A Modified Kernel SIR Method with Applications in Finance and Education

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Abstract

This study proposes a modified kernel sliced inverse regression (SIR) method for the classification of multi-dimensional and nonlinear structured data. Several simulation scenarios are conducted to compare the classification performance of the proposed method with 4 commonly used classification methods, which are principal components analysis (PCA), kernel PCA, SIR and kernel SIR. Numerical results indicate that the proposed method outperforms the 4 existing methods when there exist extreme data. We also apply the proposed method to financial data and educational data. The estimated dynamic classifications of 200 stocks in the S&P500 index are capable of reasonably reflecting the effects of economic conditions. For the educational data, the estimated classification of undergraduate students' grades of 16 compulsory courses has high accuracy prediction of their majors in graduate school.

Keywords：classification, dimension reduction, visualization.