



QMC Opening Workshop August 28-September 1, 2017

Lecture: *Error Analysis for Quasi-Monte Carlo Methods*

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Abstract:

Multidimensional integrals may be approximated by weighted averages of integrand values.

Quasi-Monte Carlo (QMC) methods are more accurate than simple Monte Carlo methods because they carefully choose where to evaluate the integrand. This tutorial focuses on how quickly QMC methods converge to the correct answer as the number of integrand values increases. The answer may depend on the smoothness of the integrand and the sophistication of the QMC method. QMC error analysis may assume the integrand belongs to a reproducing kernel Hilbert space or may assume that the integrand is an instance of a stochastic process with known covariance structure. These two approaches have interesting parallels. This tutorial also explores how the computational cost of achieving a good approximation to the integral depends on the dimension of the domain of the integrand. Finally, this tutorial explores methods for determining how many integrand values are needed to satisfy the error tolerance. Relevant software is described.