Gentz, Barbara

On the central limit theorem for the overlap in the Hopfield model. (English) Zbl 0896.60012

Bovier, Anton (ed.) et al., Mathematical aspects of spin glasses and neural networks. Boston, MA: Birkhäuser. Prog. Probab. 41, 115-149 (1998).

Summary: We consider the Hopfield model with N neurons and an increasing number $M = M(N)$ of randomly chosen patterns. Under the condition $M^2/N \to 0$, we prove for every fixed choice of overlap parameters a central limit theorem as $N \to \infty$, which holds for almost all realizations of the random patterns. In the special case where the temperature is above the critical one and there is no external magnetic field, the condition $M^{3/2} \log M \leq N$ suffices. As in the case of a finite number of patterns, the central limit theorem requires a centering which depends on the random patterns. In addition, we describe the almost sure asymptotic behavior of the partition function under the condition $M^3/N \to 0$.

For the entire collection see [Zbl 0881.00017].

MSC:

60F05 Central limit and other weak theorems
82B44 Disordered systems (random Ising models, random Schrödinger operators, etc.) in equilibrium statistical mechanics

Keywords:

Hopfield model; central limit theorem; almost sure asymptotic behavior of the partition function