

### Book Selection

the number of O.R. people interested in the book will be limited, even though many may be attracted by the title.

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#### **Stochastic Dynamic Programming**

J. VAN DER WAL

Mathematical Centre Tracts, Amsterdam, 1981. 251pp. D.fl.32.55

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The absence of an up-to-date text on Markov decision processes, aimed at the general reader, has possibly been an important inhibiting factor in the assimilation of the basic ideas of the subject outside the ranks of specialists. Unfortunately, in spite of the generality of its title and its addressing precisely those topics likely to be of most interest to operational researchers, the present book does not fill the gap. This is not to deny that the book has value for the reader with a good working knowledge of the area and a wish to update that knowledge to encompass recent developments, particularly those in algorithmic theory made by the "Dutch School", or even that any prior knowledge is necessary, in principle, to read the book, but the tightness of presentation and level of generality is likely to put off all but the most persistent reader with no background in the area. What most non-experts would wish to carry away from the subject is a feeling for the key ideas and results, with some idea of extensions and generalisations and, if wishing to apply the subject, the computational efficiency and capacity of the various methods presented. It is unlikely that they will achieve this after a casual reading of this text.

For the sake of specialists I will indicate the areas discussed. The main topic is the study of algorithms for countable state Markov decision processes in the total (discounted) reward case and for finite state problems in the average reward case. Successive approximation methods are generalised by using "go-ahead" functions to include Jacobi, Gauss-Seidel and similar extensions within a single framework. Another generalisation, which includes both successive approximation and policy iteration as special cases, alternates policy improvement steps with several successive approximation steps to evaluate that policy. Partly as input to the theory of these methods and partly for its intrinsic interest, several chapters consider the existence of nearly optimal or optimal policies for classes of problems. Some of these chapters involve conditions which seem hard to verify in either theoretical or practical applications, except where more standard conditions are also satisfied. Much more valuable is the renorming technique for extending results on bounded reward problems to unbounded rewards. Similarly, in the average cost case, as well as average and nearly optimal policies,  $k$ 'th order average optimality, a much less obviously useful concept, is studied. The final chapters extend some of the previous theory to Markov games.

To sum up, for the initiate the book presents an admirable, if selective, survey of results obtained in the last few years, obviously reflecting the author's research interests, but clearly argued and commendably free from mistakes. For the novice this is not an ideal introduction, but I am not aware of any alternative recommendation which is really suitable.

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