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Bioelectromagnetism
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Introduction to Biometrics
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Sleep Spindles: Breaking the Methodological Wall
Compressed Sensing for Engineers

BROOKS ELIEZER

MATLAB Machine Learning CRC Press
This book examines theoretical and applied aspects of wavelet analysis in neurophysics, describing in detail different practical applications of the wavelet theory in the areas of neurodynamics and neurophysiology and providing a review of fundamental work that has been carried out in these fields over the last decade. Chapters 1 and 2 introduce and review the relevant foundations of neurophysics and wavelet theory, respectively, pointing on one hand to the various current challenges in neuroscience and introducing on the other the mathematical techniques of the wavelet transform in its two variants (discrete and continuous) as a powerful and versatile tool for investigating the relevant neuronal dynamics. Chapter 3 then analyzes results from examining individual neuron dynamics and intracellular processes. The principles for recognizing neuronal spikes from extracellular recordings and the advantages of using wavelets to address these issues are described and combined with approaches based on wavelet neural networks (chapter 4). The features of time-frequency organization of EEG signals are then extensively discussed, from theory to practical applications (chapters 5 and 6). Lastly, the technical details of automatic diagnostics and processing of EEG signals using wavelets are examined (chapter 7). The book will be a useful resource for neurophysiologists and physicists familiar with nonlinear dynamical systems and data processing, as well as for graduat e students specializing in the corresponding areas.
Advances in Neural Signal Processing

Springer Science & Business Media
Although there are many books on biometrics, most are limited to a single branch. This book covers four branches of biometrics: speaker identification, fingerprint recognition, face recognition, and iris recognition. It describes classic approaches as well as the latest designs in biometric technologies and systems, including facial recognition. The book considers the use of biometrics in security, intelligence, law enforcement, and e-commerce applications. It includes several experiments and Matlab(r) code for all experiments.
Brain Signal Analysis Academic Press
This book explores intrinsic and human body part biometrics and biometrics of human physiological activities, invisible to the naked eye. This includes, for instance, brain structures, skeleton morphology, heart activity, etc. These human body parts can only be visualized using specific imaging techniques or sensors, commonly employed in the biomedical engineering field. As such, the book connects two fields, namely biometric security and biomedical engineering. The book is suitable for advanced graduate and postgraduate students, engineers and researchers, especially in Signal and Image Processing, Biometrics, and Biomedical Engineering.
Hidden Biometrics CRC Press
In the last decade, sleep spindles have attracted steadily increasing attention. This interest is motivated by the many intriguing relationships between spindles and various diseases (e.g., schizophrenia, Parkinson, Alzheimer, autism, mental retardation), recovery processes (e.g., post brain stroke), and cognitive faculties (e.g., memory consolidation, intelligence, dream recall, sleep preservation). Nonetheless, a methodological wall has impeded the study of sleep spindles. Their investigation rests heavily on our ability to reliably and consistently identify spindle patterns from background EEG activity, a task involving many obstacles, including: a fuzzy definition of spindles, low inter-expert agreement on their scoring, lack of consensus on standard techniques for their automated detection, low reproducibility of observed characteristics and correlates, unavailability of large, standardized, high-quality databases, and inconsistencies in the methods used to evaluate the performance of automated detectors. The primary aims of this research topic were to bring together world-class researchers on a project designed to facilitate exchanges on methodological difficulties encountered in assessing sleep spindles and to promote standardized spindle-related resources. In preparing their contributions, authors were encouraged to use existing – or to propose new – publicly available resources for assessing sleep spindles. To allow fair and accurate comparison of reported results, the authors were also encouraged to validate their tools on a common benchmark. A database containing expert spindle scoring (i.e., the Montreal Archive of Sleep Studies) was made publicly available for that purpose.
Wavelets and Their Applications Academic Press
The Neurobiology of Schizophrenia begins with an overview of the various facets and levels of schizophrenia pathophysiology, ranging systematically from its genetic basis over changes in neurochemistry and electrophysiology to a systemic neural circuits level. When possible, the editors point out connections between the various

systems. The editors also depict methods and research strategies used in the respective field. The individual backgrounds of the two editors promote a synthesis between basic neuroscience and clinical relevance. Provides a comprehensive overview of neurobiological aspects of schizophrenia Discusses schizophrenia at behavioral, cognitive, clinical, electrophysiological, molecular, and genetic levels Edited by a translational researcher and a psychiatrist to promote synthesis between basic neuroscience and clinical relevance Elucidates connections between the various systems depicted, when possible

The Neurobiology of Schizophrenia Springer Science & Business Media

It is probably true quite generally that in the history of human thinking the most fruitful developments frequently take place at those points where two different lines of thought meet. Hence, if they actually meet, that is, if they are at least so much related to each other that a real interaction can take place, then one may hope that new and interesting developments may follow. Werner Heisenberg This volume contains papers presented at the August 1992 NATO Advanced Study Institute on Wavelets and Their Applications. The conference was held at the beautiful Il Ciocco resort near Lucca, in the glorious Tuscany region of northern Italy. Once again we gathered at this idyllic spot to explore and extend the reciprocity between mathematics and engineering. The dynamic interaction between world-renowned scientists from the usu ally disparate communities of pure mathematicians and applied scientists, which occurred at our 1989 and 1991 ASI's, continued at this meeting. Wavelet theory and technology is in an important growth stage at which theoretical and practical results are being compared with existing methods. There have been spectacular wavelet successes and sobering comparisons with traditional ideas-but still there is a wide expanse of scientific problems to explore. Since these problems lie at the forefront of both pure mathematics and applied science, our NATO ASI was especially pertinent at this time.

EEG Signal Processing CRC Press

Compressed Sensing (CS) in theory deals with the problem of recovering a sparse signal from an under-determined system of linear equations. The topic is of immense practical significance since all naturally occurring signals can be sparsely represented in some domain. In recent years, CS has helped reduce scan time in Magnetic Resonance Imaging (making scans more feasible for pediatric and geriatric subjects) and has also helped reduce the health hazard in X-Ray Computed CT. This book is a valuable resource suitable for an engineering student in signal processing and requires a basic understanding of signal processing and linear algebra. Covers fundamental concepts of compressed sensing Makes subject matter accessible for engineers of various levels Focuses on algorithms including group-sparsity and row-sparsity, as well as applications to computational imaging, medical imaging, biomedical signal processing, and machine learning Includes MATLAB examples for further development

Brain–Computer Interfaces Handbook John Wiley & Sons

This book presents the conceptual and mathematical basis and the implementation of both

electroencephalogram (EEG) and EEG signal processing in a comprehensive, simple, and easy-to-understand manner. EEG records the electrical activity generated by the firing of neurons within human brain at the scalp. They are widely used in clinical neuroscience, psychology, and neural engineering, and a series of EEG signal-processing techniques have been developed. Intended for cognitive neuroscientists, psychologists and other interested readers, the book discusses a range of current mainstream EEG signal-processing and feature-extraction techniques in depth, and includes chapters on the principles and implementation strategies.

Brain Computer Interface Springer

This is the second volume in a trilogy on modern Signal Processing. The three books provide a concise exposition of signal processing topics, and a guide to support individual practical exploration based on MATLAB programs. This second book focuses on recent developments in response to the demands of new digital technologies. It is divided into two parts: the first part includes four chapters on the decomposition and recovery of signals, with special emphasis on images. In turn, the second part includes three chapters and addresses important data-based actions, such as adaptive filtering, experimental modeling, and classification.

Niedermeyer's Electroencephalography BoD – Books on Demand

Changes in the neurological functions of the human brain are often a precursor to numerous degenerative diseases. Advanced EEG systems and other monitoring systems used in preventive diagnostic procedures incorporate innovative features for brain monitoring functions such as real-time automated signal processing techniques and sophisticated amplifi

Springer Nature

Detailing a systems approach, Optical Wireless Communications: System and Channel Modelling with MATLAB®, is a self-contained volume that concisely and comprehensively covers the theory and technology of optical wireless communications systems (OWC) in a way that is suitable for undergraduate and graduate-level students, as well as researchers and professional engineers. Incorporating MATLAB® throughout, the authors highlight past and current research activities to illustrate optical sources, transmitters, detectors, receivers, and other devices used in optical wireless communications. They also discuss both indoor and outdoor environments, discussing how different factors—including various channel models—affect system performance and mitigation techniques. In addition, this book broadly covers crucial aspects of OWC systems: Fundamental principles of OWC Devices and systems Modulation techniques and schemes (including polarization shift keying) Channel models and system performance analysis Emerging visible light communications Terrestrial free space optics communication Use of infrared in indoor OWC One entire chapter explores the emerging field of visible light communications, and others describe techniques for using theoretical analysis and simulation to mitigate channel impact on system performance. Additional topics include wavelet denoising, artificial neural networks, and spatial diversity. Content also covers different challenges encountered in OWC, as well as outlining possible solutions and current research

trends. A major attraction of the book is the presentation of MATLAB simulations and codes, which enable readers to execute extensive simulations and better understand OWC in general.
Speech and Audio Processing Springer
Introduction to Pattern Recognition: A Matlab Approach is an accompanying manual to Theodoridis/Koutroumbas' Pattern Recognition. It includes Matlab code of the most common methods and algorithms in the book, together with a descriptive summary and solved examples, and including real-life data sets in imaging and audio recognition. This text is designed for electronic engineering, computer science, computer engineering, biomedical engineering and applied mathematics students taking graduate courses on pattern recognition and machine learning as well as R&D engineers and university researchers in image and signal processing/analyisis, and computer vision. Matlab code and descriptive summary of the most common methods and algorithms in Theodoridis/Koutroumbas, Pattern Recognition, Fourth Edition Solved examples in Matlab, including real-life data sets in imaging and audio recognition Available separately or at a special package price with the main text (ISBN for package: 978-0-12-374491-3)
Intelligent Systems and Applications Springer
Biometric recognition, or simply biometrics, is the science of establishing the identity of a person based on physical or behavioral attributes. It is a rapidly evolving field with applications ranging from securely accessing one’s computer to gaining entry into a country. While the deployment of large-scale biometric systems in both commercial and government applications has increased the public awareness of this technology, "Introduction to Biometrics" is the first textbook to introduce the fundamentals of Biometrics to undergraduate/graduate students. The three commonly used modalities in the biometrics field, namely, fingerprint, face, and iris are covered in detail in this book. Few other modalities like hand geometry, ear, and gait are also discussed briefly along with advanced topics such as multibiometric systems and security of biometric systems. Exercises for each chapter will be available on the book website to help students gain a better understanding of the topics and obtain practical experience in designing computer programs for biometric applications. These can be found at: http://www.csee.wvu.edu/~ross/BiometricsTextBook/. Designed for undergraduate and graduate students in computer science and electrical engineering, "Introduction to Biometrics" is also suitable for researchers and biometric and computer security professionals.
Brain Dynamics MIT Press
Quickly Engages in Applying Algorithmic Techniques to Solve Practical Signal Processing Problems With its active, hands-on learning approach, this text enables readers to master the underlying principles of digital signal processing and its many applications in industries such as digital television, mobile and broadband communications, and medical/scientific devices. Carefully developed MATLAB® examples throughout the text illustrate the mathematical concepts and use of digital signal processing algorithms. Readers will develop a deeper understanding of how to apply the algorithms by manipulating the codes in

the examples to see their effect. Moreover, plenty of exercises help to put knowledge into practice solving real-world signal processing challenges. Following an introductory chapter, the text explores: Sampled signals and digital processing Random signals Representing signals and systems Temporal and spatial signal processing Frequency analysis of signals Discrete-time filters and recursive filters Each chapter begins with chapter objectives and an introduction. A summary at the end of each chapter ensures that one has mastered all the key concepts and techniques before progressing in the text. Lastly, appendices listing selected web resources, research papers, and related textbooks enable the investigation of individual topics in greater depth. Upon completion of this text, readers will understand how to apply key algorithmic techniques to address practical signal processing problems as well as develop their own signal processing algorithms. Moreover, the text provides a solid foundation for evaluating and applying new digital processing signal techniques as they are developed.

Understanding Biometrics with MATLAB Oxford University Press, USA

Written specifically for biomedical engineers, Biosignal and Medical Image Processing, Third Edition provides a complete set of signal and image processing tools, including diagnostic decision-making tools, and classification methods. Thoroughly revised and updated, it supplies important new material on nonlinear methods for describing and classify

Artificial Neural Networks: Formal Models and Their Applications – ICANN 2005 John Wiley & Sons

This book constitutes the proceedings of the 20th Nordic Conference on Secure IT Systems, held in Stockholm, Sweden, in October 2015. The 11 full papers presented together with 5 short papers in this volume were carefully reviewed and selected from 38 submissions. They are organized in topical sections named: cyber-physical systems security, privacy, cryptography, trust and fraud, and network and software security.

Bioelectromagnetism Cambridge University Press

Brain Computer Interface: EEG Signal Processing discusses electroencephalogram (EEG) signal processing using effective methodology and algorithms. This book provides a basic introduction to EEG and a classification of different components present in EEG. It also helps the reader to understand the scope of processing EEG signals and their associated applications. Further, it covers specific aspects such as epilepsy detection; exploitation of P300 for various applications; design of an EEG acquisition system; and detection of saccade, fix, and blink from EEG and EOG data. Key Features: Explains the basis of brain computer interface and how it can be established using different EEG signal characteristics Covers the detailed classification of different types of EEG signals with respect to their physical characteristics Explains detection and diagnosis of epileptic seizures from the EEG data of a subject Reviews the design and development of a low-cost and robust EEG acquisition system Provides mathematical analysis of EEGs, including MATLAB® codes for students to experiment with EEG data This book is aimed at graduate students and researchers in biomedical, electrical,

electronics, communication engineering, healthcare, and cyber physical systems.
Optical Wireless Communications Frontiers Media SA
With this comprehensive and accessible introduction to the field, you will gain all the skills and knowledge needed to work with current and future audio, speech, and hearing processing technologies. Topics covered include mobile telephony, human-computer interfacing through speech, medical applications of speech and hearing technology, electronic music, audio compression and reproduction, big data audio systems and the analysis of sounds in the environment. All of this is supported by numerous practical illustrations, exercises, and hands-on MATLAB® examples on topics as diverse as psychoacoustics (including some auditory illusions), voice changers, speech compression, signal analysis and visualisation, stereo processing, low-frequency ultrasonic scanning, and machine learning techniques for big data. With its pragmatic and application driven focus, and concise explanations, this is an essential resource for anyone who wants to rapidly gain a practical understanding of speech and audio processing and technology.
Biomedical Signal and Image Processing Apress
This book is a comprehensive guide to machine learning with worked examples in MATLAB. It starts with an overview of the history of Artificial Intelligence and automatic control and how the field of machine learning grew from these. It provides descriptions of all major areas in machine learning. The book reviews commercially available packages for machine learning and shows how they fit into the field. The book then shows how MATLAB can be used to solve machine learning problems and how MATLAB graphics can enhance the programmer’s understanding of the results and help users of their software grasp the results. Machine Learning can be very mathematical. The mathematics for each area is introduced in a clear and concise form so that even casual readers can understand the math. Readers from all areas of engineering will see connections to what they know and will learn new technology. The book then provides complete solutions in MATLAB for several important problems in machine learning including face identification, autonomous driving, and data classification. Full source code is provided for all of the examples and applications in the book. What you'll learn: An overview of the field of machine learning Commercial and open source packages in MATLAB How to use MATLAB for programming and building machine learning applications MATLAB graphics for machine learning Practical real world examples in MATLAB for major applications of machine learning in big data Who is this book for: The primary audiences are engineers and engineering students wanting a comprehensive and practical introduction to machine learning.
Statistical Parametric Mapping: The Analysis of Functional Brain Images Springer
This book presents the latest developments in biometrics technologies and reports on new approaches, methods, findings, and technologies developed or being developed by the research community and the industry. The book focuses on introducing fundamental principles and concepts of key enabling technologies for biometric systems applied

for both physical and cyber security. The authors disseminate recent research and developing efforts in this area, investigate related trends and challenges, and present case studies and examples such as fingerprint, face, iris, retina, keystroke dynamics, and voice applications . The authors also investigate the advances and future outcomes in research and development in biometric security systems. The book is applicable to students, instructors, researchers, industry practitioners, and related government agencies staff. Each chapter is accompanied by a set of PowerPoint slides for use by instructors.