

Book Reviews

The Handbook of Artificial Intelligence, Vol. 1

Avron Barr and Edward A. Feigenbaum (Eds.)

William Kaufman, Inc.,
Los Altos, Calif., 1981,
409 pp. ISBN 0-86576-005-5

Engineers, mathematicians, physicists and chemists have had them for years. Finally, artificial intelligence researchers have available a handbook that is broad in scope and appropriate in depth and that answers questions about the nature of the field and its techniques. Volume 1 of the planned three-volume work covers search, knowledge representation, understanding natural language and understanding spoken language.

The book is composed of over fifty short articles, written by researchers in the particular areas. Each section begins with an overview that motivates the need for investigating the topic, introduces common terminology, problems, and techniques, and provides an historical perspective. Each article is short, to the point and uncluttered by unnecessary jargon. The hierarchical organization allows the reader to easily select the appropriate level of presentation.

The chapter on search begins with problem representation in the form of state-space representation, problem-reduction representation and game trees. There follow descriptions of the standard search techniques: blind search, AND/OR graphs, heuristics, minimax and alpha-beta pruning. The final section reviews a representative selection of search programs, from the Logic Theorist through ABSTRIPS.

The knowledge representation chapter reviews the history of and problems inherent in machine translation. The next two sections on grammars and parsing give excellent introductions to formal grammars, transformational grammars, systemic grammars, case grammars and their parsing techniques. The section on

Augmented Transition Networks is especially clear and succinct. The following section on text generation is sparse, which accurately reflects the state of the field. The final section first surveys early natural language processing systems before giving more detailed descriptions of Wilks' system, LUNAR, SHRDLU, MARGIE, SAM and PAM, and LIFER.

The final chapter on understanding spoken language itemizes and defines the types of knowledge required at different processing levels, and then surveys the HEARSAY, HARPY, HWIM and SRI/SDC speech understanding systems.

This book has many potential users. The general reader will get a clear idea of what that mysterious handle "artificial intelligence" means, understand the nature of the problems faced by researchers in AI and be presented with technical details and descriptions of existing programs. The student of AI will have a clear, comprehensive text and reference work, which can serve as an introduction to deeper reading and further study. The AI researcher is provided with a reference work, which will be of immense help in preparing lectures, recalling specific techniques and refreshing one's memory about subareas of the field (or perhaps learning them for the first time).

Volume 2 will include chapters on programming languages for AI research, applications-oriented AI research (science, mathematics, medicine and education) and automatic programming. The third and final volume will have sections on models of cognition, automatic deduction, vision, robotics, learning and planning, and problem solving.

For both browsing and study, the *Handbook of Artificial Intelligence* is a joy and a pleasure.

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