Stratified Monte Carlo Integration

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We analyze a Monte Carlo method using stratified sampling for approximate integration. We focus on integration of non-smooth functions: we consider the indicator function of a Jordan-measurable subset of the s-dimensional unit cube $I^s := [0,1)^s$. We prove bounds for the variance; when the boundary of the subset is defined by a function on I^{s1}, the variance is estimated by means of the variation of the function. The tightness of the previous bounds is assessed through numerical experiments in dimensions $s = 2$ and $s = 3$, where we compute sample variances.