Adaptive Algorithms for Stochastic Computation

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Monte Carlo and quasi-Monte Carlo methods are popular for computing i) means of random variables with complicated distributions, and ii) high dimensional integrals. The number of samples required to obtain an approximation with a given accuracy depends on the variance of the random variable or the roughness of the integrand. Adaptive methods determine how many samples are needed based on the observed random numbers or function values rather than on a priori information. We show how to construct good (quasi-)Monte Carlo algorithms for cones of random variables or integrands. In some cases we can also demonstrate the asymptotic optimality of these algorithms. Since these cones are non-convex sets, adaption can have an advantage over non-adaptive algorithms.