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Maximum Entropy Formalism

The Maximum Entropy Formalism

edited by
Raphael D. Levine
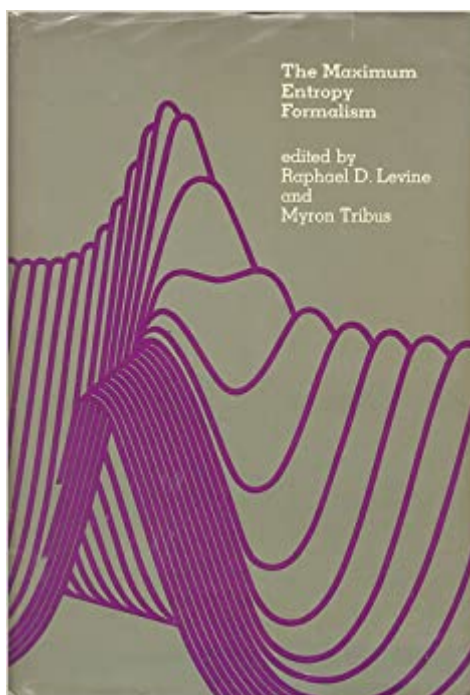and
Myron Tribus

Synopsis

This is the first book to deal specifically and entirely with the maximum entropy formalism, an extremely powerful mathematical technique for the assignment of probability distributions that was originally developed as part of statistical thermodynamics. It is an especially timely review because the formalism has in recent years reached an impressive state of maturity and found application in an increasingly diverse array of fields. Maximum Entropy Formalism brings together sixteen papers that grew out of a conference held at MIT in May 1978. The range and depth of the contributions will make the book useful to an unusually large audience. Chemists, biologists, ecologists, systems engineers and modelers, physicists, and social scientists will find here a comprehensive introduction and guide to the literature and a progress report that provides much new and provocative material on the formalism and its applications. The book is divided roughly into four partsÃ¢â¬â •overview, statistical mechanics, information theory, and biological systems. It provides both the scope needed to show the central intellectual core of the formalism and the details required by specialists for narrow applications. Three of the major figures in the development of the fieldÃ¢â¬â •Richard Cox, Walter Elsasser, and Edwin JaynesÃ¢â¬â •have contributed chapters. The short treatise by Edwin Jaynes is especially noteworthy. In some 100 pages he reviews the development of the principle, considers some of its general properties and answers some criticisms that have been raised, places it in the wider context of statistical decision theory, speculates on future applications and future theoretical developments, and presents details of what is currently the most highly promising application of the principle: the extension of the Gibbs formalism to irreversible processes. Other chapters explore such topics as the growth of information theory; the bases of logic and induction; problems in determining constraints and Lagrange parameters; applications to nonequilibrium systems; "mixing character"; search theory and its relation to information theory; entropy increase and group symmetry; and applications of the formalism to biological systems. Contributors include, in addition to the editors and the authors already noted, N. Agmon, Y. Alhassid, Gregroy J. Chaitin, Robert B. Evans, James C. Keck, Edward H. Kerner, Bernard O. Koopman, Rolf Landauer, C. Alden Mead, John G. Pierce, Baldwin Robertson, and Jerome Rothstein.

Book Information

ISBN-13: 978-0262120807

Product Dimensions: 6 x 1 x 9 inches

Shipping Weight: 2.2 pounds

Average Customer Review: 5.0 out of 5 stars   1 customer review

Best Sellers Rank: #3,917,109 in Books (See Top 100 in Books)   #99 in Books > Science & Math > Physics > Entropy   #59604 in Books > Science & Math > Mathematics   #339268 in Books > Reference

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A very useful story about the essence of the universally useful work done by Josiah Willard Gibbs ...

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