THE UNIVERSITY OF CHICAGO | DEPARTMENT OF STATISTICS

Statistics Colloquium

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"Novel results for uncertainty quantification."

Monday October 23rd, 2023, at 11:30 AM
Jones 303, 5747 S. Ellis Avenue
Refreshments will be served before the seminar at 11:00 am in Jones 303.

Abstract

In the first part of this talk, we study the cross-validation method, a ubiquitous method for risk estimation, and establish its asymptotic properties for a large class of models and with an arbitrary number of folds. Under stability conditions, we establish a central limit theorem and Berry-Esseen bounds for the cross-validated risk, which enable us to compute asymptotically accurate confidence intervals. We reveal some surprising behavior of the cross-validated risk and establish the statistically optimal choice for the number of folds.

In the second part of this talk, we propose a novel method for deriving concentration inequalities for the sample mean. Classical ones, like those due to Bernstein and Hoeffding, are valid for any sample size but overly conservative, yielding confidence intervals that are unnecessarily wide. In this talk, motivated by applications to reinforcement learning we develop new results on transport and information theoretic distances. This allows us to obtain new computable concentration inequalities with asymptotically optimal size, finite-sample validity, and sub-Gaussian decay. These bounds enable the construction of efficient confidence intervals with correct coverage for any sample size. We derive our inequalities by tightly bounding the Hellinger distance, Stein discrepancy, non-uniform Kolmogorov distance, and Wasserstein distance to a Gaussian.

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