

An Overview Of Outlier Detection Methods

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Anomaly Detection - Saira Banu 2021

When information in the data warehouse is processed, it follows a definite pattern. An unexpected deviation in the data pattern from the usual behavior is called an anomaly. The anomaly in the data is also referred to as noise, outlier, spammer, deviations, novelties and

exceptions. Identification of the rare items, events, observations, patterns which raise suspension by differing significantly from the majority of data is called anomaly detection. With progress in the technologies and the widespread use of data for the purpose for business the increase in the spams faced by the

individuals and the companies are increasing day by day. This noisy data has boomed as a major problem in various areas such as Internet of Things, web service, Machine Learning, Artificial Intelligence, Deep learning, Image Processing, Cloud Computing, Audio processing, Video Processing, VoIP, Data Science, Wireless Sensor etc. Identifying the anomaly data and filtering them before processing is a major challenge for the data analyst. This anomaly is unavoidable in all areas of research. This book covers the techniques and algorithms for detecting the deviated data. This book will mainly target researchers and higher graduate learners in computer science and data science.

Graph Mining - Deepayan Chakrabarti

2022-05-31

What does the Web look like? How can we find patterns, communities, outliers, in a social network? Which are the most central nodes in a network? These are the questions that motivate this work. Networks and graphs appear in many

diverse settings, for example in social networks, computer-communication networks (intrusion detection, traffic management), protein-protein interaction networks in biology, document-text bipartite graphs in text retrieval, person-account graphs in financial fraud detection, and others. In this work, first we list several surprising patterns that real graphs tend to follow. Then we give a detailed list of generators that try to mirror these patterns. Generators are important, because they can help with "what if" scenarios, extrapolations, and anonymization. Then we provide a list of powerful tools for graph analysis, and specifically spectral methods (Singular Value Decomposition (SVD)), tensors, and case studies like the famous "pageRank" algorithm and the "HITS" algorithm for ranking web search results. Finally, we conclude with a survey of tools and observations from related fields like sociology, which provide complementary viewpoints. Table of Contents: Introduction / Patterns in Static Graphs /

Patterns in Evolving Graphs / Patterns in Weighted Graphs / Discussion: The Structure of Specific Graphs / Discussion: Power Laws and Deviations / Summary of Patterns / Graph Generators / Preferential Attachment and Variants / Incorporating Geographical Information / The RMat / Graph Generation by Kronecker Multiplication / Summary and Practitioner's Guide / SVD, Random Walks, and Tensors / Tensors / Community Detection / Influence/Virus Propagation and Immunization / Case Studies / Social Networks / Other Related Work / Conclusions

Outlier Ensembles - Charu C. Aggarwal
2017-04-06

This book discusses a variety of methods for outlier ensembles and organizes them by the specific principles with which accuracy improvements are achieved. In addition, it covers the techniques with which such methods can be made more effective. A formal classification of these methods is provided, and

the circumstances in which they work well are examined. The authors cover how outlier ensembles relate (both theoretically and practically) to the ensemble techniques used commonly for other data mining problems like classification. The similarities and (subtle) differences in the ensemble techniques for the classification and outlier detection problems are explored. These subtle differences do impact the design of ensemble algorithms for the latter problem. This book can be used for courses in data mining and related curricula. Many illustrative examples and exercises are provided in order to facilitate classroom teaching. A familiarity is assumed to the outlier detection problem and also to generic problem of ensemble analysis in classification. This is because many of the ensemble methods discussed in this book are adaptations from their counterparts in the classification domain. Some techniques explained in this book, such as wagging, randomized feature weighting, and

geometric subsampling, provide new insights that are not available elsewhere. Also included is an analysis of the performance of various types of base detectors and their relative effectiveness. The book is valuable for researchers and practitioners for leveraging ensemble methods into optimal algorithmic design.

Outlier Detection for Temporal Data -

Manish Gupta 2014-04-14

Outlier (or anomaly) detection is a very broad field which has been studied in the context of a large number of research areas like statistics, data mining, sensor networks, environmental science, distributed systems, spatio-temporal mining, etc. Initial research in outlier detection focused on time series-based outliers (in statistics). Since then, outlier detection has been studied on a large variety of data types including high-dimensional data, uncertain data, stream data, network data, time series data, spatial data, and spatio-temporal data. While there have

been many tutorials and surveys for general outlier detection, we focus on outlier detection for temporal data in this book. A large number of applications generate temporal datasets. For example, in our everyday life, various kinds of records like credit, personnel, financial, judicial, medical, etc., are all temporal. This stresses the need for an organized and detailed study of outliers with respect to such temporal data. In the past decade, there has been a lot of research on various forms of temporal data including consecutive data snapshots, series of data snapshots and data streams. Besides the initial work on time series, researchers have focused on rich forms of data including multiple data streams, spatio-temporal data, network data, community distribution data, etc. Compared to general outlier detection, techniques for temporal outlier detection are very different. In this book, we will present an organized picture of both recent and past research in temporal outlier detection. We start with the basics and

then ramp up the reader to the main ideas in state-of-the-art outlier detection techniques. We motivate the importance of temporal outlier detection and brief the challenges beyond usual outlier detection. Then, we list down a taxonomy of proposed techniques for temporal outlier detection. Such techniques broadly include statistical techniques (like AR models, Markov models, histograms, neural networks), distance- and density-based approaches, grouping-based approaches (clustering, community detection), network-based approaches, and spatio-temporal outlier detection approaches. We summarize by presenting a wide collection of applications where temporal outlier detection techniques have been applied to discover interesting outliers. Table of Contents: Preface / Acknowledgments / Figure Credits / Introduction and Challenges / Outlier Detection for Time Series and Data Sequences / Outlier Detection for Data Streams / Outlier Detection for Distributed Data Streams / Outlier Detection for

Spatio-Temporal Data / Outlier Detection for Temporal Network Data / Applications of Outlier Detection for Temporal Data / Conclusions and Research Directions / Bibliography / Authors' Biographies

Machine Learning for Subsurface

Characterization - Siddharth Misra 2019-10-12

Machine Learning for Subsurface Characterization develops and applies neural networks, random forests, deep learning, unsupervised learning, Bayesian frameworks, and clustering methods for subsurface characterization. Machine learning (ML) focusses on developing computational methods/algorithms that learn to recognize patterns and quantify functional relationships by processing large data sets, also referred to as the "big data." Deep learning (DL) is a subset of machine learning that processes "big data" to construct numerous layers of abstraction to accomplish the learning task. DL methods do not require the manual step of

extracting/engineering features; however, it requires us to provide large amounts of data along with high-performance computing to obtain reliable results in a timely manner. This reference helps the engineers, geophysicists, and geoscientists get familiar with data science and analytics terminology relevant to subsurface characterization and demonstrates the use of data-driven methods for outlier detection, geomechanical/electromagnetic characterization, image analysis, fluid saturation estimation, and pore-scale characterization in the subsurface. Learn from 13 practical case studies using field, laboratory, and simulation data Become knowledgeable with data science and analytics terminology relevant to subsurface characterization Learn frameworks, concepts, and methods important for the engineer's and geoscientist's toolbox needed to support

Introduction to Robust Estimation and Hypothesis Testing - Rand R. Wilcox
2012-01-12

"This book focuses on the practical aspects of modern and robust statistical methods. The increased accuracy and power of modern methods, versus conventional approaches to the analysis of variance (ANOVA) and regression, is remarkable. Through a combination of theoretical developments, improved and more flexible statistical methods, and the power of the computer, it is now possible to address problems with standard methods that seemed insurmountable only a few years ago"--

Outlier Analysis - Charu C. Aggarwal 2016-12-10
This book provides comprehensive coverage of the field of outlier analysis from a computer science point of view. It integrates methods from data mining, machine learning, and statistics within the computational framework and therefore appeals to multiple communities. The chapters of this book can be organized into three categories: Basic algorithms: Chapters 1 through 7 discuss the fundamental algorithms for outlier analysis, including probabilistic and statistical

methods, linear methods, proximity-based methods, high-dimensional (subspace) methods, ensemble methods, and supervised methods. Domain-specific methods: Chapters 8 through 12 discuss outlier detection algorithms for various domains of data, such as text, categorical data, time-series data, discrete sequence data, spatial data, and network data. Applications: Chapter 13 is devoted to various applications of outlier analysis. Some guidance is also provided for the practitioner. The second edition of this book is more detailed and is written to appeal to both researchers and practitioners. Significant new material has been added on topics such as kernel methods, one-class support-vector machines, matrix factorization, neural networks, outlier ensembles, time-series methods, and subspace methods. It is written as a textbook and can be used for classroom teaching. *The 10th International Conference on Computer Engineering and Networks* - Qi Liu 2020-10-06 This book contains a collection of the papers

accepted by the CENet2020 - the 10th International Conference on Computer Engineering and Networks held on October 16-18, 2020 in Xi'an, China. The topics focus but are not limited to Internet of Things and Smart Systems, Artificial Intelligence and Applications, Communication System Detection, Analysis and Application, and Medical Engineering and Information Systems. Each part can be used as an excellent reference by industry practitioners, university faculties, research fellows and undergraduates as well as graduate students who need to build a knowledge base of the most current advances and state-of-practice in the topics covered by this conference proceedings. This will enable them to produce, maintain, and manage systems with high levels of trustworthiness and complexity. *Intelligent Data Analysis in Medicine and Pharmacology* - Nada Lavrač 2012-12-06 Intelligent data analysis, data mining and knowledge discovery in databases have recently

gained the attention of a large number of researchers and practitioners. This is witnessed by the rapidly increasing number of submissions and participants at related conferences and workshops, by the emergence of new journals in this area (e.g., Data Mining and Knowledge Discovery, Intelligent Data Analysis, etc.), and by the increasing number of new applications in this field. In our view, the awareness of these challenging research fields and emerging technologies has been much larger in industry than in medicine and pharmacology. The main purpose of this book is to present the various techniques and methods that are available for intelligent data analysis in medicine and pharmacology, and to present case studies of their application. Intelligent Data Analysis in Medicine and Pharmacology consists of selected (and thoroughly revised) papers presented at the First International Workshop on Intelligent Data Analysis in Medicine and Pharmacology (IDAMAP-96) held in Budapest in August 1996 as

part of the 12th European Conference on Artificial Intelligence (ECAI-96), IDAMAP-96 was organized with the motivation to gather scientists and practitioners interested in computational data analysis methods applied to medicine and pharmacology, aimed at narrowing the increasing gap between excessive amounts of data stored in medical and pharmacological databases on the one hand, and the interpretation, understanding and effective use of stored data on the other hand. Besides the revised Workshop papers, the book contains a selection of contributions by invited authors. The expected readership of the book is researchers and practitioners interested in intelligent data analysis, data mining, and knowledge discovery in databases, particularly those who are interested in using these technologies in medicine and pharmacology. Researchers and students in artificial intelligence and statistics should find this book of interest as well. Finally, much of the presented material will be

interesting to physicians and pharmacologists challenged by new computational technologies, or simply in need of effectively utilizing the overwhelming volumes of data collected as a result of improved computer support in their daily professional practice.

Robust Regression and Outlier Detection -

Peter J. Rousseeuw 2005-02-25

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consists of selected books that have been made more accessible to consumers in an effort to increase global appeal and general circulation.

With these new unabridged softcover volumes, Wiley hopes to extend the lives of these works by making them available to future generations of statisticians, mathematicians, and scientists.

"The writing style is clear and informal, and much of the discussion is oriented to application.

In short, the book is a keeper." -Mathematical Geology "I would highly recommend the addition of this book to the libraries of both students and

professionals. It is a useful textbook for the graduate student, because it emphasizes both the philosophy and practice of robustness in regression settings, and it provides excellent examples of precise, logical proofs of theorems. . .

Even for those who are familiar with robustness, the book will be a good reference because it consolidates the research in high-breakdown affine equivariant estimators and includes an extensive bibliography in robust regression, outlier diagnostics, and related methods. The aim of this book, the authors tell us, is 'to make robust regression available for everyday statistical practice.' Rousseeuw and Leroy have included all of the necessary ingredients to make this happen." -Journal of the American Statistical Association

Knowledge Discovery in Big Data from Astronomy and Earth Observation - Petr

Skoda 2020-04-10

Knowledge Discovery in Big Data from Astronomy and Earth Observation:

Astrogeoinformatics bridges the gap between astronomy and geoscience in the context of applications, techniques and key principles of big data. Machine learning and parallel computing are increasingly becoming cross-disciplinary as the phenomena of Big Data is becoming common place. This book provides insight into the common workflows and data science tools used for big data in astronomy and geoscience. After establishing similarity in data gathering, pre-processing and handling, the data science aspects are illustrated in the context of both fields. Software, hardware and algorithms of big data are addressed. Finally, the book offers insight into the emerging science which combines data and expertise from both fields in studying the effect of cosmos on the earth and its inhabitants. Addresses both astronomy and geosciences in parallel, from a big data perspective Includes introductory information, key principles, applications and the latest techniques Well-supported by computing and

information science-oriented chapters to introduce the necessary knowledge in these fields

Intelligent Astrophysics - Ivan Zelinka
2021-04-15

This present book discusses the application of the methods to astrophysical data from different perspectives. In this book, the reader will encounter interesting chapters that discuss data processing and pulsars, the complexity and information content of our universe, the use of tessellation in astronomy, characterization and classification of astronomical phenomena, identification of extragalactic objects, classification of pulsars and many other interesting chapters. The authors of these chapters are experts in their field and have been carefully selected to create this book so that the authors present to the community a representative publication that shows a unique fusion of artificial intelligence and astrophysics. *R and Data Mining* - Yanchang Zhao 2012-12-31

R and Data Mining introduces researchers, post-graduate students, and analysts to data mining using R, a free software environment for statistical computing and graphics. The book provides practical methods for using R in applications from academia to industry to extract knowledge from vast amounts of data. Readers will find this book a valuable guide to the use of R in tasks such as classification and prediction, clustering, outlier detection, association rules, sequence analysis, text mining, social network analysis, sentiment analysis, and more. Data mining techniques are growing in popularity in a broad range of areas, from banking to insurance, retail, telecom, medicine, research, and government. This book focuses on the modeling phase of the data mining process, also addressing data exploration and model evaluation. With three in-depth case studies, a quick reference guide, bibliography, and links to a wealth of online resources, R and Data Mining is a valuable, practical guide to a

powerful method of analysis. Presents an introduction into using R for data mining applications, covering most popular data mining techniques Provides code examples and data so that readers can easily learn the techniques Features case studies in real-world applications to help readers apply the techniques in their work

Data Science - Vijay Kotu 2018-11-27

Learn the basics of Data Science through an easy to understand conceptual framework and immediately practice using RapidMiner platform. Whether you are brand new to data science or working on your tenth project, this book will show you how to analyze data, uncover hidden patterns and relationships to aid important decisions and predictions. Data Science has become an essential tool to extract value from data for any organization that collects, stores and processes data as part of its operations. This book is ideal for business users, data analysts, business analysts, engineers, and

analytics professionals and for anyone who works with data. You'll be able to: Gain the necessary knowledge of different data science techniques to extract value from data. Master the concepts and inner workings of 30 commonly used powerful data science algorithms.

Implement step-by-step data science process using using RapidMiner, an open source GUI based data science platform Data Science techniques covered: Exploratory data analysis, Visualization, Decision trees, Rule induction, k-nearest neighbors, Naïve Bayesian classifiers, Artificial neural networks, Deep learning, Support vector machines, Ensemble models, Random forests, Regression, Recommendation engines, Association analysis, K-Means and Density based clustering, Self organizing maps, Text mining, Time series forecasting, Anomaly detection, Feature selection and more...

Contains fully updated content on data science, including tactics on how to mine business data for information Presents simple explanations for

over twenty powerful data science techniques Enables the practical use of data science algorithms without the need for programming Demonstrates processes with practical use cases Introduces each algorithm or technique and explains the workings of a data science algorithm in plain language Describes the commonly used setup options for the open source tool RapidMiner

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.

Network Anomaly Detection - Dhruba Kumar Bhattacharyya 2013-06-18

With the rapid rise in the ubiquity and sophistication of Internet technology and the accompanying growth in the number of network attacks, network intrusion detection has become increasingly important. Anomaly-based network intrusion detection refers to finding exceptional or nonconforming patterns in network traffic data compared to normal behavior. Finding these anomalies has extensive applications in areas such as cyber security, credit card and

insurance fraud detection, and military surveillance for enemy activities. Network Anomaly Detection: A Machine Learning Perspective presents machine learning techniques in depth to help you more effectively detect and counter network intrusion. In this book, you'll learn about: Network anomalies and vulnerabilities at various layers The pros and cons of various machine learning techniques and algorithms A taxonomy of attacks based on their characteristics and behavior Feature selection algorithms How to assess the accuracy, performance, completeness, timeliness, stability, interoperability, reliability, and other dynamic aspects of a network anomaly detection system Practical tools for launching attacks, capturing packet or flow traffic, extracting features, detecting attacks, and evaluating detection performance Important unresolved issues and research challenges that need to be overcome to provide better protection for networks Examining numerous attacks in detail, the

authors look at the tools that intruders use and show how to use this knowledge to protect networks. The book also provides material for hands-on development, so that you can code on a testbed to implement detection methods toward the development of your own intrusion detection system. It offers a thorough introduction to the state of the art in network anomaly detection using machine learning approaches and systems. Outlier Analysis - Charu C Aggarwal 2019-01-05 This book provides comprehensive coverage of the field of outlier analysis from a computer science point of view. It integrates methods from data mining, machine learning, and statistics within the computational framework and therefore appeals to multiple communities. The chapters of this book can be organized into three categories: Basic algorithms: Chapters 1 through 7 discuss the fundamental algorithms for outlier analysis, including probabilistic and statistical methods, linear methods, proximity-based methods, high-dimensional (subspace) methods,

ensemble methods, and supervised methods. Domain-specific methods: Chapters 8 through 12 discuss outlier detection algorithms for various domains of data, such as text, categorical data, time-series data, discrete sequence data, spatial data, and network data. Applications: Chapter 13 is devoted to various applications of outlier analysis. Some guidance is also provided for the practitioner. The second edition of this book is more detailed and is written to appeal to both researchers and practitioners. Significant new material has been added on topics such as kernel methods, one-class support-vector machines, matrix factorization, neural networks, outlier ensembles, time-series methods, and subspace methods. It is written as a textbook and can be used for classroom teaching.

Modeling and Design of Secure Internet of Things - Charles A. Kamhoua 2020-08-04

An essential guide to the modeling and design techniques for securing systems that utilize the Internet of Things Modeling and Design of

Secure Internet of Things offers a guide to the underlying foundations of modeling secure Internet of Things' (IoT) techniques. The contributors—noted experts on the topic—also include information on practical design issues that are relevant for application in the commercial and military domains. They also present several attack surfaces in IoT and secure solutions that need to be developed to reach their full potential. The book offers material on security analysis to help with in understanding and quantifying the impact of the new attack surfaces introduced by IoT deployments. The authors explore a wide range of themes including: modeling techniques to secure IoT, game theoretic models, cyber deception models, moving target defense models, adversarial machine learning models in military and commercial domains, and empirical validation of IoT platforms. This important book: Presents information on game-theory analysis of cyber deception Includes cutting-edge research finding

such as IoT in the battlefield, advanced persistent threats, and intelligent and rapid honeynet generation. Contains contributions from an international panel of experts. Addresses design issues in developing secure IoT including secure SDN-based network orchestration, networked device identity management, multi-domain battlefield settings, and smart cities. Written for researchers and experts in computer science and engineering. Modeling and Design of Secure Internet of Things contains expert contributions to provide the most recent modeling and design techniques for securing systems that utilize Internet of Things.

New Developments in Unsupervised Outlier Detection - Xiaochun Wang 2020-11-24

This book enriches unsupervised outlier detection research by proposing several new distance-based and density-based outlier scores in a k-nearest neighbors' setting. The respective chapters highlight the latest developments in k-nearest neighbor-based outlier detection

research and cover such topics as our present understanding of unsupervised outlier detection in general; distance-based and density-based outlier detection in particular; and the applications of the latest findings to boundary point detection and novel object detection. The book also offers a new perspective on bridging the gap between k-nearest neighbor-based outlier detection and clustering-based outlier detection, laying the groundwork for future advances in unsupervised outlier detection research. The authors hope the algorithms and applications proposed here will serve as valuable resources for outlier detection researchers for years to come.

Big Data Analytics for Sensor-Network Collected Intelligence - Hui-Huang Hsu 2017-02-02

Big Data Analytics for Sensor-Network Collected Intelligence explores state-of-the-art methods for using advanced ICT technologies to perform intelligent analysis on sensor collected data. The book shows how to develop systems that

automatically detect natural and human-made events, how to examine people's behaviors, and how to unobtrusively provide better services. It begins by exploring big data architecture and platforms, covering the cloud computing infrastructure and how data is stored and visualized. The book then explores how big data is processed and managed, the key security and privacy issues involved, and the approaches used to ensure data quality. In addition, readers will find a thorough examination of big data analytics, analyzing statistical methods for data analytics and data mining, along with a detailed look at big data intelligence, ubiquitous and mobile computing, and designing intelligence system based on context and situation. Indexing: The books of this series are submitted to EI-Compendex and SCOPUS Contains contributions from noted scholars in computer science and electrical engineering from around the globe Provides a broad overview of recent developments in sensor collected intelligence

Edited by a team comprised of leading thinkers in big data analytics

Identification of Outliers - D. Hawkins
2013-04-17

The problem of outliers is one of the oldest in statistics, and during the last century and a half interest in it has waxed and waned several times. Currently it is once again an active research area after some years of relative neglect, and recent work has solved a number of old problems in outlier theory, and identified new ones. The major results are, however, scattered amongst many journal articles, and for some time there has been a clear need to bring them together in one place. That was the original intention of this monograph: but during execution it became clear that the existing theory of outliers was deficient in several areas, and so the monograph also contains a number of new results and conjectures. In view of the enormous volume of literature on the outlier problem and its cousins, no attempt has been

made to make the coverage exhaustive. The material is concerned almost entirely with the use of outlier tests that are known (or may reasonably be expected) to be optimal in some way. Such topics as robust estimation are largely ignored, being covered more adequately in other sources. The numerous ad hoc statistics proposed in the early work on the grounds of intuitive appeal or computational simplicity also are not discussed in any detail.

Machine Learning and Knowledge Discovery in Databases - Peggy Cellier 2020-03-27

This two-volume set constitutes the refereed proceedings of the workshops which complemented the 19th Joint European Conference on Machine Learning and Knowledge Discovery in Databases, ECML PKDD, held in Würzburg, Germany, in September 2019. The 70 full papers and 46 short papers presented in the two-volume set were carefully reviewed and selected from 200 submissions. The two volumes (CCIS 1167 and

CCIS 1168) present the papers that have been accepted for the following workshops: Workshop on Automating Data Science, ADS 2019; Workshop on Advances in Interpretable Machine Learning and Artificial Intelligence and eXplainable Knowledge Discovery in Data Mining, AIMLAI-XKDD 2019; Workshop on Decentralized Machine Learning at the Edge, DMLE 2019; Workshop on Advances in Managing and Mining Large Evolving Graphs, LEG 2019; Workshop on Data and Machine Learning Advances with Multiple Views; Workshop on New Trends in Representation Learning with Knowledge Graphs; Workshop on Data Science for Social Good, SoGood 2019; Workshop on Knowledge Discovery and User Modelling for Smart Cities, UMCIT 2019; Workshop on Data Integration and Applications Workshop, DINA 2019; Workshop on Machine Learning for Cybersecurity, MLCS 2019; Workshop on Sports Analytics: Machine Learning and Data Mining for Sports Analytics,

MLSA 2019; Workshop on Categorising Different Types of Online Harassment Languages in Social Media; Workshop on IoT Stream for Data Driven Predictive Maintenance, IoTStream 2019; Workshop on Machine Learning and Music, MML 2019; Workshop on Large-Scale Biomedical Semantic Indexing and Question Answering, BioASQ 2019.

Machine Learning Guide for Oil and Gas Using Python - Hoss Belyadi 2021-04-09

Machine Learning Guide for Oil and Gas Using Python: A Step-by-Step Breakdown with Data, Algorithms, Codes, and Applications delivers a critical training and resource tool to help engineers understand machine learning theory and practice, specifically referencing use cases in oil and gas. The reference moves from explaining how Python works to step-by-step examples of utilization in various oil and gas scenarios, such as well testing, shale reservoirs and production optimization. Petroleum engineers are quickly applying machine learning

techniques to their data challenges, but there is a lack of references beyond the math or heavy theory of machine learning. Machine Learning Guide for Oil and Gas Using Python details the open-source tool Python by explaining how it works at an introductory level then bridging into how to apply the algorithms into different oil and gas scenarios. While similar resources are often too mathematical, this book balances theory with applications, including use cases that help solve different oil and gas data challenges. Helps readers understand how open-source Python can be utilized in practical oil and gas challenges Covers the most commonly used algorithms for both supervised and unsupervised learning Presents a balanced approach of both theory and practicality while progressing from introductory to advanced analytical techniques

Hands-On Unsupervised Learning Using Python - Ankur A. Patel 2019-02-21

Many industry experts consider unsupervised learning the next frontier in artificial

intelligence, one that may hold the key to general artificial intelligence. Since the majority of the world's data is unlabeled, conventional supervised learning cannot be applied. Unsupervised learning, on the other hand, can be applied to unlabeled datasets to discover meaningful patterns buried deep in the data, patterns that may be near impossible for humans to uncover. Author Ankur Patel shows you how to apply unsupervised learning using two simple, production-ready Python frameworks: Scikit-learn and TensorFlow using Keras. With code and hands-on examples, data scientists will identify difficult-to-find patterns in data and gain deeper business insight, detect anomalies, perform automatic feature engineering and selection, and generate synthetic datasets. All you need is programming and some machine learning experience to get started. Compare the strengths and weaknesses of the different machine learning approaches: supervised, unsupervised, and reinforcement learning Set up

and manage machine learning projects end-to-end Build an anomaly detection system to catch credit card fraud Clusters users into distinct and homogeneous groups Perform semisupervised learning Develop movie recommender systems using restricted Boltzmann machines Generate synthetic images using generative adversarial networks

Outlier Detection Methods - Özlem Gürünlü
Alma 2010-06

Outlier, abnormal or unusual observation can be defined as an observation that lies outside the overall pattern of a distribution. Diagnostic methods for identifying a single outlier or influential observation in a linear regression model are relatively simple from both analytical and computational points of view. However, if the data set contains more than one outlier, which is likely to be the case in most data sets, the problem of identifying such observations becomes more difficult because of the masking and swamping effects. A GA was allowed

simultaneous detection of outliers in data sets. Thus, this method is to overcome the problems of masking and swamping effects. It is derived additional penalized value of information criteria for Akaike Information Criterion (AIC) and Information Complexity Criterion (ICOMP) and named as AIC' and ICOMP' respectively in this study. The numerical example and simulation results clearly show a much improved performance of the proposed approach in comparison to existing method especially followed by applying the ICOMP' approach in order to accurately (robustly) detect the outliers.

Data Mining: Concepts, Methodologies, Tools, and Applications - Management

Association, Information Resources 2012-11-30

Data mining continues to be an emerging interdisciplinary field that offers the ability to extract information from an existing data set and translate that knowledge for end-users into an understandable way. Data Mining: Concepts, Methodologies, Tools, and Applications is a

comprehensive collection of research on the latest advancements and developments of data mining and how it fits into the current technological world.

Neural Systems for Control - Omid Omidvar
1997-02-24

Control problems offer an industrially important application and a guide to understanding control systems for those working in Neural Networks. Neural Systems for Control represents the most up-to-date developments in the rapidly growing application area of neural networks and focuses on research in natural and artificial neural systems directly applicable to control or making use of modern control theory. The book covers such important new developments in control systems such as intelligent sensors in semiconductor wafer manufacturing; the relation between muscles and cerebral neurons in speech recognition; online compensation of reconfigurable control for spacecraft aircraft and other systems; applications to rolling mills,

robotics and process control; the usage of past output data to identify nonlinear systems by neural networks; neural approximate optimal control; model-free nonlinear control; and neural control based on a regulation of physiological investigation/blood pressure control. All researchers and students dealing with control systems will find the fascinating Neural Systems for Control of immense interest and assistance. Focuses on research in natural and artificial neural systems directly applicable to control or making use of modern control theory Represents the most up-to-date developments in this rapidly growing application area of neural networks Takes a new and novel approach to system identification and synthesis

Secondary Analysis of Electronic Health Records
- MIT Critical Data 2016-09-09

This book trains the next generation of scientists representing different disciplines to leverage the data generated during routine patient care. It formulates a more complete lexicon of evidence-

based recommendations and support shared, ethical decision making by doctors with their patients. Diagnostic and therapeutic technologies continue to evolve rapidly, and both individual practitioners and clinical teams face increasingly complex ethical decisions. Unfortunately, the current state of medical knowledge does not provide the guidance to make the majority of clinical decisions on the basis of evidence. The present research infrastructure is inefficient and frequently produces unreliable results that cannot be replicated. Even randomized controlled trials (RCTs), the traditional gold standards of the research reliability hierarchy, are not without limitations. They can be costly, labor intensive, and slow, and can return results that are seldom generalizable to every patient population. Furthermore, many pertinent but unresolved clinical and medical systems issues do not seem to have attracted the interest of the research enterprise, which has come to focus instead on

cellular and molecular investigations and single-agent (e.g., a drug or device) effects. For clinicians, the end result is a bit of a “data desert” when it comes to making decisions. The new research infrastructure proposed in this book will help the medical profession to make ethically sound and well informed decisions for their patients.

Implementing Computational Intelligence Techniques for Security Systems Design -

Albastaki, Yousif Abdullatif 2020-02-14

Recently, cryptology problems, such as designing good cryptographic systems and analyzing them, have been challenging researchers. Many algorithms that take advantage of approaches based on computational intelligence techniques, such as genetic algorithms, genetic programming, and so on, have been proposed to solve these issues. Implementing Computational Intelligence Techniques for Security Systems Design is an essential research book that explores the

application of computational intelligence and other advanced techniques in information security, which will contribute to a better understanding of the factors that influence successful security systems design. Featuring a range of topics such as encryption, self-healing systems, and cyber fraud, this book is ideal for security analysts, IT specialists, computer engineers, software developers, technologists, academicians, researchers, practitioners, and students.

Anomaly Detection Principles and Algorithms - Kishan G. Mehrotra 2017-11-18

This book provides a readable and elegant presentation of the principles of anomaly detection, providing an easy introduction for newcomers to the field. A large number of algorithms are succinctly described, along with a presentation of their strengths and weaknesses. The authors also cover algorithms that address different kinds of problems of interest with single and multiple time series data and multi-

dimensional data. New ensemble anomaly detection algorithms are described, utilizing the benefits provided by diverse algorithms, each of which work well on some kinds of data. With advancements in technology and the extensive use of the internet as a medium for communications and commerce, there has been a tremendous increase in the threats faced by individuals and organizations from attackers and criminal entities. Variations in the observable behaviors of individuals (from others and from their own past behaviors) have been found to be useful in predicting potential problems of various kinds. Hence computer scientists and statisticians have been conducting research on automatically identifying anomalies in large datasets. This book will primarily target practitioners and researchers who are newcomers to the area of modern anomaly detection techniques. Advanced-level students in computer science will also find this book helpful with their studies.

[Encyclopedia of Business Analytics and Optimization](#) - Wang, John 2014-02-28

As the age of Big Data emerges, it becomes necessary to take the five dimensions of Big Data- volume, variety, velocity, volatility, and veracity- and focus these dimensions towards one critical emphasis - value. The Encyclopedia of Business Analytics and Optimization confronts the challenges of information retrieval in the age of Big Data by exploring recent advances in the areas of knowledge management, data visualization, interdisciplinary communication, and others. Through its critical approach and practical application, this book will be a must-have reference for any professional, leader, analyst, or manager interested in making the most of the knowledge resources at their disposal.

Handbook of Research on Cyber Crime and Information Privacy - Cruz-Cunha, Maria Manuela 2020-08-21

In recent years, industries have transitioned into

the digital realm, as companies and organizations are adopting certain forms of technology to assist in information storage and efficient methods of production. This dependence has significantly increased the risk of cyber crime and breaches in data security. Fortunately, research in the area of cyber security and information protection is flourishing; however, it is the responsibility of industry professionals to keep pace with the current trends within this field. The Handbook of Research on Cyber Crime and Information Privacy is a collection of innovative research on the modern methods of crime and misconduct within cyber space. It presents novel solutions to securing and preserving digital information through practical examples and case studies. While highlighting topics including virus detection, surveillance technology, and social networks, this book is ideally designed for cybersecurity professionals, researchers, developers, practitioners, programmers,

computer scientists, academicians, security analysts, educators, and students seeking up-to-date research on advanced approaches and developments in cyber security and information protection.

Practical Machine Learning for Data Analysis Using Python - Abdulhamit Subasi 2020-06-05
Practical Machine Learning for Data Analysis Using Python is a problem solver's guide for creating real-world intelligent systems. It provides a comprehensive approach with concepts, practices, hands-on examples, and sample code. The book teaches readers the vital skills required to understand and solve different problems with machine learning. It teaches machine learning techniques necessary to become a successful practitioner, through the presentation of real-world case studies in Python machine learning ecosystems. The book also focuses on building a foundation of machine learning knowledge to solve different real-world case studies across various fields, including

biomedical signal analysis, healthcare, security, economics, and finance. Moreover, it covers a wide range of machine learning models, including regression, classification, and forecasting. The goal of the book is to help a broad range of readers, including IT professionals, analysts, developers, data scientists, engineers, and graduate students, to solve their own real-world problems. Offers a comprehensive overview of the application of machine learning tools in data analysis across a wide range of subject areas Teaches readers how to apply machine learning techniques to biomedical signals, financial data, and healthcare data Explores important classification and regression algorithms as well as other machine learning techniques Explains how to use Python to handle data extraction, manipulation, and exploration techniques, as well as how to visualize data spread across multiple dimensions and extract useful features

Information Studies And The Quest For

Transdisciplinarity: Unity Through Diversity -
Burgin Mark 2017-03-27

This book is the second volume of a two-volume edition based on the International Society for Information Studies Summit Vienna 2015 on "The Information Society at the Crossroads. Response and Responsibility of the Sciences of Information" (see summit.is4is.org). The book gives an up-to-date multiaspect exposition of contemporary studies in the field of information and related areas. It presents most recent achievements, ideas and opinions of leading researchers in this domain reflecting their quest for advancing information science and technology. With the goal of building a better society, in which social and technological innovations help make information key to the flourishing of humanity, we dispense with the bleak view of the dark side of information society. It is aimed at readers that conduct research into any aspect of information, information society and information technology,

who develop or implement social or technological applications. It is also for those who have an interest in participating in setting the goals for the sciences of information and the social applications of technological achievements and the scientific results.

Managing Cyber Threats - Vipin Kumar
2006-03-30

Modern society depends critically on computers that control and manage the systems on which we depend in many aspects of our daily lives. While this provides conveniences of a level unimaginable just a few years ago, it also leaves us vulnerable to attacks on the computers managing these systems. In recent times the explosion in cyber attacks, including viruses, worms, and intrusions, has turned this vulnerability into a clear and visible threat. Due to the escalating number and increased sophistication of cyber attacks, it has become important to develop a broad range of techniques, which can ensure that the

information infrastructure continues to operate smoothly, even in the presence of dire and continuous threats. This book brings together the latest techniques for managing cyber threats, developed by some of the world's leading experts in the area. The book includes broad surveys on a number of topics, as well as specific techniques. It provides an excellent reference point for researchers and practitioners in the government, academic, and industrial communities who want to understand the issues and challenges in this area of growing worldwide importance.

Applying Contemporary Statistical Techniques -
Rand R. Wilcox 2003-01-06

Applying Contemporary Statistical Techniques explains why traditional statistical methods are often inadequate or outdated when applied to modern problems. Wilcox demonstrates how new and more powerful techniques address these problems far more effectively, making these modern robust methods understandable,

practical, and easily accessible. Highlights: *

- Assumes no previous training in statistics *
- Explains when and why modern methods provide more accurate results *
- Provides simple descriptions of when and why conventional methods can be highly unsatisfactory *
- Covers the latest developments on multiple comparisons *
- Includes recent advances in risk-based methods *
- Features many illustrations and examples using data from real studies *

Describes and illustrates easy-to-use s-plus functions for applying cutting-edge techniques

"The book is quite unique in that it offers a lot of up-to-date statistical tools. No other book at this level comes close in this aspect." Xuming He - University of Illinois, Urbana

Robustness and Complex Data Structures - Claudia Becker 2014-07-08

This Festschrift in honour of Ursula Gather's 60th birthday deals with modern topics in the field of robust statistical methods, especially for time series and regression analysis, and with

statistical methods for complex data structures. The individual contributions of leading experts provide a textbook-style overview of the topic, supplemented by current research results and questions. The statistical theory and methods in this volume aim at the analysis of data which deviate from classical stringent model assumptions, which contain outlying values and/or have a complex structure. Written for researchers as well as master and PhD students with a good knowledge of statistics.

Breakthroughs in Statistics - Samuel Kotz 2013-12-01

Volume III includes more selections of articles that have initiated fundamental changes in statistical methodology. It contains articles published before 1980 that were overlooked in the previous two volumes plus articles from the 1980's - all of them chosen after consulting many of today's leading statisticians.

Outlier Detection: Techniques and Applications - N. N. R. Ranga Suri 2019-01-10

This book, drawing on recent literature, highlights several methodologies for the detection of outliers and explains how to apply them to solve several interesting real-life problems. The detection of objects that deviate from the norm in a data set is an essential task in data mining due to its significance in many contemporary applications. More specifically, the detection of fraud in e-commerce transactions and discovering anomalies in network data have become prominent tasks, given recent developments in the field of information and communication technologies and security. Accordingly, the book sheds light on specific state-of-the-art algorithmic approaches such as the community-based analysis of networks and characterization of temporal outliers present in dynamic networks. It offers a valuable resource for young researchers working in data mining, helping them understand the technical depth of the outlier detection problem and devise innovative

solutions to address related challenges.

Foundations of Intelligent Systems - Aijun An
2008-05-10

This volume contains the papers selected for presentation at the 17th International Symposium on Methodologies for Intelligent Systems (ISMIS 2008), held in York University, Toronto, Canada, May 21-23, 2008. ISMIS is a conference series started in 1986. Held twice every three years, ISMIS provides an international forum for exchanging scientific research and technological achievements in building intelligent systems. Its goal is to achieve a vibrant interchange between researchers and practitioners on fundamental and advanced issues related to intelligent systems. ISMIS 2008 featured a selection of latest research work and applications from the following areas related to intelligent systems: active media human-computer interaction, autonomic and evolutionary computation, digital libraries, intelligent agent technology, intelligent information retrieval, intelligent information

systems, intelligent language processing, knowledge representation and integration, knowledge discovery and data mining, knowledge visualization, logic for artificial intelligence, soft computing, Web intelligence, and Web services. - searchers and developers from 29 countries submitted more than 100 full papers to the conference. Each paper was rigorously reviewed by three committee

members and external reviewers. Out of these submissions, 40% were selected as regular papers and 22% as short papers. ISMIS 2008 also featured three plenary talks given by John Mylopoulos, Jiawei Han and Michael Lowry. They spoke on their recent research in agent-oriented software engineering, information network mining, and intelligent software engineering tools, respectively.