Anomaly Detection Principles And Algorithms Terrorism Security And Computation

This book presents the peer-reviewed proceedings of the 2nd International Conference on Computational and Bioengineering (CBE 2020) jointly organized in virtual mode by the Department of Computer Science and the Department of BioScience & Sericulture, Sri Padmavati Mahila Visvavidyalayam (Women's University), Tirupati, Andhra Pradesh, India, during 4–5 December 2020. The book includes the latest research on advanced computational methodologies such as artificial intelligence, data mining and data warehousing, cloud computing, computational intelligence, soft computing, image processing, Internet of things, cognitive computing, wireless networks, social networks, big data analytics, machine learning, network security, computer networks and communications, bioinformatics, biocomputing/biometrics, computational biology, biomaterials, bioengineering, and medical and biomedical informatics.

The goal of machine learning is to program computers to use example data or past experience to solve a given problem. Many successful applications of machine learning exist already, including systems that analyze past sales data to predict customer behavior, optimize robot behavior so that a task can be completed using minimum resources, and extract knowledge from bioinformatics data. Introduction to Machine

Learning is a comprehensive textbook on the subject, covering a broad array of topics not usually included in introductory machine learning texts. Subjects include supervised learning; Bayesian decision theory; parametric, semi-parametric, and nonparametric methods; multivariate analysis; hidden Markov models; reinforcement learning; kernel machines; graphical models; Bayesian estimation; and statistical testing.Machine learning is rapidly becoming a skill that computer science students must master before graduation. The third edition of Introduction to Machine Learning reflects this shift, with added support for beginners, including selected solutions for exercises and additional example data sets (with code available online). Other substantial changes include discussions of outlier detection; ranking algorithms for perceptrons and support vector machines; matrix decomposition and spectral methods; distance estimation; new kernel algorithms; deep learning in multilayered perceptrons; and the nonparametric approach to Bayesian methods. All learning algorithms are explained so that students can easily move from the equations in the book to a computer program. The book can be used by both advanced undergraduates and graduate students. It will also be of interest to professionals who are concerned with the application of machine learning methods. Time series data analysis is increasingly important due to the massive production of such data through the internet of things, the digitalization of healthcare, and the rise of smart cities. As continuous monitoring and data collection become more common, the need for competent time series analysis with both statistical and machine learning

techniques will increase. Covering innovations in time series data analysis and use cases from the real world, this practical guide will help you solve the most common data engineering and analysis challengesin time series, using both traditional statistical and modern machine learning techniques. Author Aileen Nielsen offers an accessible, well-rounded introduction to time series in both R and Python that will have data scientists, software engineers, and researchers up and running quickly. You'll get the guidance you need to confidently: Find and wrangle time series data Undertake exploratory time series data analysis Store temporal data Simulate time series data Generate and select features for a time series Measure error Forecast and classify time series with machine or deep learning Evaluate accuracy and performance

The publication is attempted to address emerging trends in machine learning applications. Recent trends in information identification have identified huge scope in applying machine learning techniques for gaining meaningful insights. Random growth of unstructured data poses new research challenges to handle this huge source of information. Efficient designing of machine learning techniques is the need of the hour. Recent literature in machine learning has emphasized on single technique of information identification. Huge scope exists in developing hybrid machine learning models with reduced computational complexity for enhanced accuracy of information identification. This book will focus on techniques to reduce feature dimension for designing light weight techniques for real time identification and decision fusion. Key

Findings of the book will be the use of machine learning in daily lives and the applications of it to improve livelihood. However, it will not be able to cover the entire domain in machine learning in its limited scope. This book is going to benefit the research scholars, entrepreneurs and interdisciplinary approaches to find new ways of applications in machine learning and thus will have novel research contributions. The lightweight techniques can be well used in real time which will add value to practice. 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. Graphs naturally represent information ranging from links between web pages, to communication in email networks, to connections between neurons in our brains. These graphs often span billions of nodes and interactions between them. Within this deluge of interconnected data, how can we find the most important structures and summarize them? How can we efficiently visualize them? How can we detect anomalies that indicate critical events, such as an attack on a computer system, disease formation in the human brain, or the fall of a company? This book presents scalable, principled discovery algorithms that combine globality with locality to make sense of one or more graphs. In addition to fast algorithmic methodologies, we also contribute graph-theoretical ideas and models, and real-world applications in two main areas: •Individual Graph Mining: We show how to interpretably summarize a single graph by identifying its important graph structures. We complement summarization with inference, which leverages information about few entities (obtained via summarization or other methods) and the network structure to efficiently and effectively learn information about the unknown entities. •Collective Graph Mining: We extend the idea of individual-graph summarization to time-evolving graphs, and show how to scalably discover temporal patterns. Apart from summarization, we claim that graph similarity is often the underlying problem in a host of applications where multiple graphs occur (e.g., temporal

anomaly detection, discovery of behavioral patterns), and we present principled, scalable algorithms for aligning networks and measuring their similarity. The methods that we present in this book leverage techniques from diverse areas, such as matrix algebra, graph theory, optimization, information theory, machine learning, finance, and social science, to solve real-world problems. We present applications of our exploration algorithms to massive datasets, including a Web graph of 6.6 billion edges, a Twitter graph of 1.8 billion edges, brain graphs with up to 90 million edges, collaboration, peer-to-peer networks, browser logs, all spanning millions of users and interactions.

Kernel methods have long been established as effective techniques in the framework of machine learning and pattern recognition, and have now become the standard approach to many remote sensing applications. With algorithms that combine statistics and geometry, kernel methods have proven successful across many different domains related to the analysis of images of the Earth acquired from airborne and satellite sensors, including natural resource control, detection and monitoring of anthropic infrastructures (e.g. urban areas), agriculture inventorying, disaster prevention and damage assessment, and anomaly and target detection. Presenting the theoretical foundations of kernel methods (KMs) relevant to the remote sensing domain, this book serves as a practical guide to the design and implementation of these methods. Five distinct parts present state-of-the-art research related to remote sensing based on the recent advances in kernel methods, analysing the related methodological and practical

challenges: Part I introduces the key concepts of machine learning for remote sensing, and the theoretical and practical foundations of kernel methods. Part II explores supervised image classification including Super Vector Machines (SVMs), kernel discriminant analysis, multi-temporal image classification, target detection with kernels, and Support Vector Data Description (SVDD) algorithms for anomaly detection. Part III looks at semi-supervised classification with transductive SVM approaches for hyperspectral image classification and kernel mean data classification. Part IV examines regression and model inversion, including the concept of a kernel unmixing algorithm for hyperspectral imagery, the theory and methods for quantitative remote sensing inverse problems with kernel-based equations, kernel-based BRDF (Bidirectional Reflectance Distribution Function), and temperature retrieval KMs. Part V deals with kernel-based feature extraction and provides a review of the principles of several multivariate analysis methods and their kernel extensions. This book is aimed at engineers, scientists and researchers involved in remote sensing data processing, and also those working within machine learning and pattern recognition.

This accessible and engaging textbook presents a concise introduction to the exciting field of artificial intelligence (AI). The broad-ranging discussion covers the key subdisciplines within the field, describing practical algorithms and concrete applications in the areas of agents, logic, search, reasoning under uncertainty, machine learning, neural networks, and reinforcement learning. Fully revised and updated, this much-

anticipated second edition also includes new material on deep learning. Topics and features: presents an application-focused and hands-on approach to learning, with supplementary teaching resources provided at an associated website; contains numerous study exercises and solutions, highlighted examples, definitions, theorems, and illustrative cartoons; includes chapters on predicate logic, PROLOG, heuristic search, probabilistic reasoning, machine learning and data mining, neural networks and reinforcement learning; reports on developments in deep learning, including applications of neural networks to generate creative content such as text, music and art (NEW); examines performance evaluation of clustering algorithms, and presents two practical examples explaining Bayes' theorem and its relevance in everyday life (NEW); discusses search algorithms, analyzing the cycle check, explaining route planning for car navigation systems, and introducing Monte Carlo Tree Search (NEW); includes a section in the introduction on AI and society, discussing the implications of AI on topics such as employment and transportation (NEW). Ideal for foundation courses or modules on AI, this easy-to-read textbook offers an excellent overview of the field for students of computer science and other technical disciplines, requiring no more than a high-school level of knowledge of mathematics to understand the material.

This book has two main goals: to define data science through the work of data scientists and their results, namely data products, while simultaneously providing the reader with relevant lessons learned from applied data science projects at the

intersection of academia and industry. As such, it is not a replacement for a classical textbook (i.e., it does not elaborate on fundamentals of methods and principles described elsewhere), but systematically highlights the connection between theory, on the one hand, and its application in specific use cases, on the other. With these goals in mind, the book is divided into three parts: Part I pays tribute to the interdisciplinary nature of data science and provides a common understanding of data science terminology for readers with different backgrounds. These six chapters are geared towards drawing a consistent picture of data science and were predominantly written by the editors themselves. Part II then broadens the spectrum by presenting views and insights from diverse authors – some from academia and some from industry, ranging from financial to health and from manufacturing to e-commerce. Each of these chapters describes a fundamental principle, method or tool in data science by analyzing specific use cases and drawing concrete conclusions from them. The case studies presented, and the methods and tools applied, represent the nuts and bolts of data science. Finally, Part III was again written from the perspective of the editors and summarizes the lessons learned that have been distilled from the case studies in Part II. The section can be viewed as a meta-study on data science across a broad range of domains, viewpoints and fields. Moreover, it

provides answers to the question of what the mission-critical factors for success in different data science undertakings are. The book targets professionals as well as students of data science: first, practicing data scientists in industry and academia who want to broaden their scope and expand their knowledge by drawing on the authors' combined experience. Second, decision makers in businesses who face the challenge of creating or implementing a data-driven strategy and who want to learn from success stories spanning a range of industries. Third, students of data science who want to understand both the theoretical and practical aspects of data science, vetted by real-world case studies at the intersection of academia and industry.

This book constitutes the refereed post-conference proceedings of the Third International Conference on Intelligent Technologies and Applications, INTAP 2020, held in Grimstad, Norway, in September 2020. The 30 revised full papers and 4 revised short papers presented were carefully reviewed and selected from 117 submissions. The papers of this volume are organized in topical sections on image, video processing and analysis; security and IoT; health and AI; deep learning; biometrics; intelligent environments; intrusion and malware detection; and AIRLEAs.

Statistical pattern recognition is a very active area of study and research, which

has seen many advances in recent years. New and emerging applications - such as data mining, web searching, multimedia data retrieval, face recognition, and cursive handwriting recognition - require robust and efficient pattern recognition techniques. Statistical decision making and estimation are regarded as fundamental to the study of pattern recognition. Statistical Pattern Recognition, Second Edition has been fully updated with new methods, applications and references. It provides a comprehensive introduction to this vibrant area - with material drawn from engineering, statistics, computer science and the social sciences - and covers many application areas, such as database design, artificial neural networks, and decision support systems. * Provides a self-contained introduction to statistical pattern recognition. * Each technique described is illustrated by real examples. * Covers Bayesian methods, neural networks, support vector machines, and unsupervised classification. * Each section concludes with a description of the applications that have been addressed and with further developments of the theory. * Includes background material on dissimilarity, parameter estimation, data, linear algebra and probability. * Features a variety of exercises, from 'open-book' questions to more lengthy projects. The book is aimed primarily at senior undergraduate and graduate students studying statistical pattern recognition, pattern processing, neural

networks, and data mining, in both statistics and engineering departments. It is also an excellent source of reference for technical professionals working in advanced information development environments.

This book constitutes selected papers from the Second International Workshop on IoT Streams for Data-Driven Predictive Maintenance, IoT Streams 2020, and First International Workshop on IoT, Edge, and Mobile for Embedded Machine Learning, ITEM 2020, co-located with ECML/PKDD 2020 and held in September 2020. Due to the COVID-19 pandemic the workshops were held online. The 21 full papers and 3 short papers presented in this volume were thoroughly reviewed and selected from 35 submissions and are organized according to the workshops and their topics: IoT Streams 2020: Stream Learning; Feature Learning; ITEM 2020: Unsupervised Machine Learning; Hardware; Methods; Quantization.

Generative modeling is one of the hottest topics in AI. It's now possible to teach a machine to excel at human endeavors such as painting, writing, and composing music. With this practical book, machine-learning engineers and data scientists will discover how to re-create some of the most impressive examples of generative deep learning models, such as variational autoencoders,generative adversarial networks (GANs), encoder-decoder models and world models. Author David Foster demonstrates the inner workings of each technique, starting with

the basics of deep learning before advancing to some of the most cutting-edge algorithms in the field. Through tips and tricks, you'll understand how to make your models learn more efficiently and become more creative. Discover how variational autoencoders can change facial expressions in photos Build practical GAN examples from scratch, including CycleGAN for style transfer and MuseGAN for music generation Create recurrent generative models for text generation and learn how to improve the models using attention Understand how generative models can help agents to accomplish tasks within a reinforcement learning setting Explore the architecture of the Transformer (BERT, GPT-2) and image generation models such as ProGAN and StyleGAN

Anomaly Detection Principles and AlgorithmsSpringer

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.

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.

Summary Machine learning (ML) is a collection of programming techniques for discovering relationships in data. With ML algorithms, you can cluster and classify data for tasks like making recommendations or fraud detection and make predictions for sales trends, risk analysis, and other forecasts. Once the domain of academic data scientists, machine learning has become a mainstream business process, and tools like the easy-to-learn R programming language put high-quality data analysis in the hands of any programmer. Machine Learning with R, the tidyverse, and mlr teaches you widely used ML techniques and how to apply them to your own datasets using the R programming language and its powerful ecosystem of tools. This book will get you started! Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the book Machine Learning with R, the tidyverse, and mlr gets you started in machine learning using R Studio and the awesome mlr machine learning package. This practical guide simplifies theory and avoids needlessly complicated statistics or math. All core ML techniques are clearly explained through graphics and easy-to-grasp examples. In each engaging chapter, you'll put a new algorithm into action to solve a quirky predictive analysis problem,

including Titanic survival odds, spam email filtering, and poisoned wine investigation. What's inside Using the tidyverse packages to process and plot your data Techniques for supervised and unsupervised learning Classification, regression, dimension reduction, and clustering algorithms Statistics primer to fill gaps in your knowledge About the reader For newcomers to machine learning with basic skills in R. About the author Hefin I. Rhys is a senior laboratory research scientist at the Francis Crick Institute. He runs his own YouTube channel of screencast tutorials for R and RStudio. Table of contents: PART 1 - INTRODUCTION 1.Introduction to machine learning 2. Tidying, manipulating, and plotting data with the tidyverse PART 2 - CLASSIFICATION 3. Classifying based on similarities with k-nearest neighbors 4. Classifying based on odds with logistic regression 5. Classifying by maximizing separation with discriminant analysis 6. Classifying with naive Bayes and support vector machines 7. Classifying with decision trees 8. Improving decision trees with random forests and boosting PART 3 - REGRESSION 9. Linear regression 10. Nonlinear regression with generalized additive models 11. Preventing overfitting with ridge regression, LASSO, and elastic net 12. Regression with kNN, random forest, and XGBoost PART 4 - DIMENSION REDUCTION 13. Maximizing variance with principal component analysis 14. Maximizing similarity with t-SNE and UMAP 15. Self-organizing maps and locally linear embedding PART 5 - CLUSTERING 16. Clustering by finding centers with k-means 17. Hierarchical clustering 18. Clustering based on density: DBSCAN and OPTICS 19.

Clustering based on distributions with mixture modeling 20. Final notes and further reading

This book introduces a novel approach to the design and operation of large ICT systems. It views the technical solutions and their stakeholders as complex adaptive systems and argues that traditional risk analyses cannot predict all future incidents with major impacts. To avoid unacceptable events, it is necessary to establish and operate anti-fragile ICT systems that limit the impact of all incidents, and which learn from small-impact incidents how to function increasingly well in changing environments. The book applies four design principles and one operational principle to achieve anti-fragility for different classes of incidents. It discusses how systems can achieve high availability, prevent malware epidemics, and detect anomalies. Analyses of Netflix's media streaming solution, Norwegian telecom infrastructures, e-government platforms, and Numenta's anomaly detection software show that cloud computing is essential to achieving anti-fragility for classes of events with negative impacts.

This two-volume set of LNCS 12736-12737 constitutes the refereed proceedings of the 7th International Conference on Artificial Intelligence and Security, ICAIS 2021, which was held in Dublin, Ireland, in July 2021. The conference was formerly called "International Conference on Cloud Computing and Security" with the acronym ICCCS. The total of 93 full papers and 29 short papers presented in this two-volume proceedings was carefully reviewed and selected from 1013 submissions. Overall, a

total of 224 full and 81 short papers were accepted for ICAIS 2021; the other accepted papers are presented in CCIS 1422-1424. The papers were organized in topical sections as follows: Part I: Artificial intelligence; and big data Part II: Big data; cloud computing and security; encryption and cybersecurity; information hiding; IoT security; and multimedia forensics

This book constitutes the refereed proceedings of the 19th International Conference on Engineering Applications of Neural Networks, EANN 2019, held in Xersonisos, Crete, Greece, in May 2019. The 35 revised full papers and 5 revised short papers presented were carefully reviewed and selected from 72 submissions. The papers are organized in topical sections on AI in energy management - industrial applications; biomedical - bioinformatics modeling; classification - learning; deep learning; deep learning - convolutional ANN; fuzzy - vulnerability - navigation modeling; machine learning modeling - optimization; ML - DL financial modeling; security - anomaly detection; 1st PEINT workshop.

Time Series Analysis (TSA) and Applications offers a dense content of current research and development in the field of data science. The book presents time series from a multidisciplinary approach that covers a wide range of sectors ranging from biostatistics to renewable energy forecasting. Contrary to previous literatures on time, serious readers will discover the potential of TSA in areas other than finance or weather forecasting. The choice of the algorithmic transform for different scenarios, which is a

key determinant in the application of TSA, can be understood through the diverse domain applications. Readers looking for deep understanding and practicability of TSA will be delighted. Early career researchers too will appreciate the technicalities and refined mathematical complexities surrounding TSA. Our wish is that this book adds to the body of TSA knowledge and opens up avenues for those who are looking forward to applying TSA in their own context.

Recently there has been a growing interest in the use of the biological immune system as a source of inspiration for solving complicated computational problems. The immune system involves many information-processing abilities including pattern recognition, learning, memory and inherent distributed parallel processing and for these, and other reasons, it has received a significant amount of interest as a metaphor within computing. This emerging field is known as Artificial Immune Systems (AIS), and applications of AIS include, machine learning, fault diagnosis, computer security, scheduling, virus detection and optimisation.

WILEY-INTERSCIENCE PAPERBACK SERIES The Wiley-Interscience Paperback Series consists of selectedbooks that have been made more accessible to consumers in an effortto increase global appeal and general circulation. With these newunabridged softcover volumes, Wiley hopes to extend the lives ofthese works by making them available to future generations ofstatisticians, mathematicians, and scientists. "The writing style is clear and informal, and much of thediscussion is oriented to application.

In short, the book is akeeper." –Mathematical Geology "I would highly recommend the addition of this book to thelibraries of both students and professionals. It is a usefultextbook for the graduate student, because it emphasizes both thephilosophy and practice of robustness in regression settings, andit provides excellent examples of precise, logical proofs oftheorems. . . .Even for those who are familiar with robustness, thebook will be a good reference because it consolidates the researchin high-breakdown affine equivariant estimators and includes anextensive 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 statisticalpractice.’ Rousseeuw and Leroy have included all of thenecessary ingredients to make this happen." –Journal of the American Statistical Association

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

This two-volume-set (CCIS 293 and CCIS 294) constitutes the refereed proceedings of the International Conference on Networked Digital Technologies, NDT 2012, held in Dubai, UAE, in April 2012. The 96 papers presented in the two volumes were carefully reviewed and selected from 228 submissions. The papers are organized in topical sections on collaborative systems for e-sciences; context-aware processing and ubiquitous systems; data and network mining; grid and cloud computing; information and data management; intelligent agent-based systems; internet modeling and design; mobile, ad hoc and sensor network management; peer-to-peer social networks; quality of service for networked systems; semantic Web and ontologies; security and access control; signal

processing and computer vision for networked systems; social networks; Web services.

The four-volume set LNCS 11334-11337 constitutes the proceedings of the 18th International Conference on Algorithms and Architectures for Parallel Processing, ICA3PP 2018, held in Guangzhou, China, in November 2018. The 141 full and 50 short papers presented were carefully reviewed and selected from numerous submissions. The papers are organized in topical sections on Distributed and Parallel Computing; High Performance Computing; Big Data and Information Processing; Internet of Things and Cloud Computing; and Security and Privacy in Computing.

Security and authentication issues are surging to the forefront of the research realm in global society. As technology continues to evolve, individuals are finding it easier to infiltrate various forums and facilities where they can illegally obtain information and access. By implementing biometric authentications to these forums, users are able to prevent attacks on their privacy and security. Biometrics: Concepts, Methodologies, Tools, and Applications is a multi-volume publication highlighting critical topics related to access control, user identification, and surveillance technologies. Featuring emergent research on the issues and challenges in security and privacy, various forms of user authentication, biometric

applications to image processing and computer vision, and security applications within the field, this publication is an ideal reference source for researchers, engineers, technology developers, students, and security specialists.

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.

In the era of Internet of Things (IoT), and with the explosive worldwide growth of electronic data volume and the associated needs of processing, analyzing, and storing this data, several new challenges have emerged. Particularly, there is a need for novel schemes of secure authentication, integrity protection, encryption, and non-repudiation to protect the privacy of sensitive data and to secure systems. Lightweight symmetric key cryptography and adaptive network security algorithms are in demand for mitigating these challenges. This book presents state-of-the-art research in the fields of cryptography and security in computing and communications. It covers a wide range of topics such as machine learning, intrusion detection, steganography, multi-factor authentication, and more. It is a valuable reference for researchers, engineers, practitioners, and graduate and doctoral students working in the fields of cryptography, network security, IoT, and machine learning.

Data mining is becoming a pervasive technology in activities as diverse as using

historical data to predict the success of a marketing campaign, looking for patterns in financial transactions to discover illegal activities or analyzing genome sequences. From this perspective, it was just a matter of time for the discipline to reach the important area of computer security. Applications Of Data Mining In Computer Security presents a collection of research efforts on the use of data mining in computer security. Applications Of Data Mining In Computer Security concentrates heavily on the use of data mining in the area of intrusion detection. The reason for this is twofold. First, the volume of data dealing with both network and host activity is so large that it makes it an ideal candidate for using data mining techniques. Second, intrusion detection is an extremely critical activity. This book also addresses the application of data mining to computer forensics. This is a crucial area that seeks to address the needs of law enforcement in analyzing the digital evidence.

Utilize this easy-to-follow beginner's guide to understand how deep learning can be applied to the task of anomaly detection. Using Keras and PyTorch in Python, the book focuses on how various deep learning models can be applied to semi-supervised and unsupervised anomaly detection tasks. This book begins with an explanation of what anomaly detection is, what it is used for, and its importance. After covering statistical and traditional machine learning methods for anomaly

detection using Scikit-Learn in Python, the book then provides an introduction to deep learning with details on how to build and train a deep learning model in both Keras and PyTorch before shifting the focus to applications of the following deep learning models to anomaly detection: various types of Autoencoders, Restricted Boltzmann Machines, RNNs & LSTMs, and Temporal Convolutional Networks. The book explores unsupervised and semi-supervised anomaly detection along with the basics of time series-based anomaly detection. By the end of the book you will have a thorough understanding of the basic task of anomaly detection as well as an assortment of methods to approach anomaly detection, ranging from traditional methods to deep learning. Additionally, you are introduced to Scikit-Learn and are able to create deep learning models in Keras and PyTorch. What You Will Learn Understand what anomaly detection is and why it is important in today's world Become familiar with statistical and traditional machine learning approaches to anomaly detection using Scikit-Learn Know the basics of deep learning in Python using Keras and PyTorch Be aware of basic data science concepts for measuring a model's performance: understand what AUC is, what precision and recall mean, and more Apply deep learning to semi-supervised and unsupervised anomaly detection Who This Book Is For Data scientists and machine learning engineers interested in learning the basics of deep learning

applications in anomaly detection

This book is an outcome of the 33rd International Conference EnviroInfo 2019, held at the University of Kassel, Germany. It presents a selection of papers that describe innovative scientific approaches and ongoing research in environmental informatics and the emerging field of computational sustainability. The respective articles cover a broad range of scientific aspects including advances in core technologies such as earth observation, environmental modelling, big data and machine learning, as well as applications of ICT solutions intended to support societal transformation processes toward the more sustainable management of resource use, transportation and the energy supply. Given its scope, the book is essential reading for scientists, experts and students in these fields of research.

This book was prepared as the Final Publication of COST Action IC0703 "Data Traffic Monitoring and Analysis: theory, techniques, tools and applications for the future networks". It contains 14 chapters which demonstrate the results, quality,and the impact of European research in the field of TMA in line with the scientific objective of the Action. The book is structured into three parts: network and topology measurement and modelling, traffic classification and anomaly detection, quality of experience.

Advanced Methods and Deep Learning in Computer Vision presents advanced computer vision methods, emphasizing machine and deep learning techniques that have emerged during the past 5–10 years. The book provides clear explanations of principles and algorithms

supported with applications. Topics covered include machine learning, deep learning networks, generative adversarial networks, deep reinforcement learning, self-supervised learning, extraction of robust features, object detection, semantic segmentation, linguistic descriptions of images, visual search, visual tracking, 3D shape retrieval, image inpainting, novelty and anomaly detection. This book provides easy learning for researchers and practitioners of advanced computer vision methods, but it is also suitable as a textbook for a second course on computer vision and deep learning for advanced undergraduates and graduate students. Provides an important reference on deep learning and advanced computer methods that was created by leaders in the field Illustrates principles with modern, real-world applications Suitable for self-learning or as a text for graduate courses

While Computer Security is a broader term which incorporates technologies, protocols, standards and policies to ensure the security of the computing systems including the computer hardware, software and the information stored in it, Cyber Security is a specific, growing field to protect computer networks (offline and online) from unauthorized access, botnets, phishing scams, etc. Machine learning is a branch of Computer Science which enables computing machines to adopt new behaviors on the basis of observable and verifiable data and information. It can be applied to ensure the security of the computers and the information by detecting anomalies using data mining and other such techniques. This book will be an invaluable resource to understand the importance of machine learning and data mining in establishing computer and cyber security. It emphasizes important security aspects associated with computer and cyber security along with the analysis of machine learning and data mining based solutions. The book also highlights the future research domains in which these solutions

can be applied. Furthermore, it caters to the needs of IT professionals, researchers, faculty members, scientists, graduate students, research scholars and software developers who seek to carry out research and develop combating solutions in the area of cyber security using machine learning based approaches. It is an extensive source of information for the readers belonging to the field of Computer Science and Engineering, and Cyber Security professionals. Key Features: This book contains examples and illustrations to demonstrate the principles, algorithms, challenges and applications of machine learning and data mining for computer and cyber security. It showcases important security aspects and current trends in the field. It provides an insight of the future research directions in the field. Contents of this book help to prepare the students for exercising better defense in terms of understanding the motivation of the attackers and how to deal with and mitigate the situation using machine learning based approaches in better manner.

Neuromorphic electronic engineering takes its inspiration from the functioning of nervous systems to build more power efficient electronic sensors and processors. Event-based neuromorphic systems are inspired by the brain's efficient data-driven communication design, which is key to its quick responses and remarkable capabilities. This cross-disciplinary text establishes how circuit building blocks are combined in architectures to construct complete systems. These include vision and auditory sensors as well as neuronal processing and learning circuits that implement models of nervous systems. Techniques for building multi-chip scalable systems are considered throughout the book, including methods for dealing with transistor mismatch, extensive discussions of communication and interfacing, and making systems that operate in the real world. The book also provides historical context that helps

relate the architectures and circuits to each other and that guides readers to the extensive literature. Chapters are written by founding experts and have been extensively edited for overall coherence. This pioneering text is an indispensable resource for practicing neuromorphic electronic engineers, advanced electrical engineering and computer science students and researchers interested in neuromorphic systems. Key features: Summarises the latest design approaches, applications, and future challenges in the field of neuromorphic engineering. Presents examples of practical applications of neuromorphic design principles. Covers address-event communication, retinas, cochleas, locomotion, learning theory, neurons, synapses, floating gate circuits, hardware and software infrastructure, algorithms, and future challenges.

Fault detection, control, and forecasting have a vital role in renewable energy systems (Photovoltaics (PV) and wind turbines (WTs)) to improve their productivity, ef?ciency, and safety, and to avoid expensive maintenance. For instance, the main crucial and challenging issue in solar and wind energy production is the volatility of intermittent power generation due mainly to weather conditions. This fact usually limits the integration of PV systems and WTs into the power grid. Hence, accurately forecasting power generation in PV and WTs is of great importance for daily/hourly efficient management of power grid production, delivery, and storage, as well as for decision-making on the energy market. Also, accurate and prompt fault detection and diagnosis strategies are required to improve efficiencies of renewable energy systems, avoid the high cost of maintenance, and reduce risks of fire hazards, which could affect both personnel and installed equipment. This book intends to provide the reader with advanced statistical modeling, forecasting, and fault detection techniques in renewable energy

systems.

Finding Data Anomalies You Didn't Know to Look For Anomaly detection is the detective work of machine learning: finding the unusual, catching the fraud, discovering strange activity in large and complex datasets. But, unlike Sherlock Holmes, you may not know what the puzzle is, much less what “suspects” you’re looking for. This O’Reilly report uses practical examples to explain how the underlying concepts of anomaly detection work. From banking security to natural sciences, medicine, and marketing, anomaly detection has many useful applications in this age of big data. And the search for anomalies will intensify once the Internet of Things spawns even more new types of data. The concepts described in this report will help you tackle anomaly detection in your own project. Use probabilistic models to predict what’s normal and contrast that to what you observe Set an adaptive threshold to determine which data falls outside of the normal range, using the t-digest algorithm Establish normal fluctuations in complex systems and signals (such as an EKG) with a more adaptive probablistic model Use historical data to discover anomalies in sporadic event streams, such as web traffic Learn how to use deviations in expected behavior to trigger fraud alerts

"This book includes state-of-the-art methodologies that introduce biomedical imaging in decision support systems and their applications in clinical practice"--Provided by publisher.