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Heavy-Flavour Jet Tagging at LHCb Using Graph Neural Networks

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Efficient jet flavour-tagging is crucial for event reconstruction and particle analyses in high energy physics (HEP). Graph Neural Networks (GNNs) excel in capturing complex relationships within graph-structured data, and we aim to enhance the classification of b-jets using this method of deep learning. Presented in this work is the first application of a novel GNN b-jet tagger using the LHCb detector, and plans for further expansion into different jet architectures. The fully-connected graphs are built using the different daughter particles associated to the jet as nodes, and global information from jet kinematics is used to improve performance. Beyond normal tracking information, the GNN presented makes use of LHCb's excellent abilities to have particle identification (PID) of the daughter particles, further enhancing the performance of the classification.

Track

Tagging (Classification)

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