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EEG Signal Processing and Feature Extraction - Li Hu 2019-10-12
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.
Entropy Measures for Data Analysis - Karsten Keller 2019-12-19
Entropies and entropy-like quantities play an increasing role in modern non-linear data analysis. Fields that benefit from this application range from biosignal analysis to econophysics and engineering. This issue is a collection of papers touching on different aspects of entropy measures in data analysis, as well as theoretical and computational analyses. The relevant topics include the difficulty to achieve adequate application of entropy measures and the acceptable parameter choices for those entropy measures, entropy-based coupling, and similarity analysis, along with the utilization of entropy measures as features in automatic learning and classification. Various real data applications are given.
Signal Processing for Neuroscientists - Wim van Drongelen 2006-12-18
Signal Processing for Neuroscientists introduces analysis techniques primarily aimed at neuroscientists and biomedical engineering students with a reasonable but modest background in mathematics, physics, and computer programming. The focus of this text is on what can be considered the ‘golden trio’ in the signal processing field: averaging, Fourier analysis, and filtering. Techniques such as convolution, correlation, coherence, and wavelet analysis are considered in the context of time and frequency domain analysis. The whole spectrum of signal analysis is covered, ranging from data acquisition to data processing; and from the mathematical background of the analysis to the practical application of processing algorithms. Overall, the approach to the mathematics is informal with a focus on basic understanding of the methods and their interrelationships rather than detailed proofs or derivations. One of the principle goals is to provide the reader with the background required to understand the principles of commercially available analyses software, and to allow him/her to construct his/her own analysis tools in an environment such as MATLAB®. Multiple color illustrations are integrated in the text Includes an introduction to biomedical signals, noise characteristics, and recording techniques Basics and background for more advanced topics can be found in extensive notes and appendices A Companion Website hosts the MATLAB scripts and several data files: http://www.elsevierdirect.com/companion.jsp?ISBN=9780123708670
Transactions on Computational Science XXVIII - Marina L. Gavrilova 2016-07-20
The LNCS journal Transactions on Computational Science reflects recent developments in the field of Computational Science, conceiving the field not as a mere ancillary science but rather as an innovative approach supporting many other scientific disciplines. The journal focuses on original high-quality research in the realm of computational science in parallel and distributed environments, encompassing the facilitating theoretical foundations and the applications of large-scale computations and massive data processing. It addresses researchers and practitioners in areas ranging from aerospace to biochemistry, from electronics to geosciences, from mathematics to software architecture, presenting verifiable computational methods, findings, and solutions, and enabling industrial users to apply techniques of leading-edge, large-scale, high performance computational methods. This, the 28th issue of the Transactions on Computational Science journal, is comprised of extended versions of selected papers from the International Conference on Cyberworlds, CyberWorlds 2015, held in Gotland, Sweden, in October 2015. The first paper is a position paper, presenting open problems and identifying future directions within the domain. The remaining 8 papers focus on a range of topics, including virtual reality, games, haptic modeling, cybersecurity, brain wave analysis, shape parameterization, projects, and data mining.
Proceedings of 6th International Conference on Recent Trends in Computing - Rajendra Prasad Mahapatra 2021-04-20
This book is a collection of high-quality peer-reviewed research papers presented at Sixth International Conference on Recent Trends in Computing (ICRTC 2020) held at SRM Institute of Science and Technology, Ghaziabad, Delhi, India, during 3 – 4 July 2020. The book discusses a wide variety of industrial, engineering and scientific applications of the emerging techniques. The book presents original works from researchers from academic and industry in the field of networking, security, big data and the Internet of things.
Practical Biomedical Signal Analysis Using MATLAB® - Katarzyna J. Blinowska 2021-10-18
Covering the latest cutting-edge techniques in biomedical signal processing while presenting a coherent treatment of various signal processing methods and applications, this second edition of Practical Biomedical Signal Analysis Using MATLAB® also offers practical guidance on which procedures are appropriate for a given task and different types of data. It begins by describing signal analysis techniques—including the newest and most advanced methods in the field—in an easy and accessible way, illustrating them with Live Script demos. MATLAB® routines are listed when available, and freely available software is discussed where appropriate. The book concludes by exploring the applications of the methods to a broad range of biomedical signals while highlighting common problems encountered in practice. These chapters have been updated throughout and include new sections on multiple channel analysis and connectivity measures, phase-amplitude analysis, functional near-infrared spectroscopy, fMRI (BOLD) signals, wearable devices, multimodal signal analysis, and brain-computer interfaces. By providing a unified overview of the field, this book explains how to integrate signal processing techniques in biomedical applications properly and explores how to avoid misinterpretations and pitfalls. It helps readers to choose the appropriate method as well as design their own methods. It will be an excellent guide for graduate students studying biomedical engineering and practicing researchers in the field of biomedical signal analysis. Features: Fully updated throughout with new achievements, technologies, and methods and is supported with over 40 original MATLAB Live Scripts illustrating the discussed techniques, suitable for self-learning or as a supplement to college courses Provides a practical comparison of the advantages and disadvantages of different approaches in the context of various applications Applies the methods to a variety of signals, including electric, magnetic, acoustic, and optical Katarzyna J. Blinowska is a Professor emeritus at the University of Warsaw, Poland, where she was director of Graduate Studies in Biomedical Physics and head of the Department of Biomedical Physics. Currently, she is employed at the Institute of

Biocybernetics and Biomedical Engineering of the Polish Academy of Sciences. She has been at the forefront in developing new advanced time-series methods for research and clinical applications. Jarosław Żygierewicz is a Professor at the University of Warsaw, Poland. His research focuses on developing methods for analyzing EEG and MEG signals, brain-computer interfaces, and applications of machine learning in signal processing and classification.

Intelligent Systems in Technical and Medical Diagnostics - Jozef Korbicz 2013-07-18

For many years technical and medical diagnostics has been the area of intensive scientific research. It covers well-established topics as well as emerging developments in control engineering, artificial intelligence, applied mathematics, pattern recognition and statistics. At the same time, a growing number of applications of different fault diagnosis methods, especially in electrical, mechanical, chemical and medical engineering, is being observed. This monograph contains a collection of 44 carefully selected papers contributed by experts in technical and medical diagnostics, and constitutes a comprehensive study of the field. The aim of the book is to show the bridge between technical and medical diagnostics based on artificial intelligence methods and techniques. It is divided into four parts: I. Soft Computing in Technical Diagnostics, II. Medical Diagnostics and Biometrics, III. Robotics and Computer Vision, IV. Various Problems of Technical Diagnostics. The monograph will be of interest to scientists as well as academics dealing with the problems of designing technical and medical diagnosis systems. Its target readers are also junior researchers and students of computer science, artificial intelligence, control or robotics.

Seriously Strange - Sudhir Kakar 2012-07-17

Despite being sullied by frauds and dismissed by sceptics, the paranormal has exerted a strange fascination over humankind for centuries. In Seriously strange, a group of nine intellectuals come together to shed light on some of the most baffling experiences on record - psychical experiences. Through these illuminating essays, they tell us how such extraordinary events can be decoded nad interpreted to become the object of rigorous scientific study. the range is wide, from essays that reveal how Freud and Jung engaged with the notion of the paranormal to a provacative and humorous memoir of a physicist who spent over a decade running a secret psychic spying programme for the US government druing the Cold Wa; from hearfelt accounts by practising psychiatrists of the anomalies in their healing practice to a learned call for the renewal of professional parapsychology in the light of Patanjali's Yoga Sutras. By telling their own stories and exploring some of the implications of their work, these men and women map the mind-bending geography of the human psyche and the spectum of experiences - love and death, desire and sex, hurt and healing, myth and magic - that influence it.

The Changing Face of Epilepsy Surgery: Contributions of Computational Neuroscience and Robotics to the Field - Jorge Alvaro Gonzalez-Martinez 2022-02-09

Topic Editor Prof. Jorge Alvaro Gonzalez-Martinez has received a consulting grant from Zimmer Biomet. Prof. Stéphan Chabardès has also worked as a consultant for Zimmer Biomet. Prof. Chauvel has declared no competing interests with regards to the Research Topic subject.

17th International Conference on Biomagnetism Advances in Biomagnetism - Biomag 2010 - March 28 - April 1, 2010 - Selma Supek 2010-04-07

40th anniversary of "medical uses of SQUID" th It is my great pleasure and honor to invite you to the 17 International Conference on Biomagnetism – Biomag2010 held in Dubrovnik, Croatia from Sunday, March 28 through Thursday, April 1, 2010. The interdisciplinary field of biomagnetism includes dynamic and evolving SQUID-based technologies offering advanced real-time methods for noninvasive assessments of magnetic signals from the brain, heart and other organs as well as a range of modeling, mathematical and computational methods for functional source localization approaches. Excellent spatial resolution and unique, millisecond, temporal resolution of biomagnetic techniques allow insights into cortical neurodynamics and neurobiological basis of the human brain as well as assessment of heart and other organs functions in health and disease. Biomag2010 will be a great opportunity for an exchange of ideas and presentation of the latest developments in instrumentation, modeling approaches, basic and clinical biomedical studies. We are particularly proud to announce the celebration of the 40th anniversary of the first SQUID-based MCG measurements published on April 1, 1970. Since then ''medical uses of SQUID'' were dynamic and growing, including the most recent developments, in combination with a low field MRI, toward a ''direct neuronal imaging''. Dubrovnik, the host city of the Biomag2010, a jewel on the Adriatic, will be a superb and stimulating setting for both scientific and social aspects of this meeting. I am looking forward to hosting you in Dubrovnik, Croatia in spring of 2010.

Analyzing Neural Time Series Data - Mike X Cohen 2014-01-17

A comprehensive guide to the conceptual, mathematical, and implementational aspects of analyzing electrical brain signals, including data from MEG, EEG, and LFP recordings. This book offers a comprehensive guide to the theory and practice of analyzing electrical brain signals. It explains the conceptual, mathematical, and implementational (via Matlab programming) aspects of time-, time-frequency- and synchronization-based analyses of magnetoencephalography (MEG), electroencephalography (EEG), and local field potential (LFP) recordings from humans and nonhuman animals. It is the only book on the topic that covers both the theoretical background and the implementation in language that can be understood by readers without extensive formal training in mathematics, including cognitive scientists, neuroscientists, and psychologists. Readers who go through the book chapter by chapter and implement the examples in Matlab will develop an understanding of why and how analyses are performed, how to interpret results, what the methodological issues are, and how to perform single-subject-level and group-level analyses. Researchers who are familiar with using automated programs to perform advanced analyses will learn what happens when they click the “analyze now” button. The book provides sample data and downloadable Matlab code. Each of the 38 chapters covers one analysis topic, and these topics progress from simple to advanced. Most chapters conclude with exercises that further develop the material covered in the chapter. Many of the methods presented (including convolution, the Fourier transform, and Euler's formula) are fundamental and form the groundwork for other advanced data analysis methods. Readers who master the methods in the book will be well prepared to learn other approaches.

Design Computing and Cognition’22 - John S Gero 2023-02-05

This book reports research and development that represent the state of the art in artificial intelligence in design, design cognition, design neurocognition, and design theories from the Tenth International Conference on Design Computing and Cognition held in Glasgow, UK, in 2022. The 48 chapters are grouped under the headings of natural language processing and design; design cognition; design neurocognition; learning and design; creative design and co-design; shape grammars; quantum computing; and human behavior. These contributions are of particular interest to design researchers and design educators, as well as to users of advanced computation and cognitive science. This book contains knowledge about the cognitive and neurocognitive behavior of designers, which is valuable to those who need to gain a better understanding of designing.

8th International Conference on the Development of Biomedical Engineering in Vietnam - Vo Van Toi 2021-08-25

This book presents cutting-edge research and developments in the field of biomedical engineering, with a special emphasis on results achieved in Vietnam and neighboring low- and middle-income countries. Covering both fundamental and applied research, and focusing on the theme “Healthcare technology for smart city in low- and middle-income countries,” it reports on the design, fabrication, and application of low-cost and portable medical devices, IoT devices, and telemedicine systems, on improved methods for biological data acquisition and analysis, on nanomaterials for biological applications, and on new achievements in biomechanics, tissue engineering, and regeneration. It describes the developments of molecular and cellular biology techniques, and statistical and computational methods, including artificial intelligence, for biomedical applications, covers key public/occupational health issues and reports on cutting-edge neuroengineering techniques. Gathering the proceedings of the 8th International Conference on The Development of Biomedical Engineering in Vietnam, BME 8, 2020, Vietnam, the book offers important answers to current challenges in the field and a source of inspiration for scientists, engineers, and researchers with various backgrounds working in different research institutes, companies, and countries.

EMBEC & NBC 2017 - Hannu Eskola 2017-06-12

This volume presents the proceedings of the joint conference of the European Medical and Biological

Engineering Conference (EMBEC) and the Nordic-Baltic Conference on Biomedical Engineering and Medical Physics (NBC), held in Tampere, Finland, in June 2017. The proceedings present all traditional biomedical engineering areas, but also highlight new emerging fields, such as tissue engineering, bioinformatics, biosensing, neurotechnology, additive manufacturing technologies for medicine and biology, and bioimaging, to name a few. Moreover, it emphasizes the role of education, translational research, and commercialization.

IOT with Smart Systems - Tomonobu Senjyu 2022-01-05

This book gathers papers addressing state-of-the-art research in all areas of information and communication technologies and their applications in intelligent computing, cloud storage, data mining and software analysis. It presents the outcomes of the Fifth International Conference on Information and Communication Technology for Intelligent Systems (ICTIS 2021), held in Ahmedabad, India. The book is divided into two volumes. It discusses the fundamentals of various data analysis techniques and algorithms, making it a valuable resource for researchers and practitioners alike.

Discovering Statistics Using R - Andy Field 2012-03-07

Lecturers - request an e-inspection copy of this text or contact your local SAGE representative to discuss your course needs. Watch Andy Field's introductory video to Discovering Statistics Using R Keeping the uniquely humorous and self-deprecating style that has made students across the world fall in love with Andy Field's books, Discovering Statistics Using R takes students on a journey of statistical discovery using R, a free, flexible and dynamically changing software tool for data analysis that is becoming increasingly popular across the social and behavioural sciences throughout the world. The journey begins by explaining basic statistical and research concepts before a guided tour of the R software environment. Next you discover the importance of exploring and graphing data, before moving onto statistical tests that are the foundations of the rest of the book (for example correlation and regression). You will then stride confidently into intermediate level analyses such as ANOVA, before ending your journey with advanced techniques such as MANOVA and multilevel models. Although there is enough theory to help you gain the necessary conceptual understanding of what you're doing, the emphasis is on applying what you learn to playful and real-world examples that should make the experience more fun than you might expect. Like its sister textbooks, Discovering Statistics Using R is written in an irreverent style and follows the same ground-breaking structure and pedagogical approach. The core material is augmented by a cast of characters to help the reader on their way, together with hundreds of examples, self-assessment tests to consolidate knowledge, and additional website material for those wanting to learn more. Given this book's accessibility, fun spirit, and use of bizarre real-world research it should be essential for anyone wanting to learn about statistics using the freely-available R software.

Practical Biomedical Signal Analysis Using MATLAB® - Katarzyn J. Blinowska 2011-09-12

Practical Biomedical Signal Analysis Using MATLAB® presents a coherent treatment of various signal processing methods and applications. The book not only covers the current techniques of biomedical signal processing, but it also offers guidance on which methods are appropriate for a given task and different types of data. The first several chapters of the text describe signal analysis techniques—including the newest and most advanced methods—in an easy and accessible way. MATLAB routines are listed when available and freely available software is discussed where appropriate. The final chapter explores the application of the methods to a broad range of biomedical signals, highlighting problems encountered in practice. A unified overview of the field, this book explains how to properly use signal processing techniques for biomedical applications and avoid misinterpretations and pitfalls. It helps readers to choose the appropriate method as well as design their own methods.

Modern Telemetry - Ondrej Krejcar 2011-10-05

Telemetry is based on knowledge of various disciplines like Electronics, Measurement, Control and Communication along with their combination. This fact leads to a need of studying and understanding of these principles before the usage of Telemetry on selected problem solving. Spending time is however many times returned in form of obtained data or knowledge which telemetry system can provide. Usage of telemetry can be found in many areas from military through biomedical to real medical applications. Modern way to create a wireless sensors remotely connected to central system with artificial intelligence provide many new, sometimes unusual ways to get a knowledge about remote objects behaviour. This book is intended to present some new up to date accesses to telemetry problems solving by use of new sensors conceptions, new wireless transfer or communication techniques, data collection or processing techniques as well as several real use case scenarios describing model examples. Most of book chapters deals with many real cases of telemetry issues which can be used as a cookbooks for your own telemetry related problems.

A Survey of EEG Signal Processing Techniques - Kundan Lal Verma 2012

EEG signals are widely used to study many clinical and non-clinical applications. EEG signals are very important signals to study the behavior of brain. These signals plays very important role in extraction of information. EEG signals are nonlinear and random in nature. Hence, it is very difficult to interpret the functionality by visual analysis and linear techniques. There are so many techniques are already developed by the scientists and neural engineers to study the analysis of EEG signals. In this book attempts have been made to present unique study format for both analysis and algorithms for EEG signal processing. Also in addition MATLAB programs are discussed to clear the concepts. The various techniques discussed in this book covered the topics of Generation of EEG signals to Analysis of EEG signals. Various ancient and recent techniques, algorithms are discussed.

EEG Signal Processing - Wai Yie Leong 2019-03

Electroencephalography (EEG) is an electrophysiological monitoring method used to record the brain activity in brain-computer interface (BCI) systems. It records the electrical activity of the brain, is typically non-invasive with electrodes placed along the scalp, requires relatively simple and inexpensive equipment, and is easier to use than other methods. EEG-based BCI methods provide modest speed and accuracy which is why multichannel systems and proper signal processing methods are used for feature extraction, feature selection and feature classification to discriminate among several mental tasks. This edited book presents state of the art aspects of EEG signal processing methods, with an emphasis on advanced strategies, case studies, clinical practices and applications such as EEG for meditation, auditory selective attention, sleep apnoea; person authentication; handedness detection, Parkinson's disease, motor imagery, smart air travel support and brain signal classification.

Practical Guide for Biomedical Signals Analysis Using Machine Learning Techniques - Abdulhamit Subasi 2019-03-16

Practical Guide for Biomedical Signals Analysis Using Machine Learning Techniques: A MATLAB Based Approach presents how machine learning and biomedical signal processing methods can be used in biomedical signal analysis. Different machine learning applications in biomedical signal analysis, including those for electrocardiogram, electroencephalogram and electromyogram are described in a practical and comprehensive way, helping readers with limited knowledge. Sections cover biomedical signals and machine learning techniques, biomedical signals, such as electroencephalogram (EEG), electromyogram (EMG) and electrocardiogram (ECG), different signal-processing techniques, signal de-noising, feature extraction and dimension reduction techniques, such as PCA, ICA, KPCA, MSPCA, entropy measures, and other statistical measures, and more. This book is a valuable source for bioinformaticians, medical doctors and other members of the biomedical field who need a cogent resource on the most recent and promising machine learning techniques for biomedical signals analysis. Provides comprehensive knowledge in the application of machine learning tools in biomedical signal analysis for medical diagnostics, brain computer interface and man/machine interaction Explains how to apply machine learning techniques to EEG, ECG and EMG signals Gives basic knowledge on predictive modeling in biomedical time series and advanced knowledge in machine learning for biomedical time series

New Trends in Computational Vision and Bio-inspired Computing - S. Smys 2020-09-27

This volume gathers selected, peer-reviewed original contributions presented at the International Conference on Computational Vision and Bio-inspired Computing (ICCVBIC) conference which was held in Coimbatore, India, on November 29-30, 2018. The works included here offer a rich and diverse sampling of recent developments in the fields of Computational Vision, Fuzzy, Image Processing and Bio-inspired Computing. The topics covered include computer vision; cryptography and digital privacy; machine learning and artificial neural networks; genetic algorithms and computational intelligence; the Internet of Things;

and biometric systems, to name but a few. The applications discussed range from security, healthcare and epidemic control to urban computing, agriculture and robotics. In this book, researchers, graduate students and professionals will find innovative solutions to real-world problems in industry and society as a whole, together with inspirations for further research.

Artificial Intelligence and Soft Computing - Leszek Rutkowski 2014-05-22

The two-volume set LNAI 8467 and LNAI 8468 constitutes the refereed proceedings of the 13th International Conference on Artificial Intelligence and Soft Computing, ICAISC 2014, held in Zakopane, Poland in June 2014. The 139 revised full papers presented in the volumes, were carefully reviewed and selected from 331 submissions. The 69 papers included in the first volume are focused on the following topical sections: Neural Networks and Their Applications, Fuzzy Systems and Their Applications, Evolutionary Algorithms and Their Applications, Classification and Estimation, Computer Vision, Image and Speech Analysis and Special Session 3: Intelligent Methods in Databases. The 71 papers in the second volume are organized in the following subjects: Data Mining, Bioinformatics, Biometrics and Medical Applications, Agent Systems, Robotics and Control, Artificial Intelligence in Modeling and Simulation, Various Problems of Artificial Intelligence, Special Session 2: Machine Learning for Visual Information Analysis and Security, Special Session 1: Applications and Properties of Fuzzy Reasoning and Calculus and Clustering.

Practical Biomedical Signal Analysis Using MATLAB - Katarzyn Blinowska 2011-09-12

Practical Biomedical Signal Analysis Using MATLAB presents a coherent treatment of various signal processing methods and applications. The book not only covers the current techniques of biomedical signal processing, but it also offers guidance on which methods are appropriate for a given task and different types of data.The first several chapters o

Intelligent Human Systems Integration - Waldemar Karwowski 2017-12-30

This book reports on research on innovative human systems integration and human-machine interaction, with an emphasis on artificial intelligence and automation, as well as computational modeling and simulation. It covers a wide range of applications in the area of design, construction and operation of products, systems and services, including lifecycle development and human-technology interaction. The book describes advanced methodologies and tools for evaluating and improving interface usability, new models, as well as case studies and best practices in virtual, augmented and mixed reality systems, with a special focus on dynamic environments. It also discusses different factors concerning the human, hardware, and artificial intelligence software. Based on the proceedings of the 1st International Conference on Intelligent Human Systems Integration (IHSI 2018), held on January 7-9, 2018, in Dubai, United Arab Emirates, the book also examines the forces that are currently shaping the nature of computing and cognitive systems, such as the need for decreasing hardware costs; the importance of infusing intelligence and automation, and the related trend toward hardware miniaturization and power reduction; the necessity for a better assimilation of computation in the environment; and the social concerns regarding access to computers and systems for people with special needs. It offers a timely survey and a practice-oriented reference guide to policy- and decision-makers, human factors engineers, systems developers and users alike.

Analysis of EEG Rhythms Using Custom-made MatLab Application for Processing of Data Collected During Neurofeedback Training in ADHD Subjects - Brent Hillard 2012

INTRODUCTION: Attention Deficit/Hyperactivity Disorder (ADHD) is a disorder that is prevalent throughout the world. It is believed that 5% of school aged children suffer from ADHD, with some estimates indicating as high as 10% may suffer from the disorder. Primarily, three subtypes of ADHD have been associated with certain electroencephalographic (EEG) abnormalities. The most common treatment for ADHD is medication. However, neurofeedback is considered an efficacious treatment for ADHD. It is proposed that neurofeedback training aimed to mitigate inattention and low arousal in ADHD will be accompanied by changes in EEG bands' relative power. DATA COLLECTION: Patients were 18 children with ADHD. The neurofeedback protocol used to train patients has focused attention training mode, which according to specifications, represents an EEG desynchronization measure. The neurofeedback protocol provides one numeric output for "Focus" and one numeric output for "Alertness". This does not allow for collecting information regarding changes of specific EEG bands' power within 2-45 Hz range. Therefore, data was collected for EEG bands through the use of BioExplorer and BioReview software. Each subject completed 12 sessions with a target length of 25 minutes per session. Additionally, IVA+Plus test and ABC behavioral survey measures were administered both pre- and post- neurofeedback. DATA PROCESSING AND ANALYSIS: Analysis was completed on each of the 25 min long twelve sessions using a custom-made MatLab application to determine the relative power of each of the EEG bands throughout each session and from the first session to the last session. Additional statistical analysis was performed to determine significant changes in relative power within sessions (from minute 1 to minute 25), and between sessions (from session 1 to session 12) for an individual patient using an ANOVA. Additionally, a correlation analysis was performed to determine possible correlations between the "Focus" measure and changes in relative power of Theta, Alpha, Low and High Beta, Theta/Alpha, Theta/Beta, and Theta/Low Beta and Theta/High Beta ratios. Additional measures of patients' post-neurofeedback outcomes were assessed using an audio-visual selective attention test and behavioral evaluation scores and analyzed through a paired t-test. RESULTS: Through statistical analysis of the data computed in the MatLab application, we determined that, as expected, Theta/Low Beta and Theta/Alpha ratios decreased significantly from Session 1 to Session 12 and from minute 1 to minute 25 within sessions. "Focus" measure also demonstrated a significant gradual increase from session 1 to session 12 and from minute 1 to minute 25 within sessions. The "Focus" measure of the protocol showed high negative correlation with both Theta/Alpha and Theta/Beta ratios. CONCLUSIONS: The findings will help in elucidation of neural mechanisms of neurofeedback aimed to improve focused attention in ADHD. Also, this analysis differs from those prior studies in the consideration of what is transpiring not only from session to session, but also within each session. Therefore, improvement can be indicated within a shorter number of sessions (i.e. 12) compared to previous protocols that required 30-40 sessions per subject to indicate statistically significant improvement either in EEG or clinical behavioral measures. Probably more than 12 sessions might contribute to better consolidation of results of operant conditioning using neurofeedback and currently, we have a study in progress that will compare outcomes of 12 vs. 18 sessions of neurofeedback using the same protocol.

XV Mediterranean Conference on Medical and Biological Engineering and Computing – MEDICON 2019 - Jorge Henriques 2019-09-24

This book gathers the proceedings of MEDICON 2019 – the XV Mediterranean Conference on Medical and Biological Engineering and Computing – which was held in September 26-28, 2019, in Coimbra, Portugal. A special emphasis has been given to practical findings, techniques and methods, aimed at fostering an effective patient empowerment, i.e. to position the patient at the heart of the health system and encourages them to be actively involved in managing their own healthcare needs. The book reports on research and development in electrical engineering, computing, data science and instrumentation, and on many topics at the interface between those disciplines. It provides academics and professionals with extensive knowledge on cutting-edge techniques and tools for detection, prevention, treatment and management of diseases. A special emphasis is given to effective advances, as well as new directions and challenges towards improving healthcare through holistic patient empowerment.

Niedermeyer's Electroencephalography - Donald L. Schomer 2018

Niedermeyer's Electroencephalography: Basic Principles, Clinical Applications, and Related Fields, Seventh Edition keeps the clinical neurophysiologist on the forefront of medical advancements. This authoritative text covers basic neurophysiology, neuroanatomy, and neuroimaging to provide a better understanding of clinical neurophysiological findings. This edition further delves into current state-of-the-art recording EEG activity both in the normal clinical environment and unique situations such as the intensive care unit, operating rooms, and epilepsy monitoring suites. As computer technology evolves, so does the integration of analytical methods that significantly affect the reader's interpretations of waveforms and trends that are occurring on long-term monitoring sessions. Compiled and edited by Donald L. Schomer and Fernando H. Lopes da Silva, along with a global team of experts, they collectively bring insight to crucial sections including basic principles of EEG and MEG, normal EEG, EEG in a clinical setting, clinical EEG in seizures and epilepsy, complementary and special techniques, event-related EEG phenomena, and shed light on the future of EEG and clinical neurophysiology. Akin to an encyclopedia of everything EEG, this comprehensive

work is perfect for neurophysiology fellows, as well as neurology, neurosurgery, and general medical residents, and for the interns and medical students, and is a one-stop-shop for anyone training in EEG or preparing for neurophysiology or epilepsy board exams.

Analysis and Classification of EEG Signals for Brain–Computer Interfaces - Szczepan Paszkiel 2019-08-31

This book addresses the problem of EEG signal analysis and the need to classify it for practical use in many sample implementations of brain–computer interfaces. In addition, it offers a wealth of information, ranging from the description of data acquisition methods in the field of human brain work, to the use of Moore–Penrose pseudo inversion to reconstruct the EEG signal and the LORETA method to locate sources of EEG signal generation for the needs of BCI technology. In turn, the book explores the use of neural networks for the classification of changes in the EEG signal based on facial expressions. Further topics touch on machine learning, deep learning, and neural networks. The book also includes dedicated implementation chapters on the use of brain–computer technology in the field of mobile robot control based on Python and the LabVIEW environment. In closing, it discusses the problem of the correlation between brain–computer technology and virtual reality technology.

16th Nordic-Baltic Conference on Biomedical Engineering - Henrik Mindedal 2014-10-08

This volume presents the proceedings of the joint 16th Nordic-Baltic Conference on Biomedical Engineering & Medical Physics and Medicinteknikdagarna 2014! The conference theme is Strategic Innovation. It aims at inspiring increased triple helix collaborations between health care providers, academia and the medtech industry.

Brain and Behavior Computing - Mridu Sahu 2021-06-24

Brain and Behavior Computing offers insights into the functions of the human brain. This book provides an emphasis on brain and behavior computing with different modalities available such as signal processing, image processing, data sciences, statistics further it includes fundamental, mathematical model, algorithms, case studies, and future research scopes. It further illustrates brain signal sources and how the brain signal can process, manipulate, and transform in different domains allowing researchers and professionals to extract information about the physiological condition of the brain. Emphasizes real challenges in brain signal processing for a variety of applications for analysis, classification, and clustering. Discusses data sciences and its applications in brain computing visualization. Covers all the most recent tools for analysing the brain and it’s working. Describes brain modeling and all possible machine learning methods and their uses. Augments the use of data mining and machine learning to brain computer interface (BCI) devices. Includes case studies and actual simulation examples. This book is aimed at researchers, professionals, and graduate students in image processing and computer vision, biomedical engineering, signal processing, and brain and behavior computing.

Advances in Applied Mathematics and Global Optimization - David Y. Gao 2009-04-09

The articles that comprise this distinguished annual volume for the Advances in Mechanics and Mathematics series have been written in honor of Gilbert Strang, a world renowned mathematician and exceptional person. Written by leading experts in complementarity, duality, global optimization, and quantum computations, this collection reveals the beauty of these mathematical disciplines and investigates recent developments in global optimization, nonconvex and nonsmooth analysis, nonlinear programming, theoretical and engineering mechanics, large scale computation, quantum algorithms and computation, and information theory.

Translational Side of Emerging Invasive and Non-Invasive Stimulation Therapies - Jiande Chen 2022-02-25

Through a Glass, Darkly: The Influence of the EEG Reference on Inference About Brain Function and Disorders - Pedro Antonio Valdes-Sosa 2020-01-20

The Complex Interaction Between Biological, Metabolic and Neurologic Dysregulation in Obstructive Sleep Apnea - Georgia Trakada 2021-12-02

Attention, predictions and expectations, and their violation: attentional control in the human brain - Simone Vossel 2015-05-20

In the burdened scenes of everyday life, our brains must select from among many competing inputs for perceptual synthesis - so that only the most relevant receive full attention and irrelevant (distracting) information is suppressed. At the same time, we must remain responsive to salient events outside our current focus of attention - and balancing these two processing modes is a fundamental task our brain constantly needs to solve. Both the physical saliency of a stimulus, as well as top-down predictions about imminent sensations crucially influence attentional selection and consequently the response to unexpected events. Research over recent decades has identified two separate brain networks involved in predictive top-down control and reorientation to unattended events (or oddball stimuli): the dorsal and ventral fronto-parietal attention systems of the human brain. Moreover, specific electrophysiological brain responses are known to characterize attentional orienting as well as the processing of deviant stimuli. However, many key questions are outstanding. What are the exact functional differences between these cortical attention systems? How are they lateralised in the two hemispheres? How do top-down and bottom-up signals interact to enable flexible attentional control? How does structural damage to one system affect the functionality of the other in brain damaged patients? Are there sensory-specific and supra-modal attentional systems in the brain? In addition to these questions, it is now accepted that brain responses are not only affected by the saliency of external stimuli, but also by our expectations about sensory inputs. How these two influences are balanced, and how predictions are formed in cortical networks, or generated on the basis of experience-dependent learning, are intriguing issues. In this Research Topic, we aim to collect innovative contributions that shed further light on the (cortical) mechanisms of attentional control in the human brain. In particular, we would like to encourage submissions that investigate the behavioural correlates, functional anatomy or electrophysiological markers of attentional selection and reorientation. Special emphasis will be given to studies investigating the context-sensitivity of these attentional processes in relation to prior expectations, trial history, contextual cues or physical saliency. We would like to encourage submissions employing different research methods (psychophysical recordings, neuroimaging techniques such as fMRI, MEG, EEG or ECoG, as well as neurostimulation methods such as TMS or tDCS) in healthy volunteers or neurological patients. Computational models and animal studies are also welcome. Finally, we also welcome submission of meta-analyses and reviews articles that provide new insights into, or conclusions about recent work in the field.

6th European Conference of the International Federation for Medical and Biological Engineering - Igor Lacković 2014-09-02

This volume presents the Proceedings of the 6th European Conference of the International Federation for Medical and Biological Engineering (MBEC2014), held in Dubrovnik September 7 – 11, 2014. The general theme of MBEC 2014 is "Towards new horizons in biomedical engineering" The scientific discussions in these conference proceedings include the following themes: - Biomedical Signal Processing - Biomedical Imaging and Image Processing - Biosensors and Bioinstrumentation - Bio-Micro/Nano Technologies - Biomaterials - Biomechanics, Robotics and Minimally Invasive Surgery - Cardiovascular, Respiratory and Endocrine Systems Engineering - Neural and Rehabilitation Engineering - Molecular, Cellular and Tissue Engineering - Bioinformatics and Computational Biology - Clinical Engineering and Health Technology Assessment - Health Informatics, E-Health and Telemedicine - Biomedical Engineering Education

EEG-Based Brain-Computer Interfaces - Dipali Bansal 2019-03-14

EEG-Based Brain-Computer Interface: Cognitive Analysis and Control Applications provides a technical approach to using brain signals for control applications, along with the EEG-related advances in BCI. The research and techniques in this book discuss time and frequency domain analysis on deliberate eye-blinking data as the basis for EEG-triggering control applications. In addition, the book provides experimental scenarios and features algorithms for acquiring real-time EEG signals using commercially available units that interface with MATLAB software for acquisition and control. Details techniques for multiple types of analysis (including ERP, scalp map, sub-band power and independent component) to acquire data from deliberate eye-blinking Demonstrates how to use EEGs to develop more intuitive BCIs in real-time scenarios Includes algorithms and scenarios that interface with MATLAB software for interactive use

Proceedings of the International Conference on Paradigms of Computing, Communication and Data

Sciences - Mayank Dave 2021-02-19
This book presents best selected papers presented at the International Conference on Paradigms of Computing, Communication and Data Sciences (PCCDS 2020), organized by National Institute of Technology, Kurukshetra, India, during 1–3 May 2020. It discusses high-quality and cutting-edge research in the areas of advanced computing, communications and data science techniques. The book is a collection of latest research articles in computation algorithm, communication and data sciences, intertwined with each other for efficiency.

Advanced Informatics for Computing Research - Ashish Kumar Luhach 2018-12-12
This two-volume set (CCIS 955 and CCIS 956) constitutes the refereed proceedings of the Second International Conference on Advanced Informatics for Computing Research, ICAICR 2018, held in Shimla, India, in July 2018. The 122 revised full papers presented were carefully reviewed and selected from 427 submissions. The papers are organized in topical sections on computing methodologies; hardware; information systems; networks; security and privacy; computing methodologies.