Hyvärinen, L. P.

INFORMATION THEORY FOR SYSTEMS ENGINEERS

Econometrics and Operation Research, vol. XVII, Springer, Verlag, Berlin—Heidelberg—New York 1970

This book presents the logical foundations and the basic principles in a few areas, specific to the information theory, and it thus constitutes an adequate introduction for people desiring a further specialization in the field of discrete or continuous information-processing theories.

The problems of the discrete information-processing systems are presented. Separate chapters are meant to define some distinct fields e.g.: noiseless channels, detecting codes and error correction routines.

Current elementary notions in these fields are concomitantly defined: channel, information measure, entropy, optimal codes, natural languages, redundancy, Hamming distance, linear codes.

The author analyzes continuous information-processing systems. He defines some basic notions — Gaussian noise, correlations, convolutions, exponential smoothing — with the help of which he approaches a few wider topics: continuous channel, continuous signal detection, information filters.

The book contains frequent practical examples concerning the discussed problems. These belong to the most interesting domains of the information-processing theory, and they also reach some limitrophe domains of this theory: codes optimization, natural languages and their efficiency, message compressing, information retrieval in the computing systems, methods of looking for in lists, variable lengths codes, quantized continuous signals, convolution filters, numerical Fourier transforms, character recognition.

Two short computer programs, written in the modern PL/I language, are commented upon. These programs compute the relative character frequency of a certain text, and print entropies and code efficiency.

Besides the numerous examples in the text, the book also contains an interesting collection of solved problems.

Appendix A deals with Fourier transforms and other mathematical concepts connected to them.

The book represents an interesting reading, not only for beginners, but also for people with a higher level in the field of computation systems engineering

A. Vinea