

Abstract

Estimating soil temperature is an important issue in planning Combating Desertification (like stabilization of sand dune and planting trees), in management of water resources and in establishment of vegetation in arid areas which is done in empirical, semi-empirical and intelligent methods. The purpose of this research is to determine the soil temperature by using artificial intelligence and also it is tried to find out how much some climate factors such as sunny hours, maximum and minimum air temperature affect the soil temperature. In order to do this, daily data of soil temperature at the depths of 5, 10, 20, 30, 50 and 100 cm at Synoptic station of Zabol and Shiraz between the years of 2012 to 2015 were collected. Then these data in proportion of %20, %20 and % 60 were randomly divided into three groups- educational data experimental data, validating data, respectively. After that by using artificial intelligence (Adaptive Neuro-Fuzzy Inference System and Artificial Neural Network and Genetic Programming) we examined and analyzed the meteorological factors which were effective on soil temperature. During this time the soil temperature was simulated by these methods. To achieve this, we used MATLAB software to determine the adjustable parameters of network like: hidden layers of soil, the number of neurons in each hidden layer, function activity and educational Algorithm. The results were estimated by Root Mean Squares Error criteria and the Average Deviation of Error criteria. The results of soil temperature simulation by artificial intelligence confirmed the high accuracy of this method in soil temperature simulation. Among them Artificial Neural Network in Shiraz station and a combination of Artificial Neural Network and Genetic Algorithm in Zabol station had a better estimate. The highest correlation between the actual data and modeled data was at the depth of 5 cm and the lowest correlation was at the depth of 10 cm. According to the results of this research it is recommended that for making suitable managerial decisions in relation to Combating Desertification, it is better to use artificial intelligence for simulation of soil temperature.

Key words: Artificial Intelligence, Shiraz, Simulation, Soil Temperature, Zabol.



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**Simulation of Soil Temperature at Different
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(Case Study: Synoptic Stations Zabol and Shirz)**

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