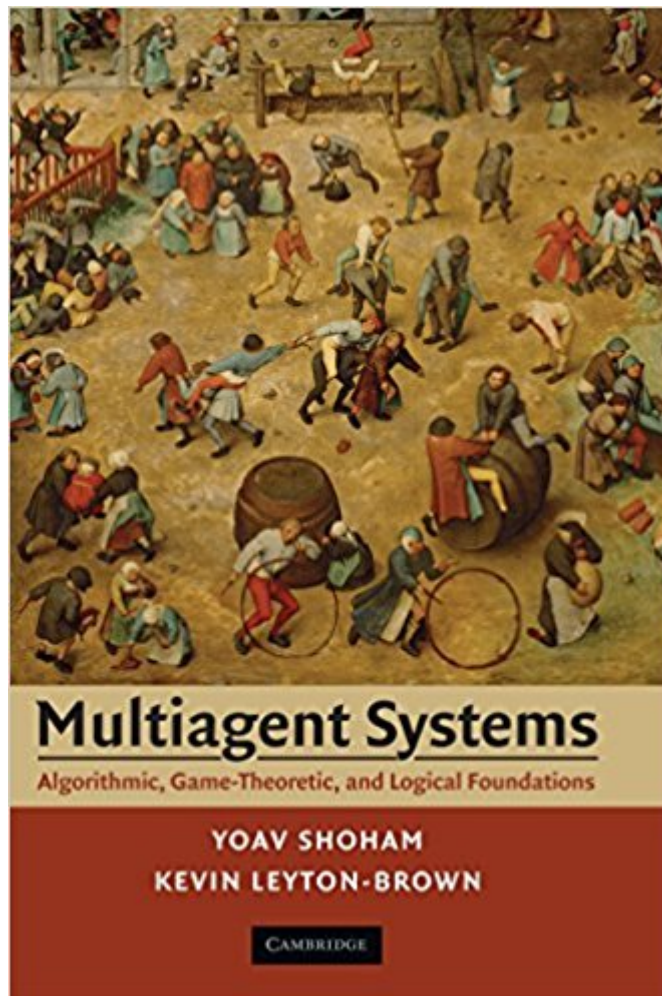




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Multiagent Systems: Algorithmic, Game-Theoretic, And Logical Foundations



Synopsis

This exciting and pioneering new overview of multiagent systems, which are online systems composed of multiple interacting intelligent agents, i.e., online trading, offers a newly seen computer science perspective on multiagent systems, while integrating ideas from operations research, game theory, economics, logic, and even philosophy and linguistics. The authors emphasize foundations to create a broad and rigorous treatment of their subject, with thorough presentations of distributed problem solving, game theory, multiagent communication and learning, social choice, mechanism design, auctions, cooperative game theory, and modal logics of knowledge and belief. For each topic, basic concepts are introduced, examples are given, proofs of key results are offered, and algorithmic considerations are examined. An appendix covers background material in probability theory, classical logic, Markov decision processes and mathematical programming. Written by two of the leading researchers of this engaging field, this book will surely serve as THE reference for researchers in the fastest-growing area of computer science, and be used as a text for advanced undergraduate or graduate courses.

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Customer Reviews

"This is by far the best text in the field of multiagent systems, one of the fastest-growing areas in computer science." Stuart Russell, University of California at Berkeley
"The integration of methodologies that study different aspects of interactive strategic systems is of vital importance in modern society. Through excellent side-by-side presentation of the main approaches in computer

science, game theory and economics, this pioneering textbook is a major advance towards the education of a better-equipped generation of computer scientists as well as social scientists." Ehud Kalai, Northwestern University

"This is a rich and comprehensive text on multiagent systems, written by two of the leading researchers in the area in an engaging and accessible style. It is unique in covering the diverse foundations of multiagent systems, including logic. Its extensive treatment of the interplay between computer science and game theory will define how the subject should be taught. I recommend the book for graduate students and advanced undergraduates, as well as researchers in both computer science and economics trying to learn the basics of the field." Joseph Halpern, Cornell University

"With the emergence of the Internet, the focus of much of the research in computer science and in artificial intelligence is shifting from the the study of the single program to the study of the interactions among different computers and programs. Multiagent Systems presents for the first time this cutting-edge research in a textbook form. The book transcends the traditional boundaries of artificial intelligence and touches all aspects of multiagent systems: from artificial intelligence to algorithms to game theory, to logic, and beyond. Written by leaders in this research area, this book is certain to become the textbook of choice for classes on multiagent systems." Noam Nisan, Hebrew University

"Shoham and Leyton-Brown traverse several disciplines to bring together the most salient and useful technical principles for understanding multiagent systems. This text is the first to provide computer scientists with a comprehensive treatment of the mathematical machinery they need to analyze systems of autonomous agents, integrating their computational and strategic dimensions." Michael Wellman, University of Michigan

"... a useful reference volume for researchers and a good foundational body of knowledge for those just starting their exploration of the field. It is rich in examples... With its 13 chapters, this volume definitely deserves a handy place on the shelves of those studying MAS... Highly recommended. G. Trajkovski, Laureate Higher Education Group for Choice Magazine

"The book with its comprehensive and broad treatment promises to become the standard textbook on multiagent systems. It provides a useful and easy to read survey of a rapidly growing field. The text is one of the clearest expositions of concepts in game theory. The book easily deserves to be on the shelf of any modern theoretical computer scientist." Haris Aziz, SIGACT News

Multiagent systems are those systems that include multiple autonomous entities with either diverging information or diverging interests, or both. This comprehensive introduction to a burgeoning field is written from a computer science perspective, while bringing together ideas from operations research, game theory, economics, logic, and even philosophy and linguistics.

A good academic text book, however, extremely theoretical and with some surprising "voids" on important topics. The book had served its purpose better if a few more examples and references to industrial cases were included. Some explanations fall short of what I suspect to be their intention at times. Students using this book would enjoy it as a book of reference for development. But as an aid to help them place MA in a business perspective it fails.

It is a good exposition of algorithmic game-theory. I bought it to understand more about how computer science people look at game-theory. Sometimes I cringe with the language (e.g. "instantiation" ?) but overall it is well-written and a nice text-book, although I would not teach from it.

have been interested in constraint optimization problems. MAS casted a fresh perspective on solving such problems, which led to more system-wise algorithms.

I have been looking for books on game theory and software development ever since I completed my game theory class. I am still reading this book, but I really like it so far.

Good book

GREAT PRODUCT!

This book is a fantastic introduction to game theory where the authors are cleverly worried about the algorithms used to solve the problems. Therefore, it provides a great link among computer science, economic theory and operational research. The structure of the book is based on very clear definitions, elucidating examples and theorems (not all proved, but several ones are proved). A great point of the book is the updated list of references in the last section of each chapter that can help the interested reader find additional information about each topic is being taught in the book. Chapter 1 introduces the problem of Distributed constraint satisfaction that will be used later in the book to compute the Nash equilibrium. Chapter 2 is a basic introduction to dynamic programming and auction theory. Chapters 3, 4 and 5 provide an introduction to decision theory and basic game theory. The bonus of these chapters is the list of algorithms that are presented in order to compute the equilibriums. It is worth mentioning that these chapters are as good as the best available introductions to game theory. All the basic topics are clearly covered. Chapter 6 presents more

specific representations of games. Some of them are very common in other books (such as Repeated games and Bayesian games), but others (such as congestion games) are not very common. Chapter 7 deals with learning and teaching. The main topics of this chapter are two very uncommon topics in game theory books, namely reinforcement learning (you may find for instance in the fantastic book of Sutton and Barto or Bertsekas) and evolutionary game theory (you may find in Game theory evolving - Gintis, Evolutionary game theory - Weibull, Evolutionary Games and Population Dynamics - Hofbauer and Sigmund, but not the most common books of game theory). Chapter 8 is about communication. This is a very interesting presentation of the topic Doing by talking (cheap talk) X Talking by doing (signaling games). Furthermore, an unusual topic of this chapter is presentation of the speech act theory dealing with rules of conversation and game theoretical view of speech acts. Chapter 9 is about the difficult to aggregate preferences. Chapter 10 is a clever introduction to mechanism design. Chapter 11 is a very good introduction to auctions. Chapter 12 presents coalitional game theory. This topic may be found for instance in A Course in Game Theory - Martin J. Osborne and Ariel Rubinstein, but the presentation in Osborne and Rubinstein is much more demanding. Chapter 13 and 14 is about the logics of knowledge and belief. Summarizing... This book is not another introduction to game theory, it is much more. It presents a lot of topics not common in other introductions and also presents several useful algorithms. Furthermore, it presents a good balance between mathematics and intuition.

On the positive side, the book gives an indication of the wide variety of work that has been done, and is being done, in the area of multiagent systems. On the negative side, I would have liked to see more work done in producing a taxonomy of the field before digging into the details of particular approaches. The authors also seem to be uncertain exactly how to integrate logic (especially modal logic) with existing and current work. As a result, rather than playing a foundational role, the authors have added logic mostly as an afterthought. This may be an honest reflection of how research in multiagent systems is done these days, with computer scientists mostly ignoring the often impenetrable modal logic literature.

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