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Identifying Heavy-Flavor Jets Using Vectors of Locally Aggregated Descriptors

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Jets of collimated particles originating from hard scattered partons are utilized in a wide range of analyses in high energy physics. Our study is focused on identifying jets originating from heavy quarks. We introduce a novel approach to tagging heavy-flavor jets at collider experiments utilizing the information contained within jet constituents via the JetVLAD model architecture. This model is based on the concept of Vectors of Locally Aggregated Descriptors, which takes a set of feature descriptors as an input and returns a fixed-length feature vector that characterizes each set. We show the performance of this model as characterized by common metrics and showcase its ability to extract high purity heavy-flavor jet sample at various realistic jet momenta and production cross-sections. The method was demonstrated on PYTHIA generated proton-proton collisions at center-of-mass energies 200 and 510 GeV.

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