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A deep neural network to direct the Pandora multi-algorithm LArTPC event reconstruction

The Deep Underground Neutrino Experiment (DUNE) is dedicated to addressing several key questions of particle physics and astrophysics: the preponderance of matter over antimatter, the dynamics of supernova neutrino bursts, and whether protons decay. DUNE's liquid argon time-projection chambers for neutrino physics have created a need for new approaches to pattern recognition to fully exploit the high-resolution imaging offered by this technology. Identifying features in recorded events presents a significant challenge for automated algorithms. The Pandora Software Development Kit uses a multi-algorithm approach, in which individual algorithms each address a specific task in the reconstruction process. Here, we describe the details of a neural network performing semantic image segmentation to classify each hit according to its local event topology, and how such hit-level classification is used within the Pandora approach to direct the reconstruction algorithms.

Mini-abstract

A hybrid method using deep learning and algorithmic approaches to pattern recognition in DUNE

Experiment/Collaboration

DUNE

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