International Journal of Information and Management Sciences
Volume 24, Number 4, pp. 279-295, 2013

Grey Interval Time Series Forecast

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Abstract

Numerous grey forecast methods have been developed for small size time series data. These methods are aimed at forecasting single-value data. Grey methods that can forecast interval-value data are rare. Therefore, this study attempts to use the grey system theory to forecast interval-value data. This research is an innovative approach that combines grey interval numbers, traditional forecast methods and the GM(1,1) model to develop four grey interval forecast methods. Specifically, the first three methods make use of interval grey number operations, and the last method expands the grey GM(1,1) model. In order to compare the forecast accuracy of the four methods, this study designs two forecast error measurement indices: grey mean absolute deviation (GMAD) and grey mean absolute percent error (GMAPE); 36 sets of real-world interval data are employed to compare the forecast accuracy of the four methods. The forecast result shows the maximum and minimum of the average GMAPE for the four methods to be 1.791% and 0.622%, respectively. This result indicates that the proposed four methods provide high forecast accuracy.

Keywords: Grey set, interval-value data, small data size, time series forecast.