1. Record Nr. UNINA9910465813303321

Autore	Mitra Partha
Titolo	Observed brain dynamics [[electronic resource] /] / Partha P. Mitra, Hemant Bokil
Pubbl/distr/stampa	Oxford ; ; New York, : Oxford University Press, c2008
ISBN	0-19-803963-8 9786611374624 1-281-37462-8 1-4356-3359-8
Descrizione fisica	1 online resource (404 p.)
Altri autori (Persone)	BokilHemant
Disciplina	612.8/2
Soggetti	Brain - Mathematical models Brain - Physiology Neural networks (Neurobiology) Electroencephalography Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references (p. 349-361) and index.
Nota di contenuto	Contents; PART I: Conceptual Background; 1 Why Study Brain Dynamics?; 1.1 Why Dynamics? An Active Perspective; 1.2 Quantifying Dynamics: Shared Theoretical Instruments; 1.3 "Newtonian and Bergsonian Time"; 2 Theoretical Accounts of the Nervous System; 2.1 Three Axes in the Space of Theories; 3 Engineering Theories and Nervous System Function; 3.1 What Do Brains Do?; 3.2 Engineering Theories; 4 Methodological Considerations; 4.1 Conceptual Clarity and Valid Reasoning; 4.2 Nature of Scientific Method; PART II: Tutorials; 5 Mathematical Preliminaries; 5.1 Scalars: Real and Complex Variables Elementary Functions5.2 Vectors and Matrices: Linear Algebra; 5.3 Fourier Analysis; 5.4 Time Frequency Analysis; 5.5 Probability Theory; 5.6 Stochastic Processes; 6 Statistical Protocols; 6.1 Data Analysis Goals; 6.2 An Example of a Protocol: Method of Least Squares; 6.3 Classical and Modern Approaches; 6.4 Classical Approaches: Estimation and Inference; 7 Time Series Analysis; 7.1 Method of Moments; 7.2 Evoked Potentials and Peristimulus Time Histogram; 7.3 Univariate

Spectral Analysis; 7.4 Bivariate Spectral Analysis; 7.5 Multivariate Spectral Analysis; 7.6 Prediction
7.7 Point Process Spectral Estimation7.8 Higher Order Correlations; PART III: Applications; 8 Electrophysiology: Microelectrode Recordings; 8.1 Introduction; 8.2 Experimental Approaches; 8.3 Biophysics of Neurons; 8.4 Measurement Techniques; 8.5 Analysis Protocol; 8.6 Parametric Methods; 8.7 Predicting Behavior From Neural Activity; 9 Spike Sorting; 9.1 Introduction; 9.2 General Framework; 9.3 Data Acquisition; 9.4 Spike Detection; 9.5 Clustering; 9.6 Quality Metrics; 10 Electro- and Magnetoencephalography; 10.1 Introduction; 10.2 Analysis of Electroencephalographic Signals: Early Work
10.3 Physics of Encephalographic Signals10.4 Measurement Techniques; 10.5 Analysis; 11 PET and fMRI; 11.1 Introduction; 11.2 Biophysics of PET and fMRI; 11.3 Experimental Overview; 11.4 Analysis; 12 Optical Imaging; 12.1 Introduction; 12.2 Biophysical Considerations; 12.3 Analysis; PART IV: Special Topics; 13 Local Regression and Likelihood; 13.1 Local Regression; 13.2 Local Likelihood; 13.3 Density Estimation; 13.4 Model Assessment and Selection; 14 Entropy and Mutual Information; 14.1 Entropy and Mutual Information for Discrete Random Variables; 14.2 Continuous Random Variables
14.3 Discrete-Valued Discrete-Time Stochastic Processes14.4 Continuous-Valued Discrete-Time Stochastic Processes; 14.5 Point Processes; 14.6 Estimation Methods; Appendix A: The Bandwagon; Appendix B: Two Famous Papers; Photograph Credits; Bibliography; Index; A; B; C; D; E; F; G; H; I; J; K; L; M; N; O; P; Q; R; S; T; U; V; W; Y

Sommario/riassunto

The biomedical sciences have recently undergone revolutionary change, due to the ability to digitize and store large data sets. In neuroscience, the data sources include measurements of neural activity measured using electrode arrays, EEG and MEG, brain imaging data from PET, fMRI, and optical imaging methods. Analysis, visualization, and management of these time series data sets is a growing field of research that has become increasingly important both for experimentalists and theorists interested in brain function. Written by investigators who have played an important role in developing the