

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 of Computer Science, Saarbruecken, Germany

David Zhang Milan Sonka (Eds.)

Medical Biometrics

Second International Conference, ICMB 2010
Hong Kong, China, June 28-30, 2010
Proceedings

Volume Editors

David Zhang
Department of Computing
The Hong Kong Polytechnic University
Kowloon, Hong Kong, China
E-mail: csdzhang@comp.polyu.edu.hk

Milan Sonka
Department of Electrical and Computer Engineering
The University of Iowa
Iowa City, IA, USA
E-mail: milan-sonka@uiowa.edu

Library of Congress Control Number: 2010928544

CR Subject Classification (1998): I.4, I.5, I.2, I.2.10, H.3, J.3

LNCS Sublibrary: SL 6 – Image Processing, Computer Vision, Pattern Recognition,
and Graphics

ISSN 0302-9743
ISBN-10 3-642-13922-1 Springer Berlin Heidelberg New York
ISBN-13 978-3-642-13922-2 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.com

© Springer-Verlag Berlin Heidelberg 2010
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper 06/3180

Preface

In the medical field, personal medical feature data, especially digital images, can be referred to as medical biometrics. Such data are produced in ever-increasing quantities and used for diagnostics and therapy purposes. Medical biometric research aims to use personal medical features in different formats such as images, signals and other sources to solve medical problems and to provide high-performance services in the medical field. Medical biometric systems integrate multidisciplinary technologies in biology, medicine, electronics, computing, and statistics. The importance of computer-aided diagnosis and therapy has drawn more and more attention worldwide and laid the foundation for modern medicine with excellent potential for promising applications such as telemedicine and Web-based healthcare.

The 2010 International Conference on Medical Biometrics (ICMB 2010) placed emphasis on efficient and effective medical biometric technologies and systems. It provided a central forum for researchers, engineers and vendors from different disciplines to exchange the most recent results, identify future directions and challenges, and initiate possible collaborative research and system development. We are pleased that this conference attracted a large number of high-quality research papers that reflect the increasing interests and popularity in this fast-growing field. The conference proceedings contain 45 papers which were selected through a strict review process, with an acceptance rate at 38%. Each paper was assessed by three independent reviewers. All of the accepted papers were presented in either oral (20) or poster (25) sessions at the conference in conjunction with three special sessions on State-of-the-Art of Computer-Aided Detection/Diagnosis (CAD), Modernization of Traditional Chinese Medicine (TCM) and Effective Healthcare.

We would like to take this opportunity to thank the five keynote speakers for their inspiring talks at ICMB 2010 and sharing their valuable experience: Ching Suen, Yueting Zhang, Hiroshi Fujita, Bernd Fischer and Lianda Li. In addition, we would like to express our gratitude to all the contributors, reviewers, Program Committee and Organizing Committee members who made their contribution to the success of ICMB 2010 in different ways. Once again, we greatly appreciate the continuing support from the International Association of Pattern Recognition (IAPR), IEEE Computational Intelligence Society (IEEE-CIS), National Natural Science Foundation in China (NSFC), and Springer. Our special thanks also go to our working team Jane You, Xiaoyi Jiang, Prabir Bhattacharya, Lei Zhang, Zhenhua Guo, Xingzheng Wang, Dongmin Guo, Feng Liu, Qin Li and Yan Wu for their dedication and hard work on various aspects of this event. Last but not least, we sincerely wish that the fruitful technical interactions during this conference will benefit everyone concerned.

April 2010

David Zhang
Milan Sonka

Organization

General Chairs

David Zhang	The Hong Kong Polytechnic University, Hong Kong
Milan Sonka	The University of Iowa, USA

Program Chairs

Jane You	The Hong Kong Polytechnic University, Hong Kong
Xiaoyi Jiang	University of Münster, Germany
Prabir Bhattacharya	University of Cincinnati, USA

Program Committee

Michael D. Abramoff	The University of Iowa, USA
Bir Bhanu	University of California, Riverside, USA
Zhaoxiang Bian	Hong Kong Baptist University, Hong Kong
Egon L. van den Broek	University of Twente, The Netherlands
Yung-Fu Chen	China Medical University, Taiwan
Da-Chuan Cheng	China Medical University, Taiwan
Ruwei Dai	Chinese Academy of Science, China
Mohammad Dawood	University of Münster, Germany
David Feng	The University of Sydney, Australia
Bernd Fischer	University of Lübeck, Germany
Hiroshi Fujita	Gifu University, Japan
Joachim Hornegger	University of Erlangen, Germany
Yung-Fa Huang	Chaoyang University of Technology, Taiwan
Xudong Jiang	Nanyang Technological University, Singapore
Mohamed Kamel	University of Waterloo, Canada
Rajiv Khosla	La Trobe University, Australia
Jai-Hie Kim	Yonsei University, Korea
Naimin Li	Harbin Institute of Technology, China
Yanda Li	Tsinghua University, China
Meindert Niemeijer	Utrecht University, The Netherlands
Witold Pedrycz	University of Alberta, Canada
Edwige Pissaloux	Université de Rouen, France
Gerald Schaefer	Loughborough University, UK
Dinggang Shen	UNC-CH School of Medicine, USA

VIII Organization

Klaus Toennies	University of Magdeburg, Germany
Max Viergever	Utrecht University, The Netherlands
Changren Wang	National Natural Science Foundation of China, China
Fei Wang	IBM Almaden Research Center, USA
Yingxu Wang	University of Calgary, Canada
Pingkun Yan	Philips Research North America, USA
Xinge You	Huangzhong University of Science and Technology, China
Pong Chi Yuen	Hong Kong Baptist University, Hong Kong
Chengqi Zhang	University of Technology, Sydney, Australia
Jianzhou Zhang	Sichuan University, China
Yongping Zheng	The Hong Kong Polytechnic University, Hong Kong
Huiyu Zhou	Queen's University Belfast, UK

Table of Contents

Feature Extraction and Classification

Fiber Segmentation Using Constrained Clustering	1
<i>Daniel Duarte Abdala and Xiaoyi Jiang</i>	
A New Multi-Task Learning Technique to Predict Classification of Leukemia and Prostate Cancer	11
<i>Austin H. Chen and Zone-Wei Huang</i>	
A Benchmark for Geometric Facial Beauty Study	21
<i>Fangmei Chen and David Zhang</i>	
An Effective Feature Extraction Method Used in Breath Analysis	33
<i>Haifen Chen, Guangming Lu, Dongmin Guo, and David Zhang</i>	
Classification of Diabetics with Various Degrees of Autonomic Neuropathy Based on Linear and Nonlinear Features Using Support Vector Machine	42
<i>Chuang-Chien Chiu, Shoou-Jeng Yeh, and Tai-Yue Li</i>	
Diabetes Identification and Classification by Means of a Breath Analysis System	52
<i>Dongmin Guo, David Zhang, Naimin Li, Lei Zhang, and Jianhua Yang</i>	
Automatic Measurement of Vertical Cup-to-Disc Ratio on Retinal Fundus Images	64
<i>Yuji Hatanaka, Atsushi Noudo, Chisako Muramatsu, Akira Sawada, Takeshi Hara, Tetsuya Yamamoto, and Hiroshi Fujita</i>	
Tongue Image Identification System on Congestion of Fungiform Papillae (CFP)	73
<i>Bo Huang and Naimin Li</i>	
Newborn Footprint Recognition Using Band-Limited Phase-Only Correlation	83
<i>Wei Jia, Rong-Xiang Hu, Jie Gui, and Ying-Ke Lei</i>	
Radii Solaris Extraction through Primitive Modelling	94
<i>Wang Junhui, Ma Lin, Wang Kuanquan, and Li Naimin</i>	
A DIAMOND Method for Classifying Biological Data	104
<i>Han-Lin Li, Yao-Huei Huang, and Ming-Hsien Chen</i>	

Tongue Image Texture Segmentation Based on Gabor Filter Plus Normalized Cut 115
Jianfeng Li, Jinhuan Shi, Hongzhi Zhang, Yanlai Li, Naimin Li, and Changming Liu

Chaos Synchronization Detector Combining Radial Basis Network for Estimation of Lower Limb Peripheral Vascular Occlusive Disease 126
Chia-Hung Lin, Yung-Fu Chen, Yi-Chun Du, Jian-Xing Wu, and Tainsong Chen

Classification of Wrist Pulse Blood Flow Signal Using Time Warp Edit Distance 137
Lei Liu, Wangmeng Zuo, Dongyu Zhang, Naimin Li, and Hongzhi Zhang

Computerized Pork Quality Evaluation System 145
Li Liu and Michael O. Ngadi

Abnormal Image Detection Using Texton Method in Wireless Capsule Endoscopy Videos 153
Ruwan Dharshana Nawarathna, JungHwan Oh, Xiaohui Yuan, Jeongkyu Lee, and Shou Jiang Tang

Active Contour Method Combining Local Fitting Energy and Global Fitting Energy Dynamically 163
Yang Yu, Caiming Zhang, Yu Wei, and Xuemei Li

Optic Disc Detection by Multi-scale Gaussian Filtering with Scale Production and a Vessels' Directional Matched Filter 173
Bob Zhang and Fakhri Karray

Retinal Vessel Centerline Extraction Using Multiscale Matched Filter and Sparse Representation-Based Classifier 181
Bob Zhang, Qin Li, Lei Zhang, Jane You, and Fakhri Karray

Pulse Waveform Classification Using ERP-Based Difference-Weighted KNN Classifier 191
Dongyu Zhang, Wangmeng Zuo, Yanlai Li, and Naimin Li

Health Care

Development of a Ubiquitous Emergency Medical Service System Based on Zigbee and 3.5G Wireless Communication Technologies 201
Ching-Su Chang, Tan-Hsu Tan, Yung-Fu Chen, Yung-Fa Huang, Ming-Huei Lee, Jin-Chyr Hsu, and Hou-Chaung Chen

Digital Skating Board with RFID Technique for Upper Extremity Rehabilitation 209
C.-C. Chen, J.-C. Lin, C.-H. Chou, Y.-Y. Shih, and Y.-L. Chen

Knowledge Acquisition and Reasoning in Web Based Epidemic Analysis	215
<i>V.S. Harikrishnan, K. Pal Amutha, and S. Sridevi</i>	
Assistive Communication Robot for Pre-operative Health Care	224
<i>R. Khosla, M.-T. Chu, K. Denecke, K. Yamada, and T. Yamaguchi</i>	
Design and Implementation of a Digital Auscultation System	231
<i>Yuan-Hsiang Lin, Chih-Fong Lin, Chien-Chih Chan, and He-Zhong You</i>	
The Application of Non-invasive Oxygen Saturation Sensor to Evaluate Blood Flow in Human	241
<i>Yi-Te Lu, Kuen-Chang Hsieh, Ming-Feng Kao, Yu-Ywan Chen, Chiung-Chu Chung, and Hsueh-Kuan Lu</i>	
Context Aware Health Monitoring System	249
<i>S. Sridevi, Bhattacharya Sayantani, K. Pal Amutha, C. Madan Mohan, and R. Pitchiah</i>	
Novel Two-Stage Analytic Approach in Extraction of Strong Herb-Herb Interactions in TCM Clinical Treatment of Insomnia	258
<i>Xuezhong Zhou, Josiah Poon, Paul Kwan, Runshun Zhang, Yinhui Wang, Simon Poon, Baoyan Liu, and Daniel Sze</i>	

Medical Diagnosis

Clinical Usage Considerations in the Development and Evaluation of a Computer Aided Diagnosis System for Acute Intracranial Hemorrhage on Brain CT	268
<i>Tao Chan</i>	
Research on the Meridian Diagnostic System Based on the Measuring Principle of the Electrical Properties of Well, Source and Sea Acupoints	276
<i>Fengxiang Chang, Wenxue Hong, Jun Jing, Jialin Song, and Chao Ma</i>	
Atrial Fibrillation Analysis Based on Blind Source Separation in 12-Lead ECG Data	286
<i>Pei-Chann Chang, Jui-Chien Hsieh, Jyun-Jie Lin, and Feng-Ming Yeh</i>	
State-of-the-Art of Computer-Aided Detection/Diagnosis (CAD)	296
<i>Hiroshi Fujita, Jane You, Qin Li, Hidetaka Arimura, Rie Tanaka, Shigeru Sanada, Noboru Niki, Gobert Lee, Takeshi Hara, Daisuke Fukuoka, Chisako Muramatsu, Tetsuro Katafuchi, Gen Inuma, Mototaka Miyake, Yasuaki Arai, and Noriyuki Moriyama</i>	

Advances in Detecting Parkinson's Disease	306
<i>Pei-Fang Guo, Prabir Bhattacharya, and Nawwaf Kharma</i>	
Using Formal Concept Analysis to Visualize Relationships of Syndromes in Traditional Chinese Medicine	315
<i>Xulong Liu, Wenxue Hong, Jialin Song, and Tao Zhang</i>	
Wrist Pulse Diagnosis Using LDA	325
<i>Bo Shen and Guangming Lu</i>	
Computerized Wrist Pulse Signal Diagnosis Using KPCA	334
<i>Yunlian Sun, Bo Shen, Yinghui Chen, and Yong Xu</i>	
Framework of Computer-Assisted Instruction and Clinical Decision Support System for Orthodontics with Case-Based Reasoning	344
<i>Shu-Li Wang and Shih-Yi Yeh</i>	
Design of an Intelligent Reporting System for Cardiac Catheterization	353
<i>Fan Wu and Hsiao-Hui Li</i>	
Presenting a Simplified Assistant Tool for Breast Cancer Diagnosis in Mammography to Radiologists	363
<i>Ping Zhang, Jenny Doust, and Kuldeep Kumar</i>	
 Medical Image Processing and Registration	
Feature Based Non-rigid Registration Using Quaternion Subdivision	373
<i>Fahad Hameed Ahmad, Sudha Natarajan, and Jimmy Liu Jiang</i>	
A Sparse Decomposition Approach to Compressing Biomedical Signals	383
<i>Lu Bing and Shiqin Jiang</i>	
A Comparative Study of Color Correction Algorithms for Tongue Image Inspection	392
<i>Xingzheng Wang and David Zhang</i>	
An Mean Shift Based Gray Level Co-occurrence Matrix for Endoscope Image Diagnosis	403
<i>Yilun Wu, Kai Sun, Xiaolin Lin, Shidan Cheng, and Su Zhang</i>	
A Novel Criterion for Characterizing Diffusion Anisotropy in HARDI Data Based on the MDL Technique	413
<i>H.Z. Zhang, T.M. McGinnity, S.A. Coleman, and M. Jing</i>	
Author Index	423