

#17 Topic: Phase detection with machine learning techniques

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Abstract:

We apply an Unsupervised learning algorithm, namely Principal Component Analysis (PCA) to five models: the Ising ferromagnet, the Ising antiferromagnet, the Ising antiferromagnet on a Triangular and Kagome lattice and finally for the XY model. For this, we feed the algorithm with configurations generated through Monte Carlo algorithms. We show that the PCA is able to detect meaningful features of the models for all but the Kagome lattice model. We give a description of the mechanism through which PCA is able to find these features and conclude that PCA finds the Fourier modes of the system. Lastly, we repeat this analysis using a Neural Network in a Confusion Learning Scheme.