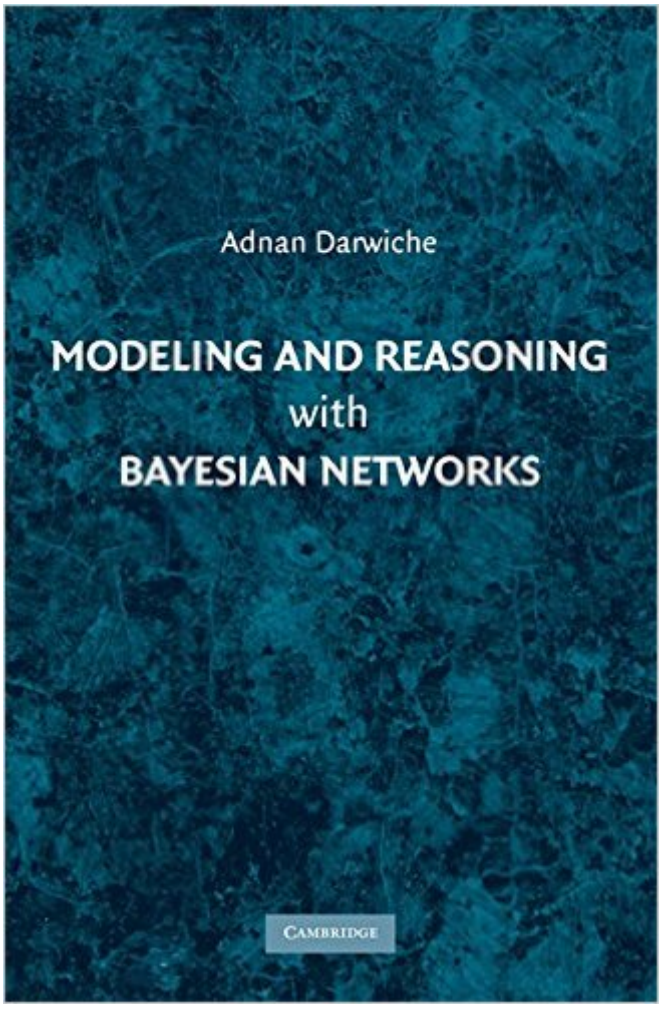
Modeling And Reasoning With Bayesian Networks



Synopsis

This book provides a thorough introduction to the formal foundations and practical applications of Bayesian networks. It provides an extensive discussion of techniques for building Bayesian networks that model real-world situations, including techniques for synthesizing models from design, learning models from data, and debugging models using sensitivity analysis. It also treats exact and approximate inference algorithms at both theoretical and practical levels. The author assumes very little background on the covered subjects, supplying in-depth discussions for theoretically inclined readers and enough practical details to provide an algorithmic cookbook for the system developer.

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Customer Reviews

While pursuing my PhD at UCLA, I took Professor Darwiche's classes and had the privilege of using the pre-release version of this book. Before taking professor Darwiche's class, I had spent a good deal of time while working on my masters degree working on Bayesian networks. I found that much of the literature on Bayesian networks was inaccessible to someone new to the field. There simply was not a comprehensive resource that would explain Bayesian networks from the beginning in a through and clear manner. I say with confidence that this has now changed.The book begins with the fundamentals of logic. It continues on to describe the properties of the Bayesian network graph such as independence relationships and d-separation as well as how the parameters of a Bayesian network work.There are then in depth discussions of the various queries we are able to perform on Bayesian networks and the algorithms for accomplishing them. These include queries such as

probability of evidence, most probable explanation and probabilistic inference. Techniques such as summing out, pearl's polytree algorithm and belief propagation are described elogently and clearly.The book also contains information on the current state of the art research going on in the field. This book is a valuable resource for anyone new to or ingrained in the use of Bayesian Networks. A book of this scope and target was sorely needed and I for one am glad it has arrived. I would and have recommended this to any of my peers in the field.

Having taken Professor Darwiche's course on Bayesian Networks, I was excited to get my hands on this book, which is a culmination of the notes from that class and his research on the subject.This is an excellent text, with very clear explanations and step by step descriptions in pseudo code of the important algorithms in the text.The first few chapters lay the probabilistic foundations needed for understanding Bayesian Networks and the conditional independences such networks encode.Chapter 5 gives examples in several different domains of using Bayesian Networks to model different systems and answer queries about them.After this, the book gets into the meat of its primary focus, efficient probabilistic inference in the context of Bayesian Networks.It lays out various algorithms for exact inference using jointrees or recursive conditioning, and the complexity and trade-offs of the different approaches.It further details further refinements that can reduce networks in some cases for even better performance.After this, it details approximate inference techniques including sampling and belief propagation.Chapter 14 on belief propagation is especially good, with its discussions on the semantics of belief propagation, generalized belief propagation, and an alternative formulation of generalized belief propagation edge deletion belief propagation.The last few chapters also delve into learning Bayesian Networks structure and parameters.All in all, this book will give an in depth knowledge of exact and approximate inference in Bayesian networks and a good overview of learning and applying these models to various domains.

It's an excellent book on Bayesian Networks. After reading it I gained a solid understanding on how Bayesian Networks work as well as how to design and use them to solve real probabilistic problems. This book is accompanied by a tool for modelling and reasoning with Bayesian Network, which was created by the Automated Reasoning Group of Professor Adnan Darwiche at UCLA. I'm planning to adopt Bayesian Networks in analyzing betting exchange markets and reading such a great book gave me all I needed to apply Bayesian Networks in my research.

Darwiche's book, _Modeling and Reasoning with Bayesian Networks_, is one of the most

well-written, lucid books that I have ever read.My background and current focus: About 6 months ago at my company, I found the need to formalize reasoning regarding derived system requirements. As I struggled with how to reason and create a logically consistent set of verifiable, probabilistic requirements, I remembered Bayesian Networks, which, a few years ago, Prof. Paul Cohen (UofAz) mentioned to me. My recall sparked an investigation, starting with Kevin Murphy's BNT Matlab Toolbox and his excellent survey of tools, which is how I found Darwiche & SamIam (we also use BNT, but we find teaching BNs easier with SamIam's GUI).My intuition is that, thanks to this book, expanded application of Bayesian networks will revolutionize the way that we design & develop algorithms and systems at my company.

The book has very good illustrating examples and the text is clear as well. I find this book more accessible. Sometimes authors give definitions but do not give illustrative examples. This book gives that. Also after reading this book, I felt that the knowledge wasn't just abstract but I got the theory and skill as well. I would recommend this book to anyone with some background in probability theory and wishes to develop not only insight into theory of Bayesian networks but also a degree of practical skill with algorithms.

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