

On probability of finding local minima in the generalized Hopfield mode

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Abstract. In this paper, we obtain expressions relating the depth of a local minimum of energy to the width of the domain of attraction. Using these expressions, we were able to represent the probability of finding a local minimum under a random initialization of the neural network as a function of the depth of this minimum. In practical applications, these expressions will make it possible to estimate the probability of determining a deeper minimum from a series of already found minima and make a decision on whether the run of a search program must be terminated or continued. The expressions are obtained by analyzing the generalized Hopfield model, namely, a neural network with Hebb correlation matrix. For matrices of this type, the analytical theory excellently agrees with the computer experiment.