Supplementary Information for Title:

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Abstract

Improving the predictive power of machine learning models is one of the greatest challenges to the science of learning. Here we demonstrate with the simplest of neural networks that the addition of an intelligence prior can drastically improve the learning capabilities. We outline this simple mechanism to decrease the number of exposures, and enhance the predictive power with a number of examples relevant to the study of quantum phase transitions. We find that guided networks are uniquely capable to identify key features of quantum phases where unguided models fail, and that while the mean square error of topologically equivalent models may be commensurate, the structure of the predictions produced by the models is qualitatively very different. In many situations where knowledge of a physical system is available, but direct sampling of the entire phase space is computationally intractable, this approach offers a superior learning alternative.

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