

The 5th International Workshop on Multimedia Data Mining (MDM/KDD2004)

Latifur Khan
Computer Science Department
University of Texas at Dallas
EC 31, Richardson, TX 75083, USA
lkhan@utdallas.edu

Valery A. Petrushin
Accenture Technology Labs
161 N. Clark Street
Chicago, IL 60601, USA
valery.a.petrushin@accenture.com

ABSTRACT

In this short report we summarize the presentations, conclusions and directions of future work that were discussed during MDM/KDD2004 workshop, held in conjunction with the 11th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, August 22, 2004 at Seattle, Washington, USA.

Keywords

Multimedia data mining, multimedia information retrieval, knowledge discovery, semantic image classification, clustering, video analysis.

1. INTRODUCTION

The fifth international workshop on Multimedia Data Mining is a continuation of series of past workshops (MDM/KDD 2000 held in Boston, USA, MDM/KDD 2001 held in San Francisco, USA, MDM/KDD 2002 held in Alberta, Canada, MDM/KDD 2003 held in Washington DC, USA) under the auspices of the ACM SIGKDD forums. The theme of this most recent workshop was "Mining Integrated Media and Complex Data." The workshop focused on issues specifically related to mining information in integrated form from multi-modality, multi-source, and multi-format data sources. With the current state of the art of multimedia technology, data are collected from several sources, including databases, streaming data, web pages, etc. Furthermore, the collected data appears in multiple forms, including numeric, structured or free text, video, image, speech or in the form of combinations of several types. Therefore, the analysis and mining of this data requires combining various techniques and methods of integration. Hence, submission of papers on the following topics was invited:

- Integration of mining techniques
- Multimedia mining methods and algorithms
- Multi-format mining application
- Data preparation, manipulation, and integration
- Data presentation, representation of results, and usage of results

Program committee members of this workshop have been extended in comparison to past workshops in order to cover a wide range of topics (see PC members list below) and represent ten countries: Australia, Azerbaijan, Belgium, Canada, France, Germany, Singapore, Slovenia, UK, and USA. A substantial number of high quality papers were submitted to the workshop from seven different countries: Australia, Czech Republic, France, India, Germany, Spain, and USA. Each paper was reviewed at

least by three program committee members. The thirteen papers were selected for publication and presentation at the workshop.

The workshop was organized into an opening talk, an invited talk, two sessions and general discussion. The opening talk that focused on the history of the Workshop and the current state of the art in the field was given by Dr. Latifur Khan. The invited talk (the first one in the history of the MDM Workshop) "Multimedia is Correlated Media." was given by Prof. Forouzan Golshani (Wright State University, USA). In his talk, Prof. Golshani outlined a series of toolsets for collectively allowing cross-modal data fusion and providing the capabilities for search and retrieval along with live demonstrations.

2. CONTRIBUTED PAPERS

The first session chaired by Dr. Valery Petrushin included six papers related to *theory, methodology and tools for multimedia data mining*.

In the first paper Chuanjun Li, Punit R. Kulkarni, Li Liu, B. Prabhakaran, and Latifur Khan (University of Texas at Dallas, USA) presented their work on *Real-time Classification of Multivariate Motion Data Using Support Vector Machines*. The authors introduced a methodology for mapping multi-dimensional data along with different lengths to characteristic vectors by using singular value decomposition. This allows efficiently classifying and recognizing real world multivariate motion data by using support vector machine techniques based on characteristic vectors. In the second paper K. Selçuk Candan, Jong Wook Kim, Huan Liu, and Reshma Suvarna (Arizona State University, USA) presented the effectiveness of *Structure-based Mining of Hierarchical Media Data, Meta-Data, and Ontologies*. The authors presented a new approach that can relate the common and uncommon terms and media components, and automatically discover mappings in hierarchical media data, meta-data, and ontologies, using the structural information inherent in these types of data. In the third paper Ankur Teredesai, Juveria Kanodia, Muhammad Ahmad, Roger Gaborski (Rochester Institute of Technology, USA) proposed *CoMMA: A Framework for Integrated Multimedia Mining using Multi-relational Associations*. The authors posed the auto-annotation problem as a multi-relational association rule mining problem where the relations exist between image-based features, and textual annotations. Their approach combined low-level image features, such as color, orientation, intensity, etc. and the corresponding text annotations to generate association rules across multiple tables using multi-relational association mining. The authors

presented a multi-relational extension to the FP-Tree algorithm to accomplish the association rule mining task more effectively if compared to the currently used de-centralized version of the a priori algorithm. In the fourth paper Karin Kailing, Hans-Peter Kriegel, Martin Pfeifle, Stefan Scheonauer (University of Munich) presented their work on *Efficient Indexing of Complex Objects for Density-based Clustering*. The authors proposed an efficient search for similar objects in complex data (e.g., chemical compounds, CAD drawings or XML data). The general problem of similarity measures suggested for complex objects is their computational complexity, which makes them unusable for large databases. The authors combined and extended the two techniques of metric index structures and multi-step query processing to improve the performance of range query processing. In the fifth paper Menno Israel, Egon L. van den Broek, Peter van der Putten (ParaBot Services b.v., University of Nijmegen, and University of Leiden, Netherlands), presented their work on *Automating the Construction of Scene Classifiers for Content-Based Video Retrieval*. The authors introduced a real time automatic scene classifier for use within content-based video retrieval. The classifier consists of a two stage procedure. First, small image fragments called patches are classified. Then frequency vectors of these patch classifications are fed into a second classifier for global scene classification (e.g., city, portraits, or countryside). In the last paper Horst Eidenberger, and Roman Divotkey (Vienna University of Technology, Austria) presented their work on *A Data Management Layer for Visual Information Retrieval*. The authors described the data management layer of the VizIR visual information retrieval project, which is an open source framework of software tools for visual retrieval research. They proposed various techniques for storing feature vector efficiently in persistence storage to accelerate the retrieval process.

The second session chaired by Dr. Chabane Djeraba and Dr. Latifur Khan included seven papers that were devoted to *multimedia data mining techniques and applications*.

In the first paper, Gang Wei, Valery A. Petrushin, Anatole V. Gershman (Accenture Technology Labs, USA) presented an approach to *Multiple-Camera People Localization in a Cluttered Environment*. The authors suggested a probabilistic framework for merging streaming data from multiple sensors. This framework was combined with agent-based technology and knowledge based techniques for the multiple camera indoor surveillance project, which objective is exploited to identify and track people and summarize their activities. The authors presented a people localization system, which identifies and roughly localizes people in an indoor environment. In the second paper, Charles Daniel and Qin Ding (Pennsylvania State University) proposed their research on *A Framework for Bayesian Classification on Banner Images*. The authors presented a data mining application on a special type of images, i.e., banner images. A banner image is an image that is displayed on a website and used for an advertisement of some product. They proposed a framework called Bayesian Banner Profiler by applying Bayesian Classification to predict the category of click-thru rates based on the attributes extracted from the banner images. In the third paper, Pavel Praks, Libor Machala, Václav Snásel (Palacky University, and TU Ostrava, Czech Republic) presented their research on *Iris Recognition Using the SVD-Free Latent Semantic Indexing*. A human eye iris has its unique structure given by pigmentation spots, furrows and other tiny features that are stable throughout life. The authors presented

a method for an automatic verification of people by iris recognition using the Latent Semantic Indexing (LSI) method. In the fourth paper, Younes Hafri, Chabane Djeraba (University of Sciences and Technologies of Lille, France) presented their research on *Web User's Profile Detection*. The authors proposed techniques that make possible prediction of future states to be visited in k steps corresponding to k hyper-linked web pages based on both content and traversed paths. In the fifth paper Zhongnan Zhang, Weili Wu, Ping Deng (University of Texas at Dallas, USA) reported on their research on *Mining Dynamic Spatio-Temporal Association Rules for Local-scale Weather Prediction*. They proposed a DYSTAL (Dynamic Spatio-Temporal Association rules for Local-scale weather prediction) approach to discover meteorological variables that have some special change tendency (such as temperature, pressure, dew point, wind clouds, visibility and present outlook). In the sixth paper, Rafael Ramirez, Amaury Hazan, Emilia Gomez, Esteban Maestre (Pompeu Fabra University, Spain) presented *A Machine Learning Approach to Expressive Performance in Jazz Standards*. The authors described an approach to performing expressive transformation in monophonic Jazz melodies. Their approach consisted of three components. The first component (melodic transcription component) extracted a set of acoustic features. The second component (a machine learning component) induced expressive transformation models from the set of extracted acoustic features. The final component (a melody synthesis one) generated expressive monophonic output from inexpressive melody descriptions using the induced expressive transformation model. In the last paper, Alexandre S. Saidi (Ecole Centrale de Lyon, France) presented results of his research on *Using Linguistic Structures in Textual Information Extraction*. The author showed how the grammatical induction can help extract the partial structure of the sublanguages used in a text.

Finally, the workshop concluded with a stimulating open discussion.

3. CONCLUSION

In the open discussion which concluded the workshop ongoing difficulties in extracting relevant and accurate knowledge from multimedia data sets were noted, despite continuing and increasing efforts in the field of multimedia data mining during the last four years. On the other hand, slow, but steady progress is being made in this promising domain of research and development, as the contributions to this workshop demonstrate.

Overall, the MDM/KDD2004 Workshop can be considered as a success. The opportunity for exchanging ideas and extending the research community in the data mining area was deeply appreciated. A strong commitment to continuing this event on an annual basis was made by all participants. The workshop URL is <http://community.techlabs.accenture.com/MDMKDD2004/Index.html>

4. ACKNOWLEDGMENTS

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5. WORKSHOP CO-CHAIRS

Latifur Khan – University of Texas at Dallas, USA
Valery A. Petrushin - Accenture Technology Labs, USA

6. WORKSHOP STEERING COMMITTEE

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Simeon J. Simoff - University of Technology Sydney, Australia
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Debbie Zhang - University of Technology Sydney, Australia
Wensheng Zhou - HRL Laboratories, LLC, USA
Djamel Zighed - ERIC, France