power of the meta-level in handling the *object knowledge* – a discussion of this would have made for a good book.

MDX is discussed in detail in Chapter 4, and is projected onto the "distributed architecture". A much clearer statement of the architecture and its components is needed by this point, together with a discussion of how it differs in substance from other expert system architectures.

Chapter 5 looks at the PATREC component of MDX, and finds it lacking in many respects, in particular that its knowledge is encoded as LISP functions ("an arcane representation of knowledge"). To a certain extent the discussion here of data abstraction is a distraction. As long as the meta-level can manipulate the knowledge as required, it is unimportant how it is represented.

Chapters 6 to 8 cover the authors' own research in the area of competent expert systems. The principal reason for adopting the "distributed architecture" was to enable *competent* expert systems to be built, and so *competence* should have played a much greater part in these chapters. Chapter 6 is a detailed case study of FIBERS, which is a shell for the management of "findings base" (one of the components of the "distributed architecture"). The following chapter illustrates how to integrate a FIBERS findings base with a task-structured hypothesis engine (Appendix B gives an example of the system in action). The transition from Chapter 7 to Chapter 8 is a little disorientating, as we are suddenly thrown into the world of knowledge engineering environments with a "sales-pitch" for KEE.

The final chapter concludes that "To corroborate the arguments presented here, one (or more) full distributed expert system needs to be developed in real-world domains of expertise". The book would have benefited here from giving a present-day view – has a "full distributed expert system" been built, does it satisfy the requirement of *competence*, and how does this work now fit into a broader picture of expert systems development?

The untimeliness of this book is exacerbated by the realization that there are only about 120 pages of real text, to which is added about 30 pages of code listings. At £25 that does not seem like very good value for money.

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An introduction to text processing by Peter D. Smith, The MIT Press, Cambridge, MA, 1990, pp 300.

In the blurb on the back cover, the publisher claims that this is "the first broad, complete and balanced survey of this burgeoning applications area, and the theories that underlie it". In fact, the book is not the first one in text processing, and it is neither complete nor balanced. It offers instead a practical, system-oriented treatment of text-manipulation packages, concentrated very largely in the areas normally known as word-processing, that is, text editing, document formatting, text transformations, and related applications. The author is obviously an expert in the use and evaluation of many of the existing text processing packages, with emphasis especially on text manipulation in the UNIX processing environment. In consequence, the two thirds of the book devoted to word processing facilities will be useful to the practitioner interested in the capabilities of available text handling systems. Repeatedly, the author includes specific program segments, and subsequently demonstrates their effect on particular types of input. This approach is appealing, and it represents by far the most notable feature in this volume.

Beyond this, I found the text largely disappointing. There is first the most unfortunate subdivision of the topic into areas labelled character-by-character handling, symbol-by-symbol handling, word-by-word handling, and natural language processing. These are differences without a distinction that have little intellectual merit. Most text handling applications are solved by approaches that include features from all these categories – for example, text retrieval may be based on certain character handling programs (used, for example, in text scanning systems); in addition, word fragment operations are required to remove suffixes from full words to construct

word stems; complete words may be used as entries in lexica and dictionaries; word phrases may be assigned to documents for content identification, and so on. By tearing a particular topic apart to meaningless subdivisions according to the type of symbol being manipulated, one loses perspective, and it becomes impossible to understand how a subject really fits together. This awkward subdivision forces the author to talk about text searching in the editing chapter (because it is treated as a character-by-character operation), and different features of a word-processing package such as WordPerfect are included in six different chapters (1, 3, 5, 7, 9 and 10).

In addition to the word processing coverage, the author devotes a few, very short, chapters to text processing applications such as information storage and retrieval (10 pages), authorship identification (16 pages), automatic abstracting (13 pages), and machine translation (14 pages). Unfortunately, the treatment here avoids linguistic theories, and lacks any kind of intellectual underpinnings. Each area is once again regarded as a practical application, and the discussion is restricted to a few approaches or programs that may be of interest in each area. Instead of asking, for example, what limitations may be inherent in using statistical language analysis methods, or syntactic approaches, or knowledge-based approaches, in solving the machine translation problem, the author simply lists the capabilities of some available machine translation packages. Furthermore, when details are given, the coverage is often misleading and always incomplete. For example, the author states that a reasonable term weight in automatic indexing may be computed as the frequency of occurrence of a term in a document divided by the frequency of the term in the whole collection. Unfortunately, the author's formula is useless in most practical situations because documents normally have unequal lengths. A term frequency of 3 in a document of 2 or 3 lines means something very different from a frequency of 3 in a document of 2 or 3 pages. One must ask in such circumstances whether the spotty treatment that is offered is, in fact, better than no treatment at all.

The author's no qualifications, matter-of-fact treatment may also short-change the reader, even when particular developments are factually correct. For example, in the chapter on text encryption, the author provides a description of the well-known RSA (Rivest–Shamif–Adelman) public-key crypto system. In this method a message block is encrypted by raising its numeric representation M to some power A. The encrypted message M^A is then decoded by using an additional exponent B in such a way that $M^{AB} = M$. The author covers the formal construction details, but never reveals what curious number-theoretic properties make it possible for this formula to work. Nor does he mention the uncomfortable fact that the computational security of the RSA method depends on the use of very large prime numbers that are generally difficult to manipulate. One just wishes that the author's attention had been confined to the word processing areas with which he is really familiar, because the casual reader cannot be expected to supply the missing details and put matters into context in the other areas.

One more remark: the blurb on the back cover quotes a reviewer who states "this book is both timely and well-written". If that were true, the reviewing process would have been more pleasant. I found the writing tedious and uninspiring. For example "Consider a text archive or collection of documents. It may be advantageous to hold it (them?) in compressed form to save space if access to a particular document is infrequent (therefore expansion of it is performed rarely) but the document may be required quickly (thus it needs to be on-line) . . . . In the following sections we look at the four categories of methods this leads to. Additional characteristics of a compression method are whether the mapping is adaptive (varies as the input is processed) or static . . . ."

In general, the volume is much in need of a proper copy-editing job, and of a more user-friendly typesetting system. One short dash (an n-dash) is used throughout the volume to represent short hyphens, long dashes, intermediate-length minus signs, and so on. The result is that in mathematical equations a plus sign (+) is two-and-a-half times as wide as a minus sign (−). There are also plenty of typos, misspelled author names, and other signs of an inadequate book production. The index is short and very selective indeed. Most entries tried by this reviewer were missing, including terms such as retrieval, document retrieval, information retrieval, information, document input, stream editor, text scanning, searching, text searching, etc. etc.

For reasons stated earlier, I would not recommend this book for classroom use. Students deserve a less utilitarian point of view. Professional readers interested in the features of available word processing packages, and in the main methods used for text manipulation will, however, be glad to see all this information between the covers of a single volume. The natural-language processing area is handled more reliably in many other books, and should be left aside.

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