Alpaydin Machine Learning Solution Manual

Detection of anomalies in data is one of the fundamental machine learning tasks. Anomaly detection provides the core technology for a broad spectrum of security-centric applications. In this dissertation, we examine various aspects of anomaly based intrusion detection in computer security. First, we present a new approach to learn program behavior for intrusion detection. Text categorization techniques are adopted to convert each process to a vector and calculate the similarity between two program activities. Then the k-nearest neighbor classifier is employed to classify program behavior as normal or intrusive. We demonstrate that our approach is able to effectively detect intrusive program behavior while a low false positive rate is achieved. Second, we describe an adaptive anomaly detection framework that is de- signed to handle concept drift and online learning for dynamic, changing environments. Through the use of unsupervised evolving connectionist systems, normal behavior changes are efficiently accommodated while anomalous activities can still be recognized. We demonstrate the performance of our adaptive anomaly detection systems and show that the false positive rate can be significantly reduced.

Class-tested and coherent, this textbook teaches classical and web information retrieval, including web search and the related areas of text classification and text clustering from basic concepts. It gives an up-to-date treatment of all aspects of the design and implementation of systems for gathering, indexing, and searching documents; methods for evaluating systems; and an introduction to the use machine learning methods on text collections. All the important ideas are explained using examples and figures, making it perfect for introductory courses in information retrieval for advanced undergraduates and graduate students in computer science. Based on feedback from extensive classroom experience, the book has been carefully structured in order to make teaching more natural and effective. Slides and additional exercises (with solutions for lecturers) are also available through the book's supporting website to help course instructors prepare their lectures.

Providing a unique approach to machine learning, this text contains fresh and intuitive, yet rigorous, descriptions of all fundamental concepts necessary to conduct research, build products, tinker, and play. By prioritizing geometric intuition, algorithmic thinking, and practical real world applications in disciplines including computer vision, natural language processing, economics, neuroscience, recommender systems, physics, and biology, this text provides readers with both a lucid understanding of foundational material as well as the practical tools needed to solve real-world problems. With in-depth Python and MATLAB/OCTAVE-based computational exercises and a complete treatment of cutting edge numerical optimization techniques, this is an essential resource for students and an ideal reference for researchers and practitioners working in machine learning, computer science, electrical engineering, signal processing, and numerical optimization.

Presents the latest techniques for analyzing and extracting information from large amounts of data in high-dimensional data spaces The revised and updated third edition of Data Mining contains in one volume an introduction to a systematic approach to the analysis of large data sets that integrates results from disciplines such as statistics, artificial intelligence, data bases, pattern recognition, and computer visualization. Advances in deep learning technology have opened an entire new spectrum of applications. The author—a noted expert on the topic—explains the basic concepts, models, and methodologies that have been developed in recent years. This new edition introduces and expands on many topics, as well as providing revised sections on software tools and data mining applications. Additional changes include an updated list of references for further study, and an extended list of problems and questions that relate to each chapter.This third edition presents new and expanded information that: ▯ Explores big data and cloud computing ▯ Examines deep learning ▯ Includes information on convolutional neural networks (CNN) ▯ Offers reinforcement learning ▯ Contains semi-supervised learning and S3VM ▯ Reviews model evaluation for unbalanced data Written for graduate students in computer science, computer engineers, and computer information systems professionals, the updated third edition of Data Mining continues to provide an essential guide to the basic principles of the technology and the most recent developments in the field.

Probabilistic Machine Learning
Concepts, Models, Methods, and Algorithms
Understanding Machine Learning
Machine Learning Refined
Foundations and Learning Algorithms
Machine Learning and Data Mining

Ecologists and natural resource managers are charged with making complex management decisions in the face of a rapidly changing environment resulting from climate change, energy development, urban sprawl, invasive species and globalization. Advances in Geographic Information System (GIS) technology, digitization, online data availability, historic legacy datasets, remote sensors and the ability to collect data on animal movements via satellite and GPS have given rise to large, highly complex datasets. These datasets could be utilized for making critical management decisions, but are often "messy" and difficult to interpret. Basic artificial intelligence algorithms (i.e., machine learning) are powerful tools that are shaping the world and must be taken advantage of in the life sciences. In ecology, machine learning algorithms are critical to helping resource managers synthesize information to better understand complex ecological systems. Machine Learning has a wide variety of powerful applications, with three general uses that are of particular interest to ecologists: (1) data exploration to gain system knowledge and generate new hypotheses, (2) predicting ecological patterns in space and time, and (3) pattern recognition for ecological sampling. Machine learning can be used to make predictive assessments even when relationships between variables are poorly understood. When traditional techniques fail to capture the relationship between variables, effective use of machine learning can unearth and capture previously unattainable insights into an ecosystem's complexity. Currently, many ecologists do not utilize machine learning as a part of the scientific process. This volume highlights how machine learning techniques can complement the traditional methodologies currently applied in this field.

The second edition of a comprehensive introduction to machine learning approaches used in predictive data analytics, covering both theory and practice. Machine learning is often used to build predictive models by extracting patterns from large datasets. These models are used in predictive data analytics applications including price prediction, risk assessment, predicting customer behavior, and document classification. This introductory textbook offers a detailed and focused treatment of the most important machine learning approaches used in predictive data analytics, covering both theoretical concepts and practical applications. Technical and mathematical material is augmented with explanatory worked examples, and case studies illustrate the application of these models in the broader business context. This second edition covers recent developments in machine learning, especially in a new chapter on deep learning, and two new chapters that go beyond predictive analytics to cover unsupervised learning and reinforcement learning.

How to design for optimum maintenance capabilities and minimize the repair time Design for Maintainability offers engineers a wide range of tools and techniques for incorporating maintainability into the design process for complex systems. With contributions from noted experts on the topic, the book explains how to design for optimum maintenance capabilities while simultaneously minimizing the time to repair equipment. The book contains a wealth of examples and the most up-to-date maintainability design practices that have proven to result in better system readiness, shorter downtimes, and substantial cost savings over the entire system life cycle, thereby, decreasing the Total Cost of Ownership. Design for Maintainability offers a wealth of design practices not covered in typical engineering books, thus allowing readers to think outside the box when developing maintainability design requirements. The book's principles and practices can help engineers to dramatically improve their ability to compete in global markets and gain widespread customer satisfaction. This important book: Offers a complete overview of maintainability engineering as a system engineering discipline Includes contributions from authors who are recognized leaders in the field Contains real-life design examples, both good and bad, from various industries Presents realistic illustrations of good maintainability design principles Provides discussion of the interrelationships between maintainability with other related disciplines Explores trending topics in technologies Written for design and logistics engineers and managers, Design for Maintainability is a comprehensive resource containing the most reliable and innovative techniques for improving maintainability when designing a system or product.

This is the first textbook on pattern recognition to present the Bayesian viewpoint. The book presents approximate inference algorithms that permit fast approximate answers in situations where exact answers are not feasible. It uses graphical models to describe probability distributions when no other books apply graphical models to machine learning. No previous knowledge of pattern recognition or machine learning concepts is assumed. Familiarity with multivariate calculus and basic linear algebra is required, and some experience in the use of probabilities would be helpful though not essential as the book includes a self-contained introduction to basic probability theory.

Neural Networks and Deep Learning
Machine Learning from Weak Supervision
Algorithms, Worked Examples, and Case Studies
A Constraint-Based Approach
Early Detection of Neurological Disorders Using Machine Learning Systems
A Probabilistic Perspective

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.

Fundamental theory and practical algorithms of weakly supervised classification, emphasizing an approach based on empirical risk minimization. Standard machine learning techniques require large amounts of labeled data to work well. When we apply machine learning to problems in the physical world, however, it is extremely difficult to collect such quantities of labeled data. In this book Masashi Sugiyama, Han Bao, Takashi Ishida, Nan Lu, Tomoya Sakai and Gang Niu present theory and algorithms for weakly supervised learning, a paradigm of machine learning from weakly labeled data. Emphasizing an approach based on empirical risk minimization and drawing on state-of-the-art research in weakly supervised learning, the book provides both the fundamentals of the field and the advanced mathematical theories underlying them. It can be used as a reference for practitioners and researchers and in the classroom. The book first mathematically formulates classification problems, defines common notations, and reviews various algorithms for supervised binary and multiclass classification. It then explores problems of binary weakly supervised classification, including positive-unlabeled (PU) classification, positive-negative-unlabeled (PNU) classification, and unlabeled-unlabeled (UU) classification. It then turns to multiclass classification, discussing complementary-label (CL) classification and partial-label (PL) classification. Finally, the book addresses more advanced issues, including a family of correction methods to improve the generalization performance of weakly supervised learning and the problem of class-prior estimation.

A detailed and up-to-date introduction to machine learning, presented through the unifying lens of probabilistic modeling and Bayesian decision theory. This book offers a detailed and up-to-date introduction to machine learning (including deep learning) through the unifying lens of probabilistic modeling and Bayesian decision theory. The book covers mathematical background (including linear algebra and optimization), basic supervised learning (including linear and logistic regression and deep neural networks), as well as more advanced topics (including transfer learning and unsupervised learning). End-of-chapter exercises allow students to apply what they have learned, and an appendix covers notation. Probabilistic Machine Learning grew out of the author's 2012 book, Machine Learning: A Probabilistic Perspective. More than just a simple update, this is a completely new book that reflects the dramatic developments in the field since 2012, most notably deep learning. In addition, the new book is accompanied by online Python code, using libraries such as scikit-learn, JAX, PyTorch, and Tensorflow, which can be used to reproduce nearly all the figures; this code can be run inside a web browser using cloud-based notebooks, and provides a practical complement to the theoretical topics discussed in the book. This introductory text will be followed by a sequel that covers more advanced topics, taking the same probabilistic approach.

The fundamental mathematical tools needed to understand machine learning include linear algebra, analytic geometry, matrix decompositions, vector calculus, optimization, probability and statistics. These topics are traditionally taught in disparate courses, making it hard for data science or computer science students, or professionals, to efficiently learn the mathematics. This self-contained textbook bridges the gap between mathematical and machine learning texts, introducing the mathematical concepts with a minimum of prerequisites. It uses these concepts to derive four central machine learning methods: linear regression, principal component analysis, Gaussian mixture models and support vector machines. For students and others with a mathematical background, these derivations provide a starting point to machine learning texts. For those learning the mathematics for the first time, the methods help build intuition and practical experience with applying mathematical concepts. Every chapter includes worked examples and exercises to test understanding. Programming tutorials are offered on the book's web site.

Deep Learning for Medical Image Analysis
The Constitution of Algorithms
A Textbook
Artificial Intelligence in Asset Management
Evolutionary Computing and Mobile Sustainable Networks
The New AI

Traditional books on machine learning can be divided into two groups- those aimed at advanced undergraduates or early postgraduates with reasonable mathematical knowledge and those that are primers on how to code algorithms. The field is ready for a text that not only demonstrates how to use the algorithms that make up machine learning methods, but

Artificial intelligence (AI) has grown in presence in asset management and has revolutionized the sector in many ways. It has improved portfolio management, trading, and risk management practices by increasing efficiency, accuracy, and compliance. In particular, AI techniques help construct portfolios based on more accurate risk and return forecasts and more complex constraints. Trading algorithms use AI to devise novel trading signals and execute trades with lower transaction costs. AI also improves risk modeling and forecasting by generating insights from new data sources. Finally, robo-advisors owe a large part of their success to AI techniques. Yet the use of AI can also create new risks and challenges, such as those resulting from model opacity, complexity, and reliance on data integrity.

A comprehensive and self-contained introduction to Gaussian processes, which provide a principled, practical, probabilistic approach to learning in kernel machines. Gaussian processes (GPs) provide a principled, practical, probabilistic approach to learning in kernel machines. GPs have received increased attention in the machine-learning community over the past decade, and this book provides a long-needed systematic and unified treatment of theoretical and practical aspects of GPs in machine learning. The treatment is comprehensive and self-contained, targeted at researchers and students in machine learning and applied statistics. The book deals with the supervised-learning problem for both regression and classification, and includes detailed algorithms. A wide variety of covariance (kernel) functions are presented and their properties discussed. Model selection is discussed both from a Bayesian and a classical perspective. Many connections to other well-known techniques from machine learning and statistics are discussed, including support-vector machines, neural networks, splines, regularization networks, relevance vector machines and others. Theoretical issues including learning curves and the PAC-Bayesian framework are treated, and several approximation methods for learning with large datasets are discussed. The book contains illustrative examples and exercises, and code and datasets are available on the Web. Appendixes provide mathematical background and a discussion of Gaussian Markov processes.

Good data mining practice for business intelligence (the art of turning raw software into meaningful information) is demonstrated by the many new techniques and developments in the conversion of fresh scientific discovery into widely accessible software solutions. Written as an introduction to the main issues associated with the basics of machine learning and the algorithms used in data mining, this text is suitable foradvanced undergraduates, postgraduates and tutors in a wide area of computer science and technology, as well as researchers looking to adapt various algorithms for particular data mining tasks. A valuable addition to libraries and bookshelves of the many companies who are using the principles of data mining to effectively deliver solid business and industry solutions.

Machine Learning in Radiation Oncology
An Algorithmic Perspective
Theory and Applications
Gaussian Processes for Machine Learning
An Artificial Intelligence Approach
Recommender Systems Handbook

It's time to dispel the myth that machine learning is difficult. Grokking Machine Learning teaches you how to apply ML to your projects using only standard Python code and high school-level math. No specialist knowledge is required to tackle the hands-on exercises using readily available machine learning tools! In Grokking Machine Learning, expert machine learning engineer Luis Serrano introduces the most valuable ML techniques and teaches you how to make them work for you. Practical examples illustrate each new concept to ensure you're grokking as you go. You'll build models for spam detection, language analysis, and image recognition as you lock in each carefully-selected skill. Packed with easy-to-follow Python-based exercises and mini-projects, this book sets you on the path to becoming a machine learning expert. Key Features · Different types of machine learning, including supervised and unsupervised learning · Algorithms for simplifying, classifying, and splitting data · Machine learning packages and tools · Hands-on exercises with fully-explained Python code samples For readers with intermediate programming knowledge in Python or a similar language. About the technology Machine learning is a collection of mathematically-based techniques and algorithms that enable computers to identify patterns and generate predictions from data. This revolutionary data analysis approach is behind everything from recommendation systems to self-driving cars, and is transforming industries from finance to art.

This book covers both classical and modern models in deep learning. The primary focus is on the theory and algorithms of deep learning. The theory and algorithms of neural networks are particularly important for understanding important concepts, so that one can understand the important design concepts of neural architectures in different applications. Why do neural networks work? When do they work better than off-the-shelf machine-learning models? When is depth useful? Why is training neural networks so hard? What are the pitfalls? The book is also rich in discussing different applications in order to give the practitioner a flavor of how neural architectures are designed for different types of problems. Applications associated with many different areas like recommender systems, machine translation, image captioning, image classification, reinforcement-learning based gaming, and text analytics are covered. The chapters of this book span three categories: The basics of neural networks: Many traditional machine learning models can be understood as special cases of neural networks. An emphasis is placed in the first two chapters on understanding the relationship between traditional machine learning and neural networks. Support vector machines, linear/logistic regression, singular value decomposition, matrix factorization, and recommender systems are shown as special cases of neural networks. These methods are studied together with recent feature engineering methods like word2vec. Fundamentals of neural networks: A detailed discussion of training and regularization is provided in Chapters 3 and 4. Chapters 5 and 6 present radial-basis function (RBF) networks and restricted Boltzmann machines. Advanced topics in neural networks: Chapters 7 and 8 discuss recurrent neural networks and convolutional neural networks. Several advanced topics like deep reinforcement learning, neural Turing machines, Kohonen self-organizing maps, and generative adversarial networks are introduced in Chapters 9 and 10. The book is written for graduate students, researchers, and practitioners. Numerous exercises are available along with a solution manual to aid in classroom teaching. Where possible, an application-centric view is highlighted in order to provide an understanding of the practical uses of each class of techniques.

Machine Learning: A Constraint-Based Approach provides readers with a refreshing look at the basic models and algorithms of machine learning, with an emphasis on current topics of interest that includes neural networks and kernel machines. The book presents the information in a truly unified manner that is based on the notion of learning from environmental constraints. While regarding symbolic knowledge bases as a collection of constraints, the book draws a path towards a deep integration with machine learning that relies on the idea of adopting multivalued logic formalisms, like in fuzzy systems. A special attention is reserved to deep learning, which nicely fits the constrained- based approach followed in this book. This book presents a simpler unified notion of regularization, which is strictly connected with the parsimony principle, and includes many solved exercises that are classified according to the Donald Knuth ranking of difficulty, which essentially consists of a mix of warm-up exercises that lead to deeper research problems. A software simulator is also included. Presents fundamental machine learning concepts, such as neural networks and kernel machines in a unified manner Provides in-depth coverage of unsupervised and semi-supervised learning Includes a software simulator for kernel machines and learning from constraints that also includes exercises to facilitate learning Contains 250 solved examples and exercises chosen particularly for their progression of difficulty from simple to complex

While doctors and physicians are more than capable of detecting diseases of the brain, the most agile human mind cannot compete with the processing power of modern technology. Utilizing algorithmic systems in healthcare in this way may provide a way to treat neurological diseases before they happen. Early Detection of Neurological Disorders Using Machine Learning Systems provides innovative insights into implementing smart systems to detect neurological diseases at a faster rate than by normal means. The topics included in this book are artificial intelligence, data analysis, and biomedical informatics. It is designed for clinicians, doctors, neurologists, physiotherapists, neurorehabilitation specialists, scholars, academics, and students interested in topics centered on biomedical engineering, bio-electronics, medical electronics, physiology, neurosciences, life sciences, and physics.

Machine Learning

An Introduction to Machine Learning
European Conference, ECML PKDD 2017, Skopje, Macedonia, September 18-22, 2017, Proceedings, Part III
Fundamentals of Machine Learning for Predictive Data Analytics, second edition
Deep Learning
An Empirical Risk Minimization Approach
This book provides a complete overview of the role of machine learning in radiation oncology and medical physics, covering basic theory, methods, and a variety of applications in medical physics and radiotherapy. An introductory section explains machine learning, reviews supervised and unsupervised learning methods, discusses performance evaluation, and summarizes potential applications in radiation oncology. Detailed individual sections are then devoted to the use of machine learning in quality assurance; computer-aided detection, including treatment planning and contouring; image-guided radiotherapy; respiratory motion management; and treatment response modeling and outcome prediction. The book will be invaluable for students and residents in medical physics and radiation oncology and will also appeal to more experienced practitioners and researchers and members of applied machine learning communities.
Machine Learning, a vital and core area of artificial intelligence (AI), is propelling the AI field ever further and making it one of the most compelling areas of computer science research. This textbook offers a comprehensive and unbiased introduction to almost all aspects of machine learning, from the fundamentals to advanced topics. It consists of 16 chapters divided into three parts: Part 1 (Chapters 1-3) introduces the fundamentals of machine learning, including terminology, basic principles, evaluation, and linear models; Part 2 (Chapters 4-10) presents classic and commonly used machine learning methods, such as decision trees, neural networks, support vector machines, Bayesian classifiers, ensemble methods, clustering, dimension reduction and metric learning; Part 3 (Chapters 11-16) introduces some advanced topics, covering feature selection and sparse learning, computational learning theory, semi-supervised learning, probabilistic graphical models, rule learning, and reinforcement learning. Each chapter includes exercises and further reading, so that readers can explore areas of interest. The book can be used as an undergraduate or postgraduate textbook for computer science, computer engineering, electrical engineering, data science, and related majors. It is also a useful reference resource for researchers and practitioners of machine learning.
A comprehensive introduction to machine learning that uses probabilistic models and inference as a unifying approach. Today's Web-enabled deluge of electronic data calls for automated methods of data analysis. Machine learning provides these, developing methods that can automatically detect patterns in data and then use the uncovered patterns to predict future data. This textbook offers a comprehensive and self-contained introduction to the field of machine learning, based on a unified, probabilistic approach. The coverage combines breadth and depth, offering necessary background material on such topics as probability, optimization, and linear algebra as well as discussion of recent developments in the field, including conditional random fields, L1 regularization, and deep learning. The book is written in an informal, accessible style, complete with pseudo-code for the most important algorithms. All topics are copiously illustrated with color images and worked examples drawn from such application domains as biology, text processing, computer vision, and robotics. Rather than providing a cookbook of different heuristic methods, the book stresses a principled model-based approach, often using the language of graphical models to specify models in a concise and intuitive way. Almost all the models described have been implemented in a MATLAB software package—PMTK (probabilistic modeling toolkit)—that is freely available online. The book is suitable for upper-level undergraduates with an introductory-level college math background and beginning graduate students.
Deep learning is providing exciting solutions for medical image analysis problems and is seen as a key method for future applications. This book gives a clear understanding of the principles and methods of neural network and deep learning concepts, showing how the algorithms that integrate deep learning as a core component have been applied to medical image detection, segmentation and registration, and computer-aided analysis, using a wide variety of application areas. Deep Learning for Medical Image Analysis is a great learning resource for academic and industry researchers in medical imaging analysis, and for graduate students taking courses on machine learning and deep learning for computer vision and medical image computing and analysis. Covers common research problems in medical image analysis and their challenges Describes deep learning methods and the theories behind approaches for medical image analysis Teaches how algorithms are applied to a broad range of application areas, including Chest X-ray, breast CAD, lung and chest, microscopy and pathology, etc. Includes a Foreword written by Nicholas Ayache
Foundations, Algorithms, and Applications
Introduction to Machine Learning, fourth edition
Grokking Machine Learning
Ground-Truthing, Programming, Formulating
Proceedings of ICECMSN 2020
Elements of Causal Inference
This second edition of a well-received text, with 20 new chapters, presents a coherent and unified repository of recommender systems' major concepts, theories, methodologies, trends, and challenges. A variety of real-world applications and detailed case studies are included. In addition to wholesale revision of the existing chapters, this edition includes new topics including: decision making and recommender systems, reciprocal recommender systems, recommender systems in social networks, mobile recommender systems, explanations for recommender systems, music recommender systems, cross-domain recommendations, privacy in recommender systems, and semantic-based recommender systems. This multi-disciplinary handbook involves world-wide experts from diverse fields such as artificial intelligence, human-computer interaction, information retrieval, data mining, mathematics, statistics, adaptive user interfaces, decision support systems, psychology, marketing, and consumer behavior. Theoreticians and practitioners from these fields will find this reference to be an invaluable source of ideas, methods and techniques for developing more efficient, cost-effective and accurate recommender systems.
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 features selected research papers presented at the International Conference on Evolutionary Computing and Mobile Sustainable Networks (ICECMSN 2020), held at the Sir M. Visvesvaraya Institute of Technology on 20–21 February 2020. Discussing advances in evolutionary computing technologies, including swarm intelligence algorithms and other evolutionary algorithm paradigms which are emerging as widely accepted descriptors for mobile sustainable networks virtualization, optimization and automation, this book is a valuable resource for researchers in the field of evolutionary computing and mobile sustainable networks.
A laboratory study that investigates how algorithms come into existence. Algorithms--often associated with the terms big data, machine learning, or artificial intelligence--underlie the technologies we use every day, and disputes over the consequences, actual or potential, of new algorithms arise regularly. In this book, Florian Jaton offers a new way to study computerized methods, providing an account of where algorithms come from and how they are constituted, investigating the practical activities by which algorithms are progressively assembled rather than what they may suggest or require once they are assembled.
Bayesian Reasoning and Machine Learning
Introduction to Machine Learning
Design for Maintainability
Introduction to Information Retrieval
Pattern Recognition and Machine Learning
Data Mining
Introduces machine learning and its algorithmic paradigms, explaining the principles behind automated learning approaches and the considerations underlying their usage.
A concise overview of machine learning—computer programs that learn from data—which underlies applications that include recommendation systems, face recognition, and driverless cars. Today, machine learning underlies a range of applications we use every day, from product recommendations to voice recognition—as well as some we don't yet use everyday, including driverless cars. It is the basis of the new approach in computing where we do not write programs but collect data; the idea is to learn the algorithms for the tasks automatically from data. As computing devices grow more ubiquitous, a larger part of our lives and work is recorded digitally, and as "Big Data" has gotten bigger, the theory of machine learning—the foundation of efforts to process that data into knowledge—has also advanced. In this book, machine learning expert Ethem Alpaydin offers a concise overview of the subject for the general reader, describing its evolution, explaining important learning algorithms, and presenting example applications. Alpaydin offers an account of how digital technology advanced from number-crunching mainframes to mobile devices, putting today's machine learning boom in context. He describes the basics of machine learning and some applications; the use of machine learning algorithms for pattern recognition; artificial neural networks inspired by the human brain; algorithms that learn associations between instances, with such applications as customer segmentation and learning recommendations; and reinforcement learning, when an autonomous agent learns act so as to maximize reward and minimize penalty. Alpaydin then considers some future directions for machine learning and the new field of "data science," and discusses the ethical and legal implications for data privacy and security.
This textbook offers a comprehensive introduction to Machine Learning techniques and algorithms. This Third Edition covers newer approaches that have become highly topical, including deep learning, and auto-encoding, introductory information about temporal learning and hidden Markov models, and a much more detailed treatment of reinforcement learning. The book is written in an easy-to-understand manner with many examples and pictures, and with a lot of practical advice and discussions of simple applications. The main topics include Bayesian classifiers, nearest-neighbor classifiers, linear and polynomial classifiers, decision trees, rule-induction programs, artificial neural networks, support vector machines, boosting algorithms, unsupervised learning (including Kohonen networks and auto-encoding), deep learning, reinforcement learning, temporal learning (including long short-term memory), hidden Markov models, and the genetic algorithm. Special attention is devoted to performance evaluation, statistical assessment, and to many practical issues ranging from feature selection and feature construction to bias, context, multi-label domains, and the problem of imbalanced classes.
This book provides an in-depth analysis of the current evolutionary machine learning techniques. Discussing the most highly regarded methods for classification, clustering, regression, and prediction, it includes techniques such as support vector machines, extreme learning machines, evolutionary feature selection, artificial neural networks including feed-forward neural networks, multi-layer perceptron, probabilistic neural networks, self-optimizing neural networks, radial basis function networks, recurrent neural networks, spiking neural networks, neuro-fuzzy networks, modular neural networks, physical neural networks, and deep neural networks. The book provides essential definitions, literature reviews, and the training algorithms for machine learning using classical and modern nature-inspired techniques. It also investigates the pros and cons of classical training algorithms. It features a range of proven and recent nature-inspired algorithms used to train different types of artificial neural networks, including genetic algorithm, ant colony optimization, particle swarm optimization, grey wolf optimizer, whale optimization algorithm, ant lion optimizer, moth flame algorithm, dragonfly algorithm, salp swarm algorithm, multi-verse optimizer, and sine cosine algorithm. The book also covers applications of the improved artificial neural networks to solve classification, clustering, prediction and regression problems in diverse fields.
Evolutionary Machine Learning Techniques
Machine learning in intrusion detection
Privacy-Preserving Machine Learning
Machine Learning in Action
Machine Learning and Knowledge Discovery in Databases
An Introduction
A practical introduction perfect for final-year undergraduate and graduate students without a solid background in linear algebra and calculus.
A substantially revised fourth edition of a comprehensive textbook, including new coverage of recent advances in deep learning and neural networks. The goal of machine learning is to program computers to use example data or past experience to solve a given problem. Machine learning underlies such exciting new technologies as self-driving cars, speech recognition, and translation applications. This substantially revised fourth edition of a comprehensive, widely used machine learning textbook offers new coverage of recent advances in the field in both theory and practice, including developments in deep learning and neural networks. The book covers a broad array of topics not usually included in introductory machine learning texts, including supervised learning, Bayesian decision theory, parametric methods, semiparametric methods, nonparametric methods, multivariate analysis, hidden Markov models, reinforcement learning, kernel machines, graphical models, Bayesian estimation, and statistical testing. The fourth edition offers a new chapter on deep learning that discusses training, regularizing, and structuring deep neural networks such as convolutional and generative adversarial networks; new material in the chapter on reinforcement learning that covers the use of deep networks, the policy gradient methods, and deep reinforcement learning; new material in the chapter on multilayer perceptrons on autoencoders and the word2vec network; and discussion of a popular method of dimensionality reduction, t-SNE. New appendixes offer background material on linear algebra and optimization. End-of-chapter exercises help readers to apply concepts learned. Introduction to Machine Learning can be used in courses for advanced undergraduate and graduate students and as a reference for professionals.
The three volume proceedings LNAI 10534 – 10536 constitutes the refereed proceedings of the European Conference on Machine Learning and Knowledge Discovery in Databases, ECML PKDD 2017, held in Skopje, Macedonia, in September 2017. The total of 101 regular papers presented in part I and part II was carefully reviewed and selected from 364 submissions; there are 47 papers in the applied data science, nectar and demo track. The contributions were organized in topical sections named as follows: Part I: anomaly detection; computer vision; ensembles and meta learning; feature selection and extraction; kernel methods; learning and optimization, matrix and tensor factorization; networks and graphs; neural networks and deep learning. Part II: pattern and sequence mining; privacy and security; probabilistic models and methods; recommendation; regression; reinforcement learning; subgroup discovery; time series and streams; transfer and multi-task learning; unsupervised and semisupervised learning. Part III: applied data science track; nectar track; and demo track.
An accessible introduction to the artificial intelligence technology that enables computer vision, speech recognition, machine translation, and driverless cars. Deep learning is an artificial intelligence technology that enables computer vision, speech recognition in mobile phones, machine translation, AI games, driverless cars, and other applications. When we use consumer products from Google, Microsoft, Facebook, Apple, or Baidu, we are often interacting with a deep learning system. In this volume in the MIT Press Essential Knowledge series, computer scientist John Kelleher offers an accessible and concise but comprehensive introduction to the fundamental technology at the heart of the artificial intelligence revolution. Kelleher explains that deep learning enables data-driven decisions by identifying and extracting patterns from large datasets; its ability to learn from complex data makes deep learning ideally suited to take advantage of the rapid growth in big data and computational power. Kelleher also explains some of the basic concepts in deep learning, presents a history of advances in the field, and discusses the current state of the art. He describes the most important deep learning architectures, including autoencoders, recurrent neural networks, and long short-term memory networks, as well as such recent developments as Generative Adversarial Networks and capsule networks. He also provides a comprehensive (and comprehensible) introduction to the two fundamental algorithms in deep learning: gradient descent and backpropagation. Finally, Kelleher considers the future of deep learning—major trends, possible developments, and significant challenges.
Algorithms and Applications
Machine Learning for Ecology and Sustainable Natural Resource Management
Mathematics for Machine Learning
Introduction to Artificial Intelligence
From Theory to Algorithms
A concise and self-contained introduction to causal inference, increasingly important in data science and machine learning. The mathematization of causality is a relatively recent development, and has become increasingly important in data science and machine learning. This book offers a self-contained and concise introduction to causal models and how to learn them from data. After explaining the need for causal models and discussing some of the principles underlying causal inference, the book teaches readers how to use causal models: how to compute intervention distributions, how to infer causal models from observational and interventional data, and how causal ideas could be exploited for classical machine learning problems. All of these topics are discussed first in terms of two variables and then in the more general multivariate case. The bivariate case turns out to be a particularly hard problem for causal learning because there are no conditional independences as used by classical methods for solving multivariate cases. The authors consider analyzing statistical asymmetries between cause and effect to be highly instructive, and they report on their decade of intensive research into this problem. The book is accessible to readers with a background in machine learning or statistics, and can be used in graduate courses or as a reference for researchers. The text includes code snippets that can be copied and pasted, exercises, and an appendix with a summary of the most important technical concepts.
Summary Machine Learning in Action is unique book that blends the foundational theories of machine learning with the practical realities of building tools for everyday data analysis. You'll use the flexible Python programming language to build programs that implement algorithms for data classification, forecasting, recommendations, and higher-level features like summarization and simplification. About the Book A machine is said to learn when its performance improves with experience. Learning requires algorithms and programs that capture data and ferret out the interestingor useful patterns. Once the specialized domain of analysts and mathematicians, machine learning is becoming a skill needed by many. Machine Learning in Action is a clearly written tutorial for developers. It avoids academic language and takes you straight to the techniques you'll use in your day-to-day work. Many (Python) examples present the core algorithms of statistical data processing, data analysis, and data visualization in code you can reuse. You'll understand the concepts and how they fit in with tactical tasks like classification, forecasting, recommendations, and higher-level features like summarization and simplification. Readers need no prior experience with machine learning or statistical processing. Familiarity with Python is helpful. Purchase of the print book comes with an offer of a free PDF, ePub, and Kindle eBook from Manning. Also available is all code from the book. What's Inside A no-nonsense introduction Examples showing common ML tasks Everyday data analysis Implementing classic algorithms Table of Contents PART 1 CLASSIFICATION Machine learning basics Classifying with k-Nearest Neighbors Splitting datasets one feature at a time: decision trees Classifying with probability theory: naïve Bayes Logistic regression Support vector machines Improving classification with the AdaBoost meta algorithm PART 2 FORECASTING NUMERIC VALUES WITH REGRESSION Predicting numeric values: regression Tree-based regression PART 3 UNSUPERVISED LEARNING Grouping unlabeled items using k-means clustering Association analysis with the Apriori algorithm Efficiently finding frequent itemsets with FP-growth PART 4 ADDITIONAL TOOLS Using principal component analysis to simplify data Simplifying data with the singular value decomposition Big data and MapReduce