

# Deep Learning in Quantum Gravity

*Wednesday, March 7, 2018 11:00 AM (1 hour)*

Is it worthwhile to study quantum gravity using deep learning? In causal set quantum gravity, it is useful for measuring discrete observables in Monte Carlo simulations. We have found that though there does not yet exist a general analytical expression for a causal set's manifold dimension, we can train a deep neural network in under five minutes to identify the correct value with over 99% accuracy. Remarkably, when trained with only 100-element Minkowski causal sets, the network can still correctly identify the dimension for those generated from other manifolds and those with larger sizes. We will discuss the types of problems for which deep learning is well suited, and also look at how one constructs a supervised learning algorithm using the TensorFlow package for Python. Finally, we will conclude by discussing how these methods may be trivially extended to study other discrete geometric properties.

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