

A Review of Attractor Neural Networks and Their Use in Cognitive Science

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Abstract : This literature review explores the role of attractor neural networks (ANNs) in modeling psychological processes in artificial and biological systems. By synthesizing research from dynamical systems theory, psychology, and computational neuroscience, the review provides an overview of the current understanding of ANN function in memory formation, reinforcement, retrieval, and forgetting. Key mathematical foundations, including dynamical systems theory and energy functions, are discussed to explain the behavior and stability of these networks. The review also examines empirical applications of ANNs in cognitive processes such as semantic memory and episodic recall, as well as highlighting the hippocampus's role in pattern separation and completion. The review addresses challenges like catastrophic forgetting and noise effects on memory retrieval. By identifying gaps between theoretical models and empirical findings, it highlights the interdisciplinary nature of ANN research and suggests future exploration areas.

Keywords : attractor neural networks, connectionism, computational modeling, cognitive neuroscience

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