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Advancing Image Classification using Intel SDK: Integrating NAQSS Encoding with Hybrid Quantum-Classical PQC Models

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Artificial intelligence has been used for the real and fake art identification and different machine learning models are being trained then employed with acceptable accuracy in classifying artworks. As the future revolutionary technology, quantum computing opens a grand new perspective in the art area. Using Quantum Machine Learning (QML), the current work explores the utilization of Normal Arbitrary Quantum Superposition State (NAQSS) for encoding images into a quantum circuit. The learning of trainable parameters for image classification is achieved through the use of layers of Parameterized Quantum Circuit (PQC) with a hybrid optimizer. Starting with the simplest example i.e. 2x2-colored images, the accuracy has been improved with the increasing size of the images, as the circuit depth increases linearly with the image size namely quantum gates. The potential of QML and parameters influencing accuracy are extensively investigated. The implementations have been carried out using the Intel Quantum SDK (Software Development Kit), based on the research within the framework of cooperation between Intel Labs and Deggendorf Institute of Technology.

Significance

A real innovative case of Quantum Machine Learning in the art identification.

References

Experiment context, if any

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