Contribution ID : **60** Type : **not specified**

Daydreaming Hopfield Networks and their surprising effectiveness on correlated data

To improve the storage capacity of the Hopfield model, we develop a version of the dreaming algorithm that perpetually reinforces the patterns to be stored (as in the Hebb rule), and erases the spurious memories (as in dreaming algorithms). For this reason, we called it Daydreaming. Daydreaming is not destructive and it converges asymptotically to stationary retrieval maps. When trained on random uncorrelated examples, the model shows optimal performance in terms of the size of the basins of attraction of stored examples and the quality of reconstruction. We also train the Daydreaming algorithm on correlated data obtained via the random-features model and argue that it spontaneously exploits the correlations, thus increasing even further the storage capacity and the size of the basins of attraction. Moreover, the Daydreaming algorithm is also able to stabilize the features hidden in the data. Finally, we test Daydreaming on the MNIST dataset and show that it still works surprisingly well, producing attractors that are close to unseen examples and class prototypes.

Role

Professor/PI

Primary author(s) : Prof. RICCI TERSENGHI, Federico (Dip. di Fisica, Sapienza Università di Roma)

Presenter(s) : Prof. RICCI TERSENGHI, Federico (Dip. di Fisica, Sapienza Università di Roma)