Regularization for Stationary Multivariate Time Series

by

Xiaodong Lin University of Cincinnati 831 old Chemistry building University of Cincinnati, Cincinnati, OH 45221 linxd@math.uc.edu

Abstract

The past decade has seen a rapid development of regularization techniques such as ridge regression, LASSO, SCAD, LARS and their extensions. However, these techniques have been developed mainly for circumstances where the observations are independent. In practice, many classes of interesting problems such as financial time series involve dependent data. In this talk, we describe extensions of the results of penalized methods for independent data to stationary multivariate time series. Under mild regularity conditions, our penalized estimators are sparseconsistent and possess well-known oracle properties. We demonstrate the utility of our results by developing a sparse version of the full factor GARCH model, and show the applicability of our theory and methods via real and simulated data. Our methods provide a framework for applications of regularization techniques to other multivariate time series models, spatial and temporal models, dynamic network models and more.