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Event Discrimination using Convolutional Neural Networks HAREESH MENON, RICHARD HUGHES, ALEC DALING, BRIAN WINER, Ohio State Univ - Columbus — Convolutional Neural Networks (CNNs) are computational models that have been shown to be effective at classifying different types of images. We present a method to use CNNs to distinguish events involving the production of a top quark pair and a Higgs boson from events involving the production of a top quark pair and several quark and gluon jets. To do this, we generate and simulate data using MADGRAPH and DELPHES for a general purpose LHC detector at 13 TeV. We produce images using a particle flow algorithm by binning the particles geometrically based on their position in the detector and weighting the bins by the energy of each particle within each bin, and by defining channels based on particle types (charged track, neutral hadronic, neutral EM, lepton, heavy flavor). Our classification results are competitive with standard machine learning techniques. We have also looked into the classification of the substructure of the events, in a process known as scene labeling. In this context, we look for the presence of boosted objects (such as top quarks) with substructure encompassed within single jets. Preliminary results on substructure classification will be presented.

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