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Deep Convolutional Neural Networks for Quantum 1D Spin Chains[1] SHAH SAAD ALAM, Rice Univ, LI YANG, Google Research, WENJUN HU, YILONG JU, HAN PU, ANKIT PATEL, Rice Univ — Combining neural network architectures with quantum variational Monte Carlo methods has opened up a new method of studying quantum many body systems. Using deep learning to improve neural networks for quantum many body problems is a relatively new field of study. We discuss previous work in using a deep convolutional neural network for studying an SU(N) 1D spin chain, and our use of Importannce Sampling Gradient Optimization (ISGO) method to speed up the learning from the Variational Quantum Monte Carlo[2]. We present our analysis of the neural network and the response of the networks layers to the particular symmetries of the SU(N) spin chain, as well as possible extensions of the neural network architecture.

[1]NSF, Welch Foundation
[2]"Deep Learning-Enhanced Variational Monte Carlo Method for Quantum Many-Body Physics", Li Yang, Zhaoqi Leng, Guangyuan Yu, Ankit Patel, Wen-Jun Hu, Han Pu https://arxiv.org/abs/1905.10730

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