A Novel Hybrid Fuzzy Time Series Approach with Applications to Enrollments and Car Road Accidents

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Abstract

Fuzzy time series techniques are more suitable than traditional time series techniques in forecasting problems with linguistic values. Two shortcomings of existing fuzzy time series forecasting techniques are they lack persuasiveness in dealing with recurrent number of fuzzy relationships and assigning weights to elements of fuzzy rules in the defuzzification process. In this paper, a novel fuzzy time series technique based on fuzzy C-means clustering and particle swarm optimization is proposed to resolve these shortcomings. Fuzzy C-means clustering is adopted in the fuzzification process to objectively partition the universe of discourse. Then, particle swarm optimization is adopted to assign optimal weights to elements of fuzzy rules. Actual yearly enrollments at the University of Alabama and yearly deaths in car road accidents in Belgium are used as benchmark data. The forecasting results showed that the proposed method outperformed other existing methods.

References
Index Terms

Computer Science Fuzzy Systems

Keywords

Forecasting, Fuzzy Time Series, Fuzzy C-means clustering, Particle Swarm Optimization.