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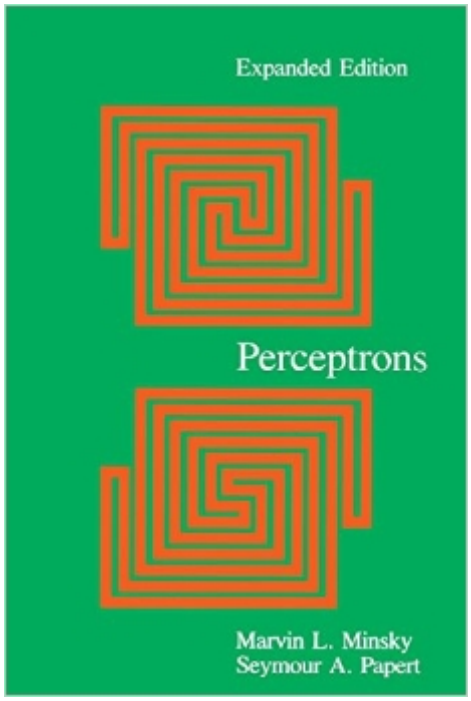
Perceptrons: An Introduction To Computational Geometry, Expanded Edition



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Synopsis

Perceptrons -- the first systematic study of parallelism in computation -- has remained a classical work on threshold automata networks for nearly two decades. It marked a historical turn in artificial intelligence, and it is required reading for anyone who wants to understand the connectionist counterrevolution that is going on today.Artificial-intelligence research, which for a time concentrated on the programming of Von Neumann computers, is swinging back to the idea that intelligence might emerge from the activity of networks of neuronlike entities. Minsky and Papert's book was the first example of a mathematical analysis carried far enough to show the exact limitations of a class of computing machines that could seriously be considered as models of the brain. Now the new developments in mathematical tools, the recent interest of physicists in the theory of disordered matter, the new insights into and psychological models of how the brain works, and the evolution of fast computers that can simulate networks of automata have given Perceptrons new importance.Witnessing the swing of the intellectual pendulum, Minsky and Papert have added a new chapter in which they discuss the current state of parallel computers, review developments since the appearance of the 1972 edition, and identify new research directions related to connectionism. They note a central theoretical challenge facing connectionism: the challenge to reach a deeper understanding of how "objects" or "agents" with individuality can emerge in a network. Progress in this area would link connectionism with what the authors have called "society theories of mind."

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Customer Reviews

This is a seminal work in the field of Artificial Intelligence. Following an initial period of enthusiasm, the field encountered a period of frustration and disrepute. Minksy and Papert's 1969 book summed up this general feeling of frustration among researchers by demonstrating the representational limitations of Perceptrons (used in neural networks). Their arguments were very influential in the field and accepted by most without further analysis.I found this book to be generally easy to read. Despite being written in 1969, it is still very timely.

In 1958, Cornell psychologist Frank Rosenblatt proposed the 'perceptron', one of the first neural networks to become widely known. A retina sensory layer projected to an association layer made up of threshold logic units which in turn connected to the third layer, the response layer. If two groups of patterns are linearly separable then the perceptron network works well in learning to classify them in separate classes. In this reference, Minsky and Papert show that assuming a diameter-limited sensory retina, a perceptron network could not always compute connectedness, ie, determining if a line figure is one connected line or two separate lines. Extrapolating the conclusions of this reference to other sorts of neural networks was a big setback to the field at the time of this reference. However, it was subsequently shown that having an additional 'hidden' layer in the neural network overcame many of the limitations. This reference figures so prominently in the field of neural networks, and is often referred to in modern works. But of even greater significance, the history of the perceptron demonstrates the complexity of analyzing neural networks. Before this reference, artificial neural networks were considered terrific, after this reference limited, and then in the 1980s terrific again. But at the time of this writing, it is realized that despite physiological plausibility, artificial neural networks do not scale well to large or complex problems that brains can easily handle, and artificial neural networks as we know them may actually be not so terrific.

Big book about those special computer science' topics, great if your looking for research material. I used it as a referral for my thesis,

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