

Prediction of Environmental Indicators in Land Leveling Using Artificial Intelligence Techniques

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Abstract

Land leveling is one of the most important steps in soil preparation and cultivation. Although land leveling with machines require considerable amount of energy, it delivers a suitable surface slope with minimal deterioration of the soil and damage to plants and other organisms in the soil. Notwithstanding, researchers during recent years have tried to reduce fossil fuel consumption and its deleterious side effects using new techniques such as; Artificial Neural Network (ANN), Imperialist Competitive Algorithm –ANN (ICA-ANN), and regression and Adaptive Neuro-Fuzzy Inference System (ANFIS) and Sensitivity Analysis that will lead to a noticeable improvement in the environment. In this research effects of various soil properties such as Embankment Volume, Soil Compressibility Factor, Specific Gravity, Moisture Content, Slope, Sand Percent, and Soil Swelling Indexing energy consumption were investigated. The study was consisted of 90 samples were collected from 3 different regions. The grid size was set 20 m in 20 m (20*20) from a farmland in Karaj province of Iran. The aim of this work was to determine best linear model Adaptive Neuro-Fuzzy Inference System(ANFIS) and Sensitivity Analysis in order to predict the energy consumption for land leveling. According to the results of Sensitivity Analysis, cant effect on energy consumption. Using adaptive neuro-fuzzy inference system for prediction of labor energy, fuel energy, total machinery cost, and total machinery energy can be successfully demonstrated.

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Received 28 March 2021; **Accepted** 05 April 2021; **Published** 12 April 2021

How to cite this article: Isham Alzoub "Prediction of Environmental Indicators in Land Leveling Using Artificial Intelligence Techniques." *Fluid Mech Open Acc* 8 (2021):e101.