Accelerated Computation and Minimax Lower Bound of Kernel Stein Discrepancy*

Zoltán Szabó†

Abstract

Kernel Stein discrepancy (KSD) is a powerful tool to quantify goodness-of-fit on a wide variety of domains with numerous successful applications. However, the classical KSD estimators (relying on U- and V-statistic) scale quadratically in terms of the sample size, which hinders their application in large-scale settings. In this presentation we will (i) present an accelerated KSD estimator based on the Nyström technique while preserving the statistical accuracy of the quadratic-time KSD approximations, and (ii) settle the optimal rate at which KSD can be estimated.

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†Part-1 is joint work with Florian Kalinke and Bharath K. Sriperumbudur; paper; Part-2 is joint work with Jose Cribeiro-Ramallo, Agnideep Aich, Florian Kalinke, and Ashit Baran Aich; paper (accepted at AISTATS-2026).