**Stability Training for Convolutional Neural Nets in LArTPC**

MATT LINDSAY, TARITREE WONGJIRAD, MIT — Convolutional Neural Nets (CNNs) are the state of the art for many problems in computer vision and are a promising method for classifying interactions in Liquid Argon Time Projection Chambers (LArTPCs) used in neutrino oscillation experiments. Despite the good performance of CNN's, they are not without drawbacks, chief among them is vulnerability to noise and small perturbations to the input. One solution to this problem is a modification to the learning process called Stability Training developed by Zheng et al. We verify existing work and demonstrate volatility caused by simple Gaussian noise and also that the volatility can be nearly eliminated with Stability Training. We then go further and show that a traditional CNN is also vulnerable to realistic experimental noise and that a stability trained CNN remains accurate despite noise. This further adds to the optimism for CNNs for work in LArTPCs and other applications.

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