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Deep Learning MicroBooNE VICTOR GENTY, KAZUHIRO TERAO, Columbia Univ Nevis Lab, TARITREE WONJIRAD, Massachusetts Institute of Technology — The Liquid Argon Time Projection Chamber (LAr TPC) technology provides a high resolution image of ionizing particle trajectories raising a need for new event reconstruction techniques based on pattern recognition. The traditional bottoms-up reconstruction approach to extract physics involves a complex sequence of signal waveform processing, 2D and/or 3D geometrical pattern recognition, calorimetry, and finally particle identification before a neutrino interaction can be identified in an event. We present a top-down reconstruction approach using a machine learning algorithm called Deep Learning which uses convolutional neural networks to find a neutrino interaction in a LAr TPC image. We trained our network on images of simulated single particles and neutrinos overlaid on cosmic-ray background data taken from the MicroBooNE detector. In this talk, we present our result that shows convolutional networks can successfully learn LAr TPC images to perform particle identification, neutrino event selection, and localization of a neutrino interaction vertex in a large LAr TPC image.

Victor Genty
Columbia Univ Nevis Lab

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