

Contents

Preface.....	xi
Editors	xvii
Contributors	xix
MATLAB Statement.....	xxix

SECTION I Biosignal Processing

Hualou Liang

1 Digital Biomedical Signal Acquisition and Processing	1-1
<i>Luca T. Mainardi, Anna M. Bianchi, and Sergio Cerutti</i>	
2 Time-Frequency Signal Representations for Biomedical Signals.....	2-1
<i>G. Faye Boudreaux-Bartels and Robin Murray</i>	
3 Multivariate Spectral Analysis of Electroencephalogram: Power, Coherence, and Second-Order Blind Identification	3-1
<i>Ramesh Srinivasan and Siyi Deng</i>	
4 General Linear Modeling of Magnetoencephalography Data.....	4-1
<i>Dimitrios Pantazis, Juan Luis Poletti Soto, and Richard M. Leahy</i>	
5 Emergence of Groupwise Registration in MR Brain Study	5-1
<i>Guorong Wu, Hongjun Jia, Qian Wang, Feng Shi, Pew-Thian Yap, and Dinggang Shen</i>	
6 Functional Optical Brain Imaging	6-1
<i>Meltem Izzetoglu</i>	
7 Causality Analysis of Multivariate Neural Data	7-1
<i>Maciej Kamiński and Hualou Liang</i>	

SECTION II Medical Imaging

Mostafa Analoui

8 Mammography.....	8-1
<i>Martin J. Yaffe</i>	

9	Computed Tomography	9-1
	<i>Ian A. Cunningham and Philip F. Judy</i>	
10	Magnetic Resonance Imaging	10-1
	<i>Steven Conolly, Albert Macovski, John Pauly, John Schenck, Kenneth K. Kwong, David A. Chesler, Xiaoping Hu, Wei Chen, Maqbool Patel, and Kamil Ugurbil</i>	
11	Nuclear Medicine	11-1
	<i>Barbara Y. Croft and Benjamin M.W. Tsui</i>	
12	Ultrasound	12-1
	<i>Richard L. Goldberg, Stephen W. Smith, Jack G. Mottley, and K. Whittaker Ferrara</i>	
13	Magnetic Resonance Microscopy.....	13-1
	<i>Xiaohong Zhou and G. Allan Johnson</i>	
14	Positron-Emission Tomography	14-1
	<i>Thomas F. Budinger and Henry F. VanBrocklin</i>	
15	Electrical Impedance Tomography.....	15-1
	<i>N. Huber, W. Wang, and D.C. Barber</i>	
16	Magnetic Resonance Imaging of Atherosclerosis.....	16-1
	<i>Chun Yuan, William S. Kerwin, Gador Canton, Jinnan Wang, Huijun Chen, and Niranjana Balu</i>	
17	Dynamic Contrast-Enhanced Magnetic Resonance Imaging	17-1
	<i>Edward Ashton and Vijay Shah</i>	
18	MRI of Myocardial Deformations: Imaging and Modeling	18-1
	<i>Hui Wang and Amir A. Amini</i>	
19	MRI for OA Diagnosis and Drug Development.....	19-1
	<i>Saara Totterman and José G. Tamez-Peña</i>	
20	Utility of PET in Pharmaceutical Development	20-1
	<i>R. Boellaard, M. Lubberink, and R.P. Maguire</i>	
21	Medical Image Search	21-1
	<i>Thomas Deserno</i>	

SECTION III Infrared Imaging

Mary Diakides

22	Advances in Medical Infrared Imaging: An Update.....	22-1
	<i>Nicholas A. Diakides, Mary Diakides, Jasper Lupo, Jeffrey Paul, and Raymond Balcerak</i>	
23	Historical Development of Thermometry and Thermal Imaging in Medicine.....	23-1
	<i>Francis J. Ring and Bryan F. Jones</i>	
24	Infrared Detectors and Detector Arrays	24-1
	<i>Paul R. Norton, Stuart B. Horn, Joseph G. Pellegrino, and Philip Perconti</i>	

- 25 Infrared Camera Characterization 25-1
Joseph G. Pellegrino, Jason Zeibel, Ronald G. Driggers, and Philip Perconti
- 26 Infrared Camera and Optics for Medical Applications 26-1
Michael W. Grenn, Jay Vizgaitis, Joseph G. Pellegrino, and Philip Perconti
- 27 Physiology of Thermal Signals..... 27-1
David D. Pascoe, James B. Mercer, and Louis de Weerd
- 28 Quantitative Active Dynamic Thermal IR-Imaging and Thermal Tomography in Medical Diagnostics..... 28-1
Antoni Nowakowski
- 29 Dynamic Thermal Assessment 29-1
Michael Anbar
- 30 Thermal Texture Mapping: Whole-Body Infrared Imaging and Its Holistic Interpretation 30-1
H. Helen Liu and Zhong Qi Liu
- 31 Infrared Imaging of the Breast: A Review..... 31-1
William C. Amalu, William B. Hobbins, Jonathan F. Head, and Robert L. Elliot
- 32 Functional Infrared Imaging of the Breast: Historical Perspectives, Current Application, and Future Considerations 32-1
John R. Keyserlingk, P.D. Ahlgren, E. Yu, Normand Belliveau, and Mariam Yassa
- 33 MammoVision (Infrared Breast Thermography) Compared to X-Ray Mammography and Ultrasonography: 114 Cases Evaluated 33-1
Reinhold Berz and Claus Schulte-Uebbing
- 34 Detecting Breast Cancer from Thermal Infrared Images by Asymmetry Analysis 34-1
Hairong Qi, Phani Teja Kuruganti, and Wesley E. Snyder
- 35 Application of Nonparametric Windows in Estimating the Mutual Information between Bilateral Breasts in Thermograms 35-1
M. Etehadtavakol, E.Y.K. Ng, Caro Lucas, S. Sadri, and N. Gheissari
- 36 Breast Cancer Screening Based on Thermal Image Classification..... 36-1
Boguslaw Wiecek, Maria Wiecek, Robert Strakowski, M. Strzelecki, T. Jakubowska, M. Wysocki, and C. Drews-Peszynski
- 37 Fuzzy C Means Segmentation and Fractal Analysis of the Benign and Malignant Breast Thermograms..... 37-1
M. Etehadtavakol, E.Y.K. Ng, Caro Lucas, and S. Sadri
- 38 The Role of Thermal Monitoring in Cardiosurgery Interventions 38-1
Antoni Nowakowski, Mariusz Kaczmarek, and Jan Rogowski
- 39 Physiology-Based Face Recognition in the Thermal Infrared Spectrum.... 39-1
Pradeep Buddharaju and Ioannis Pavlidis

- 40 Noninvasive Infrared Imaging for Functional Monitoring of Disease Processes40-1
Moinuddin Hassan, Jana Kainerstorfer, Victor Chernomordik, Abby Vogel, Israel Gannot, Richard F. Little, Robert Yarchoan, and Amir H. Gandjbakhche
- 41 Biomedical Applications of Functional Infrared Imaging 41-1
Arcangelo Merla and Gian Luca Romani
- 42 Modeling Infrared Imaging Data for the Assessment of Functional Impairment in Thermoregulatory Processes.....42-1
Alessandro Mariotti and Arcangelo Merla
- 43 Infrared Thermal Imaging Standards for Human Fever Detection43-1
Francis J. Ring and E.Y.K. Ng
- 44 Infrared Thermal Imaging for Fever Detection in Children.....44-1
Francis J. Ring, A. Jung, B. Kalicki, J. Zuber, A. Rustecka, and R. Vardasca
- 45 Thermal Imager as Fever Identification Tool for Infectious Diseases Outbreak.....45-1
E.Y.K. Ng
- 46 Thermal Imaging in Diseases of the Skeletal and Neuromuscular Systems.....46-1
Francis J. Ring and Kurt Ammer
- 47 Functional Infrared Imaging in the Evaluation of Complex Regional Pain Syndrome, Type I: Current Pathophysiological Concepts, Methodology, Case Studies, and Clinical Implications 47-1
Timothy D. Conwell and James Giordano
- 48 Thermal Imaging in Surgery48-1
Paul Campbell and Roderick Thomas
- 49 Thermal Signals and Cutaneous Circulation in Physiological Research and Reconstructive Surgery49-1
David D. Pascoe, Louis de Weerd, James B. Mercer, Joshua E. Lane, and Sven Weum
- 50 Infrared Imaging Applied to Dentistry.....50-1
Barton M. Gratt
- 51 Laser Infrared Thermography of Biological Tissues..... 51-1
Alexander Sviridov and Andrey Kondyurin
- 52 Use of Infrared Imaging in Veterinary Medicine 52-1
Ram C. Purohit, Tracy A. Turner, and David D. Pascoe
- 53 Standard Procedures for Infrared Imaging in Medicine53-1
Kurt Ammer and Francis J. Ring
- 54 Storage and Retrieval of Medical Infrared Images54-1
Gerald Schaefer
- 55 Ethical Obligations in Infrared Imaging Research and Practice55-1
James Giordano and Kim Abramson

SECTION IV Medical Informatics

Luis G. Kun

- 56 Introduction to Medical Informatics 56-1
Luis G. Kun
- 57 Hospital Information Systems: Their Function and State.....57-1
T. Allan Pryor
- 58 Computer-Based Patient Records 58-1
J. Michael Fitzmaurice
- 59 Overview of Standards Related to the Emerging Healthcare
 Information Infrastructure 59-1
Jeffrey S. Blair
- 60 Introduction to Informatics and Nursing in the New Healthcare
 Environment: 2013 60-1
Kathleen A. McCormick, Joyce Sensmeier, Connie White Delaney, and Carol J. Bickford
- 61 Non-AI Decision Making61-1
Ron Summers, Derek G. Cramp, and Ewart R. Carson
- 62 Genome Informatics..... 62-1
Konstantinos P. Exarchos, Themis P. Exarchos, and Dimitrios I. Fotiadis
- 63 Cardiovascular Health Informatics 63-1
Carmen C.Y. Poon and Yuan-ting Zhang
- 64 eEmergency Healthcare Informatics 64-1
E. Kyriacou, P. Constantinides, A. Panayides, M.S. Pattichis, and C.S. Pattichis
- 65 Disaster Response: Roles of Responders and Lessons Learned since 9/11 65-1
James Geiling, Lindsay Katona, Michael Lauria, and Joseph M. Rosen
- 66 Disaster Response: Potential Improvement with Medical Informatics 66-1
James Geiling, Ron Poropatich, Michael Lauria, Robyn E. Mosher, and Joseph M. Rosen
- Index..... Index-1**