

DeepCore2.0: Convolutional Neural Network for Tracking in the Core of High-Energy Jets

Wednesday 31 January 2024 15:55 (5 minutes)

Tracking of charged particles in dense environments, especially in the core of high transverse-momentum (p_T) jets, presents a growing challenge with increasing LHC luminosity. Despite the CMS phase-1 pixel detector upgrade, and dedicated cluster splitting and pattern recognition algorithms like JetCore, there is still significant room for improvement. Limiting the computation time for track reconstruction represents an additional challenge as the number of proton-proton interactions per crossing (pileup) increases. DeepCore is a machine learning algorithm designed to improve track seeding in the core of high- p_T jets in the presence of increased pileup. In this talk, we summarize recent improvements to DeepCore optimized in the context of a hybrid JetCore+DeepCore model, leading to a significant increase in track reconstruction efficiency relative to JetCore alone for particles with p_T above 10 GeV. This improved algorithm, referred to as DeepCore2.0, also leads to a reduction in overall computation time for track reconstruction, with further reduction possible in the future.

Author: BOUCHAMAOU, Hichem (Princeton University (US))

Co-authors: OLSEN, Jim (Princeton University (US)); HAUBRICH, Nicholas Joseph (Princeton University (US)); YOON, Soohyun (Princeton University (US))

Presenter: BOUCHAMAOU, Hichem (Princeton University (US))

Session Classification: Poster Session

Track Classification: 1 ML for object identification and reconstruction