

Fuzzy time series forecasting model based on soft computing techniques and applications

Le Thi Luong

Abstract: This study proposes a novel fuzzy time series forecasting model enhanced by soft computing techniques to address limitations in traditional forecasting methods, such as rigid interval partitioning and suboptimal rule generation. The model integrates fuzzy logic with metaheuristic optimization algorithms, including Genetic Algorithms and Particle Swarm Optimization, to automatically determine optimal interval lengths and fuzzy relations from historical data. Additionally, neural networks are employed to refine the defuzzification process, improving predictive accuracy. The proposed approach is validated through applications on benchmark datasets, including stock index and temperature forecasting. Experimental results demonstrate that the hybrid model significantly outperforms conventional fuzzy time series and statistical models in terms of root mean square error and directional accuracy. The findings highlight the efficacy of combining soft computing paradigms for adaptive and robust time series prediction, offering a practical solution for complex real-world forecasting problems.

Keywords: Fuzzy time series, soft computing, forecasting, model