

Abstract:

In recent decades, drought has had the highest incidence of natural disasters affecting human populations. Droughts all over the globe have had adverse effects and have affected the social and economic sectors in each area. In the present study, the prediction of drought in 5 provinces of Iran (including Isfahan, Khuzestan, West Azarbaijan, East Azarbaijan, and Mazandaran provinces) during a 30-year statistical period (1988-2017), using factor analysis and wavelet combination models An artificial neural network and wavelet-turbulence theory. SPSS 22 software was used for analyzing the main components and factor analysis of each province and identifying stations in the prediction of drought in each province.

The results of drought prediction in wavelet-neural network model for each province and its stations were obtained for approximately 10 years and the best learning model with the least error was presented. According to these results, the provinces of Mazandaran and East Azarbaijan were severely affected, Khuzestan and West Azarbaijan provinces were in medium range and Isfahan province in the normal range near the drought.

In the wavelet-chaos theory model, first, the chaotic nature of the time series was investigated using the correlation dimension indexes and the Lyapunov view. Chaotic results indicate quite chaotic time series behavior for the provinces under study. The dmey wavelet function has been designed to increase the accuracy and improve the wavelet-chaos theory model. The results of the prediction of 6-month SPI values for the studied provinces were presented using the nearest-fuzzy neighborhoods algorithm. The predicted results for each province for more than 3 years were more accurately compared to the neural network wavelet model, with the difference that the prediction interval in this method is lower than artificial wavelet-artificial neural network.

Keywords: Standard Precipitation Index (SPI), Main Component Analysis, Wavelet Transform, Artificial Neural Network, Chaos Theory.



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