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**Special Issue on
Multimedia – Processing and Applications**

Dumitru Dan Burdescu
Guest Editor

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Guest Editorial (Vol. 13, No. 2, June 2016)

Multimedia is increasingly becoming the “biggest big data” as the most important and valuable source for insights and information. It covers from everyone’s experiences to everything happening in the world. There will be lots of multimedia big data—surveillance video, entertainment and social media, medical images, consumer images, voice and video, to name a few, only if their volumes grow to the extent that the traditional multimedia processing and analysis systems cannot handle effectively. Consequently, multimedia big data is spurring on tremendous amounts of research and development of related technologies and applications. As an active and inter-disciplinary research field, multimedia big data also presents a great opportunity for multimedia computing in the big data era. The challenges and opportunities highlighted in this field will foster some interesting future developments in the multimedia research and applications. Recent advances in computing, networking, storage, and information technology have enabled the collection and distribution of vast amounts of multimedia data in a variety of applications such as entertainment, education, environmental protection, e-commerce, public safety, digital government, homeland security, and manufacturing.

The concept of multimedia from the traditional idea of ‘multi-mediums’ such as text, photographs, slides, video and audio tapes (analogue) is being redefined by the use of new computer concepts to integrate the digitized information to include text, graphics, sound, animation and full-motion. The dreams of multimedia technologists have come true and today we are able to store, transport, access and manipulate digitized multimedia information by simple drag and drop actions or export/import information to and from distant locations. The proliferation of image capturing devices and their diverse applications have enabled multimedia technology to contribute in the advancement of almost every aspect of human life. Multimedia research has evolved at tremendous speed in the last few decades to capitalize on the breadth of such applications, ranging from image/video coding and processing to multimedia communications to the analysis of human behavior to medical diagnostics.

The Multimedia - Processing and Applications (MMA) Symposium within the framework FEDERATED CONFERENCE ON COMPUTER SCIENCE AND INFORMATION SYSTEMS (FedCSIS) addressed several themes related to theory and practice within multimedia domain. The enormous interest in multimedia from many activity areas (medicine, digital government, e-commerce, public safety, entertainment, education) led researchers and industry to make a continuous effort to create new, innovative multimedia algorithms and applications. From papers that were accepted at MMA 2015 we selected and invited the best 8 extended papers for publication in this special issue.

More and more multimedia data become available in various real-world applications which make the learning of multimodal representations a challenge. Together with the maturation and deployment of semantic web technologies, it is now possible to build a new generation of multimedia applications that enables large-scale semantic representation, analysis, and delivery of multimedia data from heterogeneous data sources. However, there is still a long way to go for mature solutions of multimedia database systems that are capable of processing semantics-rich, large-volume of multimedia data.

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Guest Editorial (Vol. 13, No. 2, June 2016)

Education is one of the most important application areas for multimedia technologies. Universities and other educational institutions enhance their educational portfolio by using new technologies. Video and audio capture of lectures has become a common practice to produce e-learning content. Simulations allow us to explore experiments which would be too expensive or too dangerous to be conducted physically by students. Multimedia-powered demonstrations are freed from many physical restrictions such as the availability of an object to study or the timescale of an effect to observe. Teaching enriched by vivid presentations and possibilities for interaction for students can also gain from improved learner's motivation. Concepts may be realized in a demonstration and the observability of important details can be augmented. With the present amount of produced educational data, there is a high demand in techniques and methods capable of handling multimedia contents adequately. Educational content has to be presented, deployed, stored, navigated, searched, retrieved, edited, combined, and reused in a proper way. Furthermore, quality control and learning processes with feedback loops are considered to be important concepts for more effective and sustainable e-learning solutions. Multimedia technologies facilitate the evaluation, improvement, and assurance of quality in loopback controlled e-learning processes. Most of these topics involve techniques from artificial intelligence, computer vision, and multimedia, but also human computer interaction, educational science, and psychology.

Multimedia technologies have achieved impressive results in the last years and they may be the key for a revolution in the cultural heritage area. These new technologies in fact can now make available for the public huge amounts of heterogeneous data creating unbelievable opportunities of study and capitalization of the cultural items.

The authoring of multimedia documents demands attention to many issues relative to the structure and the synchronization of the media components, to the specification of the document and of the interaction, the roles of authors and end users, as well as issues concerning reuse and digital rights management. Researchers have discussed issues that include the need for referencing the media components, for specifying the synchronization and spatial the layout of the composition, for specifying asynchronous events and alternative content, as well as for offering options for performance optimization and producing multiple external formats. Open source multimedia authoring includes challenges in allowing open-ended, incremental and decentralized authoring. Users can access multimedia documents on personal computers, mobile devices or television sets, using the web or dedicated software and/or hardware. The interactive multimedia documents played back by users may be specified according to recommended formats.

The live editing of the interactive multimedia documents, investigated in the context of structured-based paradigm, has been demonstrated on the server-side and on the viewer side. A key challenge is adaptation on both the server and viewer sides. Approaches for supporting the authoring of adaptive, evolving and personalized documents have exploited the document structure, for instance, via reusing templates and via dedicated alphabets. Issues related to the need for adaptation have been studied in the context of ubiquitous environments, of mobile devices and of particular media, such as diagrams. In particular, the integration of secondary screens has been investigated in the context of multimedia documents for the TV. Authoring issues include dealing with various visual aspects of the generated documents.

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Guest Editorial (Vol. 13, No. 2, June 2016)

In the last years, the area of multimedia authoring and annotation has been challenged due to the increasing amount of available media, the diversification of environments and devices, and the new role of end-users as authors. This special issue surveys this fascinating area, illustrating current research on approaches for simplifying the authoring of multimedia presentations (templates, automatic process), for the support of devices beyond the desktop (paper), and for the inclusion of novel media types in addition to the traditional audiovisual material (3D human motion).

Today, there are lots of heterogeneous and homogeneous media data from multiple sources, such as news media websites, micro-blog, mobile phone, social networking websites, and photo/video sharing websites. Integrated together, these media data represent different aspects of the real-world and help document the evolution of the world. Consequently, it is impossible to correctly conceive and to appropriately understand the world without exploiting the data available on these different sources of rich multimedia content simultaneously and synergistically. Cross-media analysis is a research area in the general field of multimedia content analysis that focuses on the exploitation of the data with different modalities from multiple sources simultaneously and synergistically to discover knowledge and understand the world. Specifically, we emphasize two essential elements in the study of cross-media analysis that help differentiate cross-media analysis from the rest of the research in multimedia content analysis or machine learning. The first is the simultaneous co-existence of data from two or more different data sources.

These key technologies are creating a multimedia revolution that will have significant impact across a wide spectrum of consumer, business, healthcare, educational, and governmental domains. Yet many challenges remain, especially when it comes to efficiently coding, processing, indexing, mining, querying, searching, retrieving and visualizing multimedia data. Difficult research challenges involve the adaptation of intelligent software tools to the tight requirements posed by modern application.

The papers included in this special issue are representative of the current research challenges faced by the multimedia authoring community - large amounts of media content in the web, diversity of rendering devices, complexity of stories, and social relationships between authors and people portrayed in the media. Based on the articles, we can conclude that providing the right form of authoring tools for non-professionals is still a non-trivial task. We hope these papers are a valuable resource for scholars and practitioners who want to better understand the state of the art and the upcoming challenges in this fascinating field.

Dumitru Dan Burdescu
Guest Editor



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