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Early exiting from Quantum Neural Network as a noise mitigation strategy in NISQ devices, a preliminary study

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Quantum Neural Networks hold great promise for addressing computational challenges, but noise in near-term quantum devices remains a significant obstacle for circuit depth. In this work, we propose a preliminary study on a novel noise mitigation strategy based on early exit, traditionally used in classical deep learning to improve computational efficiency. Experiments have been conducted on a classification task over MNIST dataset, where early exit mechanism has been implemented through mid circuit measurements. The proposed methodology shows promising results under coherent noise, while requiring further refinement under incoherent noise conditions. Despite these limitations, the approach offers a promising path toward enhancing the robustness of QNN on near-term quantum devices.

Sessione

Quantum Machine Learning

Primary authors: CIARDIELLO, Andrea (Istituto Nazionale di Fisica Nucleare); VITTORI, Giacomo (Sapienza Università di Roma); SCARDAPANE, Simone (Sapienza Università di Roma and INFN); GIAGU, Stefano (Sapienza Università di Roma and Istituto Nazionale di Fisica Nucleare)

Presenter: VITTORI, Giacomo (Sapienza Università di Roma)

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