Capacity threshold for the Ising perceptron

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Abstract: We show that the capacity of the Ising perceptron is with high probability upper bounded by the constant $\alpha \approx 0.833$ conjectured by Krauth and Mézard, under the condition that an explicit two-variable function $S(\lambda_1, \lambda_2)$ is maximized at $(1,0)$. The earlier work of Ding and Sun proves the matching lower bound subject to a similar numerical condition, and together these results give a conditional proof of the conjecture of Krauth and Mézard.