ANN approach for predicting the soil compaction parameters

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ABSTRACT

Currently, the investment in India undergoes a rapid-building phase concerning the construction of various massive engineering projects. As a result heavy constructions and earthworks continue to inflate; various geotechnical engineering problems are also demanding the concern from engineers and geoscientists. Thus, the reliability of such structures considering saving of both cost and time are of great significance which must be taken into engineering and geoscientists considerations. Consequently, geotechnical data may substantiate our demands to create a large soil database covering most of the area in India. Artificial Neural Networks are apt to fulfill this approach. If rightly applied, it will minimize the investigation program by intensified ground coverage and optimizing the laboratory's testing. Experiential relationships are of greater importance in geotechnical engineering and are often used to estimate certain engineering properties of soil, using data from extensive laboratory or field testing, and these correlations are usually derived with the aid of statistical methods. In the past few years ANN's are becoming more reliable than statistical methods due to their special attributes of identifying intricate systems when the input and output are known from either laboratory or onsite experimentation. The present study aims at predicting soil compaction parameter based on out from the ANN prediction model. The result shows that the developed ANN model was very much competent enough to predict the data with fair degree of accuracy.

KEYWORDS: Artificial Neural Network Modeling, Finite Element Method, Simulation, Soil Compaction.

I. INTRODUCTION

In agronomy, soil compaction is a combination of both engineering compaction and consolidation. It involves a reduction in volume of the soil mass avoiding settlement, to enhance the strength of geotechnical engineering structure. Prior to compaction of soil in the site, some laboratory tests are necessary to determine their engineering properties. Amongst various properties, the maximum dry density (MDD) and the optimum moisture content (OMC) are of very much important and indicate the required density to be compacted in the field. Generally Proctor compaction test is performed to obtain the maximum dry density and the optimum moisture content of the soil to know the amount of compaction needed. The objective of compaction is to increase the bearing capacity of the soil, manage undesirable volumetric changes, changes in hydraulic conductivity, improving the stability of slopes and thus decreasing the detrimental settlement of structures [1]. Various studies have been made to know the practicability of ANN approach in different aspects of soil compaction. Suhail I.Khattab et. al. (2013) has done research on the viability of using Artificial Neural Networks to find nonlinear interactions between different soil parameters. A parametric study was made for the

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