

Synergizing Physics: Deep Learning Techniques for Time-of-Flight Reconstruction and Jet Tagging in High Energy Physics

Tuesday 5 November 2024 10:50 (20 minutes)

This talk presents a synergy between quark/gluon jet tagging on LHC data, and charged hadron time-of-flight (TOF) regression on ILC data, in the form of one problem-solving mechanism that can address both tasks. They both involve processing data represented as unordered point clouds of varying sequence lengths, optimally handled using permutation-invariant architectures.

A transformer-based quark/gluon jet classifier is introduced and compared to a convolution-based model, serving as a benchmark. Both networks operate on sets of jet constituents and per-jet observables. The transformer-based architecture outperforms its compared-to benchmark, and is on par with modern state-of-the-art models.

The transformer-based TOF estimator outperforms the current best estimator used by the ILD community, and, due to its remarkable lack of bias in flight time predictions, is optimally suited for time-of-flight-based mass estimation.

Track

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