Test for bandedness of high dimensional covariance matrices with bandwidth estimation

Song Xi Chen, Iowa State University, USA

Abstract.
Motivated by the latest effort to employ banded matrices to estimate a high dimensional covariance $\Sigma$, we propose a test for $\Sigma$ being banded with possible diverging bandwidth. The test is adaptive to the "large $p$, small $n$" situations without assuming a specific parametric distribution for the data. We also formulate a consistent estimator to the bandwidth of a banded high dimensional covariance matrix. The properties of the test and the bandwidth estimator are investigated by theoretical evaluations and simulation studies, as well as an empirical analysis on a protein mass spectroscopy data for prostate cancer.

Key Words and Phrases: Banded covariance matrix; Bandwidth estimation; High data dimension; Large $p$, small $n$; Nonparametric.