The handbook of brain theory and neural networks edited by Michael A. Arbib, Second edition, The MIT Press, 5 Cambridge Center, Cambridge, MA 02142, 2002, pp. 1290, $ 195.

The book is organised into three parts; Part I on the Background covering the elements of brain theory and neural networks, Part II dealing with Road Maps containing a guided tour of various topics to steer through a specific topic in Part III which covers 285 articles from a spectrum of disciplines such as biomedical engineering, cognitive science, computer science, electrical engineering, linguistics, mathematics, physics, neurology, neuroscience, and psychology.

The present second edition, like the first, is driven by fundamental questions about functioning of the brain and approaches to build intelligent machines. However, in the present edition, Part III has been thoroughly rewritten to reflect the latest research results.

Part I covers fundamental concepts so that the reader with no prior exposure to computational neuroscience or theoretical approaches to neural networks feels quite at ease to navigate through the book. The reader gets an excellent coverage of the basic properties of neurons and several neural models. Next, the concepts of brain theory, artificial intelligence, and cognitive psychology are very systematically linked and explained. A synthesizing overview of the underlying concepts essential to view neural networks as dynamic, adaptive systems is presented. The significance of learning methods and architectures of neural networks for a better understanding of the brain and intelligence machines is brought out. In Part I, the editor has provided a masterly treatment of the elementary concepts of modelling of brain and artificial and biological neural networks. The editor then presents Part II of the book to navigate the readers through their domain of interest.

Part II is a systematic grouping of the subject in the form of 22 road maps which are grouped under eight different headings such as grounding models of neurons and networks; brain, behavior, and cognition; psychology, linguistics, and artificial intelligence; biological neurons and networks; dynamics and learning in artificial networks; sensory systems; motor systems; and applications, implementations, and analysis. Every article in Part III occurs in at least one road map, and some articles appear in two or three road maps. The road map provides suggestions for interesting traversals of articles, with an implicit understanding that an article does not provide the necessary background for the articles it precedes.

The 285 articles in Part III are arranged in alphabetical order. Since most of these articles assume familiarity with neural networks, a reader new to neural networks should master the material in Part I. The articles are organised in such a manner that the introduction provides a nontechnical overview; the intervening sections are technical; and the final section discusses open questions, key issues, and possible linkages with other areas of brain theory. A set of useful references can be found for each article. More than 90% of the book is devoted to Part III.

It is not possible to review all the 285 articles here but these have been contributed by some of the best researchers in the broad area of computational neuroscience, drawn from several countries.

To sum up, this is an excellent book that must find a place in all libraries of institutions and researchers interested in the area of computational neuroscience. The book is very useful both for a novice and an experienced researcher.

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