Prediction of Shear Strength Parameters of Gypseous Soil using Artificial Neural Networks

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The shear strength of soil is one of the most important soil properties that should be identified before any foundation design. The presence of gypseous soil exacerbates foundation problems. In this research, an approach to forecasting shear strength parameters of gypseous soils based on basic soil properties was created using Artificial Neural Networks. Two models were built to forecast the cohesion and the angle of internal friction. Nine basic soil properties were used as inputs to both models for they were considered to have the most significant impact on soil shear strength, namely: depth, gypsum content, passing sieve no.200, liquid limit, plastic limit, plasticity index, water content, dry unit weight, and initial voids ratio. Multi-layer perceptron training by the backpropagation algorithm was used in creating the network. It was found that both models can predict shear strength parameters for gypseous soils with good reliability. Sensitivity analysis of the first model indicated that dry unit weight and plasticity index have the most significant effect on the predicted cohesion. While in the second model, the results indicated that the gypsum content and plasticity index have the most significant effect on the predicted angle of internal friction.