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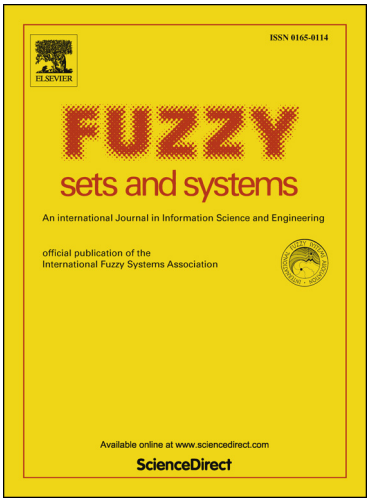

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Fuzzy Clustering of Time Series using Extremes

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Abstract

In this study we explore the grouping together of time series with similar seasonal patterns using extreme value analysis with fuzzy clustering. Input features into the fuzzy clustering methods are parameter estimates of time varying location, scale and shape obtained from fitting the generalised extreme value (GEV) distribution to annual maxima or the *r*-largest order statistics per year of the time series. An innovative contribution of the study is the development of new generalised fuzzy clustering procedures taking into account weights, and the derivation of iterative solutions based on the GEV parameter estimators. Simulation studies conducted to evaluate the methods, reveal good performance. An application is made to a set of daily sea-level time series from around the coast of Australia where the identified clusters are well validated and they can be meaningfully interpreted.

Keywords: Fuzzy *c*-means clustering; Fuzzy *c*-medoids clustering; Time series data; *r*-Largest Order Statistics; Generalised Extreme Value Distribution.

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