On the Role of Adaption in Linear Problems

Stefan Heinrich
RPTU Kaiserslautern-Landau, Germany
heinrich@informatik.uni-kl.de

The relation between n-th minimal errors of linear problems in the randomized non–adaptive and adaptive setting is studied. In a recent paper [1] the author solved a long-standing problem of Information-Based Complexity: Is there a constant $c > 0$ such that for all linear problems $\mathcal{P}$ the randomized non-adaptive and adaptive n-th minimal errors can deviate at most by the factor c? That is, does the following hold for all linear $\mathcal{P}$ and $n \in \mathbf{N}$

$$e_n^{\mathrm{ran-non}}(\mathcal{P}) \le c e_n^{\mathrm{ran}}(\mathcal{P})\,?$$

The analysis of vector-valued mean computation showed that the answer is negative. In this talk we discuss further aspects of this problem: large gaps between adaptive and non-adaptive minimal errors [2], infinite dimensional problems with deviation tending to infinity with n, as well as scalar-valued problems: mean computation and integration.

References

[1] S. Heinrich, Randomized Complexity of Parametric Integration and the Role of Adaption I. Finite Dimensional Case, preprint, see https://www.uni-kl.de/AG-Heinrich/Publications.html

[2] S. Heinrich, Randomized Complexity of Vector-Valued Approximation, to appear in: A. Hinrichs, P. Kritzer, F. Pillichshammer (eds.). Monte Carlo and Quasi-Monte Carlo Methods 2022. Springer Verlag. Preprint see https://www.uni-kl.de/AG-Heinrich/Publications.html