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Heterogeneous Point Set Transformers for Segmentation of Multiple View Detectors

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NOvA is a long-baseline neutrino experiment studying neutrino oscillations with Fermilab's NuMI beam. Prong reconstruction, the task of matching detector hits to their source particles and identifying the type of each particle, is a crucial and resource-intensive step in the event reconstruction process. This task has commonly been done using traditional clustering approaches or convolutional neural networks (CNNs). Due to the construction of the detector, the data is presented as two sparse 2D images: an XZ and a YZ view of the detector, rather than a 3D representation. We propose a point set neural network that operates on the sparse matrices with an operation that mixes information from both views. Our model uses less than 10% of the memory required using previous methods while achieving higher segmentation accuracy compared to when both views are processed independently.

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Session Classification: Experiments - NOvA