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Book reviews

The Logic of Questions and Answers, by N. D. Belnap Jr and T. B. Steel Jr, 1977; 209 pages. (*Yale University Press*, £9·00)

Immediately one tries to use computers for information processing one comes up hard against the problem that 'information' is a strange thing. It can be meaningless out of context; it can be of no intellectual value to someone who does not know how to read the language or to interpret nuances of meaning. Every object, for example, has a temperature but the question 'Has he got a temperature?' conveys a specific query and evokes a specific meaningful response in the context of medical diagnosis, though in the context of physics the certainly true answer 'of course' is valid but almost devoid of information. The designer of information systems and data bases for computerised information processing is aware of the fact that information can be uselessly, irretrievably buried away in files unless the system provides the means of asking relevant questions. This book makes a step forward in providing means to this end.

The name erotetic logic was given to the logic of questions and answers as long ago as 1955. Professor Belnap, who is a philosopher and sociologist had largely completed the major part of the book in 1968. The introduction and final chapter were mainly written by Steel who is a technical consultant in a life assurance company. Together the authors set about creating a formal language that can be used to ask and answer questions in an orderly manner. They discuss the grammar of questions, and proceed to analyse many different types and then investigate the semantics of questions and answers. The book is clearly of interest to logicians, philosophers and specialists in linguistics but it has obvious applications in computerised information processing.

About a fifth of the text is a useful *Biblography of the Theory of Questions and Answers* compiled by Egli and Schleichert.

A. YOUNG (Coleraine)

Chess Skill in Man and Machine, edited by P. W. Frey, 1977; 217 pages. (*Springer-Verlag*, US$16.00)

This book comprises eight papers on different aspects of computer chess, presented as a partial record of a graduate seminar held at Northwestern University. There is an excellent bibliography of 104 references up to 1975, and an appendix covers events as late as October 1976.

The presentation is attractive and the text is well-integrated, effectively combining theory with practical examples. Although many of the papers give a great deal of technical information, the book as a whole does not require a significant previous knowledge of either computer science or psychology.

It is probably inevitable in a book of this kind that the selection of papers appears somewhat arbitrary and that a great deal of important recent research is omitted. Nevertheless the material included is most interesting and many of the ideas deserve much greater attention than they have so far received.

As might be expected, the 'machine' part of the title accounts for the greater proportion of the content of the book. There is a historical review of the various computer chess tournaments by Ben Mittman and the standard programming techniques employed (including the alpha-beta algorithm and the use of 'bit boards') are described by Peter Frey, using existing programs as illustrations. In the longest chapter, David Slate and Larry Atkin give a detailed description of their program, Chess 4.5, which (in slightly modified form) this year won the second world computer chess championship. Many of the details given here should prove of considerable value for future programmers, particularly since the authors take pains to emphasise the limitations of their approach. These chapters together with a short article by Monroe Newborn on *Peasant*, a program to play endgames with Kings and Pawns only, are concerned with what might be called the classical Shannon-Turing approach.

Whatever its merits, this is certainly not the way in which strong chessplayers play chess, which is the main concern of the remaining papers. Russell and Kenneth Church focus on the important skills of pattern analysis and problem reduction using these as the basis for a program to play speed chess without searching any lookahead tree. As an alternative approach, Larry Harris proposes a heuristic search strategy which not only possesses certain important theoretical properties but would seem to correspond fairly closely to the master's 'progressive deepening' of analysis described by De Groot and generally allow a more effective use of available chess heuristics.

The two remaining chapters look closely at human chess skill; Neil Charness summarising the leading psychological literature and Eliot Hearst giving a critical assessment of the present status of computer chess from a psychologist's viewpoint.

To summarise, this is a most interesting and challenging—albeit selective—collection of articles.

In my opinion, it will give the reader a better insight into not only the 'state of the art' but also the unresolved conflicts within the field and the academic significance of research of this kind than any other available text.

I can strongly recommend it to both the interested newcomer and the active researcher.

M. A. BRAMER (Milton Keynes)

Machine Recognition of Patterns, edited by A. K. Agrawala, 1977; 463 pages. (*John Wiley*, £22·45, paper £10·00)

Where pattern recognition is concerned, the major problem encountered by both researcher and student is that of finding adequate introductory literature to the subject. Pattern recognition covers a broad spectrum of disciplines, from complex mathematical approaches to highly pragmatic empirical techniques, and this book provides the reader with a selection of papers representative of the current mainstream areas of pattern recognition research.

Machine Recognition of Patterns is a collection of 44 reprinted key papers taken from a number of different disciplines. We are presented with a series of papers taken from such subjects as: feature extraction and selection, mean accuracy of statistical pattern recognition, pattern classification, etc. The book aims to be a companion volume to many of the currently available textbooks in pattern recognition, but the papers are so well chosen that it, itself, could well provide an excellent introductory text to the subject. While most of the papers are easily available to anybody who has access to the last 20 years' *IEEE Trans*, a minority of the papers have been out of print for some time and would be difficult to obtain (for example, Fisher's classic paper on the linear discriminant function, published in the 1936 edition of the *Annals of Eugenics*).

Often original papers become so distorted after several requotes and reinterpretations that the original ideas become lost. I was struck, for example, when reading the paper of Fukanaga and Koontz, 'A criterion and an algorithm for grouping data' by the simplicity and clarity of their approach, two qualities that have been conspicuously absent in several reinterpretations of their work. I recommend the book to both student and researcher who needs a good and comprehensive set of key papers.

J. L. ARMSTRONG (Edinburgh)