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End-to-end jet identification for quark/gluon discrimination using CMS Open Data (20'+5')

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Jet identification is a very active area of applied machine learning research in particle physics, benefitting from a wide array of ideas and algorithms. Among these is the idea of building jet "images". However, many image-based implementations have struggled to compete with the current state-of-the-art classifiers that are dominated by specialized networks that rely on higher-level inputs. In this talk, we describe the application of the end-to-end approach (https://arxiv.org/abs/1807.11916) developed for particle and event identification at CMS to the challenge of identifying jets.

We describe end-to-end jet reconstruction using the full granularity of the CMS detector. CMS Open Data samples are used that take advantage of the full Geant4-based detector simulation. Using quark vs. gluon classification as a reference, we demonstrate competitive performance with existing state-of-the-art jet identification algorithms. Furthermore, we offer insights into the role of various sub-detectors for jet identification, and describe how end-to-end techniques can be useful for event-level classification for events containing jets.

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