

MICHIGAN STATE UNIVERSITY
Department of Statistics and Probability

COLLOQUIUM

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P-value Combination Tests for Correlated Data Analysis

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Refreshments 10:00 AM

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Abstract

P-value combination is an important statistical approach for information-aggregated decision making. It is foundational to a lot of applications such as meta-analysis, data integration, signal detection, and others. We propose two generic statistic families for combining p-values: gGOF, a general family of goodness-of-fit type statistics, and tFisher, a family of Fisher type p-value combination with a general weighting-and-truncation scheme. The two families unify many optimal statistics over a wide spectrum of signal patterns. Within these two families of statistics, data-adaptive omnibus tests are also designed for adapting the family-retained advantages to unknown signal patterns. For analyzing correlated data, we provide efficient solutions for analytical calculations of the p-value. We reveal the influence of data transformations to the signal-to-noise ratio and the statistical power under the Gaussian mean model and the generalized linear model. Applications of these methods are illustrated in gene-based SNP-set studies of genetic associations.

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