

<English Version>

Prediction improvement of non-stationary time series analysis based on transformation¹⁾

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Summary:

This study demonstrates the superiority of a scaled logit transformation in comparison with a Box-Cox transformation which is one of the most widely used transformations for a non-stationary time series dataset. The two transformation methods enhance the predictive performance of the non-stationary time series dataset by stabilizing variance and improving normality. However, the Box-Cox transformation has a disadvantage of depending on the power parameter to be estimated from the time series dataset. On the other hand, the scaled logit transformation has no parameters to be estimated, so it is stress-free in parameter estimation. For illustrative purposes, we analyze a bike-sharing dataset with features related to time and weather. In addition, two types of techniques, traditional time series and machine learning techniques, are used to model the bike-sharing dataset. According to study results, the scaled logit transformation is more effective than the Box-Cox transformation in improving the predictive performance, and machine learning techniques have higher accuracy than traditional time series techniques. These results strongly support the usefulness of the scaled logit transformation and the machine learning model in modeling and predicting the non-stationary time series dataset. Moreover, the results substantiate the applicability of the scaled logit transformation in real-world non-stationary time series datasets.

Keywords:

non-stationary time series, scaled logit transformation, machine learning, traditional time series model

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