Center for Signal & Information Processing

Center for Signal and Information Processing (CSIP)
Seminar Series presents:

Quantum Tensor Networks for Machine Learning and Signal Processing

Introducing Research from Jun Qi:

Jun Qi

Bio: Jun Qi is currently a Ph.D. candidate supervised by Prof. Xiaoli Ma and Prof. Chin-Hui Lee in the School of Electrical and Computer Engineering at Georgia Institute of Technology. Previously, he finished two Masters in EE from the University of Washington and Tsinghua University. His research focuses on (1) Quantum Tensor Networks for ML and Signal Processing; (2) Neural Networks for Speech Recognition and Enhancement; (3) Quantum Optimization for AI and Finance.

Abstract:

The state-of-the-art machine learning (ML), particularly based on deep neural networks (DNN), has enabled a wide spectrum of successful applications ranging from the everyday deployment of speech recognition and computer vision to the frontier of scientific research in synthetic biology. Despite rapid theoretical and empirical progress in DNN based regression and classification, DNN training algorithms are computationally expensive for many new scientific applications, which requires computational resources even beyond the computational limits of classical hardware. The imminent advent of quantum computing devices opens up new possibilities of exploiting quantum machine learning (QML) to improve the computational efficiency of ML algorithms in new domains. With rapid development in quantum, hardware has motivated advances in QML to run in noisy intermediate-scale quantum (NISQ) devices, we employ hybrid quantum-classical models that rely on the optimization of parametric quantum circuits, which are resilient to quantum noise errors and admit many practical QML implementations on NISQ devices. In particular, we propose a novel end-to-end training pipeline consisting of the quantum tensor network (QTN) for the generation of quantum embedding and parametric quantum circuit (PQC) for model training. Our experiments on the tasks of image classification and speech recognition have been conducted to highlight the advantages of QTN-PQC.

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Time: 3:00pm

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