Optimal Decision under Uncertainty
J.K. SENGUPTA
Lecture Notes in Economics and Mathematical Systems No. 193, Springer-Verlag, Berlin, 1982. 156pp. D.M.28.00
ISBN 3 540 10869 6

This monograph deals with the mathematical models of decision making in problems where some of the parameters are random variables or unknown. Each chapter looks at a different aspect of the model or a particular application, but the example which recurs through the book is that of a linear programme with uncertain objective function. The object is to describe some of the recent advances in the area, and especially to comment on those which have implications for applied problems. Thus several of the chapters are based on papers published over the last five years.

Chapter 2 deals with a standard L.P. problem with probabilistic objective function, concentrating on mixed strategy solutions, and goes on to the problem of partial information about the unknown parameters. Chapter 3 describes some of the ways in which risk aversion has been introduced in different types of problems and discusses their advantages and disadvantages. The next chapter deals with allocation problems in an uncertain environment and concentrates on linear allocation rules when the payoff function is quadratic. Chapter 5 introduces ways in which uncertainty can enter input-output models of the economy and looks at three methods of allowing for the extra costs due to uncertainty. Lastly, the auther equates stochastic L.P. problems and two person games with unknown payoffs (but not using the standard Dantzig identification) and then proceeds to give conditions for the existence of equilibrium pairs in particular types of such games.

These are all interesting theoretical problems with important applications, but I cannot recommend this book. It appears to have been thrown together in a tremendous hurry. Connections between the different problems studied are hardly ever made, nor is there any attempt at an overview of the way the whole area is developing. The writing is often terse to the point of incomprehension, and there are on average two or three misprints per page - even on the first page we have "our" for "over", "rish" for "risk" and "emprical". This is not acceptable, even in a lecture note series which requires quick publication of up-to-date work, since it makes studying the book very difficult. It is probably better to wait for the author's forthcoming book on "Decision Models in Stochastic Programming", which is referred to constantly throughout the book.

LYN THOMAS

Numerical Optimization of Computer Models
HANS-PAUL SCHWEFEL
John Wiley, U.K., 1981. 389pp. £12.50
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The subject matter of the book is evolution strategies for numerical optimization. However, the initial chapters of the book are devoted to the nature of optimization problems, similarities between different types of optimization problem, like those in the area of game theory, pattern recognition, cybernetics etc., and in addition a complete chapter is devoted to various optimization strategies.

Various classes of optimization problem - experimental optimization-mathematical optimization, static optimization-dynamic optimization, parameter

optimization-functional optimization, etc. - are illustrated. The relevance of computer models is highlighted in the sense that all optimization problems are modelled and solved with the help of computers. The order of magnitude of computation for different classes of problem is discussed. The advantage of analog computers for solving functional optimization problems and the role of hybrid computers for solving certain types of optimization problems is dealt with in Chapter 2.

The commonly used optimization strategies are discussed under hill-climbing strategies in Chapter 3 and include direct, mathematical parameter optimization methods dealing with generally static, non-discrete, non-stochastic, mostly unconstrained functions. The strategies have been classified into one-dimensional and multi-dimensional and, along with the procedural aspects, the order of magnitude of the computational effort required in various strategies is discussed.

The random strategies for optimization, where the parameters are varied according to probabilistic instead of deterministic rules, are discussed in Chapter 4. The evolution strategies, the subject matter of the book, are dealt with in Chapter 5. The evolution strategy for optimization is based on the process of organic evolution. The two principles of mutation and selection in organic evolution are taken as rules for variation of the parameters and for recursion of the iteration sequence respectively. An algorithm is presented for mathematical optimization based on these two principles. The parameters are changed by using a random vector. Different probability density functions are suggested for the discrete and continuous cases. The evolution strategies are discussed with respect to step length control, convergence criteria, treatment of constraints etc.

Chapter 6 presents the comparison of different strategies for optimization. The comparison is carried out on the basis of results of solving a number of test problems, which are appended, in a PDP-10 computer. The comparison is carried out with respect to convergence to optimality and reliability, or accuracy of the approximation.

The book contains everything a researcher looks for. It has an exhaustive survey of existing strategies for optimization, details of the strategy proposed, performance of the proposed strategy etc. The test problems and the program listing for the evolution strategy are appended, together with a list of references running into 43 pages.

The book will be of help to researchers and students interested in optimization models. The codes, the test problems and the results can be used to test and compare variants of evolution strategy presented in the book as well as new optimization strategies.

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