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Neutrino Physics with Deep Learning on NOvA

The NOvA experiment has made both ν_μ disappearance and ν_e appearance measurements in Fermilab's NuMI beam, and is working on cross section measurements using near detector data. At the core of NOvA's measurements is the use of deep learning algorithms for identification and reconstruction of the neutrino flavor and energy.

Presented here is the extension of our deep learning efforts for identification of neutrino signal events, final state identification, single particle tagging, and reconstruction using instance segmentation techniques. I will describe the new implementations of modified Convolutional Neural Networks for anti-neutrino events which yield a 14% improvement in efficiency. I will also show the performance of our single particle ID network, data driven performance tests, standard candle measurements, and advances for reconstruction.

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