Sensitivity Analysis and Visualization for Functional Data

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Abstract

When analyzing functional data processes, the presence of outliers can greatly influence modeling and forecasting outcomes and lead to the inaccurate conclusion. Hence, detection of such outliers becomes an essential task. Visualization of data not only plays a vital role in discovering the features of data before applying statistical models and summary statistics but also provides an auxiliary tool in identifying outliers. The research involving visualization and sensitivity analysis for functional data has not yet received much attention in the literature to date. Thus, this becomes the focus of this paper. To this end, we propose a method combining influence function with the iteration scheme motivated by Zou et al. (2012) for identifying outliers in functional data, and develop new visualization tools for displaying features and grasping the outliers in functional data. Furthermore, comparisons between our proposed methods with the existing methods are also investigated. Finally, we illustrate these proposed methods with simulation studies and real data examples.

Keywords: Functional data, influence analysis, sensitivity analysis, visualization.