Elastic net penalized Quantile Regression Model and Empirical Mode Decomposition for Improving the Accuracy of the Model Selection

ABSTRACT

In quantile regression models, numerous penalization methods have been developed to deal with ordinary least-squares method problems. Such methods are ridge penalized quantile regression, lasso penalized quantile regression, and elastic net penalized quantile regression which are used for variable selection and regularization and deals with the multicollinearity problem when it exists between the predictor variables. However, the variables of interest are often represented through time series processes, in which such time series data are often non-stationary and non-linear, which leads to poor accuracy of the resultant regression models and hence results with less reliability. The EMD-EnetQR method is proposed to address this issue, which consists of applying the empirical mode decomposition (EMD) algorithm to time series data and then using the resulting components in penalized quantile regression models. This study aims to apply the proposed EMD-QREnet method to determine the influence of the decomposition components of the original time series predictor variables on the response variable to build a model fit and improve prediction accuracy. Furthermore, this study addressed the multicollinearity between the decomposition components. Simulation studies and real dataset applications were conducted. The results show that the proposed EMDQREnet method, in most cases, outperforms the other methods by improving prediction accuracy.