

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

Alfred Kobsa

University of California, Irvine, CA, 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

TU Dortmund University, Germany

Madhu Sudan

Microsoft Research, Cambridge, MA, USA

Demetri Terzopoulos

University of California, Los Angeles, CA, USA

Doug Tygar

University of California, Berkeley, CA, USA

Gerhard Weikum

Max Planck Institute for Informatics, Saarbruecken, Germany

Hyoung-Joong Kim Yun-Qing Shi
Mauro Barni (Eds.)

Digital Watermarking

9th International Workshop, IWDW 2010
Seoul, Korea, October 1-3, 2010
Revised Selected Papers

Volume Editors

Hyoung-Joong Kim
Korea University
Graduate School of Information Management
and Security, CIST
Seoul 136-701, Korea
E-mail: khj-@korea.ac.kr

Yun-Qing Shi
New Jersey Institute of Technology
Newark, NJ 07102, USA
E-mail: shi@njit.edu

Mauro Barni
University of Siena
Department of Information Engineering
53100 Siena, Italy
E-mail: barni@dii.unisi.it

ISSN 0302-9743
ISBN 978-3-642-18404-8
DOI 10.1007/978-3-642-18405-5
Springer Heidelberg Dordrecht London New York

e-ISSN 1611-3349
e-ISBN 978-3-642-18405-5

Library of Congress Control Number: 2010942729

CR Subject Classification (1998): E.3, D.4.6, K.6.5, I.3-4, H.4, H.3

LNCS Sublibrary: SL 4 – Security and Cryptology

© Springer-Verlag Berlin Heidelberg 2011

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.

The use of general descriptive names, registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Preface

On behalf of the Technical Program Committee, we thank all authors, Program Committee members, reviewers, sponsors, invited speaker, and assistants. This 9th workshop was possible due to the help and devotion of those who love IWDW (International Workshop on Digital Watermarking). Their invaluable time, concerns and efforts will not be forgotten. Invited speaker, Alex Kot deliver an invaluable special talk on forensic analysis: “Image Forensics Tools Using Statistical Features.”

Since its first event, IWDW has been a forum to check the current state of the art, exchange new ideas, and discuss open problems. This year, 42 papers were submitted from Austria, China, India, Iran, Korea, Japan, Russia, Singapore, UK, USA. Of these 26 papers were accepted. The Selected papers are well balanced and diverse. Topics include robust watermarking, reversible watermarking, fingerprinting, steganography and steganalysis, visual encryption, digital forensics, and so on. Some data hiding and multimedia security technologies are solid and quite saturated, but other technologies are just beginning to sprout or sprouting. Target media include audio, image, video, movie, and 3D content.

We hope that the papers in this volume be a catalyst for further research in this field.

October 2010

M. Barni
H.J. Kim
Y.-Q. Shi

Organization and Committees

General Chair

Lim, Jongin Korea University, Korea

Technical Program Chairs

Kim, Hyoung Joong Korea University, Korea
Shi, Yun Q New Jersey Institute of Technology, USA
Barni, Mauro University of Siena, Italy

Publicity Committee and Secretariat

Hwang, Hee Joon Korea University, Korea
Kim, Jung Min Korea University, Korea
Sachnev, Vasiliy Korea University, Korea
Murasova, Yulia Korea University, Korea
Dong, Keming Korea University, Korea

Local Arrangements Committee

Tsomko, Elena Korea University, Korea

International Publicity Liasons

Ho, Tony University of Surrey, UK
Westfeld, Andreas Dresden University of Technology, Germany

Technical Program Committee

Abhayaratne, Charith University of Sheffield, UK
Barbier, Johann CELAR, D'epartement de Cryptologie, La Roche
 Marguerite, France
Bloom, Jeffey Thomson, USA
Cayre, Francois TEMICS / IRISA, France
Chen, Wen Dialogic, USA
Cheng, Lee-Ming City University of Hong Kong, Hong Kong
Dittman, Jana Magdeburg, Otto von Guericke University,
 Germany
Doërr, Gwenaël University College London, UK

Dugelay, Jean-Luc	Institut EURECOM, France
Goljan, Miroslav	Binghamton University, USA
Huang, Jiwu	Sun Yat-sen University, China
Jeon, Byeungwoo	Sungkyunkwan University, Korea
Kalker, Ton	Hewlett Packard Laboratories, USA
Kankanhalli, Mohan	National University of Singapore, Singapore
Ker, Andrew	Oxford University, UK
Kot, Alex	Nanyang Technological University, Singapore
Kuo, C.-C. Jay	University of Southern California, USA
Kutter, Martin	Swiss Federal Institute of Technology, Switzerland
Legendijk, Inald	Delft University of Technology, The Netherlands
Lee, Heung Kyu	KAIST, Korea
Li, Chang-Tsun	University of Warwick, UK
Lu, Zheming	University of Freiburg, Germany
Martin, Keith	Royal Holloway, University of London, UK
Memon, Nasir	Polytechnic University, USA
Ni, Jiang Qun	Sun Yat-sen University, China
Ni, Zhicheng	WorldGate Communications, USA
Pan, Jeng-Shyang	National Kaohsiung University of Applied Sciences, Taiwan
Pérez–González, Fernando	University of Vigo, Spain
Pitas, Ioannis	University of Thessaloniki, Greece
Piva, Alessandro	University of Florence, Italy
Ro, Yong-Man	Information and Communications University, Korea
Sadeghi, Ahmad-Reza	Ruhr-University Bochum, Germany
Sakurai, Kouichi	Kyushu University, Japan
Schaathun, Hans Georg	University of Surrey, UK
Voloshynovskiy, Sviatoslav	University of Geneva, Switzerland
Waller, Adrian	Thales Research and Technology, UK
Wang, Shuozhong	Shanghai University, China
Xiang, Shijun	Jinan University, China
Zhang, Hongbin	Beijing University of Technology, China
Zou, Dekun	Thomson, USA

Table of Contents

Passive Detection of Paint-Doctored JPEG Images	1
<i>Yu Qian Zhao, Frank Y. Shih, and Yun Q. Shi</i>	
Detecting Digital Image Splicing in Chroma Spaces	12
<i>Xudong Zhao, Jianhua Li, Shenghong Li, and Shilin Wang</i>	
Discriminating Computer Graphics Images and Natural Images Using Hidden Markov Tree Model	23
<i>Feng Pan and Jiwu Huang</i>	
A New Scrambling Evaluation Scheme Based on Spatial Distribution Entropy and Centroid Difference of Bit-Plane	29
<i>Liang Zhao, Avishek Adhikari, and Kouichi Sakurai</i>	
Cryptanalysis on an Image Scrambling Encryption Scheme Based on Pixel Bit	45
<i>Liang Zhao, Avishek Adhikari, Di Xiao, and Kouichi Sakurai</i>	
Plane Transform Visual Cryptography	60
<i>Jonathan Weir and WeiQi Yan</i>	
A Statistical Model for Quantized AC Block DCT Coefficients in JPEG Compression and Its Application to Detecting Potential Compression History in Bitmap Images	75
<i>Gopal Narayanan and Yun Qing Shi</i>	
A Smart Phone Image Database for Single Image Recapture Detection	90
<i>Xinting Gao, Bo Qiu, JingJing Shen, Tian-Tsong Ng, and Yun Qing Shi</i>	
Detection of Tampering Inconsistencies on Mobile Photos	105
<i>Hong Cao and Alex C. Kot</i>	
Tampered Region Localization of Digital Color Images Based on JPEG Compression Noise	120
<i>Wei Wang, Jing Dong, and Tieniu Tan</i>	
Robust Audio Watermarking by Using Low-Frequency Histogram	134
<i>Shijun Xiang</i>	
Robust Blind Watermarking Scheme Using Wave Atoms	148
<i>H.Y. Leung and L.M. Cheng</i>	

Robust Watermarking of H.264/SVC-Encoded Video: Quality and Resolution Scalability	159
<i>Peter Meerwald and Andreas Uhl</i>	
Reversible Watermarking Using Prediction Error Histogram and Blocking	170
<i>Bo Ou, Yao Zhao, and Rongrong Ni</i>	
An Efficient Pattern Substitution Watermarking Method for Binary Images	181
<i>Keming Dong and Hyoung-Joong Kim</i>	
New JPEG Steganographic Scheme with High Security Performance	189
<i>Fangjun Huang, Yun Qing Shi, and Jiwu Huang</i>	
Ternary Data Hiding Technique for JPEG Steganography	202
<i>Vasily Sachnev and Hyoung-Joong Kim</i>	
Interleaving Embedding Scheme for ECC-Based Multimedia Fingerprinting	211
<i>Xuping Zheng, Aixin Zhang, Shenghong Li, Bo Jin, and Junhua Tang</i>	
A Novel Collusion Attack Strategy for Digital Fingerprinting	224
<i>Hefei Ling, Hui Feng, Fuhao Zou, Weiqi Yan, and Zhengding Lu</i>	
Privacy Preserving Facial and Fingerprint Multi-biometric Authentication	239
<i>Esla Timothy Anzaku, Hosik Sohn, and Yong Man Ro</i>	
Blind Linguistic Steganalysis against Translation Based Steganography	251
<i>Zhili Chen, Liusheng Huang, Peng Meng, Wei Yang, and Haibo Miao</i>	
Blind Quantitative Steganalysis Based on Feature Fusion and Gradient Boosting	266
<i>Qingxiao Guan, Jing Dong, and Tieniu Tan</i>	
IR Hiding: A Method to Prevent Video Re-shooting by Exploiting Differences between Human Perceptions and Recording Device Characteristics	280
<i>Takayuki Yamada, Seiichi Gohshi, and Isao Echizen</i>	
On Limits of Embedding in 3D Images Based on 2D Watson's Model ...	293
<i>Zahra Kavehvash and Shahrokh Ghaemmaghami</i>	
A Reversible Acoustic Steganography for Integrity Verification	305
<i>Xuping Huang, Akira Nishimura, and Isao Echizen</i>	
Author Index	317