

# ADVANCED TUTORIAL

## Monte Carlo and Quasi-Monte Carlo Methods in Statistics

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This talk will examine the ways that Monte Carlo methods are used in statistical inference. The goal is to convey something of the goals of statistical inference, as well as to expose opportunities for quasi-Monte Carlo methods to be substituted for Monte Carlo.

A core problem in statistical inference is to judge the sampling uncertainty in an estimated quantity. Sometimes we want to tell whether the quantity may be purely an artifact of noise. Monte Carlo methods are coming to dominate the process, at least for complicated problems.

The methods to be studied will include bootstrap resampling, cross-validatory sampling, permutation tests and related methods like rotation tests, as well as Markov chain Monte Carlo.