Tests for High Dimensional Regression Coefficients with Factorial Designs

Song Xi Chen and Ping-Shou Zhong

Iowa State and Peking University

Abstract

We propose simultaneous tests for coefficients in high dimensional linear regression models with factorial designs. The proposed tests are designed for the ``large p, small n'' situations where the conventional F-test is no longer applicable. We derive the asymptotic distribution of the proposed test statistic under the high dimensional null hypothesis and various scenarios of the alternatives, which allow power evaluations. We also evaluate the power of the F-test under very mild dimensionality. The proposed tests are employed to analyze a micro-array data on Yorkshire Gilts to find significant gene ontology terms which are significantly associated with the thyroid hormone after accounting for the designs of the experiment.