedia technologies in a business setting. Core concepts such as mobile commerce, Internet security, and the evolution of new advertising techniques are discussed in this collection. “Distanced Leadership and Multimedia” by Stacey L. Connaughton explains how multimedia has allowed virtual teams, who may never see each other face-to-face, communicate more effectively. “Short Message Service (SMS) as an Advertising Medium” by Shintaro Okazaki provides a summary of the use of both SMS and MMS for mobile advertising. Similarly, the selection “Mobile Multimedia for Commerce” by P.M. Melliar-Smith and L.E. Moser describes the rise of mobile commerce and explains that, since mobile devices are portable, they are the perfect tools for convenient selling and purchasing. Tziporah Stern’s “Internet Privacy from the Individual and Business Perspectives” explains how online privacy has become a major issue for businesses and individuals alike. Within this selection, Stern provides both an overview of the problem and a list of potential solutions that individuals and businesses can adopt to make Web browsing and shopping more secure. The comprehensive research in this section offers an overview of the major issues that businesses must address in order to remain successful and current in an environment rich with multimedia content and interaction.

Section Seven, **Critical Issues**, presents readers with an in-depth analysis of the more theoretical and conceptual issues within this growing field of study by addressing topics such as quality of service (QoS) and multimedia security. “Distributed Approach for QoS Guarantee to Wireless Multimedia” by Kumar S. Chetan, P. Venkataram, and Ranapratap Sircar and “Quality of Service Issues in Mobile Multimedia Transmission” by Nalin Sharda discuss current and potential challenges in successfully transmitting multimedia content over wireless networks. Daniel J. Buehrer’s “Organizing Multimedia

Objects by Using Class Algebra” highlights a particular method for retrieving Web-based multimedia content. Similarly, specific methods for image retrieval and indexing are presented and defined in selections such as “A Stochastic and Content-Based Image Retrieval Mechanism” by Mei-Ling Shyu, Shu-Ching Chen, and Chengcui Zhang and “A Spatial Relationship Method Supports Image Indexing and Similarity Retrieval” by Ying-Hong Wang. Concluding this collection of the more conceptual issues within the field is “Multimedia Security and Digital Rights Management Technology” by Eduardo Fernandez-Medina, Sabrina De Capitani di Vimercati, Ernesto Damiani, Mario Piattini, and Pierangela Samarati, in which the importance of defining who has the rights to particular multimedia content is addressed. In all, the theoretical and abstract issues presented and analyzed within this collection form the backbone of revolutionary research in multimedia technologies and their applications.

The concluding section of this authoritative reference tool, **Emerging Trends**, highlights research potential within the field of multimedia technologies while exploring uncharted areas of study for the advancement of the discipline. New IETF transport layer protocols in support of multimedia data transmission are presented and explored within Michael Welzl’s “New Internet Protocols for Multimedia Transmission,” while the potential for a multimedia world is debated within “Universal Multimedia Access” by Andrea Cavallaro. Later selections, such as “Toward Effective Use of Multimedia Technologies in Education” by Geraldine Torrisi-Steele, maintain that the current use of multimedia in education is problematic and present guidelines for the future construction of multimedia-informed educational systems. Similarly, in their contribution “Future Directions of Multimedia Technologies in E-Learning,” researchers Timothy K. Shih, Qing Li, and Jason C. Hung argue for the incorporation of pedagogic theory into the design of distance learning systems which will, in their opinion, make learning more efficient. This final section demonstrates that multimedia technologies, with their infinite potential for application, will continue to both shape and define the way we access and absorb information.

Although the contents of this multi-volume book are organized within the preceding eight sections which offer a progression of coverage of the important concepts, methodologies, technologies, applications, social issues, and emerging trends, the reader can also identify specific contents by utilizing the extensive indexing system listed at the end of each volume. Furthermore, to ensure that the scholar, researcher, and educator have access to the entire contents of this multi-volume set, as well as additional coverage that could not be included in the print version of this publication, the publisher will provide unlimited, multi-user electronic access to the online aggregated database of this collection for the life of the edition, free of charge when a library purchases a print copy. In addition to providing content not included within the print version, this aggregated database is also continually updated to ensure that the most current research is available to those interested in multimedia technologies.

Within the past two decades, multimedia content began to occupy our computers, television screens, and mobile devices and has made the information age a reality. The applications of multimedia technology are both diverse and innumerable—education, business, and even art have been revolutionized by an easily accessible flood of interactive data. Research into how to properly access, distribute, and guarantee the security of multimedia content has implications in constructing multimedia interfaces, ensuring that mobile devices effectively transmit multimedia data, and shaping the future of commerce. With continued innovation in multimedia technologies and their applications and ongoing research into the best ways to distribute and utilize multimedia content, the discipline will continue to grow and transform as our world becomes more interactive.

The diverse and comprehensive coverage of multimedia technologies in this three-volume, authoritative publication will contribute to a better understanding of all topics, research, and discoveries in this developing, significant field of study. Furthermore, the contributions included in this multi-volume collection series will be instrumental in the expansion of the body of knowledge in this enormous field,

resulting in a greater understanding of the fundamentals while also fueling the research initiatives in emerging fields. We at Information Science Reference, along with the editor of this collection, hope that this multi-volume collection will become instrumental in the expansion of the discipline and will promote the continued growth of multimedia technologies.