

Functional Data Analysis using Wavelet Transforms

Univariate statistics may not be powerful when data are smooth curves or functions. In such cases, a statistical test that considers the entire functional response as an estimator is desired. Pointwise testing is an approach commonly used to test differences in functional responses. However, in the presence of noise, such tests offer better power and statistical efficiency when the responses are modelled using basis functions such as Fourier basis, B-spline basis, etc. The choice of basis and smoothing plays a significant role in efficient statistical testing. Wavelet transforms offer an orthogonal basis that is more robust than the Fourier basis due to its time-frequency localization, decorrelation, dimension reduction, and denoising properties.

In this talk, I will explain the use of wavelet transforms in the analysis of functional data. The proposed testing framework involves a statistic that is shown to be more powerful than existing methods. Several aspects of this framework including a gentle introduction to wavelet transforms, a mathematical background behind the test, some power simulations and applications of the test in genomics will be discussed. In addition, the distribution of the proposed statistic and its approximations relevant to statistical analysis of functional data will also be explained.

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Monday February 17th, 2014 at 4:00 pm
Holmes Hall Room 330

Light Refreshments will be available