of the crucial terms involved in his analysis, such as "probability" and "likelihood," without which it is difficult to appraise the suitability or the utility of his probability-based heuristic models. In this respect, what Pearl seems to have accomplished sometimes looks like a formalism in search of an interpretation without which the truth or the falsity of his claims is often impossible to assess. If the conceptions upon which his view is based do indeed conform to one or another of the traditional Bayesian models, moreover, then the very idea of a probability-based heuristic confronts a number of difficult problems of its own with respect to the distribution of probabilities to sets of alternative hypotheses, paths, or solutions, relative to the proposed refinements of those alternative hypotheses, paths, or solutions.[6] These considerations suggest that traditional conceptions should not be taken for granted, especially if we assume that this is what Pearl intends by his observation that "Probability theory is today our primary (if not the only) language for formalizing concepts such as "average" and "likely," and therefore it is the most natural language for describing those aspects of (heuristic) performance that we seek to improve" (p. 139).

On general theoretical grounds, I think, there are excellent reasons to suppose that (a)-(f) are fundamental problems in AI science and that an extensional probabilistic analysis of this sort simply cannot lead to their effective solutions. In order to understand the traditional approach, however, this book is recommended with the reservations implied above, namely, that the author has omitted basic definitions that might not be familiar to some readers, and that serious difficulties seem to confront the theoretical framework he apparently endorses, where these difficulties are especially severe from an epistemological perspective. The thorough justification of Pearl's approach as an epistemological framework for AI science with respect to the processing of heuristic information, moreover, is not provided by his analysis. Readers who are interested in these underlying (and quite pressing) theoretical concerns are advised to look elsewhere, therefore, since not only was it not Pearl's intention to address them here, but it also appears as though his approach could not succeed if that were his goal.

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[6]Fetzer (1981), p. 276

Artificial Intelligence and Robotics: Five Overviews. William D. Gevarter. Business/Technology Books, 1984. 564 pp.

Gevarter originally wrote the text for *Artificial Intelligence and Robotics; Five Overviews,* while he was a Research Associate at the National Bureau of Standards, sponsored by the National Aeronautics and Space Administration. Gevarter's work was published by the National Bureau of Standards as a set of five volumes, and this book, published by Business/Technology Books, is Gevarter's original work with some minor changes and corrections. Because Gevarter's original work was very popular, Business/Technology Books (B/T Books) has performed a useful service by binding the individual volumes into one book.

In this work, Gevarter has surveyed the field of AI and has compiled a vast amount of information relating to what is being done in AI, where AI is being done, and who is doing it. The technical depth of the book is between that of a market survey report and an introductory text on the subject. The breadth of topics covered in *Artificial Intelligence and Robotics: Five Overviews* is described by the titles of the individual volumes which are bound together:

Robotics: An Overview (volume 1)
Expert Systems: An Overview (volume 2)
Computer Vision: An Overview (volume 3)
Computer Based Natural Language Processing: An Overview (volume 4)
Artificial Intelligence: An Overview (volume 5A-The Core Ingredients)
Artificial Intelligence: An Overview (volume 5B-Fundamental Applications Areas)
Artificial Intelligence: An Overview (volume 5C-Basic

Topics).

The last three volumes of Gevarter's book (volume 5A, 5B, and 5C) contain a compendium of volumes 2, 3, and 4 (volume 1, on robotics, was not included in the compendium) plus some new material on the basics of AI. The new material includes a glossary of AI, a list of sources for AI information, and introductory AI topics, for example, search methods, knowledge representation, and computational logic.

Artificial Intelligence and Robotics: Five Overviews contains only descriptive material. The book does not contain examples or techniques for the solution of AI problems. Instead it contains the description of the techniques used by AI practitioners and researchers to solve AI problems. The important point is that this book will not help a reader who wants the "how" of AI. As an overview, it describes the "what," "where," and "who." *Artificial Intelligence and Robotics: Five Overviews* is in a form that is sometimes referred to as executive summary, and a book of this type can be useful for students, reference librarians, practicing AI researchers and engineers, and teachers. For example, in the past I have used Gevarter's NBS documents on which this book is based, for planning college courses in AI.

Rather than review the details of all the volumes, only one volume will be examined in detail. Volume 2, on Expert Systems, is the one chosen for the detail;ed discussion. The approach is to examine the number of pages (double spaced type was used) that are devoted to each of the sections within the volume on Expert systems. The volume on Expert Systems is 64 pages long with the last two pages used for references, which leaves 62 pages for the topic itself. Of the 62 pages covering expert systems, there are 34 pages devoted either to lists, tables or charts, and five blank pages. This leaves only 23 pages of double spaced prose to explain the topic of expert systems. The page count is distributed in the following manner. In the first 15 pages (page 16 is blank and not numbered, as are pages 38, 48, 56, and 58), the purpose and architecture of expert systems is introduced. From page 17 to page 37 there are tables that give the characteristics of widely used expert systems. These tables, one table per expert system, are packed with information on each expert system being explained. Following the tables, there are several pages of descriptive material which categorize expert systems by function. The remaining pages, from 47 to 62, list the places where expert systems are being worked on, where the funding is coming from, and list predictions for future expert systems. The other four volumes, Volumes 1, 3, 4, 5 (A through C), are constructed similarly to the volume on Expert Systems.

It is difficult to locate specific information in Gevarter's book, since it does not have a general index or general table of contents. Each of the five volumes contains its own table of contents, a list of tables, and a list of figures. Since each volume is separately paged, these tables of contents, lists of tables, and lists of figures, only apply to the volume in which they are located. This arrangement is inefficient as well as difficult. Readers without a knowledge of AI will have a difficult time locating specific information.

In 1984 two books by Gevarter were copyrighted, the one being reviewed and one entitled *Artificial Intelligence, Expert Systems, Computer Vision, and Natural Language Processing,* published by Noyes Publications. Both books were based on the same previously mentioned NBS reports. The Noyes book doesn't contain the volume on Robotics, but otherwise most of the tables, figures, and prose are the same in both books. I could not find a reference in either book to the other one, although both books were copyrighted in the same year.

I would recommend *Artificial Intelligence and Robotics: Five Overviews,* if you can afford the price, and you want or need an overview of AI. I personally obtained Gevarter's original work from the National Bureau of Standards, and have found it useful on a number of occasions. Because much of the material in Gevarter's book is related to data such as AI funding, robotic production, or investigators working in AI for the years in which the material was written, the book is dated. From a historical perspective, this may be an asset. One of the most important future uses *Artificial Intelligence and Robotics: Five Overviews* may be that of providing a historical description of the primitive condition of AI at the beginning of the 1980s.

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Books Received

The following books (see Books Received, next page) were received at the AAAI office since the publication of the last issue of the magazine. We encourage readers to volunteer as book reviewers. If you wish to write a review of any of these books, please contact our Book Review Editor:

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