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Training Artificial Neural Networks in Virtual Environments

A common difficulty in training robust neural networks is the expense of collecting a suitably large dataset of training data to ensure that the resulting network will generalize when encountering new data. The author presents a novel workflow for generating arbitrarily large datasets of synthetic images, using a computer graphics rendering engine, along with a pseudo-random number generator (PRNG) in order to produce a representative sampling of the virtual environment free from any statistical bias.

In order to reduce the discrepancy between the simulated virtual environment: a secondary unsupervised model is trained on rendered image data. By filtering camera sensor data through a Convolutional Auto-encoder(CAE), a Deep Q-Reinforcement Network which has been pre-trained in a virtual environment could more effectively accomplish simulated tasks in real world environments.

(Note: The current revision of the research poster can be found at <https://goo.gl/Z5Toxv>)