

# Estimating Support Size of Distribution Learnt by Generative Adversarial Networks for Particle Detector Simulation

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Generative Adversarial Networks are usually used to generate images similar to the provided training data. The 3DGAN introduced in Khattak et al 2019 has the ability to simulate data from High Energy Physics detectors where each shower is represented by a three dimensional image. To evaluate the results, the generated images were compared to Monte Carlo GEANT4 simulations in terms of physics quantities where a high level of agreement was found. The question is whether the 3DGAN actually learns the target distribution. We use the Jensen-Shannon divergence to compute distances between energy depositions along different axis and we adjust the test introduced in Arora et al 2017 based on the birthday paradox to estimate the support size of the distribution learnt by the 3DGAN.

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