Contribution ID: **12**   Type: **not specified**

Applying Machine Learning to vertex recognition for neutrino interactions

The MINERvA experiment studies neutrinos cross sections with different nuclei. Neutrino vertex recognition plays a key role in reconstructing neutrino interactions. This research aims to enhance previous Machine Learning neutrino vertex recognition models produced in MINERvA using Deep Convolutional Neural Networks (DCNN). The approach focuses on extending neutrino interaction image information used as input to generate the models. The extension allows the DCNN to look for neutrino interactions in new regions not studied before. A Domain Adversarial Neural Network (DANN) was also implemented to penalize differences between simulated data images and real data images. The model performance is evaluated using recall, precision, and the harmonical mean F1 score, a traditional well-known metric used in this field. The F1 score considers both precision and recall, providing a comprehensive assessment of the model's performance. An extra label to recognize background activity was also implemented. The new models generated are the next version to use for the MINERvA experiment, it enables analysis of all events in the detector including the calorimeters enabling new high statistics analysis in MINERvA.

Session Classification: DUNE/SBND