Elastic net for single index support vector regression model

ABSTRACT

The single index model (SIM) is a useful regression tool used to alleviate the so-called curse of dimensionality. In this paper, we propose a variable selection technique for the SIM by combining the estimation method with the Elastic Net penalized method to get sparse estimation of the index parameters. Furthermore, we propose the support vector regression (SVR) to estimate the unknown nonparametric link function due to its ability to fit the non-linear relationships and the high dimensional problems. This make the proposed work is not only for estimating the parameters and the unknown link function of the single index model, but also for selecting the important variables simultaneously. Simulations of various single index models with nonlinear relationships among variables are conducted to demonstrate the effectiveness of the proposed semi-parametric estimation and the variable selection versus the existing fully parametric SVR method. Moreover, the proposed method is illustrated by analyzing a real data set. A data analysis is given which highlights the utility of the suggested methodology.

Keyword: Elastic net; Single-index model; High-dimensional; Dimension reduction; Variable selection; Support vector regression