Statistics and Data Science Seminar

Minimax Nonparametric Multi-sample Test Under Smoothing

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Abstract: We consider the problem of comparing probability densities between two groups. A new probabilistic tensor product smoothing spline framework is developed to model the joint density of two variables. Under such a framework, the probability density comparison is equivalent to testing the presence/absence of interactions. We propose a penalized likelihood ratio test for such interaction testing and show that the test statistic is asymptotically chi-square distributed under the null hypothesis. Furthermore, we derive a sharp minimax testing rate based on the Bernstein width for nonparametric two-sample tests and show that our proposed test statistics is minimax optimal. In addition, a data-adaptive tuning criterion is developed to choose the penalty parameter. Simulations and real applications demonstrate that the proposed test outperforms the conventional approaches under various scenarios.

Wednesday, November 10 at 4:00 PM in Zoom