

Pattern Recognition Using Matlab

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Pattern Recognition Using Matlab

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ZAVIER LILLY

Chemometrics Apress

Extract patterns and knowledge from your data in easy way using MATLAB About This Book* Get your first steps into machine learning with the help of this easy-to-follow guide* Learn regression, clustering, classification, predictive analytics, artificial neural networks and more with MATLAB* Understand how your data works and identify hidden layers in the data with the power of machine learning. Who This Book Is For This book is for data analysts, data scientists, students, or anyone who is looking to get started with machine learning and want to build efficient data processing and predicting applications. A mathematical and statistical background will really help in following this book well. What You Will Learn* Learn the introductory concepts of machine learning.* Discover different ways to transform data using SAS XPORT, import and export tools,* Explore the different types of regression techniques such as simple & multiple linear regression, ordinary least squares estimation, correlations and how to apply them to your data.* Discover the basics of classification methods and how to implement Naive Bayes algorithm and Decision Trees in the Matlab environment.* Uncover how to use clustering methods like hierarchical clustering to grouping data using the similarity measures.* Know how to perform data fitting, pattern recognition, and clustering analysis with the help of MATLAB Neural Network Toolbox.* Learn feature selection and extraction for dimensionality reduction leading to improved performance. In Detail MATLAB is the language of choice for many researchers and mathematics experts for machine learning. This book will help you build a foundation in machine learning using MATLAB for beginners. You'll start by getting your system ready with the MATLAB environment for machine learning and you'll see how to easily interact with the Matlab workspace. We'll then move on to data cleansing, mining and analyzing various data types in machine learning and you'll see how to display data values on a plot. Next, you'll get to know about the different types of regression techniques and how to apply them to your data using the MATLAB functions. You'll understand the basic concepts of neural networks and perform data fitting, pattern recognition, and clustering analysis. Finally, you'll explore feature selection and extraction techniques for dimensionality reduction for performance improvement. At the end of the book, you will learn to put it all together into real-world cases covering major machine learning algorithms and be comfortable in performing machine learning with MATLAB. Style and approach The book takes a very comprehensive approach to enhance your understanding of machine learning using MATLAB. Sufficient real-world examples and use cases are included in the book to help you grasp the concepts quickly and apply them easily in your day-to-day work.

Progress in Pattern Recognition, Image Analysis and Applications Lulu Press, Inc

Master's Thesis from the year 2016 in the subject Computer Science - Technical Computer Science, grade: 81, , language: English, abstract: The goal of this thesis is to propose a fast and accurate iris pattern recognition system based on wireless network system. This thesis presents three parts; in the first part, Libor Masek algorithm is enhanced to achieve higher recognition rate. Another method of iris pattern recognition is proposed which named genetic algorithm. The two used iris pattern recognition methods are compared according to their accuracy and execution time. When testing persons of the Chinese Academy of Sciences Institute of Automation (CASIA) database, both methods achieved 100% recognition rates because there is at least one image sample for each person, which is correct matched and there is no person that is false matched. But when testing image samples per persons of CASIA database, the genetic algorithm achieved higher recognition rates and lower error rates than Libor Masek algorithm. It has been found, that the recognition time of genetic algorithm is less than Masek algorithm. The second part presents an iris image compression/decompression by using Principal Component Analysis (PCA) for compression process and Inverse Principal Component Analysis (IPCA) for decompression process.

It has been proven that PCA is the most suitable method for compressing iris images because of its ability to reduce their size while maintaining the good quality of the reconstructed images. Reconstructed images using IPCA have low compression ratios (CRs) and high Peak to Signal Ratios (PSNRs), which leads to good quality. For more security, a multi-stage image compression is performed in order to protect network's transmitted data from hackers because hackers cannot guess how much the image has been compressed. The third part, includes wireless network system consisting of one central Personal Computer (PC) and four Personal Computers (PCs) that communicate with each other through router device. The central PC takes the responsibility of monitoring and controlling the PCs of the whole network. All network PCs communicate with each other by using Transmission Control Protocol /Internet Protocol (TCP/IP) protocol suite that use client-server sockets to transfer images between PCs on the network.

Similarity-Based Pattern Recognition Createspace Independent Publishing Platform

The updated book presents Matlab illustrations on various digital signal processing (DSP) techniques such as random process, time varying wireless system model, and detection and estimation theory used in wireless communication. The book also covers recent wireless techniques like OFDM, massive MIMO techniques, non-orthogonal multiple access, millimeter wave MIMO, full duplex, cognitive radio, co-operating communication, unmanned aerial vehicles etc. This book is suitable for those who are doing basic and applied research in digital signal processing for wireless communication.

Digital Speech Processing Using Matlab Springer

This book is intended for academic and industrial developers, exploring and developing applications in the area of big data and machine learning, including those that are solving technology requirements, evaluation of methodology advances and algorithm demonstrations. The intent of this book is to provide awareness of algorithms used for machine learning and big data in the academic and professional community. The 17 chapters are divided into 5 sections: Theoretical Fundamentals; Big Data and Pattern Recognition; Machine Learning: Algorithms & Applications; Machine Learning's Next Frontier and Hands-On and Case Study. While it dwells on the foundations of machine learning and big data as a part of analytics, it also focuses on contemporary topics for research and development. In this regard, the book covers machine learning algorithms and their modern applications in developing automated systems. Subjects covered in detail include: Mathematical foundations of machine learning with various examples. An empirical study of supervised learning algorithms like Naïve Bayes, KNN and semi-supervised learning algorithms viz. S3VM, Graph-Based, Multiview. Precise study on unsupervised learning algorithms like GMM, K-mean clustering, Dritchlet process mixture model, X-means and Reinforcement learning algorithm with Q learning, R learning, TD learning, SARSA Learning, and so forth. Hands-on machine leaning open source tools viz. Apache Mahout, H2O. Case studies for readers to analyze the prescribed cases and present their solutions or interpretations with intrusion detection in MANETS using machine learning. Showcase on novel user-cases: Implications of Electronic Governance as well as Pragmatic Study of BD/ML technologies for agriculture, healthcare, social media, industry, banking, insurance and so on.

Recent Trends in Image Processing and Pattern Recognition GRIN Verlag

Deep learning (also known as deep structured learning, hierarchical learning or deep machine learning) is a branch of machine learning based on a set of algorithms that attempt to model high level abstractions in data. Deep learning is part of a broader family of machine learning methods based on learning representations of data. One of the promises of deep learning is replacing handcrafted features with efficient algorithms for unsupervised or semi-supervised feature learning and hierarchical feature extraction. Research in this area attempts to make better representations and create models to learn these representations from large-scale unlabeled data. Some of the representations are inspired by advances in neuroscience and are loosely based on interpretation of information processing and communication patterns in a nervous system, such as neural coding

which attempts to define a relationship between various stimuli and associated neuronal responses in the brain. MATLAB has the tool Neural Network Toolbox that provides algorithms, functions, and apps to create, train, visualize, and simulate neural networks. You can perform classification, regression, clustering, dimensionality reduction, time-series forecasting, and dynamic system modeling and control. The toolbox includes convolutional neural network and autoencoder deep learning algorithms for image classification and feature learning tasks. To speed up training of large data sets, you can distribute computations and data across multicore processors, GPUs, and computer clusters using Parallel Computing Toolbox. The more important features are the following: -Deep learning, including convolutional neural networks and autoencoders -Parallel computing and GPU support for accelerating training (with Parallel Computing Toolbox) -Supervised learning algorithms, including multilayer, radial basis, learning vector quantization (LVQ), time-delay, nonlinear autoregressive (NARX), and recurrent neural network (RNN) -Unsupervised learning algorithms, including self-organizing maps and competitive layers -Apps for data-fitting, pattern recognition, and clustering -Preprocessing, postprocessing, and network visualization for improving training efficiency and assessing network performance -Simulink(R) blocks for building and evaluating neural networks and for control systems applications This book develops deep learning, including convolutional neural networks and autoencoders and other types of advanced neural networks

MATLAB Machine Learning Recipes Springer Nature

Project Report from the year 2012 in the subject Engineering - Computer Engineering, Gujarat University, course: Electronics and communication, language: English, abstract: This thesis describes a face recognition system that overcomes the problem of changes in gesture and mimics in three-dimensional (3D) range images. Here, we propose a local variation detection and restoration method based on the two-dimensional (2D) principal component analysis (PCA). The depth map of a 3D facial image is first smoothed using median filter to minimize the local variation. The detected face shape is cropped & normalized to a standard image size of 101x101 pixels and the forefront nose point is selected to be the image center. Facial depth values are scaled between 0 and 255 for translation and scaling-invariant identification. The preprocessed face image is smoothed to minimize the local variations. The 2DPCA is applied to the resultant range data and the corresponding principal-(or eigen-) images are used as the characteristic feature vectors of the subject to find his/her identity in the database of pre-recorded faces. The system's performance is tested against the GavabDB facial databases. Experimental results show that the proposed method is able to identify subjects with different gesture and mimics in the presence of noise in their 3D facial image.

Practical Image and Video Processing Using MATLAB Springer Science & Business Media

Digital Speech Processing Using Matlab deals with digital speech pattern recognition, speech production model, speech feature extraction, and speech compression. The book is written in a manner that is suitable for beginners pursuing basic research in digital speech processing. Matlab illustrations are provided for most topics to enable better understanding of concepts. This book also deals with the basic pattern recognition techniques (illustrated with speech signals using Matlab) such as PCA, LDA, ICA, SVM, HMM, GMM, BPN, and KSOM.

NETLAB Lulu.com

The Algorithms such as SVD, Eigen decomposition, Gaussian Mixture Model, HMM etc. are presently scattered in different fields. There remains a need to collect all such algorithms for quick reference. Also there is the need to view such algorithms in application point of view. This book attempts to satisfy the above requirement. The algorithms are made clear using MATLAB programs.

Design and Implementation of Iris Pattern Recognition Based on Wireless Network Systems Lulu Press, Inc

This three-book set constitutes the refereed proceedings of the Second International Conference

on Recent Trends in Image Processing and Pattern Recognition (RTIP2R) 2018, held in Solapur, India, in December 2018. The 173 revised full papers presented were carefully reviewed and selected from 374 submissions. The papers are organized in topical sections in the tree volumes. Part I: computer vision and pattern recognition; machine learning and applications; and image processing. Part II: healthcare and medical imaging; biometrics and applications. Part III: document image analysis; image analysis in agriculture; and data mining, information retrieval and applications.

Fundamentals of Image, Audio, and Video Processing Using MATLAB® John Wiley & Sons
In contrast to classical image analysis methods that employ "crisp" mathematics, fuzzy set techniques provide an elegant foundation and a set of rich methodologies for diverse image-processing tasks. However, a solid understanding of fuzzy processing requires a firm grasp of essential principles and background knowledge. Fuzzy Image Processing and Applications with MATLAB® presents the integral science and essential mathematics behind this exciting and dynamic branch of image processing, which is becoming increasingly important to applications in areas such as remote sensing, medical imaging, and video surveillance, to name a few. Many texts cover the use of crisp sets, but this book stands apart by exploring the explosion of interest and significant growth in fuzzy set image processing. The distinguished authors clearly lay out theoretical concepts and applications of fuzzy set theory and their impact on areas such as enhancement, segmentation, filtering, edge detection, content-based image retrieval, pattern recognition, and clustering. They describe all components of fuzzy, detailing preprocessing, threshold detection, and match-based segmentation. Minimize Processing Errors Using Dynamic Fuzzy Set Theory This book serves as a primer on MATLAB and demonstrates how to implement it in fuzzy image processing methods. It illustrates how the code can be used to improve calculations that help prevent or deal with imprecision—whether it is in the grey level of the image, geometry of an object, definition of an object's edges or boundaries, or in knowledge representation, object recognition, or image interpretation. The text addresses these considerations by applying fuzzy set theory to image thresholding, segmentation, edge detection, enhancement, clustering, color retrieval, clustering in pattern recognition, and other image processing operations. Highlighting key ideas, the authors present the experimental results of their own new fuzzy approaches and those suggested by different authors, offering data and insights that will be useful to teachers, scientists, and engineers, among others.

Digital Signal Processing with Examples in MATLAB Nova Science Pub Incorporated
Deep Learning (translated as deep learning) is a subset of machine learning based on artificial neural networks. The process of this learning is called deep because this network structure consists of having multiple inputs, outputs and hidden layers. Each layer contains units that transform the input data into information, and in this way, the next layer can use it for a certain predictive task. In this way, a machine can learn through its own data processing. MATLAB has the tool Neural Network Toolbox (Deep Learning toolbox from release 18) that provides algorithms, functions, and apps to create, train, visualize, and simulate neural networks. You can perform classification, regression, clustering, dimensionality reduction, time-series forecasting, and dynamic system modeling and control. The toolbox includes convolutional neural network and autoencoder deep learning algorithms for image classification and feature learning tasks. To speed up training of large data sets, you can distribute computations and data across multicore processors, GPUs, and computer clusters using Parallel Computing Toolbox.

Fuzzy Image Processing and Applications with MATLAB John Wiley & Sons
In this book, the authors present current research in the study of the practices, perspectives and challenges of pattern recognition. Topics include the practical usage of algorithmic probability in pattern recognition; application of pattern recognition in optimization-simulation techniques; pattern recognition applied to spectroscopy; optimization of an embedded simplified fuzzy ARTMAP implemented on a microcontroller using MATLAB GUI environment; pattern recognition using quaternion color moments; and pattern recognition by Bessel mask and one-dimensional signatures.

DEEP LEARNING WITH MATLAB: IMAGE CLASSIFICATION AND PATTERN RECOGNITION. AUTOENCODERS GRIN Verlag

This book presents the complex topic of using computational intelligence for pattern recognition in a straightforward and applicable way, using Matlab to illustrate topics and concepts. The author covers computational intelligence tools like particle swarm optimization, bacterial foraging, simulated annealing, genetic algorithm, and artificial neural networks. The Matlab based

illustrations along with the code are given for every topic. Readers get a quick basic understanding of various pattern recognition techniques using only the required depth in math. The Matlab program and algorithm are given along with the running text, providing clarity and usefulness of the various techniques. Presents pattern recognition and the computational intelligence using Matlab; Includes mixtures of theory, math, and algorithms, letting readers understand the concepts quickly; Outlines an array of classifiers, various regression models, statistical tests and the techniques for pattern recognition using computational intelligence.

Classification, Parameter Estimation and State Estimation John Wiley & Sons
A new, full-color, completely updated edition of the key practical guide to chemometrics This new edition of this practical guide on chemometrics, emphasizes the principles and applications behind the main ideas in the field using numerical and graphical examples, which can then be applied to a wide variety of problems in chemistry, biology, chemical engineering, and allied disciplines. Presented in full color, it features expansion of the principal component analysis, classification, multivariate evolutionary signal and statistical distributions sections, and new case studies in metabolomics, as well as extensive updates throughout. Aimed at the large number of users of chemometrics, it includes extensive worked problems and chapters explaining how to analyze datasets, in addition to updated descriptions of how to apply Excel and Matlab for chemometrics. Chemometrics: Data Driven Extraction for Science, Second Edition offers chapters covering: experimental design, signal processing, pattern recognition, calibration, and evolutionary data. The pattern recognition chapter from the first edition is divided into two separate ones: Principal Component Analysis/Cluster Analysis, and Classification. It also includes new descriptions of Alternating Least Squares (ALS) and Iterative Target Transformation Factor Analysis (ITTTFA). Updated descriptions of wavelets and Bayesian methods are included. Includes updated chapters of the classic chemometric methods (e.g. experimental design, signal processing, etc.) Introduces metabolomics-type examples alongside those from analytical chemistry Features problems at the end of each chapter to illustrate the broad applicability of the methods in different fields Supplemented with data sets and solutions to the problems on a dedicated website Chemometrics: Data Driven Extraction for Science, Second Edition is recommended for post-graduate students of chemometrics as well as applied scientists (e.g. chemists, biochemists, engineers, statisticians) working in all areas of data analysis.

Machine Learning and Big Data Springer Science & Business Media
Classification, Parameter Estimation and State Estimation is a practical guide for data analysts and designers of measurement systems and postgraduates students that are interested in advanced measurement systems using MATLAB. 'Prtools' is a powerful MATLAB toolbox for pattern recognition and is written and owned by one of the co-authors, B. Duin of the Delft University of Technology. After an introductory chapter, the book provides the theoretical construction for classification, estimation and state estimation. The book also deals with the skills required to bring the theoretical concepts to practical systems, and how to evaluate these systems. Together with the many examples in the chapters, the book is accompanied by a MATLAB toolbox for pattern recognition and classification. The appendix provides the necessary documentation for this toolbox as well as an overview of the most useful functions from these toolboxes. With its integrated and unified approach to classification, parameter estimation and state estimation, this book is a suitable practical supplement in existing university courses in pattern classification, optimal estimation and data analysis. Covers all contemporary main methods for classification and estimation. Integrated approach to classification, parameter estimation and state estimation Highlights the practical deployment of theoretical issues. Provides a concise and practical approach supported by MATLAB toolbox. Offers exercises at the end of each chapter and numerous worked out examples. PRtools toolbox (MATLAB) and code of worked out examples available from the internet Many examples showing implementations in MATLAB Enables students to practice their skills using a MATLAB environment
DEEP LEARNING TECHNIQUES: CLUSTER ANALYSIS and PATTERN RECOGNITION with NEURAL NETWORKS. Examples with MATLAB CRC Press

Fundamentals of Image, Audio, and Video Processing Using MATLAB® introduces the concepts and principles of media processing and its applications in pattern recognition by adopting a hands-on approach using program implementations. The book covers the tools and techniques for reading, modifying, and writing image, audio, and video files using the data analysis and visualization tool MATLAB®. Key Features: Covers fundamental concepts of image, audio, and video processing Demonstrates the use of MATLAB® on solving problems on media processing Discusses important

features of Image Processing Toolbox, Audio System Toolbox, and Computer Vision Toolbox MATLAB® codes are provided as answers to specific problems Illustrates the use of Simulink for audio and video processing Handles processing techniques in both the Spatio-Temporal domain and Frequency domain This is a perfect companion for graduate and post-graduate students studying courses on image processing, speech and language processing, signal processing, video object detection and tracking, and related multimedia technologies, with a focus on practical implementations using programming constructs and skill developments. It will also appeal to researchers in the field of pattern recognition, computer vision and content-based retrieval, and for students of MATLAB® courses dealing with media processing, statistical analysis, and data visualization. Dr. Ranjan Parekh, PhD (Engineering), is Professor at the School of Education Technology, Jadavpur University, Calcutta, India, and is involved with teaching subjects related to Graphics and Multimedia at the post-graduate level. His research interest includes multimedia information processing, pattern recognition, and computer vision.

Deep Learning Using MATLAB. Neural Network Applications Springer Science & Business Media

Harness the power of MATLAB to resolve a wide range of machine learning challenges. This book provides a series of examples of technologies critical to machine learning. Each example solves a real-world problem. All code in MATLAB Machine Learning Recipes: A Problem-Solution Approach is executable. The toolbox that the code uses provides a complete set of functions needed to implement all aspects of machine learning. Authors Michael Paluszek and Stephanie Thomas show how all of these technologies allow the reader to build sophisticated applications to solve problems with pattern recognition, autonomous driving, expert systems, and much more. What you'll learn:How to write code for machine learning, adaptive control and estimation using MATLAB How these three areas complement each other How these three areas are needed for robust machine learning applications How to use MATLAB graphics and visualization tools for machine learning How to code real world examples in MATLAB for major applications of machine learning in big data Who is this book for: The primary audiences are engineers, data scientists and students wanting a comprehensive and code cookbook rich in examples on machine learning using MATLAB.

Pattern Recognition Using Neural and Functional Networks Lulu Press, Inc
Pattern recognition is a scientific discipline that is becoming increasingly important in the age of automation and information handling and retrieval. Patter Recognition, 2e covers the entire spectrum of pattern recognition applications, from image analysis to speech recognition and communications. This book presents cutting-edge material on neural networks, - a set of linked microprocessors that can form associations and uses pattern recognition to "learn" -and enhances student motivation by approaching pattern recognition from the designer's point of view. A direct result of more than 10 years of teaching experience, the text was developed by the authors through use in their own classrooms. *Approaches pattern recognition from the designer's point of view *New edition highlights latest developments in this growing field, including independent components and support vector machines, not available elsewhere *Supplemented by computer examples selected from applications of interest
'Fundamentals of Image, Audio, and Video Processing Using MATLAB®' and *'Fundamentals of Graphics Using MATLAB®'* CRC Press

This book constitutes the refereed proceedings of the 11th Iberoamerican Congress on Pattern Recognition, CIARP 2006, held in Cancun, Mexico in November 2006. The 99 revised full papers presented together with three keynote articles were carefully reviewed and selected from 239 submissions. The papers cover ongoing research and mathematical methods.

Pattern Recognition Academic Press
This discounted two-book set contains BOTH: Fundamentals of Image, Audio, and Video Processing Using MATLAB® introduces the concepts and principles of media processing and its applications in pattern recognition by adopting a hands-on approach using program implementations. The book covers the tools and techniques for reading, modifying, and writing image, audio, and video files using the data analysis and visualization tool MATLAB®. This is a perfect companion for graduate and post-graduate students studying courses on image processing, speech and language processing, signal processing, video object detection and tracking, and related multimedia technologies, with a focus on practical implementations using programming constructs and skill developments. It will also appeal to researchers in the field of pattern recognition, computer vision and content-based retrieval, and for students of MATLAB® courses dealing with media processing, statistical analysis, and data visualization. Fundamentals of Graphics Using MATLAB® introduces

fundamental concepts and principles of 2D and 3D graphics and is written for undergraduate and postgraduate students of computer science, graphics, multimedia, and data science. It demonstrates the use of MATLAB® programming for solving problems related to graphics and

discusses a variety of visualization tools to generate graphs and plots. The book covers important concepts like transformation, projection, surface generation, parametric representation, curve fitting, interpolation, vector representation, and texture mapping, all of which can be used in a

wide variety of educational and research fields. Theoretical concepts are illustrated using a large number of practical examples and programming codes, which can be used to visualize and verify the results.