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Ewa Piętka
Jacek Kawa (Eds.)

Information Technologies in Biomedicine

Volume 2

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Foreword

Significant development in medical diagnosis and therapy, observed in recent years, is undoubtedly connected with the development of computer systems of information processing on the basis of the improvement of technology and construction of electronic devices, application of theory and appropriate algorithms as well as development of tools used in the software development process. Possible benefits obtained in all branches of medicine are unquestionable.

The progress of civilization results in an increase of the disease rate in musculoskeletal and cardiovascular systems, tumours being predominant in medical statistics. Furthermore, factors concerning aging of population, traffic accidents, sports activity, in particular extreme sports, demand modern medical techniques and technologies. The solution of complex problems concerning diagnostics and medical therapy is possible thanks to the development of interdisciplinary cooperation of experts from diverse branches of medical and engineering fields. The engineering knowledge defined as biomedical engineering is covering biosystems, biomaterials, biomechanics and rehabilitation engineering, biomedical imaging as well as computer and telemedicine systems, neural networks and medical physics.

The development of biomedical engineering undoubtedly reflects the present state of the art and knowledge of biological reality. Mainly, it depends on the application of new cognitive and diagnostic methods that use the latest achievements from the field of natural sciences and technology.

Issues concerning biomedical engineering are actively developed in many scientific and clinical centres all over the world, which is manifested by a stream of reports, publications and papers. Thus, their periodic analysis and synthesis is required. In consequence, comprehensive studies enriching the present state of the art are published. The studies will be useful in the

arrangement of knowledge and its application, in the production of medical devices and the elaboration of innovative diagnostic and therapeutic procedures in clinical practice. The papers presented in this book are pursuing the above denoted aims.

Gliwice, June 2010 Jan Marciniak

Preface

Information Technology in Biomedicine is an interdisciplinary research area, that bridges the gap between methodological achievements in engineering and clinical requirements in medical diagnosis and therapy. It is an emerging field focusing on collaboration between physicians, scientists, and technicians in order to define and meet patients needs. Many of these areas are recognized as research and development frontiers in employing new technology in clinical environment. These include image-guided diagnosis and treatment, biotechnology, biomaterials, biometrics, telemedicine and home care. New approaches to information technologies increase the efficiency of medical diagnostic and treatment and permit more information to be extracted from the acquired data. In this book, members of the academic society of technical and medical background present their research results and clinical implementation in order to satisfy the functional requirements of authorized physicians for the benefit of the patients.

An extended area is covered by the articles. It includes biomedical signals, medical image processing, computer-aided diagnosis and surgery, biometrics, healthcare and telemedicine, biomechanics, biomaterials, bioinformatics. Section on bronchoscopy presents the basis as well as new research studies performed in this field. Papers present various theoretical approaches and new methodologies based on fuzzy sets, mathematical statistics, mathematical morphology, fractals, wavelets, syntactic methods, artificial neural networks, graphs and many others.

We would like to express our gratitude to all paper reviewers as well as the authors who have contributed their original research papers.

Gliwice,
June 2010

Ewa Piętka
Jacek Kawa

Contents

Part I: Image Processing and CAD

On a Hybrid Fuzzy Clustering Method 3
Tomasz Przybyła, Janusz Jeżewski, Dawid Roj
1 Introduction 3
2 Generalized Cost Function 4
2.1 Weighted Myriad 4
2.2 Weighted Meridian 6
2.3 Generalized Cost Function 8
3 Hybrid Clustering Method 10
3.1 Data Clustering with the Hybrid Clustering Method 11
4 Numerical Experiments 12
5 Conclusions 13
References 14

Complete Gradient Clustering Algorithm for Features Analysis of X-Ray Images 15
Małgorzata Charytanowicz, Jerzy Niewczas, Piotr Kulczycki, Piotr A. Kowalski, Szymon Łukasik, Sławomir Żak
1 Introduction 15
2 Complete Gradient Clustering Algorithm (CGCA) 16
2.1 Kernel Density Estimation 16
2.2 Procedures of the CGCA 18
3 Materials and Methods 19
4 Results and Discussion 20
5 Conclusions 23
References 24

Dynamics of the Clusterization Process in an Adaptative Method of Image Segmentation 25
Aleksander Lamża, Zygmunt Wróbel
1 Introduction 25
2 Definitions and Fundamentals 26
3 Segmentation Algorithm 26
3.1 Generating the Initial Set of Clusters 27
3.2 Merging the Clusters 27
3.3 Adaptation of the Threshold Variance 28
3.4 Dynamics of the Merging Process 30
4 Conclusions 32
References 32

Application of Adaptive Weighed Averaging to Digital Filtering of 2D Images 33
Alina Momot
1 Introduction 33
2 Weighted Averaging Methods 35
2.1 EBWA Method 35
2.2 Adaptive Linear Spatial Filtering 36
3 Numerical Experiments 37
3.1 Experiments with Salt-and-Pepper Noise 37
3.2 Experiments with Gaussian Noise 40
4 Conclusions 44
References 44

Photodynamic Image e-Atlas in Diagnostic and Treatment Procedures 45
Ewa Pietka, Aleksander Sieron, Dominik Spinczyk, Przemyslaw Szabelak, Sebastian Kwiatek, Jakub Murawski
1 Introduction 45
2 Acquisition Module 46
3 Image Archive and Presentation Module 46
4 Computer Aided Diagnosis and Therapy 49
5 Results 51
6 Summary 52
References 52

Multiseries MR Data in Brain Tumours Segmentation 53
Jacek Kawa, Paweł Szwarc, Barbara Bobek-Billewicz, Ewa Piętka
1 Introduction 53
1.1 Brain Tumours 54
1.2 Nature of MR Imaging Data 54
1.3 Brain Tumour Segmentation Approaches 55
2 Segmentation Algorithm 55

2.1 Segmentation of Contrast Enhanced T1W Series . . . 56
2.2 Perfusion Maps Analysis . . . 57
3 Results . . . 59
4 Conclusions . . . 63
References . . . 63

Symmetry Plane of the Brain on Perfusion MR Images . . . 65
Rafał Henryk Kartaszyński, Paweł Mikołajczak
1 Introduction . . . 65
2 Method . . . 66
3 Data Preprocessing . . . 67
4 Finding Characteristic Points . . . 68
5 Perpendicular Regression . . . 69
6 Results and Tests . . . 70
7 Conclusions . . . 72
References . . . 72

A Two-Step Method for Detection of Architectural Distortions in Mammograms . . . 73
Magdalena Jasionowska, Artur Przelaskowski, Aleksandra Rutczynska, Anna Wroblewska
1 Introduction . . . 73
1.1 Architectural Distortion . . . 74
2 Materials . . . 74
3 ArDist Method . . . 76
3.1 GF Method . . . 77
3.2 DD Method . . . 79
3.3 Results of ArDist Method . . . 82
4 Conclusion . . . 83
References . . . 84

An Instrument for Monitoring Inflow and Washout of an Optical Contrast Agent into the Brain . . . 85
Daniel Milej, Michał Kacprzak, Norbert Żołek, Piotr Sawosz, Roman Maniewski, Adam Liebert
1 Introduction . . . 85
2 Methods . . . 86
3 Results . . . 88
4 Discussion and Conclusions . . . 88
References . . . 89

4D Segmentation of Ewing's Sarcoma in MR Images . . . 91
Joanna Czajkowska, Pawel Badura, Ewa Pietka
1 Ewing's Sarcoma Segmentation Problem . . . 91
2 ROI Detection, Fuzzy C-Means Clustering . . . 93

3 Gaussian Mixture Model 94
4 Fuzzy Connectedness 95
5 Transformation 96
6 Results 99
7 Conclusions 100
References 100

Segmentation of Stained Lymphoma Tissue Section Images 101
Urszula Neuman, Anna Korzynska, Carlos Lopez, Marylene Lejeune
1 Introduction 101
2 Materials 103
3 Methods 104
3.1 Algorithm Description 105
3.2 Algorithm Implementation 107
3.3 Evaluation of the Proposed Method 107
3.4 Sample and Image Acquisition 108
4 Results 109
5 Discussion 109
6 Conclusions 110
References 111

Anterior and Posterior Cruciate Ligament – Extraction and 3D Visualization 115
Piotr Zarychta, Anna Zarychta-Bargieła
1 Introduction 115
2 Location of the Cruciate Ligament Structure on the T1W MR Series 117
3 Extraction of the Cruciate Ligament Structure from the T1W MR Series 118
4 Numerical Results and Conclusion 120
References 122

Computerized Evaluation of Abnormal Hand Bone Patterns in Skeletal Dysplasias 123
Arkadiusz Gertych, Morgan Clond, Ralph Lachman, David Rimoin
1 Introduction 124
2 Materials 124
3 Methods 125
4 Results 127
5 Conclusions 128
References 131

Method of Brain Structure Extraction for CT-Based Stroke Detection 133
Aleksandra Rutczyńska, Artur Przelaskowski, Magdalena Jasionowska, Grzegorz Ostrek
1 Introduction 133
2 Method 135
2.1 Stochastic Image Modeling 136
3 Results 139
4 Conclusions 141
References 143

Combined DICOM and HL7 Viewer in Support of a Bridge from Content-Based Image Retrieval to Computer-Aided Diagnosis 145
Petra Welter, Fatih Topal, Sebastian Jansen, Thomas M. Deserno, Jörg Riesmeier, Christoph Grouls, Rolf W. Günther
1 Introduction 145
2 Materials and Methods 147
2.1 CBIR-Based CADx Scheme 147
2.2 DICOM SR Encoded CBIR Results 147
2.3 Query of HL7 Diagnostic Findings 147
2.4 Mapping of DICOM and HL7 Identifiers 148
2.5 Analysis of Data Capture Process 148
3 Results 149
3.1 System Design 149
3.2 Implementation of IRMACON Viewer 150
3.3 Layout of IRMACON Viewer 150
4 Conclusions 151
References 151

3D Diagnostic System for Anatomical Structures Detection Based on a Parameterized Method of Body Surface Analysis 153
Wojciech Glinkowski, Jakub Michonski, Robert Sitnik, Marcin Witkowski
1 Introduction 154
2 Telescreening Diagnostic System 155
2.1 Measurement System 156
2.2 Database 158
2.3 Calculation and Diagnosis Support 160
3 Conclusions 162
References 162

Reconstruction of the Pelvic Region Based on the Statistical Shape Modeling 165
Pawel Skadlubowicz, Zdzislaw Krol, Zygmunt Wrobel, Fritz Hefti, Andreas Krieg
1 Introduction 165
2 Methods 166
3 Results and Discussion 169
4 Conclusions and Future Work 172
References 172

Automatic Measuring of the Iridocorneal Angle in the Optical Coherence Tomographic Image of the Anterior Segment of the Eye 175
Robert Koprowski, Zygmunt Wrobel, Anna Nowinska, Edward Wylegala
1 Introduction 175
2 Image Acquisition 177
3 Existing Methods of the Iridocorneal Angle Analysis 178
4 Results Obtained by Existing Algorithms 178
5 Conclusion 182
References 182

Parametric Curves in Liver Deformation for Laparoscopic Purposes 183
Monika Bugdol, Jan Juszczyk
1 Introduction 183
2 Data Collecting 184
3 Deformation Modelling 185
4 Results 188
5 Future Works 189
References 189

Fractal Analysis of Dental Radiographic Images in the Irregular Regions of Interest 191
Edward Oczeretko, Marta Borowska, Izabela Szarmach, Agnieszka Kitlas, Janusz Szarmach, Andrzej Radwański
1 Introduction 191
2 Practical Assessment of Fractal Dimension 193
2.1 Rectangular Prism Surface Area Method — "Skyscraper Method" 193
2.2 Triangular Prism Surface Area Method 194
2.3 Intensity Difference Scaling Method 194
3 Irregular Regions of Interest 195
4 Experiments – Intensity Difference Scaling Method 196
4.1 Magnetic Resonance Image 196
4.2 Pantomogram (Panoramic Radiograph) 196