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Variational Autoencoders and Metropolis-Hastings

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The use of generative models to learn and sample complex distributions is increasingly common in computational physics. Many generative approaches are being used with a view to improving algorithms for complex lattice systems like QCD. One such generative model is the Variational Autoencoder, which can simplify a complex distribution by identifying the distribution with a Gaussian in a latent space. In this work we use a Variational Autoencoder to learn efficient Monte-Carlo updates to the Ising model. We use this model as an example to discuss ergodicity and detailed balance conditions within the Metropolis-Hastings algorithm.

Primary author: HADLEY, Joseph (University of Liverpool)

Presenter: HADLEY, Joseph (University of Liverpool)

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