Probabilistic Reasoning In Intelligent Systems: Networks Of Plausible Inference (Morgan Kaufmann Series In Representation And Reasoning)

Synopsis

Probabilistic Reasoning in Intelligent Systems is a complete and accessible account of the theoretical foundations and computational methods that underlie plausible reasoning under uncertainty. The author provides a coherent explication of probability as a language for reasoning with partial belief and offers a unifying perspective on other AI approaches to uncertainty, such as the Dempster-Shafer formalism, truth maintenance systems, and nonmonotonic logic.The author distinguishes syntactic and semantic approaches to uncertainty--and offers techniques, based on belief networks, that provide a mechanism for making semantics-based systems operational. Specifically, network-propagation techniques serve as a mechanism for combining the theoretical coherence of probability theory with modern demands of reasoning-systems technology: modular declarative inputs, conceptually meaningful inferences, and parallel distributed computation. Application areas include diagnosis, forecasting, image interpretation, multi-sensor fusion, decision support systems, plan recognition, planning, speech recognition--in short, almost every task requiring that conclusions be drawn from uncertain clues and incomplete information.Probabilistic Reasoning in Intelligent Systems will be of special interest to scholars and researchers in AI, decision theory, statistics, logic, philosophy, cognitive psychology, and the management sciences. Professionals in the areas of knowledge-based systems, operations research, engineering, and statistics will find theoretical and computational tools of immediate practical use. The book can also be used as an excellent text for graduate-level courses in AI, operations research, or applied probability.

Book Information

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Customer Reviews

Recently I needed to learn the principles of Bayesian networks quickly, so I bought three books: this one by Pearl, "Pattern Recognition and Machine Learning" by Bishop, and "Bayesian Artificial Intelligence" by Korb and Nicholson. Each has a very different audience and different set of strengths.The Bishop book would probably be a great text for a serious student with a year to spend learning the theory of machine learning. But I found it a bit too concise, with a bias towards an "algebraic" description rather than a "geometric" one (my preference). I wound up spending a lot of time trying to translate equations into mental pictures in order to grasp the concepts. Too much work, so I dropped this after a couple of days.Next I tackled the Korb and Nicholson book. This one's aimed at the application engineer who wants to get a network up and running quickly, and is not too concerned about how it works. I've been in that position many times in my career, and have always welcomed books like this for giving me a quick start into a new field. But this time I needed to really understand how Bayesian networks worked, and for this the Korb and Nicholson book is not great. In the first 9 pages of chapter 3 they try to explain the belief propagation algorithm, but their hearts just weren't it in--I found their explanation to be unintelligible. (I suspect most readers just skim this to get to the applications.) So after several days of struggling and getting nowhere, I tossed this aside as well.The Pearl book was the only left; I put it off to last since I was initially somewhat intimidated by it. After all, this is one of the books that kicked off the "Bayesian revolution," so I was fearing a foundational math book consisting of one dry theorem after another. Not so!

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