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A deep-learning based raw waveform region-of-interest finder for the liquid argon time projection chamber

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Deep learning techniques are being widely used in high energy physics and they are playing a significant role in the reconstruction of the neutrino interactions in particle detectors. However, those algorithms normally use 2D images as inputs. Here, we consider a unique approach of using a simple 1D convolutional neural network (1D-CNN) to look directly at raw waveforms from single wires in a Liquid Argon Time Projection Chamber (LArTPC). In this poster, we present encouraging results in the application of a 1D-CNN to the task of finding the region-of-interest (ROI) in raw LArTPC waveforms from data collected by the ArgoNeuT experiment. The 1D-CNN ROI finder shows a promising ability to extract small signals from low-energy phenomena and can be implemented in early stages of reconstruction as a very effective filter to remove noise. It offers great potential for low-energy neutrino physics.

Summary

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