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SIGMM Records

Volume 3, Number 4, December 2011

Editorial

Dear Member of the SIGMM Community,

Welcome to the December issue of the SIGMM Records in 2011.

We can announce the first call for nominations for ACM SIGMM's new award, the Nicolas Georganas TOMCCAP Award, which will be awarded for the best paper that was published in ACM TOMCCAP in 2011. You can also find the call for another award, the ACM History Fellowship award.

We are pleased to introduce to you a new columnist for the Records. Pablo Cesar will from this issue on report about an Open Source project in every issue. This issue talks about LIRe, an image retrieval library.

Christian Timmerer reports from the 98th MPEG meeting, which concluded some important work and is preparing for new challenges. The education column presents a book on image and video processing that you may find interesting in your teaching. You can also find a report from Ed-Media, a conference that discusses the use of multimedia for education. You can also read the PhD thesis summaries provided by three candidates who have recently passed their doctoral exams, you find pointers to the latest issues of TOMCCAP and MMSJ, and several announcements from ACM and SIGMM.

With this, the editors of the SIGMM Records conclude their work in 2011 and wish you all an enjoyable and successful year 2012.

The Editors
Stephan Kopf
Viktor Wendel
Lei Zhang
Pradeep Atrey
Christian Timmerer
Pablo Cesar

Carsten Griwodz

Open Source Column: LIRe - A Java Library for Content Based Image Retrieval

Authors: Mathias Lux
URL: http://www.semanticmetadata.net/lire
by Pablo Cesar

Dr. Mathias Lux is currently assistant professor at the Institute for Information Technology at Klagenfurt University. He received his M.S. in Mathematics and his Ph.D. in Telematics from Graz University of Technology. He worked in industry on web-based applications, then as a junior researcher at a research center for knowledge-based applications. He was research and teaching assistant at the Knowledge Management Institute (KMI) of Graz University of Technology and in 2006 he started working in a post doc position at Klagenfurt University, at the Institute for Information Technology. In his scientific career he has (co-) authored more than 50 scientific publications and has served in multiple program committees of international conferences. He is also well known for managing the development of the award winning and popular open source tools Caliph & Emir and LIRe for multimedia information retrieval. He is currently working on user intentions in multimedia retrieval and production and emergent semantics in social multimedia computing.

LIRe - A Java Library for Content Based Image Retrieval

Content based image retrieval (CBIR) has been for quite some time a hot research topic. Early results and their commercial implementations like IBM QBIC or Cantos Cumulus have not yield good enough results to be applied in everyday tasks. Also research in CBIR has been consolidated and discussed on a general level several times. Different evaluation organizations and events, like imageCLEF, MediaEval or TRECVid, provide playgrounds for researchers and practitioners to test new and consolidate current approaches. Many

research groups and practitioners aim to build on existing tools to avoid reimplementation of existing approaches. LIRe satisfies such needs by providing a library of basic and advanced functions employed in the field of content based image retrieval.

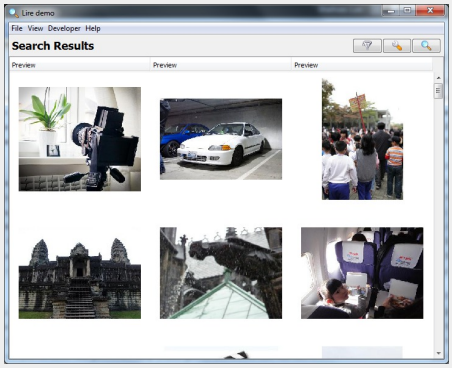
LIRe is a Java library to be integrated in existing or yet to be built applications and code. From a design perspective, LIRe tries to hide as much as possible the complexity of CBIR. LIRe is based on Lucene, a text search engine providing inverted indexing, search and fast random access to text indexes. At a first glance developers encounter in LIRe few parameters to be set and even fewer choices. DocumentBuilder classes provide easy access to different low level features and wrap the use of Lucene, which is used for indexing. ImageSearcher classes allow for search and retrieval based on single query images or already indexed documents. Extensibility is a main feature of Lire. By implementing an easy interface, which takes care of serialization of features within the Lucene index, developers can provide their own methods and share them as open source code with the research community.

LIRe provides a broad range of image features including color and texture features, correlograms, joint histograms, region and edge features as well as several different metrics for distance computation. Local features SIFT and SURF are supported by 3rd party libraries, an implementation of MSER and a local feature descriptor describing found regions is in early beta phase.

In general, global as well as local features are stored as byte payload in a Lucene based index. Basic search implementations use linear search to find the most promising n candidates and return them in a ranked list. This works fine for smaller image collection, up to 100k images. For local features a further indexing step allows for the use of an inverted index for the bag of visual words approach. However, for several scenarios with millions of images and global features sub linear search in feature spaces is needed. The approach implemented in LIRe is the metric spaces method based on the ideas of Giuseppe Amato. This approach utilizes inverted lists to characterize data points in feature spaces by their distance to a set of reference data points. Utilizing a ranked list of nearest neighbors the foot-rule distance provides an approximation of the original pair wise distance. This approach has been shown to work well on sets of millions of images.

LIRe has seen its first release in Feb. 2006. Since then it has been downloaded from sourceforge.net more than 22,000 times (with Dec. 28th 2011). This does not include downloads from SVN or from the LIRe website or blog. Since 2006 it has been continuously extended and maintained. In 2008 students from my course on multimedia information systems contributed Tamura and Gabor features, in 2009 Savvas Chatzchristofis added the joint histogram descriptors CEDD and FCTH, being currently the global descriptors of choice for practical applications. In the same year first tests with the metric spaces approach started. In 2010 a major re-write of the serialization of feature descriptors resulted in a major performance increase and in 2011 another re-write of core functions simplified the use of local descriptors and index management of bag of visual words indexes.

Besides core functions and features, several smaller but nevertheless interesting methods have been implemented in LIRe. Examples are an estimator for visual attention in images included, a parallelized version of k-means clustering, a parallel indexer for large file repositories, a benchmarking suite based on the Simplicity data set, and latent semantic indexing. Also a desktop Java demo tool has been developed which allows for easy try-out and testing on arbitrary image collections.



Lire demo, a simple GUI tool for testing LIRe features on arbitrary image collections

Lire has been around for nearly 6 years now and many researchers and lecturers have adopted LIRe for starting point or platform of their research or framework for teaching and practical assignments in education. Many bug fixes, enhancements and suggestions have been contributed. I appreciate all the positive feedback and help and I'd like to thank all the people who helped throughout the years including Anna-Maria Pasterk, Arthur Li, Arthur Pitman, Bastian Hösch, Benjamin Sznajder, Christian Penz, Christine Keim, Christoph Kofler, Dan Hanley, Daniel Pötzinger, Fabrizio Falchi, Giuseppe Amato, Harald Kosch, Janine Lachner, Katharina Tomanec, Lukas Esterle, Laszlo Böszörmenyi, Marco Bertini, Manuel Oraze, Manuel Warum, Marian Kogler, Markus Fauster, Marko Keuschnig, Oge Marques, Rodrigo Carvalho Rezende, Roman Divotkey, Roman Kern and Savvas Chatzichristofis.

MPEG Column: 98th MPEG Meeting

URL: http://multimediacommunication.blogspot.com/2011/12/mpeg-news-report-from-98th-meeting.html
by Christian Timmerer

MPEG news: a report from the 98th meeting, Geneva, Switzerland

#MPEG98 report: DASH=IS ✔ CDVS=CfP eval ✔ {MMT, HEVC, 3DAudio}=MPEG-H ✔ IVC={IVC, WebVC} ✔ 3DVC=CfP eval ✔

... MPEG news from its 98th meeting in Geneva, Switzerland with less than 140 characters and a lot of acronyms. The official press release is, as usual, here. As you can see from the press release, MPEG produced significant results, namely:

- MPEG *Dynamic Adaptive Streaming over HTTP (DASH)* ratified
- *3D Video Coding*: Evaluation of responses to Call for Proposals
- MPEG royalty free video coding: *Internet Video Coding (IVC) + Web Video Coding (WebVC)*
- High Efficiency Coding and Media Delivery in Heterogeneous Environments: *MPEG-H* comprising MMT, HEVC, 3DAC
- *Compact Descriptors for Visual Search (CDVS)*: Evaluation of responses to the Call for Proposals
- Call for requirements: *Multimedia Preservation Description Information (MPDI)*
- MPEG *Augmented Reality (AR)*

As you can see, a long list of achievements within a single meeting but let's dig inside. For each topic I've also tried to provide some research issues which I think are worth to investigate both inside and outside MPEG.

MPEG Dynamic Adaptive Streaming over HTTP (DASH): DASH=IS

As the official press release states, the MPEG ratifies its draft standard for DASH and it comes better, the standard should become publicly available which I expect to happen somewhat early next year, approx. March 2012, or maybe earlier. I say "should" because there is no guarantee that this will actually happen but signs are good. In the meantime, feel free using our software to play around and we expect to update it to the latest version of the standard as soon as possible. Finally, IEEE Computer Society Computing Now has put together a theme on Video for the Universal Web featuring DASH.

Research issues: performance, bandwidth estimation, request scheduling (aka adaptation logic), and Quality of Service/Experience.

3D Video Coding: 3DVC=CfP eval

MPEG evaluated more than 20 proposals submitted as a response to the call issued back in April 2011. The evaluation of the proposal comprised subjective quality assessments conducted by 13 highly qualified test laboratories distributed around the world and coordinated by the COST Action IC1003 QUALINET. The report of the subjective test results from the call for proposals on 3D video coding will be available by end of this week. MPEG documented the standardization tracks considered in 3DVC (i.e., compatible with MVC, AVC base-view, HEVC, ...) and agreed on a common software based on the best-performing proposals.

Research issues: encoding efficiency of 3D depth maps and compatibility for the various target formats (AVC, MVC, HEVC) as well as depth map estimation at the client side.

MPEG royalty free video coding: IVC vs. WebVC

In addition to the evaluation of the responses to the call for 3DVC, MPEG also evaluated the responses to the Internet Video Coding call. Based on the responses, MPEG decided to follow up with two approaches namely Internet Video Coding (IVC) and Web Video Coding (WebVC). The former - IVC - is based on MPEG-1 technology which is assumed to be royalty-free. However, it requires some performance boosts in order to make it ready for the Internet. MPEG's approach is a common platform called Internet video coding Test Model (ITM) which serves as the basis for further improvements. The latter - WebVC - is based on the AVC constrained baseline profile which performance is well-known and satisfactory but, unfortunately, it is not clear which patents of the AVC patent pool apply to this profile. Hence, a working draft (WD) of WebVC will be provided (also publicly available) in order to get patent statements from companies. The WD will be publicly available by December 19th.

Further information:

- Royalty-Free MPEG Proposals Announced
- MPEG Plus or Patent Pool Lite? MPEG Mulls Royalty-Free Proposals
- Half of MPEG-2 Patents Expire in 2012

Research issues: coding efficiency with using only royalty free coding tools whereby the optimization is first towards royalties and then efficiency.

MPEG-H

A new star is born which is called MPEG-H referred to as "High Efficiency Coding and Media Delivery in Heterogeneous Environments" comprising three parts: Pt. 1 MMT, Pt. 2 HEVC, Pt. 3 3D Audio. There's a document called context and objective of MPEG-H but I can't find out whether it's public (I come back later on this).

Part 1: MMT (MPEG Media Transport) is progressing (slowly) but a next step should be definitely to check the relationship of MMT and DASH for which an Ad-hoc Group has been established (N12395), subscribe here, if interested.

Research issues: very general at the moment, what is the best delivery method (incl. formats) for future multimedia applications? Answer: It depends, ... ;-)

Part 2: HEVC (High-Efficiency Video Coding) made significant progress at the last meeting, in particular: only one entropy coder (note: AVC has two, CABAC and CAVLC which are supported in different profiles), 8 bit decoding (could be also 10 bit, probably done in some profiles), specific integer transform, stabilized and more complete high-level syntax and HRD description (i.e., reference picture buffering, tiles, slices, and wavefronts enabling parallel decoding process). Finally, a prototype has been demonstrated decoding HEVC in software on an iPad 2 at WVGA resolution and the 10min Big Buck Bunny sequence at SD resolution with avg. 800 kbit/s which clearly outperformed the corresponding AVC versions.

Research issues: well, coding efficiency, what else? The ultimative goal to have a performance gain of more than 50% compared to the predecessor which is AVC.

Part 3: 3D Audio Coding (3DAC) is in its early stages but there will be an event during San Jose meeting which will be announced here. As of now, use cases are provided (home theatre, personal TV, smartphone TV, multichannel TV) as well as candidate requirements and evaluation methods. One important aspect seems to be user experience for highly immersive audio (i.e., 22.2, 10.2, 5.1) including bitstream adaptation for low-bandwidth and low-complexity.

Research issues: sorry, I'm not really an audio guy but I assume it's coding efficiency, specifically for 22.2 channels ;-)

Compact Descriptors for Visual Search (CDVS)

For CDVS, responses to the call for proposals (from 10 companies/institutions) have been evaluated and a test model has been established based on the best performing proposals. The next steps include the improvement of the test model towards for inclusion in the MPEG-7 standard.

Research issues: descriptor efficiency for the intended application as well as precision on the information retrieval results.

Multimedia Preservation Description Information (MPDI)

The aim of this new work item is to provide "standard technology helping users to preserve digital multimedia that is used in many different domains, including cultural heritage, scientific research, engineering, education and training, entertainment, and fine arts for long-term across system, organizational, administrative and generational boundaries". It comes along with two public documents, the current requirements and a call for requirements which are due at the 100th MPEG meeting in April 2002.

Research issues: What and how to preserve digital multimedia information?

Augmented Reality (AR)

MPEG's newest project is on Augmented Reality (AR), starting with an application format for which a working draft exists. Furthermore, draft requirements and use cases are available. These three documents will be available on Dec 31st.

Research issues: N/A

Finally, I hope now you can better understand what I've put at the beginning with all these acronyms ...

#MPEG98 report: DASH=IS ✔ CDVS=CfP eval ✔ {MMT, HEVC, 3DAudio}=MPEG-H ✔ IVC={IVC, WebVC} ✔ 3DVC=CfP eval ✔

Report from ED-Media 2011

Authors: Martin Ebner (Member of Steering Committee)
URL: http://www.aace.org/CONF/EDMEDIA
by Viktor Wendel

ED-MEDIA is an international conference on "Educational Multimedia, Hypermedia & Telecommunication" and started in 1993 as follow-up after 6 years of International Conferences on Computers and Learning (ICCAL). As a non-profit organization for the advancement of computers in education, AACE developed the ED-Media annual conference as a multi-disciplinary forum for the discussion and exchange of information on the research, development, and applications on all topics related to multimedia, hypermedia, telecommunications and distance education. Without the honorable work of AACE the conference would not be such a worldwide event.

Nowadays it is certainly one of the largest international conferences on these topics. About 1000 participants every year attend numerous sessions and workshops for 5 days. Two very fresh publications (Khan et al, 2009) (Mendez & Duval, 2009) pointed out the huge amount of contributions, the relationship of authors, the key players and lots of more trends. In 2008 for the very first time Twitter was used to support the conference by announcements and a live stream beside each keynote talk (Ebner, 2009).

So ED-Media conference stands for innovation in education and encourages their participants to collaborate not only at the conference but also later on.

In especially these economically rough times, the interdisciplinary exchange of ideas and research in the field of ICT and lifelong learning is of main importance to help solving today's society's problems. Working on one's individual competencies and knowledge is the key to employment and to a better life for individuals, education is important for countries and regions to be competitive in a global world... yes we have heard those lines many times before, but in fact it is true! We should also not forget that we need an educational- and training infrastructure that provides first class learning experiences to learners. Unfortunately that is often not the case. In our opinion, new technology, new pedagogy and new role models in teaching and research are extremely important and now needed more then ever!

Due to the fact that education is maybe the most important investment for our future, the topics of ED-Media are strongly focusing on the improvement of learning and teaching using digital technologies. Therefore it doesn't matter if we are talking of schoolchildren, students or even elder people in lifelong learning-programs. ED-Media aims to bring technologists, pedagogic and didactical specialist together on one central point to initiate discussions and exchange of information and newest research results.

Furthermore this year (in Lisbon, Portugal) three keynote speaker gave a deep impression of learning methodologies and technologies of tomorrow. Beside the intensive use of so-called Web 2.0 technologies for teaching and learning, the topic Open Educational Resources was the driving force of the conference. To get a further impression it can be stated that total of 512 full papers were submitted, of which 241 were accepted. Of these, 28 were nominated as outstanding papers and passed through a second round of reviews with the Steering Committee. Of these, a small number were selected as award winning papers. In addition, 362 brief papers were submitted of which 165 were accepted. 150 reviewers from around the world were involved in the review process.

Finally it must be pointed out, that the Steering Committee is very encouraged to integrate and assist our young academics. For that, Ed-Media is offering an excellent Graduate Student and Research Training Program during the conference for our young academics as well as supervisors, advisors, early career researchers. A series of presentation and a detailed program aimed to assist to get a professional enhancement in the field of research. In forthcoming years this initiative will be further improved and enhanced to allow young researchers get in touch with other academics, professors.

The exchange of research results and therefore the improvement of our education with the help of technologies is not only the main goal of the conference; it is simply its passion. So I would like to invite you all outside to our next event in the end of June in Denver, Colorado, US - become part of our big family and help to improve the worldwide education with your valuable work.

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of Research in Innovative Teaching (JRIT), 2(1):91-100, 2009.

Announcement: Open Source Software on sigmm.org

Authors: Pablo Cesar
URL: http://sigmm.org/Resources/software
by Pablo Cesar

The new Open Source Software section on SIGMM's webpage at sigmm.org contains information about open source multimedia software.

The intention is to provide a space for fostering better synergy between the multimedia and the open source communities. To facilitate the sharing of software developed by different researchers, we are providing an environment to share your software here. Your software should also include documentation giving all appropriate information to use it easily. Also, if the techniques behind the software have appeared in research publications, please include those references also.

The new section is still under construction, but you can already find information about the Open Source Software Competition of ACM Multimedia over the years with links to the project and to the published paper in the ACM Digital Library. You can already find more than 50 other relevant project including a link and short description.

We hope that you make good use of the new section and look forward to your feedback and inputs.

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Christian Timmerer, Klagenfurt University, Austria
Marco Bertini, Florence University, Italy

ACM Author-izer

Authors: (web page excerpt)
URL: http://www.acm.org/publications/acm-author-izer-service
by Klara Nahrstedt

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SIGMM Education Column: Practical Image and Video Processing Using MATLAB

Authors: Pradeep Atrey
URL: http://www.sigmm.org/Education
by Pradeep Atrey

SIGMM Education Column of this issue highlights a new book titled "Practical Image and Video Processing Using MATLAB", which provides a practical introduction to the most important topics in image and video processing, using MATLAB® (and its Image Processing Toolbox) as a tool to demonstrate relevant techniques and algorithms. The book is written by Prof. Oge Marques of Florida Atlantic University and it is published by Wiley-IEEE press.

This book was motivated by the lack of an introductory text that covered the basics of image and video processing using MATLAB® in a single volume, and therefore it focuses on providing a practical perspective the reader to develop working projects. It adopts a "just enough math" philosophy, which favors the computational, algorithmic, and conceptual aspects of the techniques described along the book, over excessive mathematical formalism.

As a result, the book should appeal not only to its original target audience when used as a textbook (namely, upper-level undergraduate and early graduate students in Computer Science, Computer Engineering, Electrical Engineering, and related courses), but also to researchers and practitioners who have access to MATLAB®, solid computing/programming skills, and want to teach themselves the fundamentals of image and video processing.

The book has been organized in two parts. Part I: Image Processing, begins with an overview of the field, then introduces the fundamental concepts, notation, and terminology associated with image representation and basic image processing operations. Next, it discusses MATLAB® and its Image Processing Toolbox with the start of a series of chapters with hands-on activities and step-by-step tutorials. These chapters cover image acquisition and digitization, arithmetic logic, and geometric operations; image enhancement techniques; image filtering techniques; image restoration; mathematical morphology; edge detection techniques; image segmentation; image compression and coding; and feature extraction and representation. Part II: Video Processing, presents the main concepts and terminology associated with analog video signals and systems, as well as digital video formats and standards. It then describes the technically involved problem of standards conversion, discusses motion estimation and compensation techniques, shows how video sequences can be filtered, and concludes with an example of solution to object detection and tracking in video sequences using MATLAB®.

In addition, there are two appendices in this book. Appendix A presents selected aspects of the human visual system that bear implications in the design of image and video processing systems. Appendix B provides a tutorial on how to develop Graphical User Interfaces (GUIs) in MATLAB®.

The book's companion website (http://www.ogemarques.com/) contains additional resources, such as: source code for all tutorials in the book and associated figures, sample materials and resources for instructors who adopt the textbook, an expanded and updated list of useful online resources organized by chapter, a forum which encourages discussions and exchanges among readers of the book and a blog, that is used to keep track of updates to the website as well as relevant posts on technical topics related to the book.

Award opportunities

Call for Nominations: ACM Transactions on Multimedia Computing, Communications and Applications Nicolas D. Georganas Best Paper Award

More informational: http://tomccap.acm.org/

The Editor in Chief of ACM TOMCCAP invites you to nominate candidates for the ACM Transactions on Multimedia Computing, Communications and Applications Nicolas D. Georganas Best Paper.

The award is given annually to the author(s) of an outstanding paper published in ACM TOMCCAP within the previous legal year from January 1 until December 31. The award carries a plaque as well as travel funds to the ACM MM conference where the awardee(s) will be honored. Nominations for the award must include the following:

- A statement describing the technical contributions of the nominated paper and a description of the significance of the paper. The statement should not exceed 500 words. No self-nomination is accepted.
- Two additional supporting statements by recognized experts in the field regarding the technical contribution of the paper and its significance to the respective field.

Nominations will be reviewed by the Selection Committee and the winning paper will finally be voted by the TOMCCAP Editorial Board.

Deadline for nominations of papers published in 2011 (Volume 7) is the 15th of June 2012. Only papers published in regular issues (no Special Issues) can be nominated.

Call for Proposals: ACM History Fellowship

More informational: http://history.acm.org/public/public_documents/acm_history_fellowship.php

The Association for Computing Machinery, founded in 1947, is the oldest and largest educational and scientific society dedicated to the computing profession, and today has 100,000 members around the world. To encourage historical research, the ACM History Committee plans to make two types of awards. Travel grants of $2,500 support smaller projects, while a fellowship grant of $5,000 may support a larger or more demanding project. Projects should focus on ACM activities, including those of members, officers, and prize winners, or ACM's rich institutional history, including consideration of its organization, publications, SIG activities, and conferences. Successful candidates may be of any rank, from graduate students through senior researchers. The current and past winners of the fellowship can be found here.

PhD thesis abstracts

Andreas Reinhardt

Designing Sensor Networks for Smart Spaces - Unified Interfacing and Energy Efficient Communication between Wireless Sensor and Actuator Nodes

Wireless sensor and actuator networks are comprised of embedded systems with sensing, actuation, computation, and wireless communication capabilities. Their untethered character provides installation flexibility and has in consequence led to their application in a large range of domains, e.g. environmental and habitat monitoring, or industrial process surveillance and control. Besides these traditional application areas, the vision of smart spaces foresees the transparent integration of sensing and actuation components into everyday environments. Smart services that rely on information about the current situation and the possibility of physical interaction are envisioned to emerge in versatile ways, such as context-aware building automation or support for ambient assisted living.

From a technological perspective, wireless sensor and actuator networks represent an adequate infrastructure for the realization of smart spaces. As a result of the different application scenarios however, concepts resulting from research on traditional sensor and actuator networks can only be applied to a limited extent. Most prominently, the heterogeneous nature of devices in smart environments necessitates dedicated means to cater for their interoperability. At the same time, the need for small-sized devices entails tight resource and energy constraints, which need to be carefully regarded during application design. Finally, the collection and wireless transmission of data from mobile entities play a vital role in smart environments, whereas they are rarely considered in traditional sensor network deployments. We address the requirements of smart environments by presenting the Sensor-RPC framework, which enables the generic interoperability between diverse wireless sensor and actuator devices. The presented solution applies the remote procedure call paradigm to abstract from the underlying hardware platforms, i.e. sensing, processing, and actuation functionalities are encapsulated into remotely invocable functions. Sensor-RPC makes use of binary packet representations and a modular parameter serialization concept in order to ensure its efficient applicability on resource-constrained embedded systems. In order to maximize the utilization of the available energy budget, Sensor-RPC is complemented by Squeeze.KOM, a framework for lossless packet payload compression. Squeeze.KOM takes temporal correlations between successive data packets into account and exploits the observed similarities in order to reduce the size of transmitted packets, and thus the energy demand of their transmission. Depending on the characteristics of the underlying data, the actual data compression step is realized by means of binary distance coding of packet differences, or by applying adaptive Huffman coding with a code tree of limited size. Both take advantage of the specific properties of real-world sensor data sets, in which strongly biased symbol distributions are frequent. Besides the lossless compression of packet payloads, the further reduction of packet sizes by means of header compression is presented. Our stateful header compression mechanism SFHC.KOM omits header fields with constant or deterministically changing values from their transmission by encapsulating them into so called compression contexts. Tailored to its application in smart spaces, SFHC.KOM adapts to the presence of both static and mobile nodes. The practicality of the devised solutions is investigated through prototypical implementations and the validation of their function on widely adopted wireless sensor and actuator node platforms. We substantiate the evaluations of the presented solutions by detailed analyses of their resource and energy demands. In order to assess the applicability of the contributions in smart environments, real-world data traces from the envisioned application scenario have been collected and extensively used in simulations.

Advisor(s): Ralf Steinmetz (supervisor), Adam Wolisz (Gutachter), Matthias Hollick (Gutachter)
SIG MM member(s): Ralf Steinmetz
http://tuprints.ulb.tu-darmstadt.de/2844/

Sensor Network Technology Area at KOM

The research carried our within the Sensor Network Technology Area at KOM finds applications in diverse fields. Some of these are:

- Logistics Monitoring and Transportation Optimization
- Industry/Factory Automation
- Smart Communication Services
- Green/Smart Houses and Buildings
- Ambient Intelligent Systems

Our research in this area encompasses analytical tools, simulation studies, user tests, as well as design and development of a heteregenous sensor network testbed platform.

Manfred del Fabro

Non-Sequential Decomposition, Composition and Presentation of Multimedia Content

This thesis discusses three major issues that arise in the context of non-sequential usage of multimedia content, i.e. a usage, where users only access content that is interesting for them. These issues are (1) semantically meaningful segmentation of videos, (2) composition of new video streams with content from different sources and (3) non-sequential presentation of multimedia content.

A semantically meaningful segmentation of videos can be achieved by partitioning a video into scenes. This thesis gives a comprehensive survey of scene segmentation approaches, which were published in the last decade. The presented approaches are categorized based on the underlying mechanisms used for the segmentation. The characteristics that are common for each category as well as the strengths and weaknesses of the presented algorithms are stated. Additionally, an own scene segmentation approach for sports videos with special properties is introduced. Scenes are extracted based on recurring patterns in the motion information of a video stream.

Furthermore, different approaches in the context of real-life events are presented for the composition of new video streams based on content from multiple sources. Community-contributed photos and videos are used to generate video summaries of social events. The evaluation shows that by using content provided by a crowd of people a new and richer view of an event can be created. This thesis introduces a new concept for this emerging view, which is called ``The Vision of Crowds''.

The presentation of such newly, composed video streams is described with a simple but powerful formalism. It provides a great flexibility in defining the temporal and spatial arrangement of content. Additionally, a video browsing application for the hierarchical, non-sequential exploration of video content is introduced. It is able to interpret the formal description of compositions and can be adapted for different purposes with plug-ins.

Advisor(s): Laszlo Böszörmenyi (1st supervisor), Klagenfurt University
SIG MM member(s): Manfred del Fabro, Laszlo Böszörmenyi, Alan Hanjalic

Distributed Multimedia Systems Group

www.aau.at/tewi/inf/itec/dms/

Current research topics:

- Self-organizing Content Delivery
- Interactive Image and Video Search
- Multimedia Content Visualization
- Social Aspects of Multimedia Information Systems
- User-centered Multimedia Information Retrieval
- Creating Summaries and Stories out of Large Social Events
- Applications in the Medical Domain (Endoscopy) and in Traffic Surveillance

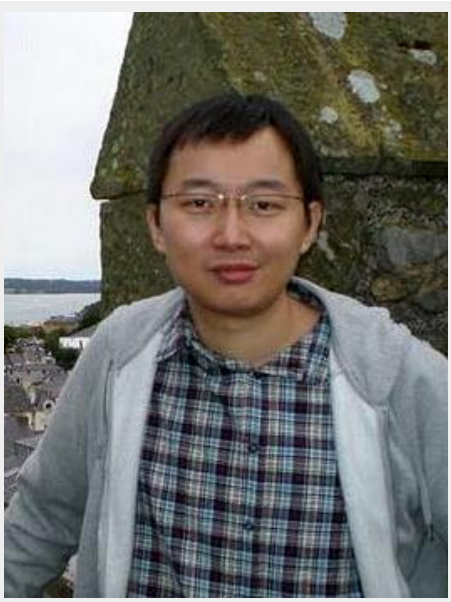
While our main interest lies in basic research, we aim to actively participate in the international scientific community and strive to apply our results in close cooperation with industry.

Mu Mu

Parametric Assessment of Video Quality in Content Distribution Networks

IP-based packet-switched networks have become one of the main content distribution platforms for emerging multimedia services such as IPTV, thanks to the rapidly growing bandwidth and exclusive inter-networking and interactivity features of IP-based networks. Meanwhile, high quality video content services are becoming particularly popular within content delivery networks (CDN). During content distribution, packets of encoded video streams can be delayed, corrupted or dropped due to network impairments in packet-switched networks. This leads to perceptual quality degradations of the delivered content at receiver. Although network impairments are rare in commercial managed networks, any distortion caused by impairments can be highly detrimental to end users' experience. Consequently the ability to meet customer expectations on video quality has become a critical service differentiator. Quality of Experience (QoE) that was merely recognised as a

value-added service of traditional content distribution services is now one of the fundamental requirements and challenges of providing high quality video services. In order to maintain a high level of user experience throughout the life-cycle of a video service, a service quality measurement and management service must be established.



The thesis first outlines the problem space of video content distribution in packet-switched networks and motivates the in-service quality assessment model to evaluate quality degradation caused by the content loss effect. This is followed by the background research which explores the key elements and mechanisms of video content distribution systems including video codecs, content encapsulation, packet-switched networks and content presentation in conjunction with discussion of human vision and end user expectations. The potential causes of quality degradation and factors that could influence the perceptual impact of degradation in distribution systems are also discussed.

A detailed analysis of existing objective evaluation methodologies with regard to the performance in accessing user experience and the feasibility of implementing them in video content distribution networks is also carried out. It is concluded that quality of delivery (QoD) is the critical part of the overall acceptability of a video service and should be assessed in-service. Further, packet analysis is the ideal method of providing such an in-service assessment in distribution networks due to its operational nature.

In order to investigate the origin, appearance and perception of content loss in the distribution network, initial subjective experiments are necessary. One of the prerequisites of these experiments is the use of a testbed system that processes the source video content and produces test sequences for the experiment according to the test plan. The testbed system is also an essential tool for designing and validating the objective QoE model. The LA2 testbed system has been developed for the development and evaluation of objective quality assessment models. Under the framework of the LA2 system, operational functions (such as deep packet inspection and header analysis) of the proposed model have been realised. The LA2 system facilitates the efficient generation of test sequences for subjective experiments according to designated test plans with multiple functional modules such as the network impairment emulator (NIE) and configuration tools. The testbed system has been used to facilitate early exploratory data analysis which leads to the formulation of relevant scientific questions and helps to establish further quantitative data analysis. Test results prove that the perceivable impact of content loss on video content is determined by the joint influence of multiple impact factors.

With the results from analytical study and a number of exploratory tests, a discrete parametric assessment model to provide high performance in-service video quality measurements is introduced. A distinctive discrete network analysis methodology is outlined followed by details of three key functions: packet inspection, perceptual impact assessment and impact aggregation. Content factors, error factors, system factors, and user factors are identified as the essential impact factors from the modelling. Each impact factor is composed by one or multiple impact indices reflecting different aspects of the impact effect. Quantitative metrics are also defined for each impact index.

The thesis then elaborates on the subjective experiment and modelling efforts to realise the perceptual impact assessment model. Source content selection, test condition design, test environment establishment, and test procedures are introduced. After an overview of the observed user opinion scores obtained in the subjective, the analysis of the statistical inference process, including model specification, estimation of model parameters and estimation of precision, which are relevant to the modelling of assessment functions are introduced. Two assessment functions have been derived to evaluate the dichotomous and polytomous visibility of content loss respectively. Both functions provide high performance estimations according to their fitness to the subjective data.

Advisor(s): Andreas Mauthe (Supervisor), Ralf Steinmetz(Examiner)
SIG MM member(s): Andreas Mauthe, Ralf Steinmetz

School of Computing and Communications

http://www.scc.lancs.ac.uk/

Event and publication reports

MMSJ, Volume 17, Issue 6, November 2011

Editor-in-Chief: Thomas Plagemann
URL: http://www.springer.de/
Published: June 2011

Papers

- Abdelkrim Abdelli and Nadjib Badache: *Context-aware adaptation of multimedia documents for consistent presentations*
- Ombretta Gaggi and Annalisa Bossi: *Analysis and verification of SMIL documents*
- Wilson Cheruiyot, Guan-Zheng Tan, Felix Musau and Joseph Cosmas Mushi: *Query quality refinement in singular value decomposition to improve genetic algorithms for multimedia data retrieval*
- Yong Wei, Suchendra M. Bhandarkar, Kang Li and Lakshmish Ramaswamy: *Video personalization in heterogeneous and resource-constrained environments*

TOMCCAP, Volume 7, Issue 4, November 2012

Editor-in-Chief: Ralf Steinmetz
URL: http://tomccap.acm.org/
Sponsored by ACM SIG Multimedia
Published: November 2012

Papers

- Richang Hong, Jinhui Tang, Hung-Khoon Tan, Chong-Wah Ngo, Shuicheng Yan, Tat-Seng Chua: *Beyond search: Event-driven summarization for web videos*
- Wen-Kuang Kuo, Kuo-Wei Wu: *Traffic prediction and QoS transmission of real-time live VBR videos in WLANs*
- Namunu C. Maddage, Haizhou Li: *Beat space segmentation and octave scale cepstral feature for sung language recognition in pop music*
- Simone Santini: *Efficient computation of queries on feature streams*
- Renato Verdugo, Miguel Nussbaum, Pablo Corro, Pablo Nuñez, Paula Navarrete: *Interactive films and coconstruction*
- Shahram Ghandeharizadeh, Shahin Shayandeh: *Domical cooperative caching for streaming media in wireless home networks*

TOMCCAP, Volume 7S, Issue 1, October 2012

Editor-in-Chief: Ralf Steinmetz
URL: http://tomccap.acm.org/
Sponsored by ACM SIG Multimedia
Published: October 2012

Due to increased submissions, we have decided to introduce a supplemental online-only issue. The 2011 issue, available in ACM's Digital Library, contains the extended versions of ACM Multimedia 2010 best papers and a special issue on social media.

Papers

- Shervin Shirmohammadi, Jiebo Luo, Jie Yang, Abdulmotaleb El Saddik: *Introduction to ACM multimedia best paper candidates*
- Subhabrata Bhattacharya, Rahul Sukthankar, Mubarak Shah: *A holistic approach to aesthetic enhancement of photographs*
- Shulong Tan, Jiajun Bu, Chun Chen, Bin Xu, Can Wang, Xiaofei He: *Using rich social media information for music recommendation via hypergraph model*
- Simone Milani, Giancarlo Calvagno: *A cognitive approach for effective coding and transmission of 3D video*
- Richang Hong, Meng Wang, Xiao-Tong Yuan, Mengdi Xu, Jianguo Jiang, Shuicheng Yan, Tat-Seng Chua: *Video accessibility enhancement for hearing-impaired users*
- Susanne Boll, Ramesh Jain, Jiebo Luo, Dong Xu: *Introduction to special issue on social media*
- Yu-Ching Lin, Yi-Hsuan Yang, Homer H. Chen: *Exploiting online music tags for music emotion classification*
- Mohamad Rabbath, Philipp Sandhaus, Susanne Boll: *Automatic creation of photo books from stories in social media*
- Weiming Hu, Haiqiang Zuo, Ou Wu, Yunfei Chen, Zhongfei Zhang, David Suter: *Recognition of adult images, videos, and web page bags*
- Yu-Ru Lin, K. Selcuk Candan, Hari Sundaram, Lexing Xie: *SCENT: Scalable compressed monitoring of evolving multirelational social networks*

- Jitao Sang, Changsheng Xu: *Browse by chunks: Topic mining and organizing on web-scale social media*
- Rongrong Ji, Yue Gao, Bineng Zhong, Hongxun Yao, Qi Tian: *Mining flickr landmarks by modeling reconstruction sparsity*
- Michael I. Mandel, Razvan Pascanu, Douglas Eck, Yoshua Bengio, Luca M. Aiello, Rossano Schifanella, Filippo Menczer: *Contextual tag inference*
- Joan-Isaac Biel, Daniel Gatica-Perez: *VlogSense: Conversational behavior and social attention in YouTube*

Calls for contributions

Calls for SIGMM Sponsored and Co-sponsored Events

ACM International Conference on Multimedia (MM)

Full paper Deadline: April 2, 2012
Event location: Nara, Japan
Event date: October 29 - November 2, 2012
URL: http://www.acmmm12.org/

Since the founding of ACM SIGMM in 1993, ACM Multimedia has been the worldwide premier conference and a key world event to display scientific achievements and innovative industrial products in the multimedia field. In ACM Multimedia 2012, we will celebrate its twentieth anniversary with an extensive program consisting of technical sessions covering all aspects of the multimedia field in both forms of oral and poster presentations, tutorials, panels, exhibits, demonstrations and workshops bringing into focus the principal subjects of investigation, competitions of research teams on challenging problems, and also an interactive art program stimulating artists and computer scientists to meet and discover together the frontiers of artistic communication.

SIGMM Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV)

Full paper Deadline: March 1, 2012, 23:59 EST
Event location: Toronto, Canada
Event date: June 7 - 8, 2012
URL: http://london.csl.toronto.edu/nossdav12/

The workshop seeks research papers in all areas of multimedia networking and systems, especially papers that discuss system-level support for social media and social networking, improving performance with multi-core and many-core processors, as well as papers that focus on multimedia applications on mobile devices and/or in a cloud computing environment.

4th International Conference on Internet Multimedia Computing and Service (ICIMCS)

Full paper Deadline: May 29, 2012
Event location: Wuhan, China
Event date: September 9-12, 2012
URL: http://www.icimcs2012.org/

ICIMCS 2012 will provide a forum for researchers and engineers in both academia and industry to exchange the latest innovations and research advancements in Internet multimedia processing, analysis and services. ICIMCS 2012 also provides the attendees the chances to identify the emerging research topics, as well as the future development directions of internet multimedia computing and services.

Calls for Events held in cooperation with SIGMM

Sixth ACM/IEEE International Conference on Distributed Smart Cameras (ICDSC)

Full paper Deadline: June 10, 2012
Event location: Hongkong
Event date: October 30 - November 2, 2012
URL: http://www.icdsc.org

Technological developments in imaging, processing, and networking have created an opportunity for multi-disciplinary approaches to applications based on vision. The extensive availability and use of cameras in various application domains calls for the study of new embedded processing systems and algorithms.

International Conference on Multimodal Interaction (ICMI)

Full paper Deadline: Spring 2012
Event location: Santa Monica, CA, USA
Event date: October 22-26, 2012
URL: http://www.acm.org/icmi/2012/

ICMI is the premier international forum for multidisciplinary research on multimodal human-human and human-computer interaction, interfaces, and system development. The conference focuses on theoretical and empirical foundations, component technologies, and combined multimodal processing techniques that define the field of multimodal interaction analysis, interface design, and system development.

EuroITV

Full paper Deadline: January 21, 2012
Event location: Berlin, Germany
Event date: July 4-6, 2012
URL: http://www.euroitv2012.org/

EuroITV is the leading international conference for media and interaction related to video and television. This year's theme of "Bridging People, Places and Platforms" focuses on synergies to support current practice and to explore new perspectives - empowering users to interact with content and each other across localities and across various delivery platforms and media.

Other multimedia-related Events

Workshop on Multimedia-Aware Networking 2012 (TEMU)

Full paper Deadline: March 25, 2012
Event location: Heraklion, Crete, Greece
Event date: July 30 - August 01, 2012
URL: http://www.temu.gr/Special%20Sessions.html

This workshop solicits novel contributions and breaking results on all aspects of multimedia-aware networking. In particular, workshop papers should describe algorithms, issues and experiences related to content-aware networking and network-aware applications, future (media) Internet architectures, User-Generated Content and High-popularity VoD.

The 3rd FTRA International Workshop on Multimedia and Semantic Technologies (MUST)

Full paper Deadline: January 15, 2012
Event location: Vancouver, Canada
Event date: June 26-28, 2012
URL: http://www.ftrai.org/must2012/

The 3rd FTRA International Workshop on Multimedia and Semantic Technologies (MUST'12) aims at high quality research contributions in multimedia semantic computing, with a focus on how to apply the semantic technologies to the acquisition, generation, storage, processing, and retrieval of large-scale multimedia information.

10th International Workshop on Content-Based Multimedia Indexing (CBMI)

Full paper Deadline: January 27, 2012
Event location: Annecy, France
Event date: June 27-29, 2012
URL: http://www.polytech.univ-savoie.fr/index.php?id=cbmi2012

The 10th International CBMI Workshop aims at bringing together the various communities involved in all aspects of content-based multimedia indexing, retrieval, browsing and presentation. The scientific program of CBMI 2012 will include invited keynote talks and regular, special and demo sessions with contributed research papers.

4th International Workshop on Advances in Music Information Research: The Web of Music (AdMIRe)

Full paper Deadline: January 22, 2012
Event location: Barcelona, Spain
Event date: April 17, 2012
URL: http://www.cp.jku.at/conferences/AdMIRe2012/

The International Workshop on Advances in Music Information Research (AdMIRe) serves as a forum for theoretical and practical discussions of cutting edge research on Web technologies for music information research. Topics covered include Web mining for music information extraction, retrieval, and recommendation as well as mobile applications and services that make use of Web 2.0 technology. Submissions addressing concrete implementations of systems and services by both academic institutions and industrial companies are also welcome.

11th International Conference on Entertainment Computing (ICEC)

Full paper Deadline: April 1, 2012
Event location: Bremen, Germany
Event date: September 26, 2012

URL: http://icec2012.org/

The IFIP International Conference on Entertainment Computing explores the application of computational technology to entertainment. The conference brings together practitioners and researchers interested in the art and design of entertainment computing applications. ICEC welcomes submissions on the design, engineering, application and theory of entertainment technology.

ICME Multimedia Demonstration Sessions

Full paper Deadline: March 5th, 2012
Event location: Melbourne, Australia
Event date: July 9th-13th, 2012
URL: http://www.icme2012.org/TechnicalProgram_Demo.php

We request proposals for demonstrations from the multimedia community, including academic institutes, research labs, and industry. Submissions are encouraged in all areas related to multimedia, including 3D-multimedia and immersive technologies, computer-human interfaces, haptics, wireless multimedia applications, multimedia-based-security, content analysis, content-based retrieval, multimedia databases, multimedia authoring, media-rich social networks, rich-media advertising.

ICME 2012 Expert Talks on Innovating the Future Leveraging the Past - Time Machine Session

Full paper Deadline: March 5th, 2012
Event location: Melbourne, Australia
Event date: July 9th-13th, 2012
URL: http://www.icme2012.org/TechnicalProgram_ExpertTalk.php

The Time Machine Session at the ICME 2012 is dedicated to the principle of improving the future by leveraging valuable insights from the past. The session will consist of a series of expert-talks that re-introduce ideas that were published "before their time" and, as a result, were never fully exploited.

International Workshop on Image Analysis for Multimedia Interactive Services (WIAMIS)

Full paper Deadline: Feb. 3, 2012
Event location: Dublin, Ireland
Event date: May 23-25, 2012
URL: http://wiamis.dcu.ie/

The objective of the workshop is to bring together researchers and developers from academia and industry working in the areas of image, video and audio applications, with a special focus on analysis.

Free Material

Utrecht Multi-Person Motion (UMPM) benchmark

URL: http://www.projects.science.uu.nl/umpm/

At Utrecht University, we have created the Utrecht Multi-Person Motion (UMPM) benchmark to evaluate human motion capturing algorithms for multiple subjects in a similar way as HumanEva does for a single subject. It includes 10 different multi-person scenarios including interaction, each with 1-4 persons. Per scenario, we provide four synchronized color video sequences of 30-60 sec at 644x484 and 50 fps, motion capture data at 100 fps for at most 2 persons, calibration data and background images. The UMPM benchmark is available to the research community.

For further questions, please contact us at UMPM@science.uu.nl.

Back matter

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