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Deep Learning Program Opening Workshop
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SPEAKER TITLES/ABSTRACTS

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"Complexity Bounds for Deep Learning Networks via the Probabilistic Method"

It has been experimentally observed in recent years that multi-layer neural networks have a surprising ability to generalize, even when trained with far more parameters than observations. Is there a theoretical basis for this? As a partial answer, we show that the mean squared generalization error for multi-layer Lipschitz networks is of order $[(L^3 V^2 \log(d)) / n]^{1/2}$, where L is the number of layers, V is a complexity constant that coincides with the 1-norm of the path weights, d is the number of inputs per layer, and n is the sample size. The key idea is a probabilistic reformulation of any multi-layer Lipschitz network which, in turn, motivates a proof strategy based purely on the probabilistic method instead of the usual route via Rademacher analysis.

This is joint work with Andrew R. Barron from Yale University.