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Slicing with DL models at ProtoDUNE-SP

DUNE is a cutting edge experiment aiming to study neutrinos in detail, with a special focus on the flavor oscillation mechanism. ProtoDUNE-SP (the prototype of the DUNE Far detector Single Phase TPC), has been built and operated at CERN and a full suite of reconstruction tools have been developed. Pandora is a multi-algorithm framework that implements reconstructions tools: a large number of algorithms (exploiting traditional clustering, detector physics and deep learning approaches) are applied to images in order to gradually build up a picture of events.

The Pandora slicing algorithm aims to partition the detector hits of an event in sets called slices. Each slice represents a single interaction in the detector and should identify all the hits related to the interacting particle and its subsequent decay products. We expect on the order of tens of slices per event in ProtoDUNE-SP.

Here we present a deep learning approach to the problem, designing a model able to outperform the state-of-the-art slicing algorithm which is currently implemented within Pandora. We assess the performance of our tool in terms of efficiency and accuracy, while exploiting hardware accelerating setups. The ultimate goal is to incorporate this deep learning approach into the Pandora reconstruction.

Significance

The presentation covers novel results obtained in the reconstruction process, eventually the present work gives an idea of how far the new deep learning technologies can help developing software for the broad physics community

References

Speaker time zone

Compatible with Europe

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