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Machine Learning in the NOvA Experiment

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NOvA is a long-baseline neutrino experiment primarily studying neutrino oscillations in the NuMI beam from Fermi National Laboratory (FNAL), USA. It consists of two functionally identical, finely granulated detectors which are separated by 809 km and situated 14.6 mrad off the NuMI beam axis from FNAL. A new set of oscillation results were shown at the Neutrino 2020 conference. Key to these measurements was the use of machine learning algorithms that use topological features for the reconstruction of neutrino interaction flavor and particle identification. For this analysis, the NOvA Collaboration made several significant improvements to these algorithms. Some of the highlights include a new, optimized architecture and improved training techniques which enhance our performance for physics analyses and reduce systematic bias, as well as a network designed to filter out cosmic events at the earliest possible stage of the reconstruction process. NOvA has also begun developing techniques for the next generation of analyses. A brief outline of some of these prospects will be discussed.

Primary author: WARBURTON, Karl (Iowa State University)

Presenter: WARBURTON, Karl (Iowa State University)

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