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History of coding theory. In 1948, Claude Shannon published "A Mathematical Theory of Communication", an article in two parts in the July and October issues of the Bell System Technical Journal. This work focuses on the problem of how best to encode the information a sender wants to transmit. In this fundamental work he used tools in probability theory, developed by Norbert Wiener, which were ...

~~Coding theory - Wikipedia~~

Coding theory is one of the most important and direct applications of information theory. It can be subdivided into source coding theory and channel coding theory. Using a statistical description for data, information theory quantifies the number of bits needed to describe the data, which is the information entropy of the source.

~~Information theory - Wikipedia~~

Information Theory & Coding □ EEE2004 □ SLG □ School of EECE - Spring 2012 Lossless compression techniques Compression algorithms allowing the exact original data to be reconstructed from the compressed data. Used in software compression tools such as the popular ZIP file format. Used when the original and the decompressed data

~~Information Theory - Part 1~~

Most of Information Theory involves probability distributions of random variables, and conjoint or conditional probabilities defined over ensembles of random variables. Indeed, the information content of a symbol or event is defined by its (im)probability.

~~Information Theory and Coding - University of Cambridge~~

Discrete mathematics, information theory and coding; Applied Combinatorics on Words. \$174.95 (C) Part of Encyclopedia of

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Mathematics and its Applications. Author: M. Lothaire;

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Information theory, coding and cryptography are the three load-bearing pillars of any digital communication system. In this introductory course, we will start with the basics of information theory and source coding. Subsequently, we will discuss the theory of linear block codes (including cyclic codes,

~~INFORMATION THEORY, CODING AND ELECTRICAL ENGINEERING ...~~

Information theory is the basis of modern telecommunication systems. Main topics of information theory are source coding, channel coding, multi-user communication systems, and cryptology. These topics are based on Shannons work on information theory, which allows to describe information with measures like entropy and redundancy.

~~Applied Information Theory — Universität Ulm~~

The study of error-control codes is called coding theory. This area of discrete applied mathematics includes the study and discovery of

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various coding schemes that are used to increase the number of errors that can be corrected during data transmission. Coding theory emerged following the publi-

~~Introduction to Algebraic Coding Theory~~

Offered by University of Colorado System. Welcome to Cryptography and Information Theory! This course combines cryptography (the techniques for protecting information from unauthorized access) and information theory (the study of information coding and transfer). More specifically, the course studies cryptography from the information-theoretical perspectives and discuss the concepts such as ...

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This book is devoted to the theory of probabilistic information measures and their application to coding theorems for information sources and noisy channels. The eventual goal is a general development of Shannon's mathematical theory of communication, but much of the space is devoted to the tools and methods

This book provides a practical introduction to the theory and practice of coding and information theory for application in the field of electronic communications. It is written at an introductory level and assumes no prior background in coding or information theory. While the mathematical level is detailed, it is still introductory. Through a discussion that balances theory and practical applications and abandons the traditional "theorem-proof" format, this valuable book presents an overview of digital communication systems and the concept of information. It is written in a easy-to-follow conversational style that integrates practical engineering issues

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through formal and conceptual discussions of mathematical issues. It also makes extensive use of explicit examples that illustrate methods and theory throughout the book. For the professional, it provides an essential hands-on head start for real-world projects and situations. An essential reference for professional engineers in the field of electronic communications.

A concise, easy-to-read guide, introducing beginners to the engineering background of modern communication systems, from mobile phones to data storage. Assuming only basic knowledge of high-school mathematics and including many practical examples and exercises to aid understanding, this is ideal for anyone who needs a quick introduction to the subject.

This book is an introduction to information and coding theory at the graduate or advanced undergraduate level. It assumes a basic knowledge of probability and modern algebra, but is otherwise self-contained. The intent is to describe as clearly as possible the fundamental issues involved in these subjects, rather than covering all aspects in an encyclopedic fashion. The first quarter of the book is devoted to information theory, including a proof of Shannon's famous Noisy Coding Theorem. The remainder of the book is devoted to coding theory and is independent of the information theory portion of the book. After a brief discussion of general families of codes, the author discusses linear codes (including the Hamming, Golary, the Reed-Muller codes), finite fields, and cyclic codes (including the BCH, Reed-Solomon, Justesen, Goppa, and Quadratic Residue codes). An appendix reviews relevant topics from modern algebra.

This book is intended to introduce coding theory and information theory to undergraduate students of mathematics and computer science. It begins with a review of probability theory as applied to finite sample spaces and a general introduction to the nature and

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types of codes. The two subsequent chapters discuss information theory: efficiency of codes, the entropy of information sources, and Shannon's Noiseless Coding Theorem. The remaining three chapters deal with coding theory: communication channels, decoding in the presence of errors, the general theory of linear codes, and such specific codes as Hamming codes, the simplex codes, and many others.

Since the main principles of applied information theory were formulated in the 1940s, the science has been greatly developed and today its areas of application range from traditional communication engineering problems to humanities and the arts. Interdisciplinary in scope, this book is a single-source reference for all applications areas, including engineering, radar, computing technology, television, the life sciences (including biology, physiology and psychology) and arts criticism. A review of the current state of information theory is provided; the author also presents several generalized and original results, and gives a treatment of various problems. This is a reference for both specialists and non-professionals in information theory and general cybernetics.

From the reviews: "This book nicely complements the existing literature on information and coding theory by concentrating on arbitrary nonstationary and/or nonergodic sources and channels with arbitrarily large alphabets. Even with such generality the authors have managed to successfully reach a highly unconventional but very fertile exposition rendering new insights into many problems."
-- MATHEMATICAL REVIEWS

Various measures of information are discussed in first chapter. Information rate, entropy and mark off models are presented. Second and third chapter deals with source coding. Shannon's encoding algorithm, discrete communication channels, mutual information, Shannon's first theorem are also presented. Huffman

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coding and Shannon-Fano coding is also discussed. Continuous channels are discussed in fourth chapter. Channel coding theorem and channel capacity theorems are also presented. Block codes are discussed in chapter fifth, sixth and seventh. Linear block codes, Hamming codes, syndrome decoding is presented in detail. Structure and properties of cyclic codes, encoding and syndrome decoding for cyclic codes is also discussed. Additional cyclic codes such as RS codes, Golay codes, burst error correction is also discussed. Last chapter presents convolutional codes. Time domain, transform domain approach, code tree, code trellis, state diagram, Viterbi decoding is discussed in detail.

The latest edition of this classic is updated with new problem sets and material The Second Edition of this fundamental textbook maintains the book's tradition of clear, thought-provoking instruction. Readers are provided once again with an instructive mix of mathematics, physics, statistics, and information theory. All the essential topics in information theory are covered in detail, including entropy, data compression, channel capacity, rate distortion, network information theory, and hypothesis testing. The authors provide readers with a solid understanding of the underlying theory and applications. Problem sets and a telegraphic summary at the end of each chapter further assist readers. The historical notes that follow each chapter recap the main points. The Second Edition features: * Chapters reorganized to improve teaching * 200 new problems * New material on source coding, portfolio theory, and feedback capacity * Updated references Now current and enhanced, the Second Edition of Elements of Information Theory remains the ideal textbook for upper-level undergraduate and graduate courses in electrical engineering, statistics, and telecommunications.

Books on information theory and coding have proliferated over the last few years, but few succeed in covering the fundamentals without losing students in mathematical abstraction. Even fewer

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build the essential theoretical framework when presenting algorithms and implementation details of modern coding systems. Without abandoning the theoret

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