

COMPUTATIONAL LEARNING AND PROBABILISTIC REASONING

Edited by *A. Gammerman*



Computational Learning And Probabilistic Reasoning

Krishnakumar Sukhramdas Purswani



Computational Learning And Probabilistic Reasoning:

Computational Learning and Probabilistic Reasoning Alexander Gammerman, 1996-08-06 This book is devoted to two interrelated techniques for solving some important problems in machine intelligence and pattern recognition namely probabilistic reasoning and computational learning Part one describes several new inductive principles and techniques used in computational learning Part two contains chapters on Causal Probabilistic Modes model selection and application of Bayesian networks to multivariate statistical analysis The third part is on Bayesian Belief Networks and hybrid systems The fourth part describes some related theoretical work in the field of probabilistic reasoning

Statistical Relational Artificial Intelligence Luc De Raedt, Kristian Kersting, Sriraam Natarajan, David Poole, 2022-05-31 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

Applied Decision Technologies, 1995

A Probabilistic Reasoning-based Approach to Machine Learning Krish Purswani, University of Illinois at Urbana-Champaign. Department of Computer Science, Larry Rendell, 1986

A Probabilistic Reasoning-based Approach to Machine Learning Krishnakumar Sukhramdas Purswani, 1989 This thesis describes a novel approach to machine learning based on the principle of learning by reasoning Current learning systems have significant limitations like brittleness i e the deterioration of performance on a different domain or problem and lack of power required for handling real world learning problems The goal of my research was to develop an approach in which many of these limitations are overcome in a unified coherent and general frame work This learning approach is based on techniques of reasoning such as the discovery of the underlying principle and the recognition of the deeper basis of similarity which emulate human learning In this thesis the limitations of current systems are discussed along with the arguments for using a different approach to learning This thesis then presents a Reasoning based Approach to machine learning the author developed along with the details of a computer implementation It also illustrates the approach on some learning problems not directly solvable by previous approaches

Reasoning with Probabilistic and Deterministic Graphical Models Rina Dechter, 2022-06-01 Graphical models e g Bayesian and constraint networks influence diagrams and Markov decision processes have become a central paradigm for knowledge representation and reasoning in both artificial intelligence and computer science in general These models are

used to perform many reasoning tasks such as scheduling planning and learning diagnosis and prediction design hardware and software verification and bioinformatics These problems can be stated as the formal tasks of constraint satisfaction and satisfiability combinatorial optimization and probabilistic inference It is well known that the tasks are computationally hard but research during the past three decades has yielded a variety of principles and techniques that significantly advanced the state of the art This book provides comprehensive coverage of the primary exact algorithms for reasoning with such models The main feature exploited by the algorithms is the model's graph We present inference based message passing schemes e.g. variable elimination and search based conditioning schemes e.g. cycle cutset conditioning and AND/OR search Each class possesses distinguished characteristics and in particular has different time vs space behavior We emphasize the dependence of both schemes on few graph parameters such as the treewidth cycle cutset and the pseudo tree height The new edition includes the notion of influence diagrams which focus on sequential decision making under uncertainty We believe the principles outlined in the book would serve well in moving forward to approximation and anytime based schemes The target audience of this book is researchers and students in the artificial intelligence and machine learning area and beyond

Reasoning with Probabilistic and Deterministic Graphical Models Rina Kraus, 2022-12-06 Graphical models e.g. Bayesian and constraint networks influence diagrams and Markov decision processes have become a central paradigm for knowledge representation and reasoning in both artificial intelligence and computer science in general These models are used to perform many reasoning tasks such as scheduling planning and learning diagnosis and prediction design hardware and software verification and bioinformatics These problems can be stated as the formal tasks of constraint satisfaction and satisfiability combinatorial optimization and probabilistic inference It is well known that the tasks are computationally hard but research during the past three decades has yielded a variety of principles and techniques that significantly advanced the state of the art In this book we provide comprehensive coverage of the primary exact algorithms for reasoning with such models The main feature exploited by the algorithms is the model's graph We present inference based message passing schemes e.g. variable elimination and search based conditioning schemes e.g. cycle cutset conditioning and AND/OR search Each class possesses distinguished characteristics and in particular has different time vs space behavior We emphasize the dependence of both schemes on few graph parameters such as the treewidth cycle cutset and the pseudo tree height We believe the principles outlined here would serve well in moving forward to approximation and anytime based schemes The target audience of this book is researchers and students in the artificial intelligence and machine learning area and beyond

Machine Learning, Optimization, and Data Science Giuseppe Nicosia, Varun Ojha, Sven Giesselbach, M. Panos Pardalos, Renato Uméton, 2025-03-03 The three volume set LNAI 15508 15510 constitutes the refereed proceedings of the 10th International Conference on Machine Learning Optimization and Data Science LOD 2024 held in Castiglione della Pescaia Italy during September 22-25 2024 This year in the LOD Proceedings decided to also include the papers of the fourth

edition of the Symposium on Artificial Intelligence and Neuroscience ACAIN 2024 The 79 full papers included in this book were carefully reviewed and selected from 127 submissions The LOD 2024 proceedings focus on machine learning deep learning AI computational optimization neuroscience and big data that includes invited talks tutorial talks special sessions industrial tracks demonstrations and oral and poster presentations of refereed papers

Reasoning With Probabilistic and Deterministic Graphical Models Rina Dechter, 2019-02-14 Graphical models e.g. Bayesian and constraint networks influence diagrams and Markov decision processes have become a central paradigm for knowledge representation and reasoning in both artificial intelligence and computer science in general These models are used to perform many reasoning tasks such as scheduling planning and learning diagnosis and prediction design hardware and software verification and bioinformatics These problems can be stated as the formal tasks of constraint satisfaction and satisfiability combinatorial optimization and probabilistic inference It is well known that the tasks are computationally hard but research during the past three decades has yielded a variety of principles and techniques that significantly advanced the state of the art This book provides comprehensive coverage of the primary exact algorithms for reasoning with such models The main feature exploited by the algorithms is the model's graph We present inference based message passing schemes e.g. variable elimination and search based conditioning schemes e.g. cycle cutset conditioning and AND/OR search Each class possesses distinguished characteristics and in particular has different time vs space behavior We emphasize the dependence of both schemes on few graph parameters such as the treewidth cycle cutset and the pseudo tree height The new edition includes the notion of influence diagrams which focus on sequential decision making under uncertainty We believe the principles outlined in the book would serve well in moving forward to approximation and anytime based schemes The target audience of this book is researchers and students in the artificial intelligence and machine learning area and beyond

Multimodal Probabilistic Reasoning for Prediction and Coordination Problems in Machine Learning Jaleh Zand, 2021

Ai-Driven Predictive Supply Chain Optimization System Using Machine Learning For Demand Forecasting And Inventory Management Irshadullah Asim Mohammed, 2024-12-14 This book provides a comprehensive exploration of the practical applications of advanced analytics and machine learning drawing directly from the author's hands on experience in optimising inventory and demand forecasting using models such as ARIMA Prophet and LSTM It's a direct extension of Irshadullah's patented work in AI driven optimization The book has received encouraging reviews from leading book communities including the Indian Book Critics Thoughtful Critic Read By Critics and more

Machine Learning for Data Science Handbook Lior Rokach, Oded Maimon, Erez Shmueli, 2023-08-17 This book is a major update to the very successful first and second editions 2005 and 2010 of Data Mining and Knowledge Discovery Handbook Since the last edition this field has continued to evolve and to gain popularity Existing methods are constantly being improved and new methods applications and aspects are introduced The new title of this handbook and its content reflect these changes thoroughly Some existing chapters have been brought up to

date In addition to major revision of the existing chapters the new edition includes totally new topics such as deep learning explainable AI human factors and social issues and advanced methods for big data The significant enhancement to the content reflects the growth in importance of data science The third edition is also a timely opportunity to incorporate many other changes based on peers and students feedback This comprehensive handbook also presents a coherent and unified repository of data science major concepts theories methods trends challenges and applications It covers all the crucial important machine learning methods used in data science Today s accessibility and abundance of data make data science matters of considerable importance and necessity Given the field s recent growth it s not surprising that researchers and practitioners now have a wide range of methods and tools at their disposal While statistics is fundamental for data science methods originated from artificial intelligence particularly machine learning are also playing a significant role This handbook aims to serve as the main reference for researchers in the fields of information technology e Commerce information retrieval data science machine learning data mining databases and statistics as well as advanced level students studying computer science or electrical engineering Practitioners working within these related fields and data scientists will also want to purchase this handbook as a reference

Machine Learning: ECML 2007 Joost N. Kok, Jacek Koronacki, Ramon Lopez de Mantaras, Stan Matwin, Dunja Mladenic, 2007-09-08 This book constitutes the refereed proceedings of the 18th European Conference on Machine Learning ECML 2007 held in Warsaw Poland September 2007 jointly with PKDD 2007 The 41 revised full papers and 37 revised short papers presented together with abstracts of four invited talks were carefully reviewed and selected from 592 abstracts submitted to both ECML and PKDD The papers present a wealth of new results in the area and address all current issues in machine learning

THE ART OF INTELLIGENT MACHINES UNLEASHING THE POWER OF MACHINE LEARNING Mr. Om Prakash Singh, Dr. L. Sridhara Rao, Dr. Sanjay Agal, Dr. Haewon Byeon, 2023-08-14 Intelligent machines also known as artificial intelligence AI systems are a fascinating area of study and development that integrates computer science mathematics and cognitive science to create machines that can simulate human like intellect and conduct This field of study and development aims to produce machines that can create intelligent machines that can simulate human like intelligence and behavior These computers are programmed to perceive learn reason and make judgments in a manner that is either comparable to or superior to the cognitive powers of humans Machine learning is a subsection of artificial intelligence that focuses on the development of algorithms and models that enable computers to learn from and make predictions or judgments based on data Intelligent machines are constructed on top of this foundation which is the basis of machine learning Intelligent machines are able to analyze huge amounts of data recognize patterns in that data and make decisions based on that analysis through the use of machine learning techniques such as neural networks decision trees and reinforcement learning The capacity to learn new things and advance themselves over time is one of the most distinguishing features of intelligent machines They are able to gain knowledge from their experiences and modify

either their behavior or their models in order to get better results This skill is frequently referred regarded as artificial intelligence since these machines can demonstrate features that we generally associate with human intellect such as problem solving the ability to grasp plain language and visual perception The applications for intelligent machines are quite diverse and can be found in a variety of domains They are used in a variety of industries including the healthcare sector the financial sector the transportation sector and the manufacturing sector to automate processes improve decision making and increase efficiency In the field of medicine for instance intelligent robots can be of assistance in the process of disease diagnosis the analysis of medical imaging and the development of individualized treatment regimens

Applied Decision Technologies,1995 **Machine Learning: ECML-98** Claire Nedellec,Celine Rouveirol,1998-04-08 This book constitutes the refereed proceedings of the 10th European Conference on Machine Learning ECML 98 held in Chemnitz Germany in April 1998 The book presents 21 revised full papers and 25 short papers reporting on work in progress together with two invited contributions the papers were selected from a total of 100 submissions The book is divided in sections on applications of ML Bayesian networks feature selection decision trees support vector learning multiple models for classification inductive logic programming relational learning instance based learning clustering genetic algorithms reinforcement learning and neural networks **Machine Learning, ECML- ...**,1998 **Introduction to Statistical Relational Learning** Lise Getoor,Ben Taskar,2019-09-22 Advanced statistical modeling and knowledge representation techniques for a newly emerging area of machine learning and probabilistic reasoning includes introductory material tutorials for different proposed approaches and applications Handling inherent uncertainty and exploiting compositional structure are fundamental to understanding and designing large scale systems Statistical relational learning builds on ideas from probability theory and statistics to address uncertainty while incorporating tools from logic databases and programming languages to represent structure In **Introduction to Statistical Relational Learning** leading researchers in this emerging area of machine learning describe current formalisms models and algorithms that enable effective and robust reasoning about richly structured systems and data The early chapters provide tutorials for material used in later chapters offering introductions to representation inference and learning in graphical models and logic The book then describes object oriented approaches including probabilistic relational models relational Markov networks and probabilistic entity relationship models as well as logic based formalisms including Bayesian logic programs Markov logic and stochastic logic programs Later chapters discuss such topics as probabilistic models with unknown objects relational dependency networks reinforcement learning in relational domains and information extraction By presenting a variety of approaches the book highlights commonalities and clarifies important differences among proposed approaches and along the way identifies important representational and algorithmic issues Numerous applications are provided throughout **Proceedings of the ... Annual ACM Conference on Computational Learning Theory**,1995 *Proceedings of the Genetic and Evolutionary Computation Conference*,2002

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