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Algorithmic Intelligence Cambridge University Press

Mathematical Methods in Artificial Intelligence introduces the student to the important mathematical foundations and tools in AI and describes their applications to the design of AI algorithms. This useful text presents an introductory AI course based on the most important mathematics and its applications. It focuses on important topics that are proven useful in AI and involve the most broadly applicable mathematics. The book explores AI from three different viewpoints: goals, methods or tools, and achievements and failures. Its goals of reasoning, planning, learning, or language understanding and use are centered around the expert system idea. The tools of AI are presented in terms of what can be incorporated in the data structures. The book looks into the concepts and tools of limited structure, mathematical logic, logic-like representation, numerical information, and nonsymbolic structures. The text emphasizes the main mathematical tools for representing and manipulating knowledge symbolically. These are various forms of logic for qualitative knowledge, and probability and related concepts for quantitative knowledge. The main tools for manipulating knowledge nonsymbolically, as neural nets, are optimization methods and statistics. This material is covered in the text by topics such as trees and search, classical mathematical logic, and uncertainty and reasoning. A solutions diskette is available, please call for more information.

Computational Intelligence World Scientific

Can computers think? Can they use reason to develop their own concepts, solve complex problems, understand our languages? This updated edition of a comprehensive survey includes extensive new text on "Artificial Intelligence in the 21st Century," introducing deep neural networks, conceptual graphs, languages of thought, mental models, metacognition, economic prospects, and research toward human-level AI. Ideal for both lay readers and students of computer science, the original text features abundant illustrations, diagrams, and photographs as well as challenging exercises. Lucid, easy-to-read discussions examine problem-solving methods and representations, game playing, automated understanding of natural languages, heuristic search theory, robot systems, heuristic scene analysis, predicate-calculus theorem proving, automatic programming, and many other topics.

Artificial Intelligence Springer

This book provides an introduction to the mathematical and algorithmic foundations of data science, including machine learning, high-dimensional geometry, and analysis of large networks. Topics include the counterintuitive nature of data in high dimensions, important linear algebraic techniques such as singular value decomposition, the theory of random walks and Markov chains, the fundamentals of and important algorithms for machine learning, algorithms and analysis for clustering, probabilistic models for large networks, representation learning including topic modelling and non-negative matrix factorization, wavelets and compressed sensing. Important probabilistic techniques are developed including the law of large numbers, tail inequalities, analysis of random projections, generalization guarantees in machine learning, and moment methods for analysis of phase transitions in large random graphs. Additionally, important structural and complexity measures are discussed such as matrix norms and VC-dimension. This book is suitable for both undergraduate and graduate courses in the design and analysis of algorithms for data.

Foundations of Logic Programming Springer Nature

Provides an in-depth and even treatment of the three pillars of computational intelligence and how they relate to one another This book covers the three fundamental topics that form the basis of computational intelligence: neural networks, fuzzy systems, and evolutionary computation. The text focuses on inspiration, design, theory, and practical aspects of implementing procedures to solve

real-world problems. While other books in the three fields that comprise computational intelligence are written by specialists in one discipline, this book is co-written by current former Editor-in-Chief of IEEE Transactions on Neural Networks and Learning Systems, a former Editor-in-Chief of IEEE Transactions on Fuzzy Systems, and the founding Editor-in-Chief of IEEE Transactions on Evolutionary Computation. The coverage across the three topics is both uniform and consistent in style and notation. Discusses single-layer and multilayer neural networks, radial-basis function networks, and recurrent neural networks Covers fuzzy set theory, fuzzy relations, fuzzy logic interference, fuzzy clustering and classification, fuzzy measures and fuzzy integrals Examines evolutionary optimization, evolutionary learning and problem solving, and collective intelligence Includes end-of-chapter practice problems that will help readers apply methods and techniques to real-world problems Fundamentals of Computational intelligence is written for advanced undergraduates, graduate students, and practitioners in electrical and computer engineering, computer science, and other engineering disciplines.

Introduction to Machine Learning IGI Global

This volume provides a cutting-edge view of the world's leading authorities in fields where information and computation play a central role.

Computational Neuroscience for Advancing Artificial Intelligence: Models, Methods and Applications Oxford University Press on Demand

An intelligent agent interacting with the real world will encounter individual people, courses, test results, drugs prescriptions, chairs, boxes, etc., and needs to reason about properties of these individuals and relations among them as well as cope with uncertainty. Uncertainty has been studied in probability theory and graphical models, and relations have been studied in logic, in particular in the predicate calculus and its extensions. This book examines the foundations of combining logic and probability into what are called relational probabilistic models. It introduces representations, inference, and learning techniques for probability, logic, and their combinations. The book focuses on two representations in detail: Markov logic networks, a relational extension of undirected graphical models and weighted first-order predicate calculus formula, and Problog, a probabilistic extension of logic programs that can also be viewed as a Turing-complete relational extension of Bayesian networks.

Deep Learning Cambridge University Press

Artificial Intelligence presents a practical guide to AI, including agents, machine learning and problem-solving simple and complex domains.

Information and Computation Cambridge University Press

This outstanding collection is designed to address the fundamental issues and principles underlying the task of Artificial Intelligence.

Mathematical Methods in Artificial Intelligence O'Reilly Media

An introduction to a broad range of topics in deep learning, covering mathematical and conceptual background, deep learning techniques used in industry, and research perspectives. "Written by three experts in the field, *Deep Learning* is the only comprehensive book on the subject." —Elon Musk, cochair of OpenAI; cofounder and CEO of Tesla and SpaceX Deep learning is a form of machine learning that enables computers to learn from experience and understand the world in terms of a hierarchy of concepts. Because the computer gathers knowledge from experience, there is no need for a human computer operator to formally specify all the knowledge that the computer needs. The hierarchy of concepts allows the computer to learn complicated concepts by building them out of simpler ones; a graph of these hierarchies would be many layers deep. This book introduces a broad range of topics in deep learning. The text offers mathematical and conceptual background, covering relevant concepts in linear algebra, probability theory and information theory, numerical computation, and machine learning. It describes deep learning techniques used by

practitioners in industry, including deep feedforward networks, regularization, optimization algorithms, convolutional networks, sequence modeling, and practical methodology; and it surveys such applications as natural language processing, speech recognition, computer vision, online recommendation systems, bioinformatics, and videogames. Finally, the book offers research perspectives, covering such theoretical topics as linear factor models, autoencoders, representation learning, structured probabilistic models, Monte Carlo methods, the partition function, approximate inference, and deep generative models. Deep Learning can be used by undergraduate or graduate students planning careers in either industry or research, and by software engineers who want to begin using deep learning in their products or platforms. A website offers supplementary material for both readers and instructors.

Machine Learning John Wiley & Sons

Build real-world Artificial Intelligence applications with Python to intelligently interact with the world around you About This Book Step into the amazing world of intelligent apps using this comprehensive guide Enter the world of Artificial Intelligence, explore it, and create your own applications Work through simple yet insightful examples that will get you up and running with Artificial Intelligence in no time Who This Book Is For This book is for Python developers who want to build real-world Artificial Intelligence applications. This book is friendly to Python beginners, but being familiar with Python would be useful to play around with the code. It will also be useful for experienced Python programmers who are looking to use Artificial Intelligence techniques in their existing technology stacks. What You Will Learn Realize different classification and regression techniques Understand the concept of clustering and how to use it to automatically segment data See how to build an intelligent recommender system Understand logic programming and how to use it Build automatic speech recognition systems Understand the basics of heuristic search and genetic programming Develop games using Artificial Intelligence Learn how reinforcement learning works Discover how to build intelligent applications centered on images, text, and time series data See how to use deep learning algorithms and build applications based on it In Detail Artificial Intelligence is becoming increasingly relevant in the modern world where everything is driven by technology and data. It is used extensively across many fields such as search engines, image recognition, robotics, finance, and so on. We will explore various real-world scenarios in this book and you'll learn about various algorithms that can be used to build Artificial Intelligence applications. During the course of this book, you will find out how to make informed decisions about what algorithms to use in a given context. Starting from the basics of Artificial Intelligence, you will learn how to develop various building blocks using different data mining techniques. You will see how to implement different algorithms to get the best possible results, and will understand how to apply them to real-world scenarios. If you want to add an intelligence layer to any application that's based on images, text, stock market, or some other form of data, this exciting book on Artificial Intelligence will definitely be your guide! Style and approach This highly practical book will show you how to implement Artificial Intelligence. The book provides multiple examples enabling you to create smart applications to meet the needs of your organization. In every chapter, we explain an algorithm, implement it, and then build a smart application.

Probabilistic Machine Learning Morgan Kaufmann

A panorama of new ideas in mathematics that are driving innovation in computing and communications.

Mathematics for Future Computing and Communications Elsevier

Computational Intelligence: An Introduction, Second Edition offers an in-depth exploration into the adaptive mechanisms that enable intelligent behaviour in complex and changing environments. The main focus of this text is centred on the computational modelling of biological and natural intelligent systems, encompassing swarm intelligence, fuzzy systems, artificial neural networks, artificial immune systems and evolutionary computation. Engelbrecht provides readers with a wide knowledge of Computational Intelligence (CI) paradigms and algorithms; inviting readers to implement and problem solve real-world, complex problems within the CI development framework. This implementation framework will enable readers to tackle new problems without any difficulty through a single Java class as part of the CI library. Key features of this second edition include: A tutorial, hands-on based presentation of the material. State-of-the-art coverage of the most recent developments in computational intelligence with more elaborate discussions on intelligence and artificial intelligence (AI). New discussion of Darwinian evolution versus Lamarckian evolution, also including swarm robotics, hybrid systems and artificial immune systems. A section on how to perform empirical studies; topics including statistical analysis of stochastic algorithms, and an open source library of CI algorithms. Tables, illustrations, graphs, examples, assignments, Java code implementing the algorithms, and a complete CI implementation and experimental framework. Computational Intelligence: An Introduction, Second Edition is essential reading for third and fourth year undergraduate and postgraduate students studying CI. The first edition has been prescribed by a number of overseas universities and is thus a valuable teaching tool. In addition, it will also be a useful resource for researchers in Computational Intelligence and Artificial Intelligence, as well as engineers, statisticians, operational researchers, and bioinformaticians with an interest in applying AI or CI to solve problems in their domains. Check out <http://www.ci.cs.up.ac.za> for examples, assignments and Java code implementing the algorithms.

Logic for Computer Science and Artificial Intelligence MIT Press

This book presents recent research on computational intelligence (CI) algorithms in the field of sport. In the modern age, information technologies have greatly reduced the need for human effort in the carrying out of many daily tasks. These technologies have radically influenced the lives of humans, and the information society in general. Unfortunately, these advances have brought with them certain negative effects, including the encouragement of sedentary lifestyles and the attendant health problems such as obesity that these engender. Other modern maladies, chiefly cardiovascular disease, diabetes, and cancer, have also been on the increase. Today, sports are virtually the only activity that still connects modern humans to their original lifestyle, which was based on physical motion. This book tears familiarizing sports scientists with the foundations of computational intelligence, while at the same time presenting the problems that have arisen in the training domain to computer scientists. Lastly, the book proposes the use of an Artificial Sports Trainer designed to enhance the training of modern athletes who cannot afford the considerable expense of hiring a human personal trainer. This intelligent system can monitor performance and design and direct appropriate future training, thus promoting both healthy lifestyles and competitive success in athletes.

Artificial Intelligence with Python John Wiley & Sons

This book gives an account of the mathematical foundations of logic programming. I have attempted to make the book self-contained by including proofs of almost all the results needed. The only prerequisites are some familiarity with a logic programming language, such as PROLOG, and a certain mathematical maturity. For example, the reader should be familiar with induction

arguments and be comfortable manipulating logical expressions. Also the last chapter assumes some acquaintance with the elementary aspects of metric spaces, especially properties of continuous mappings and compact spaces. Chapter 1 presents the declarative aspects of logic programming. This chapter contains the basic material from first order logic and fixpoint theory which will be required. The main concepts discussed here are those of a logic program, model, correct answer substitution and fixpoint. Also the unification algorithm is discussed in some detail. Chapter 2 is concerned with the procedural semantics of logic programs. The declarative concepts are implemented by means of a specialized form of resolution, called SLD-resolution. The main results of this chapter concern the soundness and completeness of SLD-resolution and the independence of the computation rule. We also discuss the implications of omitting the occur check from PROLOG implementations. Chapter 3 discusses negation. Current PROLOG systems implement a form of negation by means of the negation as failure rule. The main results of this chapter are the soundness and completeness of the negation as failure rule.

Unsupervised Learning Pearson

Fundamentals of Artificial Intelligence introduces the foundations of present day AI and provides coverage to recent developments in AI such as Constraint Satisfaction Problems, Adversarial Search and Game Theory, Statistical Learning Theory, Automated Planning, Intelligent Agents, Information Retrieval, Natural Language & Speech Processing, and Machine Vision. The book features a wealth of examples and illustrations, and practical approaches along with the theoretical concepts. It covers all major areas of AI in the domain of recent developments. The book is intended primarily for students who major in computer science at undergraduate and graduate level but will also be of interest as a foundation to researchers in the area of AI.

Statistical Relational Artificial Intelligence Springer Nature

Artificial intelligence touches nearly every part of your day. While you may initially assume that technology such as smart speakers and digital assistants are the extent of it, AI has in fact rapidly become a general-purpose technology, reverberating across industries including transportation, healthcare, financial services, and many more. In our modern era, an understanding of AI and its possibilities for your organization is essential for growth and success. Artificial Intelligence Basics has arrived to equip you with a fundamental, timely grasp of AI and its impact. Author Tom Taulli provides an engaging, non-technical introduction to important concepts such as machine learning, deep learning, natural language processing (NLP), robotics, and more. In addition to guiding you through real-world case studies and practical implementation steps, Taulli uses his expertise to expand on the bigger questions that surround AI. These include societal trends, ethics, and future impact AI will have on world governments, company structures, and daily life. Google, Amazon, Facebook, and similar tech giants are far from the only organizations on which artificial intelligence has had—and will continue to have—an incredibly significant result. AI is the present and the future of your business as well as your home life. Strengthening your prowess on the subject will prove invaluable to your preparation for the future of tech, and Artificial Intelligence Basics is the indispensable guide that you've been seeking. What You Will Learn Study the core principles for AI approaches such as machine learning, deep learning, and NLP (Natural Language Processing) Discover the best practices to successfully implement AI by examining case studies including Uber, Facebook, Waymo, UiPath, and Stitch Fix Understand how AI capabilities for robots can improve business Deploy chatbots and Robotic Processing Automation (RPA) to save costs and improve customer service Avoid costly gotchas Recognize ethical concerns and other risk factors of using artificial intelligence Examine the secular trends and how they may impact your business Who This Book Is For Readers without a technical background, such as managers, looking to understand AI to evaluate solutions.

Machine Learning Foundations MIT Press

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.

Boosting Springer Nature

"This book argues that computational models in behavioral neuroscience must be taken with caution, and advocates for the study of mathematical models of existing theories as complementary to neuro-psychological models and computational models"--

Deep Learning for Coders with fastai and PyTorch Springer

This book presents a variety of techniques designed to enhance and empower multi-disciplinary and multi-institutional machine learning research in healthcare informatics. It is intended to provide a unique compendium of current and emerging machine learning paradigms for healthcare informatics, reflecting the diversity, complexity, and depth and breadth of this multi-disciplinary area.

Computational Intelligence MIT Press

This book provides a comprehensive introduction to the application of artificial intelligence in social computing, from fundamental data processing to advanced social network computing. To broaden readers' understanding of the topics addressed, it includes extensive data and a large number of charts and references, covering theories, techniques and applications. It particularly focuses on data collection, data mining, artificial intelligence algorithms in social computing, and several key applications of social computing application, and also discusses network propagation mechanisms and dynamic analysis, which provide useful insights into how information is disseminated in online social networks. This book is intended for readers with a basic knowledge of advanced mathematics and computer science.

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