Contribution ID: **40** Type: **talk**

A Novel Approach to Unsupervised Learning for Anomalous Jet Identification with a Variational Recurrent Neural Network

Wednesday, 14 July 2021 17:00 (15 minutes)

The search for new physics at the energy frontier has a strong model-based foundation, with well-motivated theories informing the phase space that is subsequently investigated in data. This strategy has been effective for decades in establishing the Standard Model, culminating in the 2012 discovery of the Higgs boson with the Large Hadron Collider (LHC). Recent developments in machine learning techniques motivate the complementation of current model-driven analysis programs with generic searches for unexpected new physics signals. Anomaly detection is at the essence of this pursuit, with the goal of identifying features of the data solely based on their inconsistency with a background-only model. In this talk, a novel application of a Variational Recurrent Neural Network (VRNN) to the task of anomalous jet detection is presented. This method is fully unsupervised, in that it trains directly on data and does not use a signal hypothesis. Results are shown using the LHC Olympics simulated datasets, where a VRNN-based selection is shown to enhance sensitivity to both two- and three-prong large-R jet signal excesses. Future prospects for integrating this and other unsupervised learning methods into LHC analyses are also discussed.

Are you are a member of the APS Division of Particles and Fields?

Yes

Primary author: GONSKI, Julia Lynne (Columbia University (US))

Presenter: GONSKI, Julia Lynne (Columbia University (US))

Session Classification: Beyond Standard Model

Track Classification: Beyond Standard Model Physics