Contribution ID: **108** Type: **not specified**

UParT: A unified approach for jet-based object identification in CMS in Run 3

Tuesday 5 November 2024 17:00 (20 minutes)

The steady progress in machine learning leads to substantial performance improvements in various areas of high-energy physics, especially for object identification. Jet flavor identification (tagging) is a prominent benchmark that profits from elaborate architectures, leveraging information from low-level input variables and their correlations. Throughout the data-taking eras of the Large Hadron Collider (LHC) (Run 1 - Run 3), various deep-learning-based algorithms were established and led to a significantly improved tagging performance of heavy flavor jets, originating from the hadronization of b and c quarks. Individual developments led to the extension of heavy-flavor jet tagging to hadronic τ jet identification and simultaneous jet energy regression. At the same time, using a so-called adversarial training strategy, the robustness of algorithms was increased, reducing the dependence on possible mismodeling in simulation compared to data. This note presents a new approach for object tagging based on jets, unifying different approaches and extending the paradigm of b and c jet identification to s and hadronic τ jet identification, simultaneous flavor aware jet energy and resolution regression, and incorporating an innovative adversarial training approach. We show that the new algorithm based on the ParticleTransformer architecture denoted UParT, presents an advantageous algorithm for Run 3.

Track

Tagging (Classification)

Co-authors: LIAO, Hongbo (Chinese Academy of Sciences (CN)); SARKAR, Uttiya (Rheinisch Westfaelische Tech. Hoch. (DE))

Presenter: SARKAR, Uttiya (Rheinisch Westfaelische Tech. Hoch. (DE))

Session Classification: Tagging