

Sampling Function Space: Applications and Algorithms

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Abstract: Many problems arising in applications require the sampling of a measure on function space. A particular structure that often arises is when the measure has Radon-Nikodym derivative with respect to a Gaussian measure. We introduce MCMC methods for sampling such measures, and study their complexity as a function of the dimension n of the approximating space. The measures in question may be viewed as having a multiscale structure in which a spectrum of scales is present. This spectrum is manifest in the Karhunen-Loeve representation of the reference Gaussian measure.

We start the talk with various illustrations from the fields of econometrics, transition path sampling, signal processing and data assimilation. We then illustrate the unifying mathematical structure underlying all these problems. This leads naturally into the study of algorithms for such problems, and their computational complexity.