Prediction of environmental indicators in land leveling using artificial intelligence techniques

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Abstract

Land leveling is one of the most significant strides in soil planning and development. Despite the fact that land leveling with machines requires significant measure of vitality, it conveys a reasonable surface incline with negligible decay of the dirt and harm to plants and different living beings in the dirt. In any case, specialists during late years have attempted to decrease petroleum derivative utilization and its pernicious symptoms utilizing new procedures, for example, Artificial Neural Network (ANN),Imperialist Competitive Algorithm – ANN (ICA-ANN), and relapse and Adaptive Neuro-Fuzzy Inference System (ANFIS) and Sensitivity Analysis that will prompt a perceptible improvement in the earth. In this examination impacts of different soil properties, for example, Embankment Volume, Soil Compressibility Factor, Specific Gravity, Moisture Content, Slope, Sand Percent, and Soil Swelling Index in vitality utilization were researched. The examination was comprised of 90 examples were gathered from 3 unique areas. The lattice size was set 20 m in 20 m (20*20) from a farmland in Karaj territory of Iran. The point of this work was to decide best direct model Adaptive Neuro-Fuzzy Inference System (ANFIS) and Sensitivity Analysis so as to anticipate the vitality utilization for land leveling. As indicated by the aftereffects of Sensitivity Analysis, just three boundaries; Density, Soil Compressibility Factor and, Embankment Volume Index had critical impact on fuel utilization. As per the aftereffects of relapse, just three boundaries; Slope, Cut-Fill Volume (V) and, Soil Swelling Index (SSI) had huge impact on vitality utilization. utilizing versatile neuro-fluffy derivation framework for forecast of work vitality, fuel vitality, complete apparatus cost, and all out hardware vitality can be effectively illustrated. In correlation with ANN, all ICA-ANN models had higher exactness in forecast by their higher R2 worth and lower RMSE esteem.

Keywords

Artificial neural network, Energy, Environmental research, Imperialist Competitive Algorithm, ANFIS

Introduction

During the last century due to increasing human population, demands for agricultural commodities have been enormously increased. Nowadays, one of the cardinal environmental challenges in the world is energy production and consumption. Despite using modern types of energy such as solar energy, inappropriate use and lack of proper management have led to an intensive rise in energy consumption in this field. It also should be taken into account that environmental conservation and market globalization will be dependent on food security in the future agriculture.