

## **Abstract**

Air temperature is an important meteorological and climatological factor that its changes are offspring of the most fluctuation on agriculture, water resources and environment. Because of this measurement and prediction of air temperature have more importance and long background than other atmospheric parameters. The aim of this study is to illustrate a mathematical model for the time series of monthly mean temperature, using a new approach of gene expression programming (GEP). (GEP) is a powerful tool to modeling and detection of linkage between complex phenomenons that produced from Genetic programming. Also another characteristic of this approach is to present mathematical relationship from model that produced. This approach is performed in two main steps: 1. train the model that can predict time series. 2. Test or validate the model that produced in last step with actual data. Models are trained in six different historical (subsequence) patterns. In step two for validating models, Root Mean Square Error (RMSE) and coefficient of determination ( $R^2$ ) is used. 80 percent of data is considered for training and 20 percent considered for model verification. In this way time series of monthly mean temperature from 31 synoptic stations of Iran is modeled. Models classified in seven different climate of Iran. Reasons of each climate were presented and were compared together. Results showed that the 45 percent of models produced in fourth pattern. Genetic programming is a very suitable approach for modeling hydrological parameters, although its performance is different in various climates. For models that are produced from specific climate, it can be expected that, main factors like input patterns are similar. Finally results showed that the (GEP) for modeling of monthly mean temperature is very suitable. The best model in this research was achieved for seventh climate group and Zabol city.



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