Contribution ID: **92** Type: **not specified**

The Fundamental Limit of Jet Tagging

Tuesday 5 November 2024 13:50 (20 minutes)

Identifying the origin of high-energy hadronic jets ('jet tagging') has been a critical benchmark problem for machine learning in particle physics. Jets are ubiquitous at colliders and are complex objects that serve as prototypical examples of collections of particles to be categorized. Over the last decade, machine learning-based classifiers have replaced classical observables as the state of the art in jet tagging. Increasingly complex machine learning models are leading to increasingly more effective tagger performance. Our goal is to address the question of convergence - are we getting close to the fundamental limit on jet tagging or is there still potential for computational, statistical, and physical insight for further improvements? We address this question using state-of-the-art generative models to create a realistic, synthetic data with a known optimum. Various state-of-the-art taggers are deployed on this dataset, showing that there is a significant gap between their performance and the optimum. Our dataset and software are made public to provide a benchmark task for future developments in jet tagging and other areas of particle physics.

Track

Tagging (Classification)

Authors: Dr MÜCK, Alexander (RWTH Aachen University); NACHMAN, Ben (Lawrence Berkeley National Lab. (US)); Dr REYES-GONZÁLEZ, Humberto (RWTH Aachen); GEUSKENS, Joep; KRAMER, Michael (Rheinisch Westfaelische Tech. Hoch. (DE)); GITE, Nishank Nilesh (Lawrence Berkeley National Lab. (US)); MIKUNI, Vinicius Massami (Lawrence Berkeley National Lab. (US))

Presenter: GITE, Nishank Nilesh (Lawrence Berkeley National Lab. (US))

Session Classification: Tagging