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## Neural Networks

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Original contribution

# Statistical neurodynamics of associative memory

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## Abstract

A new statistical neurodynamical method is proposed for analyzing the non-equilibrium dynamical behaviors of an autocorrelation associative memory model. The theory explains strange dynamical behaviors in recalling processes which are observed by computer simulations: Starting with an initial state close to a memorized pattern, the state monotonically approaches the memorized one. Starting with an initial state which is not so close to a memorized one, the state once approaches it but then goes away from it. The theory not only gives the relative and absolute capacity of the memory network without using the spin glass analogy, but it explains the non-equilibrium or transient dynamical behaviors of the recalling process by taking the long-term correlation effects into account. It thus explains the strange behaviors due to strange shapes of the basins of attractors.

## Keywords

Associative memory; Memory capacity; Recalling process; Basin of attractor; Statistical neurodynamics; Macroscopic state; Equilibrium

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