

Quantum mechanics as a random neural network

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It has been proposed that random wide neural networks near Gaussian process are quantum field theories around Gaussian fixed points. In this paper, we provide a novel map with which a wide class of quantum mechanical systems can be cast into the form of a neural network with a statistical summation over network parameters. Our simple idea is to use the universal approximation theorem of neural networks to generate arbitrary paths in the Feynman's path integral. The map can be applied to interacting quantum systems / field theories, even away from the Gaussian limit. Our findings bring machine learning closer to the quantum world. The talk is based on arXiv:2403.11420 in collaboration with Yuji Hirono, Jun Maeda and Jojiro Totsuka-Yoshinaka (Mach. Learn.: Sci. Technol. 5 045039 (2024)).