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Submission Summary

Paper ID:	472
Title:	Towards Provable Learning of Polynomial Neural Networks Using Low-Rank Matrix Estimation

Abstract:

We study the problem of (provably) learning the weights of a two-layer neural network with quadratic activations. In particular, we focus on the under-parametrized regime where the number of neurons in the hidden layer is (much) smaller than the dimension of the input. Our approach uses a lifting trick, which enables us to borrow algorithmic ideas from low-rank matrix estimation. In this context, we propose two novel, non-convex training algorithms which do not need any extra tuning parameters other than the number of hidden neurons. We support our algorithms with rigorous theoretical analysis, and show that the proposed algorithms enjoy linear convergence, fast running time per iteration, and near-optimal sample complexity. Finally, we complement our theoretical results with several numerical experiments.

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