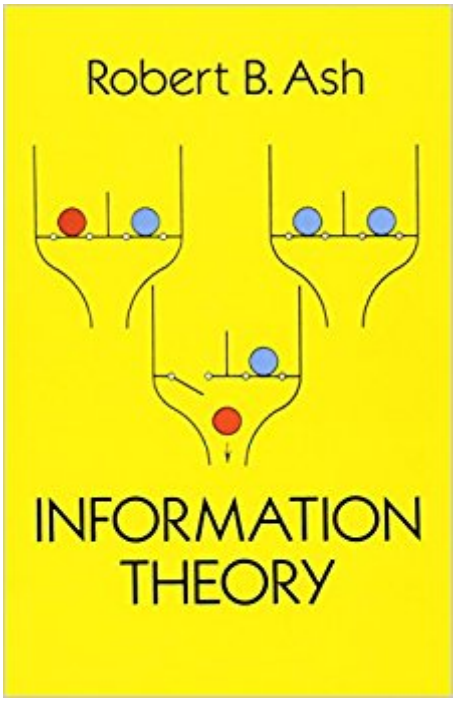
Information Theory (Dover Books On Mathematics)



Synopsis

Developed by Claude Shannon and Norbert Wiener in the late 1940s, information theory, or statistical communication theory, deals with the theoretical underpinnings of a wide range of communication devices: radio, television, radar, computers, telegraphy, and more. This book is an excellent introduction to the mathematics underlying the theory.Designed for upper-level undergraduates and first-year graduate students, the book treats three major areas: analysis of channel models and proof of coding theorems (chapters 3, 7, and 8); study of specific coding systems (chapters 2, 4, and 5); and study of statistical properties of information sources (chapter 6). Among the topics covered are noiseless coding, the discrete memoryless channel, effort correcting codes, information sources, channels with memory, and continuous channels.The author has tried to keep the prerequisites to a minimum. However, students should have a knowledge of basic probability theory. Some measure and Hilbert space theory is helpful as well for the last two sections of chapter 8, which treat time-continuous channels. An appendix summarizes the Hilbert space background and the results from the theory of stochastic processes necessary for these sections. The appendix is not self-contained but will serve to pinpoint some of the specific equipment needed for the analysis of time-continuous channels.In addition to historic notes at the end of each chapter indicating the origin of some of the results, the author has also included 60 problems with detailed solutions, making the book especially valuable for independent study.

Book Information

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Customer Reviews

Professor Emeritus of Mathematics at the University of Illinois, Robert Ash is the author ofÃ Â three other Dover books: Basic Abstract Algebra, Basic Probability Theory, and Complex Variables and Information Theory.

Classic graduate text on the mathematical theory of communications. This book was written by a mathematician specifically for graduate students in electrical and computer engineering. Both theory and text have stood well the test of time.

good

Thorough, but not very exciting. Figures, tables and equations are too dense and hard to read.The book is useful and informative, but the format is lagging behind today’s standard. You may be better off spending a few dollars more on a modern book.

This 1990 Dover publication of the original 1965 edition serves as a great introduction to "the statistical communication theory", otherwise known as Information Theory, a subject which concerns the theoretical underpinnings of a broad class of communication devices. The exposition here is based on the Shannon’s (not Wiener’s) formulation or model of the theory, having been initiated in his breakthrough 1948 paper. I purchased this book more than a couple of years ago as a beginning math grad student mainly interested to (quickly and affordably) learn some basics about the subject, without necessarily intending to specialize in it. The text in my opinion should also be accessible to any engineering student with a one or two semester background in real analysis, and a working knowledge of the theory of probability (also summarized at the beginning of the book). Topics discussed include: noiseless coding, discrete memoryless channels, error correcting codes, information sources, channels with memory, and continuous channels. There are some very illuminating historical notes + remarks, and also problem sets at the end of each chapter, with solutions included at the back of the book, making an ideal setting for self-study. Aside from being a great resource for learning the basics however, one sole setback of the book is that all the results and theorems presented therein date from the 50’s and early 60’s, so one will have to look elsewhere to find out about some of the more recent developments in the field.

This is the best book for self-study of information theory which I have found, and I looked hard

because I needed to learn the basics of information theory in grad school. As far as content, Ash covers all the major topics in information theory, from definitions of basic quantities like mutual information to the mathematical representation of continuous communication channels. One of the best aspects of the book is a set of problem sets at the end of each chapter, each with detailed solutions at the end of the book. They serve as very useful checks on one's understanding. As for structure, Ash manages to cover these topics in a way that is concise and illuminating yet without sacrificing mathematical rigour (note that the book assumes you know basic probability theory and calculus). If anyone wants to learn the mathematical theory of communication, I highly recommend using this book as your guide.

This book is highly similar to the Reza book, also published by Dover publications. The Ash book kind of continues where the Reza book leaves off. In truth, this book is very, very rigorous... not so much in terms of proofs (see the small Khinchin book for great proofs), but in terms of it involves mathematics and concepts which require a higher level of knowledge. Undergraduate students would have alot of trouble trying to understand both math and general concepts.Even graduate students would find this book daunting, because after all, it probably is one of the best books written on information theory.If your a beginner seeking a good book, this is not it at all.Aside from being too rigorous, it covers many topics which are of completely no use to a beginner or even somebody with a fair amount of information theory knowledge. Also, the book is not very motivating from a practical aspect. That is, much like the Reza and Kitchkin book, it's written more from a dry mathematical perspective and not an "engineers" perspective.It doesn't examine information theory from the perspective of electrical engineering and communications theory... which might make it hard for some people to relate to if they can't be told what the practical applications are (see Pierce's books and Cover and Thomas for very good "practical" books).For beginners, I recommend the Pierce book, subtitled "Symbols, Signals and Noise" which is bar-none the best beginners book ever written (or some of Pierce's other books). Pierce is one of the finest authors of his era and he published several books on information theory; most of which are more "engineer friendly" and are more relavent to the study of electronic communications.Summary, this book is NOT for beginners. It will be almost completely useless unless you have a decent degree of information theory knowledge to begin with. Sadly, this was the first book I ever purchased on that topic.. and boy was that a mistake!! I spent 2 years trying to figure heads or tails of half the chapters.. Then I went ahead and got some more appropriate books (Pierce, Reza, Cover and Thomas) and when I had sufficient knowledge... only then did this book make any sense.

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