Convolutional Neural Networks for Jet Classification

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Jets are an essential tool in nuclear and particle physics to study subatomic matter, as they constitute the experimental signature of quarks and gluons. Vast amounts of data need to be processed to classify jets according to their origin. Some techniques have been devised to speed up this task while maintaining performance, when compared to traditional cut-based techniques. Some of these methods include algorithms at the intersection of quantum computing and machine learning. Quantum machine learning holds the promise of speeding up of some of the computationally expensive tasks in physics analysis such as classification and clustering. In this project, we developed a simulated two qubit circuit, inspired in a convolutional neural network, and validated on the Iris data set. We then extend these techniques to create a quantum machine learning algorithm and apply it to jet classification.