immediately pick up from the formal section. Also, for those less familiar with using logic as a programming language, there is a short appendix covering some useful issues.

The description in the book satisfyingly follows its own espoused methodology, and sticks to declarative readings and explanations wherever possible; this, surprisingly, is not always the case with logic programming books. The text is not too formal, and is comfortable to read, with, I find, the pace being judged just about right. Also, once one becomes a bit more familiar with the topic, there is a reasonably good index, for quick access—though I would have liked the "system index" to have been organized by predicate function rather than name (to be fair, the naming convention is sufficiently sensible that these are often the same thing).

In short, I think the book succeeds pretty much completely in being what it is intended to be: an accessible but detailed, digestible but complete, guide to the facilities of an exciting new programming language. It will certainly be indispensable to the users of the Gödel system—it is *considerably* more useful than many programming reference books I have had the misfortune to use in the past. It will also be useful to teachers and students, not just for Gödel itself, but for logic programming as a whole. Here, at last, is a logic programming language which is designed from the bottom up, with the features that most programmers view as necessary for efficient and correct programming; and with it a book to do it credit.

If I have one serious misgiving, it is not with the book itself, but with its publisher. The book is published only in hardback, and is correspondingly expensive. To do the logic programming community, and indeed itself, a service, MIT Press should be producing this kind of volume in softback, so it becomes more easily accessible *en masse* to students and other users. This sort of reference book is of little use in a library—you need your own copy next to you as you write programs. Gödel needs the book, and as Gödel use increases, more books will be sold. But at these prices, there's a real hindrance to book sales and, indirectly, to Gödel uptake. This is really a shame.

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Advanced methods in neural computing by Philip Wasserman, International Thomson Publishing (Van Nostrand Reinhold), USA, 1993, ISBN 0-442-00461-3.

The upsurge of interest in neural networks literature over the last decade is a reliable sign of the increasing popularity of a field that promises to yield answers to questions resisting satisfactory solutions when attacked by cybernetics, finite-machines theory and artificial intelligence, to name just a few of the attempts to build "smart" machines.

The crucial feature that makes this discipline attract the attention of undergraduate students as well as of established scientists is probably the seemingly inexhaustible reservoir of novel ideas and techniques that it offers. Indeed, the number of journals and conferences dedicated to this paradigm grows so fast that it is sometimes difficult to keep pace with the forefront of the current research.

The simplest way to find one's way through the labyrinth of new articles and products is to pick a moderately sized textbook that attempts to establish some order in the material and to emphasize the essential approaches that a beginner should master before probing further.

But here the problem begins. Those who have lectured this subject know how difficult it is to select a proper monograph. Some are too introductory and tend to be superficial, others are so exhaustive that the unhappy undergraduate soon gets lost in the maths addressed to more experienced readers. And, due to the rapid development of the discipline, any such textbook must face the gloomy prospect of becoming outdated before long. However, lecturers value good sources so much that they usually do not feel like forsaking them just because of slight information ageing. Rather, they want to recommend supplementary reading. But this, again, is far from being easy because journal papers are written for scientists, and students can find them discouragingly difficult to read.

Wasserman's book is aimed at those who have already acquired some initial knowledge about artificial neural networks and want to learn what is new in the domain without having to delve into oceans of theories. Vividly written and accompanied by copious illustrations, the text leads you through cutting-edge science without becoming excessively theoretical or superficial, and, importantly, without boring you. Moreover, you do not need any special background knowledge to understand the explanations. If you search for an easy overview, grab the book.

The volume is conceived as a loose collection of chapters presenting novel ideas in neural networks and their close neighbourhood. Apart from field theory methods, probabilistic neural networks, radial basis functions and sparse distributed memory, separate chapters are devoted to genetic algorithms and fuzzy logic as well as to questions pertaining to the application of neural networks in control. The author does not hesitate to venture into even such controversial issues as, for example, the relation of neural networks to chaos theory. Due space is devoted to second-derivative variations of the backpropagation algorithm and, incredibly, all these topics are squeezed into hardly more than 250 pages—an ideal size for quick information.

Obviously, there is a price to be paid for such diversity. Any book of this kind has to face the danger of becoming inconsistent and, in a way, this is a weak spot of Wasserman's book as well. Some chapters address topics that are easy to visualize with pictures, diagrams and graphs while others necessitate more abstract treatment. For instance, the introductions to sparse distributed memory and to fuzzy logic are spirited and elegant and the same goes for the explanation of the essence of chaos. But then, all of a sudden, the lulled reader is abruptly thrown into a complicated neural network based model of the olfactory system—definitely not material that can be understood at first sight. Similarly, the cobweb of mathematical formulae relating to advanced approaches to the backpropagation algorithm sharply contrasts with the "softer" presentation of other chapters.

However, these objections should not be considered as principal and are certainly outweighed by more positive aspects. As for the selection of topics, this will always depend upon each author's experience and personal preferences. But even though the reviewer might be tempted to complain that some of his favoured themes are missing while others are improperly overemphasized, Wasserman's choice certainly covers the mainstream of today's research in artificial neural networks.

To summarize, the book provides a good source of knowledge for interested students and, as artificial neural networks emerge from research labs into real world applications, to any scientifically trained practitioner that seeks an overview of some new perspectives of this technology.

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Model theory by Wilfred Hodges, Encyclopedia of Mathematics and its Applications, Vol. 42, Cambridge University Press, 1994, pp 772, £65.00, ISBN 0-521-30442-3.

Mathematics works at various levels of abstraction. Geometry, as learnt at an early stage at school, is an example of a formal mathematical theory which is an abstraction from observations made about the real world. It became clear to mathematicians in the nineteenth century that a theory may have more than one "model" when Bolyai and Lobachevski, and Reimann, constructed alternative non-euclidean geometries. These provided two different, yet self-consistent, models of a theory defined by all of Euclid's axioms bar the parallel postulate (that there exists one and only one line parallel to a given line, which passes through a point not on that line).