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Nota di contenuto	Cover; Title Page; Copyright; Preface; Chapter 1 Brain Signals, Their Generation, Acquisition and Properties; 1.1 Introduction; 1.2 Historical Review of the Brain; 1.3 Neural Activities; 1.4 Action Potentials; 1.5 EEG Generation; 1.6 Brain Rhythms; 1.7 EEG Recording and Measurement; 1.8 Abnormal EEG Patterns; 1.9 Aging; 1.10 Mental Disorders; 1.11 Memory and Content Retrieval; 1.12 MEG Signals and Their Generation; 1.13 Conclusions; References; Chapter 2 Fundamentals of EEG Signal Processing; 2.1 Introduction; 2.2 Nonlinearity of the Medium; 2.3 Nonstationarity; 2.4 Signal Segmentation 2.5 Other Properties of Brain Signals 2.6 Conclusions; References; Chapter 3 EEG Signal Modelling; 3.1 Physiological Modelling of EEG Generation; 3.2 Mathematical Models; 3.3 Generating EEG Signals Based on Modelling the Neuronal Activities; 3.4 Electronic Models; 3.5 Dynamic Modelling of the Neuron Action Potential Threshold; 3.6 Conclusions; References; Chapter 4 Signal Transforms and Joint Time-Frequency Analysis; 4.1 Introduction; 4.2 Parametric Spectrum Estimation and Z-Transform; 4.3 Time-Frequency Domain Transforms;

4.4 Ambiguity Function and the Wigner-Ville Distribution
4.5 Hermite Transform
4.6 Conclusions; References; Chapter 5 Chaos and Dynamical Analysis; 5.1 Entropy; 5.2 Kolmogorov Entropy; 5.3 Lyapunov Exponents; 5.4 Plotting the Attractor Dimensions from Time Series; 5.5 Estimation of Lyapunov Exponents from Time Series; 5.6 Approximate Entropy; 5.7 Using Prediction Order; 5.8 Conclusions; References; Chapter 6 Classification and Clustering of Brain Signals; 6.1 Introduction; 6.2 Linear Discriminant Analysis; 6.3 Support Vector Machines; 6.4 k-Means Algorithm; 6.5 Common Spatial Patterns; 6.6 Conclusions; References
Chapter 7 Blind and Semi-Blind Source Separation
7.1 Introduction; 7.2 Singular Spectrum Analysis; 7.3 Independent Component Analysis; 7.4 Instantaneous BSS; 7.5 Convulsive BSS; 7.6 Sparse Component Analysis; 7.7 Nonlinear BSS; 7.8 Constrained BSS; 7.9 Application of Constrained BSS; Example; 7.10 Nonstationary BSS; 7.11 Tensor Factorization for Underdetermined Source Separation; 7.12 Tensor Factorization for Separation of Convulsive Mixtures in the Time Domain; 7.13 Separation of Correlated Sources via Tensor Factorization; 7.14 Conclusions; References
Chapter 8 Connectivity of Brain Regions
8.1 Introduction; 8.2 Connectivity Through Coherency; 8.3 Phase-Slope Index; 8.4 Multivariate Directionality Estimation; 8.5 Modelling the Connectivity by Structural Equation Modelling; 8.6 EEG Hyper-Scanning and Inter-Subject Connectivity; 8.7 State-Space Model for Estimation of Cortical Interactions; 8.8 Application of Adaptive Filters; 8.9 Tensor Factorization Approach; 8.10 Conclusions; References; Chapter 9 Detection and Tracking of Event-Related Potentials; 9.1 ERP Generation and Types; 9.2 Detection, Separation, and Classification of P300 Signals
9.3 Brain Activity Assessment Using ERP

Sommario/riassunto

"Brain signal processing spans a broad range of knowledge across engineering, science and medicine, and this book brings together the disparate theory and application to create a comprehensive resource on this growing topic. It will provide advanced tools for the detection, monitoring, separation, localizing and understanding of brain functional, anatomical, and physiological abnormalities. The focus will be on advanced and adaptive signal processing techniques for the processing of electroencephalography and magneto-encephalography signals, and their correlation to the corresponding functional magnetic resonance imaging (fMRI). Multimodal processing of brain signals, the new focus for brain signal research, will also be explored. The book covers the broad remit of neuro-imaging, ensuring comprehensive coverage of all issues related to brain signal processing. Topics such as mental fatigue, brain connectivity and new recording techniques will also be covered. This book will be a progression/follow on from Dr Sanei's first book with Wiley, EEG Signal Processing"--
"Covers the fundamentals of brain signal processing, before developing the subject at advanced level"--
