

Non-perturbative renormalization for the neural network-QFT correspondence

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The NN-QFT correspondence provides a description of a statistical ensemble of neural networks in terms of a quantum field theory. The infinite-width limit is mapped to a free field theory while finite N corrections are taken into account by interactions. In this talk, after reviewing the correspondence, I will describe how to use non-perturbative renormalization in this context. An important difference with the usual analysis is that the effective (IR) 2-point function is known, while the microscopic (UV) 2-point function is not, which requires setting the problem with care. Finally, I will discuss preliminary numerical results for translation-invariant kernels. A major result is that changing the standard deviation of the neural network weight distribution can be interpreted as a renormalization flow in the space of networks.

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