Two-Sample Test for
Equal Mean Functions for Curve Data

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Abstract

In many scientific studies, data collected are often a sample of independent curves. Two samples of independent curves may be collected from the same study with two different treatments. Of interest is how to test whether such a treatment effect is statistically significant. In this talk, we introduce and study an L^2-norm based global test which are constructed based on the local polynomial reconstructions of the individual curves. Under some regularity conditions, we show that the proposed test statistic has an asymptotic expression of χ^2-type mixtures, and the proposed test is $\sqrt{N}$-consistent where N is the total number of curves in the two samples. Methods for approximating the null distribution of the proposed test statistic are briefly described with the underlying covariance functions of the two samples consistently estimated. Simulation studies show that the power of the proposed test is not sensitive to the reasonable bandwidth choices but will be affected if the underlying covariance functions are not consistently estimated. A real data application is used to motivate and illustrate the test.