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Capacity of the binary perceptron: Recent insights on an old open problem

Consider vertices of a high-dimensional hypercube. How many random cuts of the space in half are needed in order to remove all the vertices with probability one? This problem called "storage capacity of binary perceptron" in closely related to learning in simple neural networks. An explicit formula providing the answer was conjectured by Gardner & Derrida and Krauth & Mezard in 1989. Yet up to date the problem remains open. This talk will review what makes this problem so hard, and we will give recent results on variants of this problem, where rigorous answers were obtained.