

Multimedia and semantic technologies for future computing environments

Seungmin Rho · Marco Bertini ·
Gamhewage Chaminda de Silva · Stephan Kopf

Published online: 19 March 2011
© Springer Science+Business Media, LLC 2011

Abstract Research progresses in multimedia computing and systems using semantic technologies have been recently and widely explored. This special issue on multimedia and semantic technologies for future computing environments provides high quality contributions addressing related theoretical and practical aspects of semantic multimedia. We have selected fourteen research papers whose topics are strongly related to the multimedia and semantic technology.

1 Introduction

With the popularity of multimedia data on the internet, efficiently accessing and managing the explosively growing multimedia content from large-scale multimedia database has become essential. During the last decades, extensive research efforts have been dedicated to automatic multimedia analysis and processing, such as acquisition, generation, storage, and retrieval of large-scale multimedia information. However, despite these techniques already provide promising results, there are still several key difficulties such as semantic gap and user gap in multimedia analysis/processing and

S. Rho
School of Electrical Engineering, Korea University, Seoul, Korea
e-mail: smrho@korea.ac.kr

M. Bertini (✉)
Dipartimento Sistemi e Informatica, Università di Firenze, Florence, Italy
e-mail: bertini@dsi.unifi.it

G. C. de Silva
Interfaculty Initiative in Information Sciences, The University of Tokyo, Tokyo, Japan
e-mail: chamds@hal.t.u-tokyo.ac.jp

S. Kopf
Department of Computer Science IV, University of Mannheim, Mannheim, Germany
e-mail: kopf@informatik.uni-mannheim.de

annotation/tagging, respectively. The aim of this special issue is to provide an overview of emerging research challenges in Semantic Multimedia and to help reducing the Semantic and User Gap between low-level content descriptions of multimedia and the semantics in high-level human interpretations of audiovisual media.

We have received 40 manuscripts. Fourteen manuscripts were finally selected for this special issue. Each manuscript selected was blindly reviewed by at least three reviewers consisting of guest editors and external reviewers. In the following section, we present a brief overview of each manuscript.

2 Related works

The first paper entitled “Gestural Cue Analysis in Automated Semantic Miscommunication Annotation,” by Inoue et al. [4] investigates automated annotation of miscommunications in conversational video using the low-level hand gestural features. It is difficult for machines to detect miscommunications due to the lack of understanding on which cues contribute to them and the implicitness of gestures. Nine simple gestural features are taken from gesture data, and both simple and complex classifiers are used. The experimental results suggest that there is no single gestural feature that can predict or explain the occurrence of semantic miscommunication in their setting.

The second paper entitled “Determination of Emotional Content of Video Clips by Low-Level Audiovisual Features,” by René Marcelino Abritta Teixeira et al. [12] presents an affective analysis which has proven to be an interesting and efficient means of interaction with movies. But still, the lack of understanding of the emotional contents carried by low-level features and efficient modeling have been obstacles. Shedding light on these issues, they propose a set of affective models capable of representing low-level audiovisual features. They have acquired them through user experiments by using movies of diverse genres. These models are able to interchange affective values between dimensional and categorical emotional paradigms.

Another paper in this special issue, entitled “Tertiary Hash Tree-based Index Structure for High Dimensional Multimedia Data,” by Tak et al. [11] proposes a hash tree-based indexing structure called “tertiary hash tree” to index high-dimensional feature data. This tree was designed to consider resource usage and search performance in the high-dimensional feature space. Through some experiments, they show the acceptable performance for their index structure.

The fourth paper entitled “Multimodal Concept Fusion using Semantic Closeness for Image Concept Disambiguation,” by Ahmad Adel Abu-Shareha et al. [1] proposes a technique to resolve the ambiguity of concepts that are extracted from visual stream with the help of identified concepts from associated textual stream. The disambiguation is performed at the concept-level based on semantic closeness over the domain ontology. The semantic closeness is a function of the distance between the concept to be disambiguated and selected associated concepts in the ontology.

The fifth paper entitled “Recommender System Design using Movie Genre Similarity and Preferred Genres in SmartPhone,” by Nam-Mee Moon et al. [7] proposes a recommender system using movie genre similarity and preferred genres.

Next paper entitled “Enabling Context-aware Multimedia Annotation by a Novel Generic Semantic Problem-Solving Platform,” by Ruben Verborgh et al. [13] presents a generic problem-solving platform that is able to maintain a semantic notion of context

during the execution of a task. They demonstrate the added value of this context by a real-world face recognition use case.

The seventh paper entitled “Developing a Strategic Framework for the WiBro Service in the Global Market,” by Bong Gyou Lee et al. [8] presents a strategic framework, associated with a standardization strategy, to achieve successful commercialization of the WiBro (brand service name for WiMAX) service on the global market. This research analyzed the effects of standardization on business strategies. Based on the Delta Model, this research devises strategies for the WiBro service’s commercialization on the global market and presents a strategic framework based on empirical research using the ANP methodology. The analysis results in this study suggest a strategic roadmap for global commercialization of WiBro.

The eighth paper entitled “Automatic Extraction of User’s Search Intention from Web Search Logs,” by Heuseok Lim et al. [9] proposes a method to extract users’ intentions and to build an intention map representing these extracted intentions. The proposed method makes intention vectors from clicked pages from previous search logs obtained on a given query. The components of the intention vector are weights of the keywords in a document. It extracts user’s intentions by using clustering the intention vectors and extracting intention keywords from each cluster. The extracted the intentions on a query are represented in an intention map.

Another paper in this special issue, entitled “Improving online gaming experience using location awareness and interaction details,” by Dewan Tanvir Ahmed et al. [2] introduces a game state sharing mechanism for timely interaction using participants’ unused resources. This quality control scheme considers several pragmatic aspects of Massively Multiplayer Online Games (MMOG) such as players’ mobility, the importance of transient interaction, and their virtual position and physical location.

The tenth paper entitled “Image Hash Generation Method using Hierarchical Histogram,” by Jong Hyuk Park et al. [3] proposes GLOCAL image hashing method utilizing the hierarchical histogram which is based on histogram bin population method. They modified existing image hashing method developed by [14].

The eleventh paper entitled “A Two-level Model for Automatic Image Annotation,” by Xiao Ke et al. [6] proposes a hierarchical image annotation model which combines advantages of discriminative model and generative model. In first annotation layer, discriminative model is used to assign topic annotations to unlabeled images, and then relevant image sets are obtained. In second annotation layer, a keywords-oriented method is used to establish links between images and keywords, and then an iterative algorithm is proposed to expand relevant image sets. Candidate labels will be given higher weights by using proposed method based on visual keywords. Finally, generative model is used to assign detailed annotations to unlabeled images on expanded relevant image sets.

Next paper entitled “Implementation of MAC-based RTL module for Inverse DCT in H.264/AVC,” by Yoon-Ho Kim et al. [10] implements the MAC-based RTL module for inverse DCT in H.264/AVC to improve applicability, to reduce processing time and utilize resources. They focus the design of FU architecture, its interconnection topology, regular formula of inverse DCT and array processor mapping as well as MAC-based RTL module constructing.

The thirteenth paper entitled “English Course E-learning System Based on Relative Item Difficulty Using Web Component Composition,” by Seongsoo Cho et al. [5] presents the implementation of English e-learning system including the item guessing parameter by using the relative correction of item difficulty. In the system, a learner was given to choose the learning step by the relative difficulty to increase learning effectiveness. These all the learning contents were based on Sharable Content Object Reference Model (SCORM) with Learning Management System (LMS). As a result of application, the learner was able to study efficiently by selecting the relative item difficulty.

The last paper entitled “A Study on Multimedia File Carving Method,” by Sangjin Lee et al. [15] proposes a carving method for multimedia files and represent a recovery plan for deleted NTFS compressed files. In addition, we propose a way to apply such a recovery method to the carving of multimedia files.

3 Conclusion

Finally, our special thanks go to Prof. Borko Furht and all editorial staffs for their valuable supports throughout the preparation and publication of this special issue. We would like to thank all authors for their contributions to this special issue. We also extend our thanks to the external reviewers for their excellent help in reviewing the manuscripts.

References

1. Abu-Shareha AA, Mandava R, Khan L, Ramachandram D (2011) “Multimodal Concept Fusion using Semantic Closeness for Image Concept Disambiguation,” *Multimedia Tools and Applications (MTAP)*, Online Published, January 11 2011. (doi:10.1007/s11042-010-0707-8)
2. Ahmed DT, Shirmohammadi S (2011) “Improving online gaming experience using location awareness and interaction details,” *Multimedia Tools and Applications (MTAP)*, Online Published, January 13 2011. (doi:10.1007/s11042-010-0703-z)
3. Choi YS, Park JH (2011) “Image Hash Generation Method using Hierarchical Histogram,” *Multimedia Tools and Applications (MTAP)*, Online Published, January 20 2011. (doi:10.1007/s11042-010-0724-7)
4. Inoue M, Ogihara M, Hanada R, Furuyama N (2011) “Gestural cue analysis in automated semantic miscommunication annotation,” *Multimedia Tools and Applications (MTAP)*, Online Published, January 19 2011. (doi:10.1007/s11042-010-0701-1)
5. Jeong H-Y, Hong B-H, Shrestha B, Cho S (2011) “English course E-learning system based on relative item difficulty using web component composition,” *Multimedia Tools and Applications (MTAP)*, Online Published, January 22 2011. (doi:10.1007/s11042-010-0708-7)
6. Ke X, Li S, Cao D (2011) “A Two-level Model for Automatic Image Annotation,” *Multimedia Tools and Applications (MTAP)*, accepted in 2011
7. Kim K-R, Moon NM (2011) “Recommender system design using movie genre similarity and preferred genres in SmartPhone,” *Multimedia Tools and Applications (MTAP)*, Online Published, February 1 2011. (doi:10.1007/s11042-011-0728-y)
8. Lee BG, Seo H, Om SY, Oh J, Seol J, (2011) “Developing a strategic framework for the WiBro service in the global market,” *Multimedia Tools and Applications (MTAP)*, Online Published, January 11 2011. (doi:10.1007/s11042-010-0705-x)
9. Park K, Jee H, Lee T, Jung S, Lim H (2011) “Automatic extraction of user’s search intention from web search logs,” *Multimedia Tools and Applications (MTAP)*, Online Published, January 13 2011. (doi:10.1007/s11042-010-0723-8)
10. Park K-H, Ju W-K, Kim Y-H (2011) “Implementation of MAC-based RTL module for Inverse DCT in H.264/AVC,” *Multimedia Tools and Applications (MTAP)*, accepted in 2011
11. Tak Y, Rho S, Hwang E, Lee H (2010) “Tertiary Hash Tree: Indexing Structure for Content-based Image Retrieval,” *Multimedia Tools and Applications (MTAP)*, Online Published, December 30 2010. (doi:10.1007/s11042-010-0687-8)
12. Teixeira RMA, Yamasaki T, Aizawa K (2011) “Determination of emotional content of video clips by low-level audiovisual features,” *Multimedia Tools and Applications (MTAP)*, Online Published, January 11 2011. (doi:10.1007/s11042-010-0702-0)
13. Verborgh R, Van Deursen D, Mannens E, Poppe C, Van de Walle R (2011) “Enabling context-aware multimedia annotation by a novel generic semantic problem-solving platform,” *Multimedia Tools and Applications (MTAP)*, Online Published, January 7 2011. (doi:10.1007/s11042-010-0709-6)

14. Xiang S, Kim HJ, Huang J (2007) “Histogram-based image hashing scheme robust against geometric deformations,” Proceedings of the ACM Multimedia and Security Workshop, pp 121–128
15. Yoo B, Park J, Lim S, Bang J, Lee S (2011) “A Study on Multimedia File Carving Method,” Multimedia Tools and Applications (MTAP), Online Published, January 19 2011. (doi:10.1007/s11042-010-0704-y)



Seungmin Rho received his MS and PhD Degrees in Computer Science from Ajou University, Korea, in Computer Science from Ajou University, Korea, in 2003 and 2008, respectively. In 2008–2009, he was a Postdoctoral Research Fellow at the Computer Music Lab of the School of Computer Science in Carnegie Mellon University. He is currently working as a Research Professor at School of Electrical Engineering in Korea University. His research interests include database, music retrieval, multimedia systems, machine learning, knowledge management and intelligent agent technologies. He has been a reviewer in Multimedia Tools and Applications (MTAP), Journal of Systems and Software, Information Science (Elsevier), and Program Committee member in over 10 international conferences. He has published 25 papers in journals and book chapters and 30 in international conferences and workshops. He is listed in Who’s Who in the World.



Marco Bertini received the Laurea Degree in Electronics Engineering (Laurea in Ingegneria Elettronica) from the University of Florence in 1999, and Ph.D. in 2004. He is working in the Media Integration and Communication Center of the University of Florence. He has worked on several EU funded research projects dealing with automatic semantic annotation of multimedia content. Now he is an assistant professor in the Department of Systems and Informatics at the University of Florence, Italy. His research interests include content-based indexing and retrieval of videos and Semantic Web technologies.



Gamhewage Chaminda de Silva completed the B.Sc. (Eng.) degree in Computer Engineering at the University of Moratuwa, Sri Lanka in 1996 and served as a lecturer in the same university until 2001. He received the M. Eng. degree in Electrical and Computer Engineering from the National University of Singapore in 2003, and the Ph. D. degree in Frontier Informatics from the University of Tokyo in 2007. Chaminda worked as a researcher in Media Information Sciences at ATR International, Kyoto, Japan, and Hewlett-Packard Research Labs Japan, before joining the University of Tokyo as an Assistant professor in Information Sciences. His research interests are in novel user interaction techniques for multimedia retrieval, computer vision-based human-computer interaction and mobile multimedia management. He is a professional member of ACM, and has served as a reviewer for IEEE Computer Magazine, IEEE Transactions on Multimedia, and ACM Transactions on Multimedia Computing, Communications and Applications.



Stephan Kopf received the M.Sc. degree in business informatics (2000) and the Ph.D. degree in computer science (2007) both from the University of Mannheim (Germany), and is currently working as senior researcher and lecturer at the multimedia department at the University of Mannheim. His research interests focus on multimedia content analysis, media retargeting, high dynamic range videos, shape-based object recognition, and digital watermarking for videos. He has published over 50 refereed book chapters, journal and conference papers in these fields. Dr. Kopf is initiator and co-editor of the ACM SIG Multimedia Records and the ACM SIGMM eNewsletter. He serves on the program committee of several conferences and workshops, and is initiator and co-chair of several workshops. He is a member of IEEE, ACM, and ACM SIGMM.