Structural Change Detection in Polynomial Regression for Dependent Data with Heterogeneous Variance

Chih-Hao Chang
National University of Kaohsiung

Abstract

In this talk, we considered a nonlinear polynomial regression model with two breakpoints, where the mean trend of the data is a constant function within the two breakpoints. This model, denoted by $\mathcal{M}_2$, includes models with one or no breakpoints, denoted by $\mathcal{M}_1$ and $\mathcal{M}_0$, respectively, as special cases. We derived a quick algorithm to estimate the parameters of models $\mathcal{M}_\kappa$; $\kappa = 1, 2$, where the square-root-n consistency of breakpoint estimators was established under some mild conditions. We then applied a model-selection procedure for selecting $\mathcal{M}_\kappa$; $\kappa = 0, 1, 2$, for dependent data with heterogeneous variance, where the structural changes in variance are allowed at any locations. When the underlying model exists, we also established the selection consistency under the aforementioned conditions. This method can be easily applied to detect multiple breakpoints for multivariate dependent data with both homogeneous and heterogenous variance. We conducted some simulation experiments to demonstrate the finite-sample performance of our asymptotic results.