

Water quality forecasting of Haihe River based on improved fuzzy time series model

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ABSTRACT

Fuzzy time series (FTS) forecasting model has both advantages of fuzzy theory and time series, and can overcome the problem that historical data is inaccurate or incomplete. It has been applied in many fields and has achieved lots of good results, but few studies have paid attention to the application in water quality forecasting. This study introduced the method to short-term forecasting of water quality. Some improvements on the calculation process of FTS forecasting was made and the improved fuzzy time series (IFTS) model was proposed. Potassium permanganate index (COD_{Mn}) and dissolved oxygen (DO) concentrations of Sanchakou Station of Haihe River were predicted by this proposed method. FTS and modified GM (1,1) methods were also used for prediction. Through a series of contrast and analysis, it is concluded that this proposed IFTS method has obvious advantages than modified GM (1,1) method in prediction of data with no apparently monotonous trend, and better than the FTS method. Therefore, it is a good water quality forecasting method and can be widely used in short-term water quality forecasting. The prediction results provided an important theoretical basis for Haihe River water quality management.

Keywords: Water quality forecasting; Fuzzy time series; Fuzzy c-means; Grey prediction

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