# Adaptive Forecasts to Detect Random Level Changes and Outliers in Changing Levels Model

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## Abstract

Occurrences of level changes and outliers are formulated in a form of dynamic linear model by use of a dummy variable representing either a random level change or an outlier. A time point at which the highest probability ratio of occurrence of such changes to no change obtained, is temporary identified as the most suspected change point. When an estimate of the posterior probability that a particular change has occurred at the previously identified change point becomes greater than a prespecified limit, it is determined that the particular change has actually occurred at that time point. Simulation results show that about 90 percent of such changes can be detected with misclassification rate less than 1 percent within two or three periods for change sizes over three to four standard deviation of forecast errors.

## Keywords

Level Change, Outlier, Change Type, Adaptive Forecast, Kalman Filter, Dynamic Linear Model, Exponential Smoothing