BIOSTATISTICS SEMINAR

Kai Zhang
PhD,
Assistant Professor
Dept. of Statistics
and Operations
Research, UNC

BET on Independence

We study the problem of nonparametric dependence detection. Many existing methods may suffer severe power loss due to non-uniform consistency, which we illustrate with a paradox. To avoid such power loss, we approach the nonparametric test of independence through the new framework of binary expansion statistics (BEStat) and binary expansion testing (BET), which examine dependence through a novel binary expansion filtration approximation of the copula. Through a Hadamard transform, we find that the symmetry statistics in the filtration are complete sufficient statistics for dependence. These statistics are also uncorrelated under the null. By utilizing symmetry statistics, the BET avoids the problem of non-uniform consistency and improves upon a wide class of commonly used methods (a) by achieving the minimax rate in sample size requirement for reliable power and (b) by providing clear interpretations of global relationships upon rejection of independence. The binary expansion approach also connects the symmetry statistics with the current computing system to facilitate efficient bitwise implementation. We illustrate the BET with a study of the distribution of stars in the night sky and with an exploratory data analysis of the TCGA breast cancer data.

Thursday February 21, 2019   **3:30 pm - 4:30 pm**
Blue Cross and Blue Shield of North Carolina Foundation Auditorium