

Evaluation of Coherent Ising Machine as an Associative Memory

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The Hopfield network (HN) is a neural network with symmetric interactions between neurons and can be regarded as a thermal-equilibrium system [1]. It is well known that the HN functions as an associative memory (AM). In contrast, a coherent Ising machine (CIM) [2–4], or more generally a gain-based computer [5], is a nonequilibrium system that exhibits dynamics partly analogous to those of the HN. Aonishi et al. theoretically studied the CIM as an AM and showed that its memory capacity can reach that of the HN (~ 0.138) [6].

Here we report recent experiments evaluating the performance of a real CIM as an associative memory. Our preliminary results suggest that, while the HN tends to retrieve a relatively restricted set of states, the CIM recalls a broader distribution of states, including mixture states formed from multiple stored patterns.

References

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