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HERD data classification

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The growing demand for GPUs has led to rapid development of machine learning research techniques in all areas of science, including High Energy Physics. We present a study focused on the classification task of simulated electrons and protons detected by the HERD detector. HERD is a high-energy cosmic-ray detector based on a deep three-dimensional electromagnetic calorimeter, proposed to be installed on the Chinese Space Station. The main scientific objectives of HERD include detecting dark matter particles, studying cosmic ray composition, and observing high energy gamma rays.
Our classification task is based on data from Monte Carlo simulations of proton and electron particle showers in the HERD electromagnetic calorimeter, with energies ranging from 100 GeV to 20 TeV. We have two datasets, one composed of three-dimensional images, and the other from their 2-dimensional projections.
Our approach is inspired by the Inception neural network, a very deep convolutional neural network that achieved state-of-the-art performance in the ImageNet Large Scale Visual Recognition Challenge 2015 when combined with residual connections.

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Session Classification: Tuesday afternoon: Part II