

ACMS Statistics Seminar

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**Xiamen University and
Penn State University**

Wednesday, November 1, 2023

101A Crowley Hall

3:30 PM – 4:30 PM



Test and Measure for Partial Mean Dependence Based on Machine Learning Methods

It is of importance to investigate the significance of a subset of covariates W for the response Y given covariates Z in regression modeling. To this end, we propose a significance test for the partial mean independence problem based on machine learning methods and data splitting. The test statistic converges to the standard chi-squared distribution under the null hypothesis while it converges to a normal distribution under the fixed alternative hypothesis. Power enhancement and algorithm stability are also discussed. If the null hypothesis is rejected, we propose a partial Generalized Measure of Correlation (pGMC) to measure the partial mean dependence of Y given W after controlling for the nonlinear effect of Z . We present the appealing theoretical properties of the pGMC and establish the asymptotic normality of its estimator with the optimal root- N convergence rate. Furthermore, the valid confidence interval for the pGMC is also derived. As an important special case when there are no conditional covariates Z , we introduce a new test of overall significance of covariates for the response in a model-free setting. Numerical studies and real data analysis are also conducted to compare with existing approaches and to demonstrate the validity and flexibility of our proposed procedures.

The Department of Applied and Computational
Mathematics and Statistics

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