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(I) Quantum Barren Plateaus and Generative Pre-Training

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In recent years the prospects of quantum machine learning and quantum deep neural network have gained notoriety in the scientific community. By combining ideas from quantum computing with machine learning methodology, quantum neural networks (QNNs) promise new ways to interpret classical and quantum data sets. However, many of the proposed quantum neural network architectures exhibit a concentration of measure leading to barren plateau phenomena. In this talk, I will show that, with high probability, entanglement between the visible and hidden units can lead to exponentially vanishing gradients. To overcome the gradient decay, our work introduces a new step in the process which we call quantum generative pre-training.

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