

A modified fast component-by-component construction of rank-1 lattice points in weighted spaces

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Abstract

Lattice rules are of high benefit in practice because their implementation can be accomplished by very effective construction algorithms. In this talk, we describe a modified component-by-component method (CBC) for rank-1 lattice rules such that the quality function is independent of the smoothness parameter α and has a connection with the worst-case error. We study this method for the case when N is prime. The CBC constructed lattice rules achieve almost optimal order of convergence (which is independent of the weights) and we show that with suitable weights conditions the error bounds can be made independent of the dimensions. We present fast implementation of the construction (with the help of the techniques introduced by Dirk Nuyens and Ronald Cools [2]) and analyze the computational complexity. We further show numerical experiments to compare the error convergence with the classical CBC construction.

References

- [1] N.M. Korobov: *Number-theoretic methods in approximate analysis*, Fizmatgiz, 1963.
- [2] D. Nuyens and R. Cools: *Fast component-by-component construction of rank-1 lattice rules with a non-prime number of points*, J. Complexity, 22(1):4-28, 2006.