



Contribution ID: 4

Type: **Individual Talk**

Convolution Transformers for NOvA Event and Particle Classification

Wednesday, 23 August 2023 11:00 (25 minutes)

NOvA is a long-baseline neutrino experiment studying neutrino oscillations with Fermilab's NuMI beam. The experiment consists of two functionally identical detectors formed from plastic extrusions filled with a liquid scintillator for the purpose of observing the disappearance of muon neutrinos and the appearance of electron neutrinos. NOvA's recent oscillation measurements used convolution networks to determine neutrino flavor and reject backgrounds in both the near and far detectors. We introduce a transformer-based architecture known as TransformerCVN which accepts as input all event data as pixel map images and classifies both individual particles as well as the overall event interaction types in an end-to-end manner. By exploiting attention mechanisms, TransformerCVN is able to extract contextual information shared between all particles present in an event to improve reconstruction for both tasks. Additionally, the shared attention mechanisms allows us to produce interpretable attention maps, providing insight into specific particles and pixels of each particle's pixel map which are responsible for produced classification.

Primary authors: YANKELEVICH, Alejandro (University of California, Irvine); SHMAKOV, Alexander (University of California, Irvine)

Presenter: YANKELEVICH, Alejandro (University of California, Irvine)

Session Classification: Session 3