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Artificial Intelligence Trends in Intelligent Systems Radek Silhavy 2017-04-06 This book presents new methods and approaches to real-world problems as well as exploratory research that describes novel artificial intelligence applications, including deep learning, neural networks and hybrid algorithms. This book constitutes the refereed proceedings of the Artificial Intelligence Trends in Intelligent Systems Section of the 6th Computer Science On-line Conference 2017 (CSOC 2017), held in April 2017.

The Cross-Entropy Method Reuven Y. Rubinstein 2013-03-09 Rubinstein is the pioneer of the well-known score function and cross-entropy methods. Accessible to a broad audience of engineers, computer scientists, mathematicians, statisticians and in general anyone, theorist and practitioner, who is interested in smart simulation, fast optimization, learning algorithms, and image processing.

Facing the Challenges in Structural Engineering Hugo Rodrigues 2017-07-11 This edited volume brings together findings and case studies on fundamental and applied aspects of structural engineering, applied to buildings, bridges and infrastructures in general. It focuses on the application of advanced experimental and numerical techniques and new technologies to the built environment. This volume is part of the proceedings of the 1st GeoMEast International Congress and Exhibition on Sustainable Civil Infrastructures, Egypt 2017.

Introduction to Semi-supervised Learning Xiaojin Zhu 2009 Semi-supervised learning is a learning paradigm concerned with the study of how computers and natural systems such as humans learn in the presence of both labeled and unlabeled data. Traditionally, learning has been studied either in the unsupervised paradigm (e.g., clustering, outlier detection) where all the data are unlabeled, or in the supervised paradigm (e.g., classification, regression) where all the data are labeled. The goal of semi-supervised learning is to understand how combining labeled and unlabeled data may change the learning behavior, and design algorithms that take advantage of such a combination.

Semi-supervised learning is of great interest in machine learning and data mining because it can use readily available unlabeled data to improve supervised learning tasks when the labeled data are scarce or expensive. Semi-supervised learning also shows potential as a quantitative tool to understand human category learning, where most of the input is self-evidently unlabeled. In this introductory book, we present some popular semi-supervised learning models, including self-training, mixture models, co-training and multiview learning, graph-based methods, and semi-supervised support vector machines. For each model, we discuss its basic mathematical formulation. The success of semi-supervised learning depends critically on some underlying assumptions. We emphasize the assumptions made by each model and give counterexamples when appropriate to demonstrate the limitations of the different models. In addition, we discuss semi-supervised learning for cognitive psychology. Finally, we give a computational learning theoretic perspective on semi-supervised learning, and we conclude the book with a brief discussion of open questions in the field. Table of Contents: Introduction to Statistical Machine Learning / Overview of Semi-Supervised Learning / Mixture Models and EM / Co-Training / Graph-Based Semi-Supervised Learning / Semi-Supervised Support Vector Machines / Human Semi-Supervised Learning / Theory and Outlook

MATLAB Kelly Bennett 2014-09-08 MATLAB is an indispensable asset for scientists, researchers, and engineers. The richness of the MATLAB computational environment combined with an integrated development environment (IDE) and straightforward interface, toolkits, and simulation and modeling capabilities, creates a research and development tool that has no equal. From quick code prototyping to full blown deployable applications, MATLAB stands as a de facto development language and environment serving the technical needs of a wide range of users. As a collection of diverse applications, each book chapter presents a novel application and use of MATLAB for a specific result.

MATLAB for Brain and Cognitive Scientists Mike X Cohen 2017-05-12 An introduction to a popular programming language for neuroscience research, taking the reader from beginning to intermediate and advanced levels of MATLAB programming. MATLAB is one of the most popular programming languages for neuroscience and psychology research. Its balance of usability, visualization, and widespread use makes it one of the most powerful tools in a scientist's toolbox. In this book, Mike Cohen teaches brain scientists how to program in MATLAB, with a focus on applications most commonly used in neuroscience and psychology. Although most MATLAB tutorials will abandon users at the beginner's level, leaving them to sink or swim, MATLAB for Brain and Cognitive Scientists takes readers from beginning to intermediate and advanced levels of MATLAB programming, helping them gain real expertise in applications that they will use in their work. The book offers a mix of instructive text and rigorous explanations of MATLAB code along with programming tips and tricks. The goal is to teach the reader how to program data analyses in neuroscience and psychology. Readers will learn not only how to but also how not to program, with examples of bad code that they are invited to correct or improve. Chapters end with exercises that test and develop the skills taught in each chapter.

Interviews with neuroscientists and cognitive scientists who have made significant contributions their field using MATLAB appear throughout the book. MATLAB for Brain and Cognitive Scientists is an essential resource for both students and instructors, in the classroom or for independent study.

Applications of Operations Research and Management Science G. S. R. Murthy 2015-06-15 This book includes case studies that examine the application of operations research to improve or increase efficiency in industry and operational activities. This collection of "living case studies" is all based on the author's 30-year career of consulting and advisory work. These true-to life industrial applications illustrate the research and development of solutions, as well as potential implementation and integration problems that may occur when adopting these methods into a business. Among the topics covered in the chapters include optimization in circuit board manufacturing, Decision Support System (DSS) for plant loading and dispatch planning, as well as development of important test procedures for tyre and pharma industry with shelf life constraints. In particular, the study on deckle optimization should be of great help to managers in paper industry and consultants for development of deckle optimization software. The application of operations research throughout the industry makes it an ideal guide for industrial executives, professionals and practitioners responsible for quality and productivity improvement.

Kernel Methods and Machine Learning S. Y. Kung 2014-04-17 Offering a fundamental basis in kernel-based learning theory, this book covers both statistical and algebraic principles. It provides over 30 major theorems for kernel-based supervised and unsupervised learning models. The first of the theorems establishes a condition, arguably necessary and sufficient, for the kernelization of learning models. In addition, several other theorems are devoted to proving mathematical equivalence between seemingly unrelated models. With over 25 closed-form and iterative algorithms, the book provides a step-by-step guide to algorithmic procedures and analysing which factors to consider in tackling a given problem, enabling readers to improve specifically designed learning algorithms, build models for new applications and develop efficient techniques suitable for green machine learning technologies. Numerous real-world examples and over 200 problems, several of which are Matlab-based simulation exercises, make this an essential resource for graduate students and professionals in computer science, electrical and biomedical engineering. Solutions to problems are provided online for instructors.

Computational Statistics Handbook with MATLAB Wendy L. Martinez 2015-12-16 A Strong Practical Focus on Applications and AlgorithmsComputational Statistics Handbook with MATLAB, Third Edition covers today's most commonly used techniques in computational statistics while maintaining the same philosophy and writing style of the bestselling previous editions. The text keeps theoretical concepts to a minimum, emphasizing the i

Exploratory Data Analysis with MATLAB Wendy L. Martinez 2004-11-29 Exploratory

data analysis (EDA) was conceived at a time when computers were not widely used, and thus computational ability was rather limited. As computational sophistication has increased, EDA has become an even more powerful process for visualizing and summarizing data before making model assumptions to generate hypotheses, encompassing larger a

Medical Imaging: Concepts, Methodologies, Tools, and Applications Management Association, Information Resources 2016-07-18 Medical imaging has transformed the ways in which various conditions, injuries, and diseases are identified, monitored, and treated. As various types of digital visual representations continue to advance and improve, new opportunities for their use in medical practice will likewise evolve. Medical Imaging: Concepts, Methodologies, Tools, and Applications presents a compendium of research on digital imaging technologies in a variety of healthcare settings. This multi-volume work contains practical examples of implementation, emerging trends, case studies, and technological innovations essential for using imaging technologies for making medical decisions. This comprehensive publication is an essential resource for medical practitioners, digital imaging technologists, researchers, and medical students.

Data-Driven Science and Engineering Steven L. Brunton 2022-05-05 A textbook covering data-science and machine learning methods for modelling and control in engineering and science, with Python and MATLAB®.

Large Scale Optimization in Supply Chains and Smart Manufacturing Jesús M. Velásquez-Bermúdez 2019-09-06 In this book, theory of large scale optimization is introduced with case studies of real-world problems and applications of structured mathematical modeling. The large scale optimization methods are represented by various theories such as Benders' decomposition, logic-based Benders' decomposition, Lagrangian relaxation, Dantzig –Wolfe decomposition, multi-tree decomposition, Van Roy' cross decomposition and parallel decomposition for mathematical programs such as mixed integer nonlinear programming and stochastic programming. Case studies of large scale optimization in supply chain management, smart manufacturing, and Industry 4.0 are investigated with efficient implementation for real-time solutions. The features of case studies cover a wide range of fields including the Internet of things, advanced transportation systems, energy management, supply chain networks, service systems, operations management, risk management, and financial and sales management. Instructors, graduate students, researchers, and practitioners, would benefit from this book finding the applicability of large scale optimization in asynchronous parallel optimization, real-time distributed network, and optimizing the knowledge-based expert system for convex and non-convex problems.

Classification and Clustering in Biomedical Signal Processing Dey, Nilanjan 2016-04-07 Advanced techniques in image processing have led to many innovations supporting the medical field, especially in the area of disease diagnosis. Biomedical imaging is an essential part of early disease detection and often

considered a first step in the proper management of medical pathological conditions. Classification and Clustering in Biomedical Signal Processing focuses on existing and proposed methods for medical imaging, signal processing, and analysis for the purposes of diagnosing and monitoring patient conditions. Featuring the most recent empirical research findings in the areas of signal processing for biomedical applications with an emphasis on classification and clustering techniques, this essential publication is designed for use by medical professionals, IT developers, and advanced-level graduate students.

Kernel Methods for Pattern Analysis Department of Computer Science Royal Holloway John Shawe-Taylor 2004-06-28 Publisher Description

Intelligent Systems for Sustainable Person-Centered Healthcare Dalia Kriksciuniene 2022 This open access book establishes a dialog among the medical and intelligent system domains for igniting transition toward a sustainable and cost-effective healthcare. The Person-Centered Care (PCC) positions a person in the center of a healthcare system, instead of defining a patient as a set of diagnoses and treatment episodes. The PCC-based conceptual background triggers enhanced application of Artificial Intelligence, as it dissolves the limits of processing traditional medical data records, clinical tests and surveys. Enhanced knowledge for diagnosing, treatment and rehabilitation is captured and utilized by inclusion of data sources characterizing personal lifestyle, and health literacy, and it involves insights derived from smart ambience and wearables data, community networks, and the caregivers' feedback. The book discusses intelligent systems and their applications for healthcare data analysis, decision making and process design tasks. The measurement systems and efficiency evaluation models analyze ability of intelligent healthcare system to monitor person health and improving quality of life. .

Advances in Robotics, Automation and Data Analytics Jessnor Arif Mat Jizat 2021-03-10 This book presents essentially a collection of proceedings that deliberate on the key challenges and recent trends on robotics, automation and data analytics which are the pillars of Industry 4.0. Solutions that are employed in the multitude spectra of innovative robotics & automation and data analytics are discussed. The readers are expected to gain an insightful view on the current trends, issues, mitigating factors as well as solutions from the book. This book consists of selected papers presented at the 2nd International Conference on Innovative Technology, Engineering and Sciences 2020 (iCITES) hosted virtually by Universiti Malaysia Pahang on 22nd December 2020. iCITES is a biennial conference, aimed at building a platform that allows relevant stakeholders to share and discuss their latest researches, ideas and survey reports from theoretical to a practical standpoint especially in the Innovative Robotics & Automation and Data Analytics tracks which was published in this book.

Handbook of Discrete and Combinatorial Mathematics Kenneth H. Rosen 2017-10-19 Handbook of Discrete and Combinatorial Mathematics provides a comprehensive

reference volume for mathematicians, computer scientists, engineers, as well as students and reference librarians. The material is presented so that key information can be located and used quickly and easily. Each chapter includes a glossary. Individual topics are covered in sections and subsections within chapters, each of which is organized into clearly identifiable parts: definitions, facts, and examples. Examples are provided to illustrate some of the key definitions, facts, and algorithms. Some curious and entertaining facts and puzzles are also included. Readers will also find an extensive collection of biographies. This second edition is a major revision. It includes extensive additions and updates. Since the first edition appeared in 1999, many new discoveries have been made and new areas have grown in importance, which are covered in this edition.

Computational Learning Approaches to Data Analytics in Biomedical Applications Khalid Al-Jabery 2019-11-29 Computational Learning Approaches to Data Analytics in Biomedical Applications provides a unified framework for biomedical data analysis using varied machine learning and statistical techniques. It presents insights on biomedical data processing, innovative clustering algorithms and techniques, and connections between statistical analysis and clustering. The book introduces and discusses the major problems relating to data analytics, provides a review of influential and state-of-the-art learning algorithms for biomedical applications, reviews cluster validity indices and how to select the appropriate index, and includes an overview of statistical methods that can be applied to increase confidence in the clustering framework and analysis of the results obtained. Includes an overview of data analytics in biomedical applications and current challenges Updates on the latest research in supervised learning algorithms and applications, clustering algorithms and cluster validation indices Provides complete coverage of computational and statistical analysis tools for biomedical data analysis Presents hands-on training on the use of Python libraries, MATLAB® tools, WEKA, SAP-HANA and R/Bioconductor

Metaheuristics for Portfolio Optimization G. A. Vijayalakshmi Pai 2017-12-27 The book is a monograph in the cross disciplinary area of Computational Intelligence in Finance and elucidates a collection of practical and strategic Portfolio Optimization models in Finance, that employ Metaheuristics for their effective solutions and demonstrates the results using MATLAB implementations, over live portfolios invested across global stock universes. The book has been structured in such a way that, even novices in finance or metaheuristics should be able to comprehend and work on the hybrid models discussed in the book.

Selected Applications of Convex Optimization Li Li 2015-03-26 This book focuses on the applications of convex optimization and highlights several topics, including support vector machines, parameter estimation, norm approximation and regularization, semi-definite programming problems, convex relaxation, and geometric problems. All derivation processes are presented in detail to aid in comprehension. The book offers concrete guidance, helping readers recognize and formulate convex optimization problems they might encounter in practice.

Distributed Computer and Communication Networks: Control, Computation, Communications Vladimir M. Vishnevskiy 2021-01-04 This book constitutes the refereed proceedings of the 23rd International Conference on Distributed and Computer and Communication Networks, DCCN 2020, held in Moscow, Russia, in September 2020. Due to the COVID-19 pandemic the conference was held online. The 43 papers were carefully reviewed and selected from 167 submissions.The papers are organized in the following topical sections: computer and communication networks and technologies; analytical modeling of distributed systems, and distributed systems applications.

Computational Intelligence Paradigms S. Sumathi 2010-01-05 Offering a wide range of programming examples implemented in MATLAB®, Computational Intelligence Paradigms: Theory and Applications Using MATLAB® presents theoretical concepts and a general framework for computational intelligence (CI) approaches, including artificial neural networks, fuzzy systems, evolutionary computation, genetic algorithms and programming, and swarm intelligence. It covers numerous intelligent computing methodologies and algorithms used in CI research. The book first focuses on neural networks, including common artificial neural networks; neural networks based on data classification, data association, and data conceptualization; and real-world applications of neural networks. It then discusses fuzzy sets, fuzzy rules, applications of fuzzy systems, and different types of fused neuro-fuzzy systems, before providing MATLAB illustrations of ANFIS, classification and regression trees, fuzzy c-means clustering algorithms, fuzzy ART map, and Takagi–Sugeno inference systems. The authors also describe the history, advantages, and disadvantages of evolutionary computation and include solved MATLAB programs to illustrate the implementation of evolutionary computation in various problems. After exploring the operators and parameters of genetic algorithms, they cover the steps and MATLAB routines of genetic programming. The final chapter introduces swarm intelligence and its applications, particle swarm optimization, and ant colony optimization. Full of worked examples and end-of-chapter questions, this comprehensive book explains how to use MATLAB to implement CI techniques for the solution of biological problems. It will help readers with their work on evolution dynamics, self-organization, natural and artificial morphogenesis, emergent collective behaviors, swarm intelligence, evolutionary strategies, genetic programming, and the evolution of social behaviors.

RoboCup 2018: Robot World Cup XXII Dirk Holz 2019-08-06 This book includes the post-conference proceedings of the 22nd RoboCup International Symposium, held in Montreal, QC, Canada, in June 2018. The 32 full revised papers and 11 papers from the winning teams presented were carefully reviewed and selected from 51 submissions. This book highlights the approaches of champion teams from the competitions and documents the proceedings of the 22nd annual RoboCup International Symposium. Due to the complex research challenges set by the RoboCup initiative, the RoboCup International Symposium offers a unique perspective for exploring scientific and engineering principles underlying advanced robotic and AI systems.

Soft Computing Techniques in Voltage Security Analysis Kabir Chakraborty
2015-03-04 This book focuses on soft computing techniques for enhancing voltage
security in electrical power networks. Artificial neural networks (ANNs) have
been chosen as a soft computing tool, since such networks are eminently
suitable for the study of voltage security. The different architectures of the
ANNs used in this book are selected on the basis of intelligent criteria rather
than by a "brute force" method of trial and error. The fundamental aim of this
book is to present a comprehensive treatise on power system security and the
simulation of power system security. The core concepts are substantiated by
suitable illustrations and computer methods. The book describes analytical
aspects of operation and characteristics of power systems from the viewpoint of
voltage security. The text is self-contained and thorough. It is intended for
senior undergraduate students and postgraduate students in electrical
engineering. Practicing engineers, Electrical Control Center (ECC) operators
and researchers will also find the book useful.

FUNDAMENTALS OF MEDICAL IMAGE PROCESSING USING MATLAB MAJUMDER, DWIJESH KUMAR
DUTTA 2022-07-01 The book is designed as per the present requirement of
subject. It acquaints the students/readers with fundamental image processing
concepts and methodologies for better understanding and more meaningful
retrieval of information of the internal structure of human organs. In the
book, various concepts of image processing are discussed for different
modalities of medical imaging, such as CT, MRI, PET, and SPECT. The book covers
various important topics such as Programming in MATLAB, Biomedical Imaging,
Artificial Neural Network, and Image Processing. The chapters on image
enhancement, segmentation, shape analysis, registration, visualization, and
retrieval make this book very comprehensive and useful for the
students/readers. The exercises and examples given in each chapter will be very
helpful to better understand the topics and to do quick revision. KEY FEATURES
1. Artificial Neural Network in image processing is described briefly. 2.
Different modalities of image processing are discussed in the book. 3. Shape
theoretic approach of image processing is also discussed. 4. Chapters on
Programming in MATLAB, Biomedical Imaging, ANN, Medical Image Modalities, Image
Enhancement, Segmentation, Shape Analysis, Registration, Visualization, and
Retrieval make the book very comprehensive. TARGET AUDIENCE 1. B.Tech/M.Tech
CSE, IT, Engineering Physics, and Mathematics and Computing 2. MCA

Satellite Image Analysis: Clustering and Classification Surekha Borra
2019-02-08 Thanks to recent advances in sensors, communication and satellite
technology, data storage, processing and networking capabilities, satellite
image acquisition and mining are now on the rise. In turn, satellite images
play a vital role in providing essential geographical information. Highly
accurate automatic classification and decision support systems can facilitate
the efforts of data analysts, reduce human error, and allow the rapid and
rigorous analysis of land use and land cover information. Integrating Machine
Learning (ML) technology with the human visual psychometric can help meet
geologists' demands for more efficient and higher-quality classification in
real time. This book introduces readers to key concepts, methods and models for

satellite image analysis; highlights state-of-the-art classification and clustering techniques; discusses recent developments and remaining challenges; and addresses various applications, making it a valuable asset for engineers, data analysts and researchers in the fields of geographic information systems and remote sensing engineering.

Handbook of Research on Applied Optimization Methodologies in Manufacturing Systems Faruk Y?lmaz, Ömer 2017-11-30 Today␣s manufacturing systems are undergoing significant changes in the aspects of planning, production execution, and delivery. It is imperative to stay up-to-date on the latest trends in optimization to efficiently create products for the market. The Handbook of Research on Applied Optimization Methodologies in Manufacturing Systems is a pivotal reference source including the latest scholarly research on heuristic models for solving manufacturing and supply chain related problems. Featuring exhaustive coverage on a broad range of topics such as assembly ratio, car sequencing, and color constraints, this publication is ideally designed for practitioners seeking new comprehensive models for problem solving in manufacturing and supply chain management.

Machine Learning, Optimization, and Data Science Giuseppe Nicosia 2022 This two-volume set, LNCS 13163-13164, constitutes the refereed proceedings of the 7th International Conference on Machine Learning, Optimization, and Data Science, LOD 2021, together with the first edition of the Symposium on Artificial Intelligence and Neuroscience, ACAIN 2021. The total of 86 full papers presented in this two-volume post-conference proceedings set was carefully reviewed and selected from 215 submissions. These research articles were written by leading scientists in the fields of machine learning, artificial intelligence, reinforcement learning, computational optimization, neuroscience, and data science presenting a substantial array of ideas, technologies, algorithms, methods, and applications.

Machine Learning Mohssen Mohammed 2016-08-19 Machine learning, one of the top emerging sciences, has an extremely broad range of applications. However, many books on the subject provide only a theoretical approach, making it difficult for a newcomer to grasp the subject material. This book provides a more practical approach by explaining the concepts of machine learning algorithms and describing the areas of application for each algorithm, using simple practical examples to demonstrate each algorithm and showing how different issues related to these algorithms are applied.

Machine Learning and Mathematical Models for Single-Cell Data Analysis Le Ou-Yang 2022-11-29

Image Processing with MATLAB Omer Demirkaya 2008-12-22 Image Processing with MATLAB: Applications in Medicine and Biology explains complex, theory-laden topics in image processing through examples and MATLAB algorithms. It describes classical as well emerging areas in image processing and analysis. Providing many unique MATLAB codes and functions throughout, the book covers the theory

of probability an

Biomedical Signal and Image Processing Kayvan Najarian 2016-04-19 Written for
senior-level and first year graduate students in biomedical signal and image
processing, this book describes fundamental signal and image processing
techniques that are used to process biomedical information. The book also
discusses application of these techniques in the processing of some of the main
biomedical signals and images, such as EEG, ECG, MRI, and CT. New features of
this edition include the technical updating of each chapter along with the
addition of many more examples, the majority of which are MATLAB based.

Machine Learning with SVM and Other Kernel Methods K.P. Soman 2009-02-02
Support vector machines (SVMs) represent a breakthrough in the theory of
learning systems. It is a new generation of learning algorithms based on recent
advances in statistical learning theory. Designed for the undergraduate
students of computer science and engineering, this book provides a
comprehensive introduction to the state-of-the-art algorithm and techniques in
this field. It covers most of the well known algorithms supplemented with code
and data. One Class, Multiclass and hierarchical SVMs are included which will
help the students to solve any pattern classification problems with ease and
that too in Excel. KEY FEATURES ⬜ Extensive coverage of Lagrangian duality and
iterative methods for optimization ⬜ Separate chapters on kernel based spectral
clustering, text mining, and other applications in computational linguistics
and speech processing ⬜ A chapter on latest sequential minimization algorithms
and its modifications to do online learning ⬜ Step-by-step method of solving
the SVM based classification problem in Excel. ⬜ Kernel versions of PCA, CCA
and ICA The CD accompanying the book includes animations on solving SVM
training problem in Microsoft EXCEL and by using SVMLight software . In
addition, Matlab codes are given for all the formulations of SVM along with the
data sets mentioned in the exercise section of each chapter.

Nonlinear Modeling of Solar Radiation and Wind Speed Time Series Luigi Fortuna
2016-06-21 This brief is a clear, concise description of the main techniques of
time series analysis —stationary, autocorrelation, mutual information, fractal
and multifractal analysis, chaos analysis, etc.— as they are applied to the
influence of wind speed and solar radiation on the production of electrical
energy from these renewable sources. The problem of implementing prediction
models is addressed by using the embedding-phase-space approach: a powerful
technique for the modeling of complex systems. Readers are also guided in
applying the main machine learning techniques for classification of the
patterns hidden in their time series and so will be able to perform statistical
analyses that are not possible by using conventional techniques. The conceptual
exposition avoids unnecessary mathematical details and focuses on concrete
examples in order to ensure a better understanding of the proposed techniques.
Results are well-illustrated by figures and tables.

Data Clustering Guojun Gan 2007-01-01 Cluster analysis is an unsupervised
process that divides a set of objects into homogeneous groups. This book starts

with basic information on cluster analysis, including the classification of data and the corresponding similarity measures, followed by the presentation of over 50 clustering algorithms in groups according to some specific baseline methodologies such as hierarchical, center-based, and search-based methods. As a result, readers and users can easily identify an appropriate algorithm for their applications and compare novel ideas with existing results. The book also provides examples of clustering applications to illustrate the advantages and shortcomings of different clustering architectures and algorithms. Application areas include pattern recognition, artificial intelligence, information technology, image processing, biology, psychology, and marketing. Readers also learn how to perform cluster analysis with the C/C++ and MATLAB programming languages.

Introduction to Statistical Machine Learning Masashi Sugiyama 2015-10-31 Machine learning allows computers to learn and discern patterns without actually being programmed. When Statistical techniques and machine learning are combined together they are a powerful tool for analysing various kinds of data in many computer science/engineering areas including, image processing, speech processing, natural language processing, robot control, as well as in fundamental sciences such as biology, medicine, astronomy, physics, and materials. Introduction to Statistical Machine Learning provides a general introduction to machine learning that covers a wide range of topics concisely and will help you bridge the gap between theory and practice. Part I discusses the fundamental concepts of statistics and probability that are used in describing machine learning algorithms. Part II and Part III explain the two major approaches of machine learning techniques; generative methods and discriminative methods. While Part III provides an in-depth look at advanced topics that play essential roles in making machine learning algorithms more useful in practice. The accompanying MATLAB/Octave programs provide you with the necessary practical skills needed to accomplish a wide range of data analysis tasks. Provides the necessary background material to understand machine learning such as statistics, probability, linear algebra, and calculus. Complete coverage of the generative approach to statistical pattern recognition and the discriminative approach to statistical machine learning. Includes MATLAB/Octave programs so that readers can test the algorithms numerically and acquire both mathematical and practical skills in a wide range of data analysis tasks Discusses a wide range of applications in machine learning and statistics and provides examples drawn from image processing, speech processing, natural language processing, robot control, as well as biology, medicine, astronomy, physics, and materials.

MATLAB® Primer for Speech Language Pathology and Audiology Frank R. Boutsen 2015-11-30 MATLAB® Primer for Speech-Language Pathology and Audiology provides training and access to MATLAB®, the computational language developed by MathWorks®. While there are MATLAB® textbooks and manuals written for the field of engineering, there are no textbooks targeting allied heath disciplines, particularly speech-language pathology and audiology. Research and practice in this field can greatly benefit from quantification and automation in data

management, a domain that is increasingly labor-intensive. The text anticipates and promotes increased reliance on quantification and automation in the fields of speech-language pathology and audiology. This book is intended for students, practitioners, and researchers in speech-language pathology and audiology who wish to increase their productivity by incorporating and automating common research procedures and data-analysis calculations, or who wish to develop new tools and methods for their own paradigms and data processing. It assumes no prior knowledge of programming, but requires the reader to have a grasp of basic computer skills, such as managing folders, moving files, and navigating file paths and folder structures. Content and style are chosen so as to lower the threshold for an audience who has limited training in computer science. Concepts are presented in a personalized writing style (almost a dialogue with the reader), along with a didactic format similar to programmed instruction, using applications and work assignments that are concrete and manageable. Key features include: * A comprehensive introduction for the user in an effort to limit background knowledge needed to understand the content * Several mathematical review appendices * Exercises for the student to apply skills learned in laboratory and clinical applications Disclaimer: Please note that ancillary content (such documents, audio, and video) may not be included as published in the original print version of this book.

Pattern Recognition and Neural Networks Ludmila Kuncheva 2019

Clinical Nuclear Medicine Physics with MATLAB® Maria Lyra Georgosopoulou 2021-09-28 The use of MATLAB® in clinical Medical Physics is continuously increasing, thanks to new technologies and developments in the field. However, there is a lack of practical guidance for students, researchers, and medical professionals on how to incorporate it into their work. Focusing on the areas of diagnostic Nuclear Medicine and Radiation Oncology Imaging, this book provides a comprehensive treatment of the use of MATLAB in clinical Medical Physics, in Nuclear Medicine. It is an invaluable guide for medical physicists and researchers, in addition to postgraduates in medical physics or biomedical engineering, preparing for a career in the field. In the field of Nuclear Medicine, MATLAB enables quantitative analysis and the visualization of nuclear medical images of several modalities, such as Single Photon Emission Computed Tomography (SPECT), Positron Emission Tomography (PET), or a hybrid system where a Computed Tomography system is incorporated into a SPECT or PET system or similarly, a Magnetic Resonance Imaging system (MRI) into a SPECT or PET system. Through a high-performance interactive software, MATLAB also allows matrix computation, simulation, quantitative analysis, image processing, and algorithm implementation. MATLAB can provide medical physicists with the necessary tools for analyzing and visualizing medical images. It is useful in creating imaging algorithms for diagnostic and therapeutic purposes, solving problems of image reconstruction, processing, and calculating absorbed doses with accuracy. An important feature of this application of MATLAB is that the results are completely reliable and are not dependent on any specific γ-cameras and workstations. The use of MATLAB algorithms can greatly assist in the exploration of the anatomy and functions of the human body, offering accurate

and precise results in Nuclear Medicine studies. KEY FEATURES Presents a practical, case-based approach whilst remaining accessible to students Contains chapter contributions from subject area specialists across the field Includes real clinical problems and examples, with worked through solutions Maria Lyra Georgosopoulou, PhD, is a Medical Physicist and Associate Professor at the National and Kapodistrian University of Athens, Greece. Photo credit: The Antikythera Mechanism is the world's oldest known analog computer. It consisted of many wheels and discs that could be placed onto the mechanism for calculations. It is possible that the first algorithms and analog calculations in mathematics were implemented with this mechanism, invented in the early first centuries BC. It has been selected for the cover to demonstrate the importance of calculations in science.