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Identifying Heavy-Flavor Jets Using Vectors of Locally Aggregated Descriptors

Jets of collimated particles arising from hard scattered partons have been studied extensively in high energy collisions. Jets serve a multitude of purposes as they are utilized in fundamental studies of the Standard Model (SM), in searches for new particles and also towards understanding jet-medium interactions in relativistic heavy ion collisions. Jet evolution in the presence of either a hot or cold nuclear medium is expected to be sensitive to fundamental properties of the jets, such as the kinematics, i.e. virtuality and momentum, but also the flavor of the parton that initiates the jet. Identifying the jet flavor enables a tagging of initial states in the parton distribution functions and also helps us study mass dependence of jet-medium interactions. We present a novel approach to tagging heavy-flavor jets at collider experiments utilizing the information contained within jet constituents via the JetVLAD model architecture[1]. 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. Given the performance of the tagger, we discuss potential impact of its application in contrasting systems such as heavy-ion events with large underlying event and also at the EIC with significantly cleaner environment (as compared to pp).

[1] Ponimatkin, G et. al. 2005.01842 (Accepted by JINST)

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