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Quantum metric learning for jet analysis

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Recently, quantum computing holds great promise in HEP analysis. Quantum metric learning is a self supervised learning method in which signal and background events are learned via a quantum repeated embedding that maximizes the distance between the different projected events onto the qubit. Quantum metric learning shows larger classification performance over the classical (contrastive) metric learning, e.g simCLR. Moreover, classical contrastive learning suffers from the collapse of the projection heads which degrade the classification performance in most of the classification analysis. Quantum metric learning with Hilbert-Schmidt distance overcomes the collapse problem.

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