On the weighted star discrepancy of lattice rules

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Quasi-Monte Carlo methods can be used to approximate integrals in various weighted spaces of functions. The uniformity of the distribution of QMC point sets can be assessed by the weighted star discrepancy. Such a discrepancy is based on an L_∞ maximum error and has the merit that among other types of discrepancy, it requires lesser smoothness from the integrand.

This talk will summarise my results on the weighted star discrepancy of lattice rules, which belong to the larger family of QMC methods. Some recent results on the existence and construction of lattice rules have been obtained by assuming that the weights are "general", the number of points is composite (not necessarily prime) and the lattice rule can be shifted arbitrarily. These assumptions have only been considered before separately, not altogether.

We then obtain bounds on the weighted star discrepancy and establish conditions for tractability and strong tractability. We also compare these bounds with the actual value of the discrepancy in low dimensions and discuss the future of the weighted star discrepancy as a measure of goodness from a more practical viewpoint.