عنوان مقاله:

Novel Hybrid Fuzzy-Evolutionary Algorithms for Optimization of a Fuzzy Expert System Applied to Dust Phenomenon Forecasting Problem

محل انتشار:

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خلاصه مقاله:

Nowadays, dust phenomenon is one of the important challenges in warm and dry areas. Forecasting the phenomenon before its occurrence helps to take precautionary steps to prevent its consequences. Fuzzy expert systems capabilities have been taken into account to assist and cope with the uncertainty associated to complex environments such as dust forecasting problem. This paper presents novel hybrid Fuzzy-Evolutionary algorithms to predict the dust phenomenon. For this, first a fuzzy expert system was designed and then it was optimized using evolutionary algorithms like Genetic and Differential Evolutionary algorithms. Evolutionary nature of these algorithms have been taken into account to optimize the fuzzy system in the complex area of the dust phenomenon. To evaluate the proposed hybrid models a real dataset including 55 years of the dust phenomenon in Zanjan province in Iran was considered. Performance of these methods was investigated through an ROC curve analysis in combination with a 10-fold cross validation technique. The accuracy of the fuzzy expert system was 92.13% and after optimization through the Fuzzy-Genetic model and hybrid differential evolutionary model was reached to 93.5% and 97.30%, .respectively. The results are promising for early forecasting of the dust phenomena and preventing its consequences

کلمات کلیدی:

Fuzzy expert system, Differential Evolutionary Algorithm, genetic algorithm, ROC Curve Analysis, Dust Phenomenon Forecasting