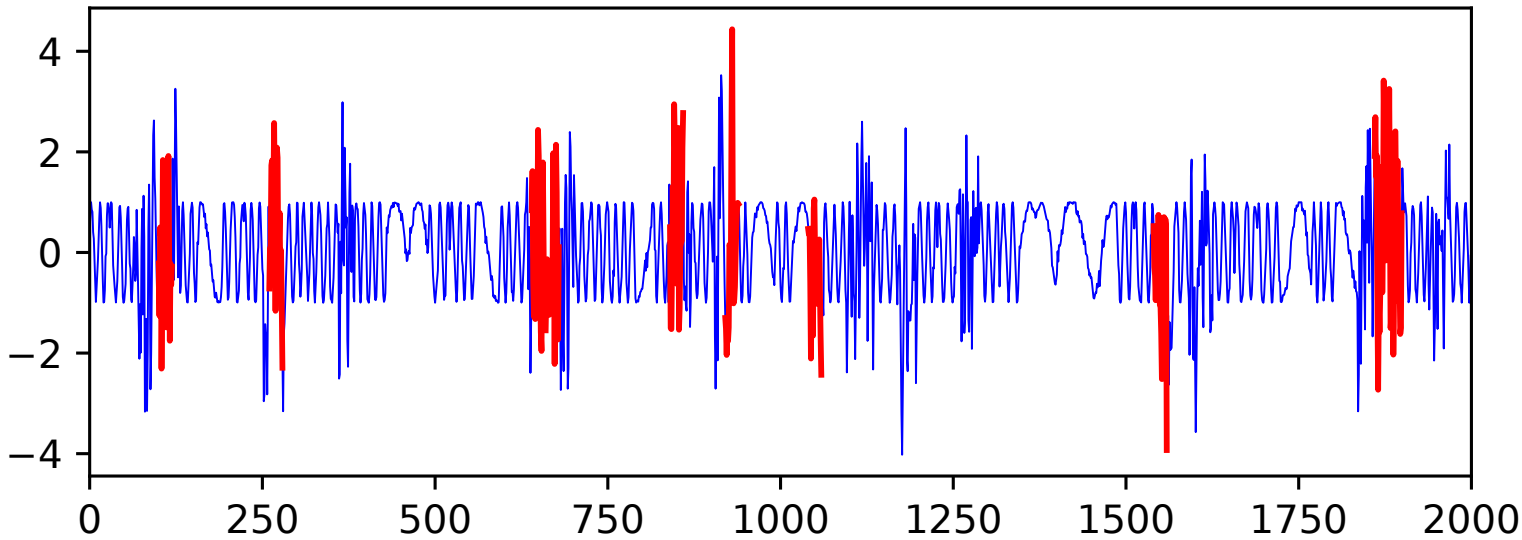


Airline dataset: Shingle-based time-series outlier detection. The window size was set to 6 and the anomaly detector employed was *Isolation Forest*. Since a clear trend is present, we first de-trend the series by differencing with lag 1. The **top rows** show the outlier windows detected in the de-trended series. The **bottom rows** show the corresponding outliers in the original series. In all plots, the outlier windows are shown in **red**. **(a)** simply de-trending the original series does not stabilize the variance. **(b)** log-transforming the original data is reasonable. This transformation is done *before* de-trending because the original data is positive. **Note:** There is no separate train or test set in this shingle-based approach.



Synthetic dataset: Shingle-based time-series outlier detection. The window size was set to 20 and the anomaly detector employed was an *autoencoder*. Since there is no trend in the original data, we did not apply and de-trending operation and the outlier windows are shown in the original timeseries data. The outlier windows are shown in **red**. **Note:** There is no separate train or test set in this shingle-based approach.