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Prediction of environmental indicators in land levelling using artificial intelligence techniques

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Abstract

Land leveling is one of the most important steps in soil preparation for agricultural and other purposes. . New techniques based on artificial intelligence, such as Artificial Neural Network, integrating Artificial Neural Network and Imperialist Competitive Algorithm (ICA-ANN), or Genetic Algorithms (GA-ANN), or Particle Swarm Optimization (PSO-ANN) have been employed for developing predictive models to estimate the energy related parameters and the results were compared to SPSS and Sensitivity Analysis results. In this study, several soil properties such as cut/fill volume, compressibility factor, specific gravity, moisture content, slope of the area, sand percent, and swelling index were measured and their effects on energy consumption were investigated. Totally 90 samples were collected from 3 land areas by grid size of 20m×20m. The aim of this work was to develop predictive models based on artificial intelligence techniques to predict the environmental indicators of land leveling . Results of sensitivity analysis illustrated that only three parameters consist of soil density, soil compressibility, and soil cut/fill volume had meaningful effects on energy consumption. Among the proposed methods, the GA-ANN had the most capability in prediction of the environmental energy parameters. However, for prediction of LE and FE the ANN and ICA-ANN algorithms had better performance.

On the other hand, SPSS software had higher R 2 value than Minitab software and sensitivity analysis and in fact close to the ANN values. Keywords: Energy; Imperialist competitive algorithm; Sensitivity analysis; ANN; Land levelling; Environmental indicators.

Biography:

Isham Alzoub has a background in Physics and Chemistry. He joined Maucher Jenkins in 2017as a patent attorney. Maucher Jenkins have a number of clients in the field of Green Energy and are interested in the value of patent protection for investment in the field of Green Energy.