Contribution ID: **30**   Type: **not specified**

Scalar field Restricted Boltzmann Machine as an ultraviolet regulator

Friday, 30 June 2023 09:30 (25 minutes)

Restricted Boltzmann Machines (RBMs) are well known tools used in Machine Learning to learn probability distribution functions from data. We analyse RBMs with scalar fields on the nodes from the perspective of lattice field theory. Starting with the simplest case of Gaussian fields, we show that the RBM acts as an ultraviolet regulator, with the cutoff determined by either the number of hidden nodes or a model mass parameter. We verify these ideas in the scalar field case, where the target distribution is known, and explore implications for cases where it is not known using the MNIST data set.

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