

Nested sampling designs with good covering properties

Luc Pronzato

(pronzato@i3s.unice.fr, CNRS, Université Côte d'Azur, Laboratoire I3S, Sophia Antipolis)

Abstract: The covering radius and L_r -quantization error ($r > 1$) of a sampling design are key factors for the derivation of error bounds for function approximation or integration. Constructions of designs with small covering radii or small quantization errors have received a lot of attention, in particular those forming regular patterns such as lattices. However, incremental constructions, although of major practical interest, have received less attention. There exist bounds on the covering radius (also called dispersion) for low discrepancy sequences used in Quasi-Monte Carlo methods, but they are extremely pessimistic and the performances of these constructions are rather deceiving.

Three incremental constructions will be presented in the talk, based on the minimization of a Maximum-Mean-Discrepancy by kernel herding, on the greedy maximization of an integrated covering measure that defines a submodular set function, or on geometrical considerations leading to the greedy-packing algorithm and its boundary-phobic variants. In the later case, performance guarantees can be provided.

This work is partly supported by the ANR project INDEX (INcremental Design of EXperiments), nb. ANR-18-CE91-0007.