

## Book Reviews

### An Introduction to Neural Networks

James A. Anderson

Cambridge, MA: The MIT Press, 1995

Hardbound, 650 pages, \$55.00. ISBN 0-262-01144-1

Reviewed by Joel Davis

The past two decades have seen explosive growth in knowledge about animal nervous systems. At the same time, interest in computers and computing systems has evolved beyond a sequential, von Neuman approach, especially for dealing with ill-posed and "fuzzy" real-world computational problems. Finally, a new generation of cognitive scientists is more amenable to incorporating biological data into their work. Neural networks and neurocomputing represent a confluence of these three disciplines and has enjoyed tremendous recent growth, as readers of this journal are, no doubt, aware.

Anderson's introduction to this area far surpasses the three or four available competitors. Introduction to Neural Networks evolved over several years from course notes, and the integration to topics, perspectives, examples, and applications all suggest a carefully considered approach. Many introductory books in neural nets are designed for engineering students and, therefore, concentrate almost exclusively on a mathematical analysis of available networks and algorithms. Anderson skillfully interweaves a biologically relevant message about real-world processes and how a computational approach can enhance an understanding of the underlying neuroscience. The book concentrates primarily on those approaches that have proven "useful"—primarily for pattern recognition. Anderson limits his mathematical emphasis not so much on the formal analysis of networks as on the use of algorithms. However, a student without some calculus, algebra, familiarity with vectors, and some programming experience may find parts of this text daunting. Some neuroscience and cognitive science experience would also provide a useful background for any prospective student, although the chapters on neuron and synaptic physiology as they pertain to networks are quite clear.

Anderson begins the history of network modeling with Rosenblatt's Perceptron and early gradient descent algorithms such as Widrow and Hoff's ADALINE. Hopfield networks and Boltzmann machines are extremely well covered. Kohonen's adaptive map-forming algorithm is nicely contrasted with a section entitled "Biological Caveat," which contrasts the biological complexity with the "simplicity" suggested by simple adaptive algorithms. Nonlinear Autoassociative neural networks are repre-

sented by the brain-state-in-a-box (BSB) model, a system the author is closely associated with. In an approach similar to the other network examples, Anderson describes the theory behind the model and informally explains some of its mathematical properties. He ends with some "real-world" examples.

Extremely well written (humorous at times!) and well organized, anyone willing to read and understand this Introduction will have acquired a strong background in the neural network area that should permit a profitable reading of proliferating journals in this field. Furthermore, students or active researchers who may have heard the commotion and hype generated by the numerous neural network mavens can now judge for themselves whether this approach can provide a "value-added" addition if applied to their own particular area of expertise.

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### The Engine of Reason, the Seat of the Soul: A Philosophical Journey into the Brain

Paul M. Churchland

Cambridge, MA: The MIT Press, 1995

Hardbound, 329 pages, \$29.95. ISBN 0-262-03224-4

Reviewed by David P. Freidman

By the time you finish *Engine of Reason, Seat of the Soul*, its author, the philosopher of science Paul Churchland, hopes that you will "reconceive at least some of your own mental life in explicitly neurocomputational terms." That's just what I've been doing ever since I finished the book. I assume most of you are like me, and I don't spend that much time reconceiving my life in any terms. That I am doing it now in "explicitly neurocomputational" terms is all the more remarkable because if I have been doing any reconceiving at all, it