# Lecture Notes in Computer Science

4577

Commenced Publication in 1973
Founding and Former Series Editors:
Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

#### **Editorial Board**

David Hutchison

Lancaster University, UK

Takeo Kanade

Carnegie Mellon University, Pittsburgh, PA, USA

Josef Kittler

University of Surrey, Guildford, UK

Jon M. Kleinberg

Cornell University, Ithaca, NY, USA

Friedemann Mattern

ETH Zurich, Switzerland

John C. Mitchell

Stanford University, CA, USA

Moni Naor

Weizmann Institute of Science, Rehovot, Israel

Oscar Nierstrasz

University of Bern, Switzerland

C. Pandu Rangan

Indian Institute of Technology, Madras, India

Bernhard Steffen

*University of Dortmund, Germany* 

Madhu Sudan

Massachusetts Institute of Technology, MA, USA

Demetri Terzopoulos

University of California, Los Angeles, CA, USA

Doug Tygar

University of California, Berkeley, CA, USA

Moshe Y. Vardi

Rice University, Houston, TX, USA

Gerhard Weikum

Max-Planck Institute of Computer Science, Saarbruecken, Germany

Nicu Sebe Yuncai Liu Yueting Zhuang Thomas S. Huang (Eds.)

# Multimedia Content Analysis and Mining

International Workshop, MCAM 2007 Weihai, China, June 30-July 1, 2007 Proceedings



#### Volume Editors

Nicu Sebe University of Amsterdam Faculty of Science, The Netherlands E-mail: nicu@science.uva.nl

Yuncai Liu

Shandong University, China E-mail: whomliu@sjtu.edu.cn

Yueting Zhuang Zhejiang University, China E-mail: yzhuang@cs.zju.edu.cn

Thomas S. Huang University of Illinois at Urbana-Champaign, USA E-mail: huang@ifp.uiuc.edu

Library of Congress Control Number: 2007929552

CR Subject Classification (1998): H.5.1, H.3, H.5, C.2, H.4, I.2-4, E.3, K.6

LNCS Sublibrary: SL 3 – Information Systems and Application, incl. Internet/Web and HCI

ISSN 0302-9743

ISBN-10 3-540-73416-3 Springer Berlin Heidelberg New York ISBN-13 978-3-540-73416-1 Springer Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.

Springer is a part of Springer Science+Business Media

springer.com

© Springer-Verlag Berlin Heidelberg 2007 Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India Printed on acid-free paper SPIN: 12085408 06/3180 5 4 3 2 1 0

#### **Preface**

Welcome to the International Workshop on Multimedia Content Analysis and Mining, MCAM 2007. Our workshop gives a snapshot of the current world-wide research in multimedia analysis. Through recent advances in computing, networking, and data storage, multimedia will create new interesting technical possibilities in a wide range of fields, such as entertainment, commerce, science, medicine, and public safety. To benefit from this potential, developers need reliable techniques for the analysis, search, and management of multimedia data, as well as distributed system architectures in which these techniques can be embedded to effectively help the users.

Recently, there have been many workshops and meetings dedicated to Multimedia, but most of them followed the standard pattern consisting mainly of oral and poster presentations. We all feel that there is a need for a meeting that really is a workshop, i.e., one that provides a lot of opportunities for discussions and dissemination. Consequently, the format of the workshop consists of 4 panels on hot topics in multimedia followed by discussions and poster presentations. The topics of the panels are: Multimedia Analysis and Applications, Multimedia Search and Mining, P2P Streaming, and Security. This volume contains a number of invited contributions from experts in the area as well as the selected regular contributions.

This year 139 submissions from 13 countries were submitted and 46 were accepted for presentation at the conference after being reviewed by the Program Committee members.

We would like to thank all members of the Program Committee, as well as the additional referees listed below, for their help in ensuring the quality of the papers accepted for publication. We would also like to thank the Organizing Committee for all their efforts in making this workshop happen.

April 2007

Nicu Sebe Yuncai Liu Yueting Zhuang

# International Workshop on Multimedia Content Analysis and Mining 2007 Organization

#### Organizing Committee

Honorary Chair Tao Zhan, Shandong University, China

General Chairs Thomans S. Huang, University of Illinois at

Urbana-Champaign, USA

Arnold Smeulders, University of Amsterdam,

The Netherlands

Dongfeng Yuan, Shadong University, China

Program Chairs Yuncai Liu, Shanghai Jiao Tong University, China

Nicu Sebe, University of Amsterdam, The Netherlands

Yueting Zhuang, Zhejiang University, China

International Steering

Committee

Wen Gao, Chinese Academy of Sciences, China Shih-Fu Chang, Columbia University, USA

Kiyo Aizawa, University of Tokyo, Japan

Hong Jiang Zhang, Microsoft Research Asia, China Alan Smeaton, Dublin City University, Ireland Ed Chang, University of California, Santa Barbara,

USA & Google, China

Bob Liang, Intel Research, USA

### **Program Committee**

Kiyo Aizawa University of Tokyo, Japan Noboru Babaguchi Osaka University, Japan

Susanne Boll University of Oldenburg, Germany Dick Bulterman CWI, Amsterdam, The Netherlands

Shih-Fu Chang Columbia University, USA

Homer Chen National Taiwan University, Taiwan Chang Wen Chen Florida Institute of Technology, USA

Alberto Del Bimbo University of Florence, Italy

Jana Dittman Otto-von-Guericke-University, Germany Wen Gao Chinese Academy of Sciences, China

Forouzan Golshani Wright State University, USA William Grosky University of Michigan, USA

Allan Hanbury TU Vienna, Austria

Tiejun Huang Chinese Academy of Sciences, China

Alejandro Jaimes IDIAP, Martigny, Switzerland

#### VIII Organization

Mingyan Jiang Shandong University, China John Kender Columbia University, USA

Michael Lew Leiden University. The Netherlands

Bob Liang Intel, USA

Rainer Lienhart University of Augsburg, Germany

Jiebo Luo Eastman Kodak, USA

University of North Carolina, USA Ketan Mayer-Patel

Nasir Memon Polytech University, USA

Jan Nesvadba Philips Research, The Netherlands Yuhua Peng Shandong University, China Alan Smeaton Dublin City University, Ireland

Ralf Steinmetz Darmstadt University of Technology, Germany

Fengrong Sun Shandong University, China

Qi Tian University of Texas at San Antonio, USA University of Amsterdam, The Netherlands Marcel Worring Changsheng Xu Institute for Infocomm Research, Singapore

#### Additional Reviewers

Jehanzeb Abbas University of Illinois at Urbana-Champaign,

USA

Yen-Kuang Chen Intel, USA

University of Illinois at Urbana-Champaign, Charlie Dagli

USA

University of Amsterdam, The Netherlands Ivo Everts

Pablo Cesar Garcia CWI, Amsterdam, The Netherlands

Jinhua Guo University of Michigan, USA Junfeng He Columbia University, USA Niels Henze OFFIS, Oldenburg, Germany Eva Hoerster University of Augsburg, Germany Simon Hoffmann University of Augsburg, Germany

Huxiao Hu University of Illinois at Urbana-Champaign,

USA

Wei Jiang Columbia University, USA Delft University of Technology, Bart Kroon

The Netherlands

Aleksandar Ivanovic University of Illinois at Urbana-Champaign,

Harbin Institute of Technology, China Dawei Liang Ming Liu

University of Illinois at Urbana-Champaign,

USA

Jochen Lux University of Augsburg, Germany Noel O'Connor Dublin City University, Ireland

Xi Shao Nanjing University of Posts and Telecomm.,

China

Roberto Valenti Jun Wang Dajun Wu Xun Xu

Xinguo Yu Eric Zavesky Zhenqiu Zhang

Xi Zhou

University of Amsterdam, The Netherlands

Columbia University, USA

Institute for Infocomm Research, Singapore University of Illinois at Urbana-Champaign,

USA

Institute for Infocomm Research, Singapore

Columbia University, USA

University of Illinois at Urbana-Champaign,

USA

University of Illinois at Urbana-Champaign,

USA

# **Table of Contents**

## **Invited Contributions**

Multimedia Analysis by Learning	1
Learning Concepts by Modeling Relationships	5
Emerging Issues for Multimedia Analysis and Applications	4
The Real Problem of Bridging the "Semantic Gap"	6
Multimedia Ontology Based Computational Framework for Video Annotation and Retrieval	8
Scalable Indexing for Perceptual Data	4
Searching One Billion Web Images by Content: Challenges and Opportunities	3
Challenges on Peer-to-Peer Live Media Streaming	7
Video Streaming to Mobile Handheld Devices: Challenges in Decoding, Adaptation, and Browsing	2
Fixed-Mobile Convergence, Streaming Multimedia Services, and Peer-to-Peer Communication	2
Blind Passive Media Forensics: Motivation and Opportunity	7
Security Models of Digital Watermarking	0
Evolvement of DRM Schema: From Encryption to Interoperability and Monitoring	5

# ${\bf Regular\ Contributions}$

Junding Sun and Xiaosheng Wu	76
3D Motion Segmentation from Straight-Line Optical Flow	85
A Fast Adaptive ME Algorithm Based on H.264	95
Shared Latent Dynamical Model for Human Tracking from Videos	102
Panoramic Video Coding Using Affine Motion Compensated Prediction	112
Robust Bootstrapping of Speaker Models for Unsupervised Speaker Indexing	122
Reversible Data Embedding Technique for Palette Images Using De-clustering	130
The PT-2 Caching Algorithm in the Transcoding Proxy Cluster to Facilitate Adaptive Content Delivery	140
Constructing and Application of Multimedia TV News Archives	151
A Three-Level Scheme for Real-Time Ball Tracking	161
Video Object Mining with Local Region Tracking	172
Automatic Extraction of Semantic Relationships from Images Using Ontologies and SVM Classifiers	184
A Robust Caption Detecting Algorithm on MPEG Compressed Video	195

P2P Media Streaming .....

Shuangjia Chen, Longshe Huo, Qiang Fu, Rui Guo, and Wen Gao

325

An Optimized Topology Maintenance Framework for P2P Media Streaming	334
Rui Guo, Longshe Huo, Qiang Fu, Shuangjia Chen, and Wen Gao	
Building Large Scale 3D Face Database for Face Analysis	343
Senary Huffman Compression – A Reversible Data Hiding Scheme for Binary Images	35
Managing and Searching Distributed Multidimensional Annotations with Large Scale Image Data	361
A Closed-Form Solution of Reconstruction from Nonparallel Stereo Geometry Used in Image Guided System for Surgery	37
SIEVE—Search Images Effectively Through Visual Elimination Ying Liu, Dengsheng Zhang, and Guojun Lu	38
Virtual Community Based Secure Service Discovery and Access for 3D Video Steaming Applications	39
QoS Adaptive Data Organizing and Delivery Framework for P2P Media Streaming	398
Adaptive Interpolation for Error Concealment in H.264 Using Directional Histograms	408
Players and Ball Detection in Soccer Videos Based on Color Segmentation and Shape Analysis	410
Efficient Image Retrieval Using Conceptualization of Annotated Images	420
3-D Camera Modeling and Its Applications in Sports Broadcast Video Analysis	43

Table of Contents	ΛV
Face Recognition by Matching 2D and 3D Geodesic Distances	444
A Blind Watermarking Scheme Based on Visual Model for Copyright Security	454
Fast Mode Decision by Exploiting Spatio-temporal Correlation in H.264	464
SVM-Based Audio Classification for Content-Based Multimedia Retrieval	474
Moving Object Tracking in H.264/AVC Bitstream	483
A Prediction Error Compression Method with Tensor-PCA in Video Coding	493
On the Robustness of Parametric Watermarking of Speech	501
Author Index	511