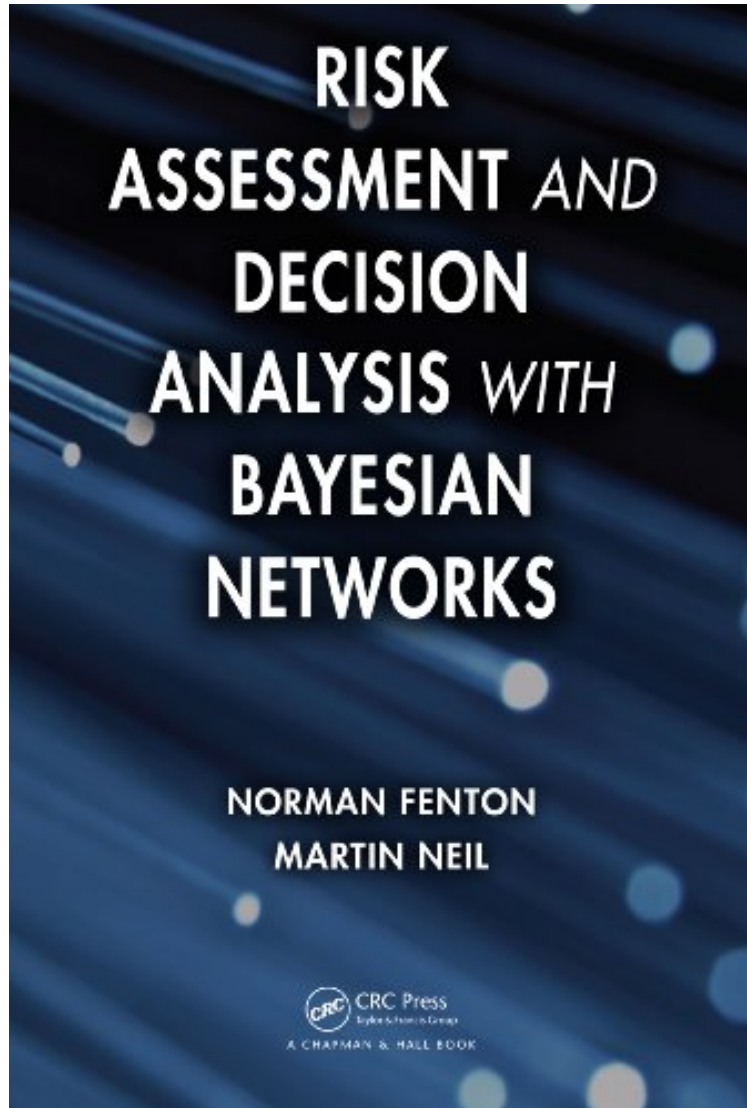


Risk Assessment and Decision Analysis with Bayesian Networks

Norman Fenton, Martin Neil

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Norman Fenton, Martin Neil : Risk Assessment and Decision Analysis with Bayesian Networks before purchasing it in order to gage whether or not it would be worth my time, and all praised Risk Assessment and Decision Analysis with Bayesian Networks:

14 of 14 people found the following review helpful. The single most important book on Bayesian methods for decision analystsBy Douglas W. HubbardFenton and Neil have successfully made a "crossover" book that reaches broad audiences on a topic which is too often presented in a dry and esoteric manner. It is rich with illustrations, interesting examples, debunking of common fallacies, and a passionate philosophical position on Bayesian methods vs. the "frequentist" methods common in statistics.This book is a comprehensive treatment of Bayesian methods but focuses

on the particularly powerful models that can be made when conditional probabilities are presented in networks. The authors present a complete algebra of Bayesian networks using both formal expressions and simple diagrams so that almost any reader can be comfortable with the topic. This book does not assume that the reader has even basic training in probabilistic methods (it has a chapter on the basics of probability) but it also does not compromise on substantive content. The reader seeking basic explanations will not feel excluded and the reader seeking more advanced treatments will be satisfied as well. This is exactly the sort of rigorous thinking that needs to displace the "softer" methods more common in risk assessment and decision analysis. It is presented as an entirely practical solution for managers, not an abstract, academic exercise. The "best practices" committees for PMBOK, ISO, Cobit and managers everywhere would be well advised to read this book before inventing yet another risk assessment or decision analysis method based on fluffy scores. Doug Hubbard Author of How to Measure Anything (2007, 2010, 2014), The Failure of Risk Management (2009) and Pulse (2011) 29 of 31 people found the following review helpful. Where has this book been all my life? By Serac So, I must admit. This book is nothing like what I expected when I ordered it. Having a background in engineering, many statistics classes (some graduate level), and experience with other types of "networks," I was expecting a fairly tough book filled with theorems, equations, and trivial first-principle examples. Was I ever wrong. Instead, this book discusses Bruce Willis blowing up a meteor, game shows, the author sleeping too long and missing work, and scenarios in Agatha Christie novels. In my stuffy statistics classes, Bayesian statistics was explained as something not short of gnosticism - that if you didn't get it already, it was not worth explaining. I used Bayes' Theorem for simple problems, but for nothing very practical - practical implementation was too difficult. It is a sign that someone knows a complex subject very well: Explain it simply enough (and still be correct) so that a bright grade-school child would understand. This is exactly that the authors have done. The appealing and simple approach to this book hides the fact that they to an amazingly good job at explaining Bayesian statistics. The light subjects I mentioned in the paragraph above should be taken that these authors do a tremendous job at explaining themselves, not that this book is a pushover, or is simple or pedestrian. If you, like me, have always wished that someone would have taken the time to explain Bayesian statistics to you, or if you are somewhat experienced in statistics but feel like you need more (or see the holes that these authors point out), then this book is for you. If you are looking for a book filled with proofs and theorems, or if you like authors that make themselves sound smart by intimidation and shock-and-awe, then skip this book. This book is the real deal. 1 of 1 people found the following review helpful. An accessible and highly practical guide to understanding risk By C. D. Lynn It's rare to find a serious statistics book that is fun to read, so Fenton Neil's textbook is a pleasant surprise. Its focus is practical throughout, providing tools and worked examples to analyze increasingly complex problems of probability. Starting with the nature of randomness and the dangers of misleading correlations, the book moves through simple probability examples like the Monty Hall problem and the chances of someone winning the lottery twice, to causal analysis with Bayesian Networks. A BN is defined as an explicit description of dependencies using a directed graph (network) and a set of Node Probability Tables (NPTs). The book moves on to discuss hypothesis testing, risk modeling, and reliability analysis using BNs, illustrated by the authors' accompanying 'AgenaRisk' software. A final chapter persuasively argues for the application of BNs to the legal system. All this is done with no more than a high school level of mathematics - the deeper math (unnecessary for the lay reader) is saved for the appendices. A worthwhile and accessible read for anyone interested in understanding risk.

Although many Bayesian Network (BN) applications are now in everyday use, BNs have not yet achieved mainstream penetration. Focusing on practical real-world problem solving and model building, as opposed to algorithms and theory, Risk Assessment and Decision Analysis with Bayesian Networks explains how to incorporate knowledge with data to develop and use (Bayesian) causal models of risk that provide powerful insights and better decision making. Provides all tools necessary to build and run realistic Bayesian network models. Supplies extensive example models based on real risk assessment problems in a wide range of application domains provided; for example, finance, safety, systems reliability, law, and more. Introduces all necessary mathematics, probability, and statistics as needed. The book first establishes the basics of probability, risk, and building and using BN models, then goes into the detailed applications. The underlying BN algorithms appear in appendices rather than the main text since there is no need to understand them to build and use BN models. Keeping the body of the text free of intimidating mathematics, the book provides pragmatic advice about model building to ensure models are built efficiently. A dedicated website, www.BayesianRisk.com, contains executable versions of all of the models described, exercises and worked solutions for all chapters, PowerPoint slides, numerous other resources, and a free downloadable copy of the AgenaRisk software.

"By offering many attractive examples of Bayesian networks and by making use of software that allows one to play with the networks, readers will definitely get a feel for what can be done with Bayesian networks. ... the power and also uniqueness of the book stem from the fact that it is essentially practice oriented, but with a clear aim of equipping the developer of Bayesian networks with a clear understanding of the underlying theory. Anyone involved

in everyday decision making looking for a better foundation of what is now mainly based on intuition will learn something from the book."Peter J.F. Lucas, Journal of Statistical Theory and Practice, Vol. 8, March 2014 "hellip; very useful to practitioners, professors, students, and anyone interested in understanding the application of Bayesian networks to risk assessment and decision analysis. Having many years of experience in the area, I highly recommend the book."William E. Vesely, International Journal of Performability Engineering, July 2013 "Risk Assessment and Decision Analysis with Bayesian Networks is a brilliant book. Being a non-mathematician, I've found all of the other books on BNs to be an impenetrable mass of mathematical gobble-de-gook. This, in my view, has slowed the uptake of BNs in many disciplines because people simply cannot understand why you would use them and how you can use them. This book finally makes BNs comprehensible, and I plan to develop a risk assessment course at the University of Queensland using this book as the recommended textbook."Carl Smith, School of Agriculture and Food Sciences, The University of Queensland "hellip; although there have been several excellent books dedicated to Bayesian networks and related methods, these books tend to be aimed at readers who already have a high level of mathematical sophistication hellip; . As such they are not accessible to readers who are not already proficient in those subjects. This book is an exciting development because it addresses this problem. hellip; it should be understandable by any numerate reader interested in risk assessment and decision making. The book provides sufficient motivation and examples (as well as the mathematics and probability where needed from scratch) to enable readers to understand the core principles and power of Bayesian networks. However, the focus is on ensuring that readers can build practical Bayesian network models hellip; readers are provided with a tool that performs the propagation, so they will be able to build their own models to solve real-world risk assessment problems."From the Foreword by Judea Pearl, UCLA Computer Science Department and 2011 Turing Award winner "Let's be honest, most risk assessment methodologies are guesses, and not very good ones at that. People collect statistics about what they can see and then assume it tells them something about what they can't. The problem is that people assume the world follows nice distributions embedded in the world's fabric and that we simply need a little data to get the parameters right. Fenton and Neil take readers on an excellent journey through a more modern and appropriate way to make sense of uncertainty by leveraging prior beliefs and emerging evidence. Along the way they provide a wakeup call for the classic statistical views of risk and eloquently show the biases, fallacies and misconceptions that exist in such a view, and how dangerous they are for those making decisions. The book is not condescending to those without a mathematical background and is not too simple for those who do. It sets a nice tone which focuses more on how readers should think about risk and uncertainty and then uses a wealth of practical examples to show them how Bayesian methods can deliver powerful insights. After reading this book, you should be in no doubt that not only is it possible to model risk from the perspective of understanding how it behaves, but also that is necessarily the only sensible way to do so if you want to do something useful with your model and make correct decisions from it. Anyone aspiring to work, or already working, in the field of risk is well advised to read this book and put it into practice."Neil Cantle, Milliman "The lovely thing about Risk Assessment and Decision Analysis with Bayesian Networks is that it holds your hand while it guides you through this maze of statistical fallacies, p-values, randomness and subjectivity, eventually explaining how Bayesian networks work and how they can help to avoid mistakes. There are loads of vivid examples (for instance, one explaining the Monty Hall problem), and it doesn't skim over any of the technical details hellip;"Angela Saini (MIT Knight Science Journalism Fellow 2012-2013) on her blog, December 2012 "As computational chip size and product development cycle time approach zero, survival in the software industry becomes predicated on three related capabilities: prediction, diagnosis, and causality. These are the competitive advantages in 21st century software design testing. Fenton and Neil not only make a compelling case for Bayesian inference, but they also meticulously and patiently guide software engineers previously untrained in probability theory toward competence in mathematics. We have been waiting for decades for the last critical component that will make Bayesian a household word in industry: the incredible combination of an accessible software tool and an accompanying and brilliantly written textbook. Now software testers have the math, the algorithms, the tool, and the book. We no longer have any excuses for not dramatically raising our technology game to meet that challenge of continuous testing. Fenton and Neil came to our rescue, and just in the nick of time. Thanks, guys."Michael Corning, Microsoft Corporation "This is an awesome book on using Bayesian networks for risk assessment and decision analysis. What makes this book so great is both its content and style. Fenton and Neil explain how the Bayesian networks work and how they can be built and applied to solve various decision-making problems in different areas. Even more importantly, the authors very clearly demonstrate motivations and advantages for using Bayesian networks over other modelling techniques. The core ideas are illustrated by lots of examples from toy models to real-world applications. In contrast with many other books, this one is very easy to follow and does not require a strong mathematical or statistical background. I highly recommend this book to all researchers, students and practitioners who would like to go beyond traditional statistics or automated data mining techniques and incorporate expert knowledge in their models."Dr. ukasz Radliski, Szczecin University "It is the first book that takes the art and science of developing Bayesian network models for actual problems as seriously as the underlying mathematics. The reader will obtain a good understanding of the methods as they are introduced through well-motivated and intuitive examples and attractive case studies. The authors do this in such a way that

readers with little previous exposure to probability theory and statistics will be able to grasp and appreciate the power of Bayesian networks. While this in itself is already a major achievement, the authors go far beyond this by providing very close and pragmatic links between model building and the required techniques. It, thus, shares insights that are mostly missing from other textbooks, making this book also of interest to advanced readers, lecturers and researchers in the area."

Prof.dr. Peter Lucas, Institute for Computing and Information Sciences, Radboud University Nijmegen, and Leiden Institute of Advanced Computer Science, Leiden University "This book gives a thorough account of Bayesian networks, one of the most widely used frameworks for reasoning with uncertainty, and their application in domains as diverse as system reliability modelling and legal reasoning. The book's central premise is that 'essentially, all models are wrong, but some are useful' (G.E.P. Box), and the book distinguishes itself by focusing on the art of building useful models for risk assessment and decision analysis rather than on delving into mathematical detail of the models that are built. The authors are renowned for their ability to put Bayesian network technology into practical use, and it is therefore no surprise that the book is filled to the brim with motivating and relevant examples. With the accompanying evaluation copy of the excellent AgenaRisk software, readers can easily play around with the examples and gain valuable insights of how the models behave 'at work'; I believe this book should be of interest to practitioners working with risk assessment and decision making and also as a valuable textbook in undergraduate courses on probability and risk."

Helge Langseth, Norwegian University of Science and Technology "Bayesian networks are revolutionizing the way experts assess and manage uncertainty. This is the first book to explain this powerful new tool to a non-specialist audience. It takes us on a compelling journey from the basics of probability to sophisticated networks of system design, finance and crime. This trip is greatly supported by free software, allowing readers to explore and develop Bayesian networks for themselves. The style is accessible and entertaining, without sacrificing conceptual or mathematical rigor. This book is a must-read for anyone wanting to learn about Bayesian networks; it provides the know-how and software so that we can all share this adventure into risk and uncertainty."

David Lagnado, Senior Lecturer in Cognitive and Decision Sciences, University College London "This is the book I have wanted to see for many years. Whilst we are entitled to see appropriate duty of care in any risk management scenario, ill-informed practice is in fact prevalent in industry and society. There is little real excuse for this as classical decision theory has a long established history, and it can now be operationalized in complex scenarios using the Bayesian network technology that is a core theme of this book. The problem has been that most books on Bayesian networks and decision theory focus in depth on the technical foundations, and provide little in the way of practical guidance on how to use the technology to support real-world risk assessment and decision making. In contrast, Norman Fenton and Martin Neil have provided a clearly written and highly readable book that is packed with informative and insightful examples. I had fun reading it, but there is also sufficient technical detail so that one can obtain a deep understanding of the subject from studying the book. It is a joy, and one that I keep dipping back into."

Paul Krause, Professor of Software Engineering, University of Surrey "Given the massive uncertainties managers now need to operate within, this book is both vital and timely. Fenton and Neil's explanation of how to create practical models that simulate real-life strategic scenarios gives hard-pressed managers a new tool that they can use to understand potential impacts and opportunities. This book should be required reading for anyone involved in strategy, business planning, or significant decision-making."

Rob Wirszycz, Celaton Limited