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Improving IceCube Event Reconstruction Using A Graph Convolutional Network And Semantic Segmentation RUI AN, Harvard University — Machine learning is a candidate for the next-generation reconstruction for neutrino experiments such as IceCube. IceCube is an ice-Cherenkov neutrino detector embedded in a cubic kilometer of glacial ice in Antarctica. The detector observes astrophysical and atmospheric neutrinos via the light emitted by charged particles produced in neutrino interactions with 5160 digital optical modules (DOM). A typical ν_μ interaction (1TeV$\sim$100TeV) originating inside the detector, namely the "starting track", is dominated by deep inelastic scattering which produces a hadronic cascade near the interaction vertex and a muon track. Conventional reconstruction assumes continuous energy loss for "starting track" events in the hadronic cascades, leading to a generally underestimated energy reconstruction. Correct clustering the hadronic cascade and track is crucial for improving the energy reconstruction. This study presents a graph convolutional network for semantic segmentation to distinguish the DOM charges as cascade-like and track-like charges.

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