

Book Review: *Statistical Mechanics of Neural Networks*

Statistical Mechanics of Neural Networks. L. Garrido, ed., Lecture Notes in Physics 368, Springer-Verlag, Berlin, 1990.

This proceedings of the 1990 Sitges conference is a collection of contributions from mostly European physicists working in the field of neural networks. Not surprisingly, more than half of the papers use the replica-spin-glass type of calculation. The papers on associative memory deal with various extensions and/or modifications of the Hopfield model, such as analog neurons, multistate and Potts-glass neurons, modified Hebbian learning, the influence of training and retrieval noise, a learning algorithm for binary synapses, the capacity of diluted networks or with sign-constrained weights, and time-delayed dynamics. Two papers review interesting recent results on learning and generalization in single-layer feedforward networks. Other neural architectures are discussed, but they are clearly not the main theme. One paper deals with the Kohonen model, another presents the basic ideas for a synergetic neurocomputer, and a third deals with adaptive recurrent networks.

Most of the remaining papers are "isolated" contributions dealing with applications, hardware or software implementation, or with the modeling of real neural networks. I mention neuronal oscillators, a discussion of the role of the hippocampus in memory, the hardware implementation of competitive neural networks, a neural model for locomotion of nematodes, semilocal signal processing in the visual system, an autoaugmenting network for diagnostic reasoning, and a model for acquired dyslexia.

The papers are typically written in the form of condensed research papers, rendering them not very easy to read by a nonexpert. Also, even though the spin-glass approach is a central theme, one cannot claim that the book reflects the state of the art in this topic as of June 1990. Nevertheless it is, as far as I know, the only proceedings (on a par with

Vol. 22 of the *Journal of Physics A*, dedicated to E. Gardner, and the proceedings of the STATPHYS 17 workshop on neural networks and spin glasses) that collects so many neural network papers written by physicists. One will have to decide if this is sufficient value for the \$57 hard cover version.

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