Geophysical Research Abstracts
Vol. 17, EGU2015-122, 2015
EGU General Assembly 2015

Application of artificial neural network to predict clay sensitivity in a high landslide prone area using CPTu data- A case study in Southwest of Sweden

Abbas Shahri (1,3), Mahsasadat Mousavinaseri (2), Shima Naderi (1), and Maria Espersson (3)

(1) Faculty of Civil Engineering, Islamic Azad University, Rudehen branch, Tehran, Iran, Islamic Republic Of (a_abbaszadeh@iauh.ac.ir; shima.naderii@gmail.com), (2) Faculty of Geoinformation, Vienna University of Technology, Vienna, Austria (mmahsa.mousavi88@gmail.com), (3) Uppsala University, Box 534, Construction Engineering Department, SE-75121 Uppsala, Sweden (Maria.Espersson@angstrom.uu.se)

Application of Artificial Neural Networks (ANNs) in many areas of engineering, in particular to geotechnical engineering problems such as site characterization has demonstrated some degree of success. The present paper aims to evaluate the feasibility of several various types of ANN models to predict the clay sensitivity of soft clays form piezocone penetration test data (CPTu). To get the aim, a research database of CPTu data of 70 test points around the Göta River near the Lilli Edet in the southwest of Sweden which is a high prone land slide area were collected and considered as input for ANNs. For training algorithms the quick propagation, conjugate gradient descent, quasi-Newton, limited memory quasi-Newton and Levenberg-Marquardt were developed tested and trained using the CPTu data to provide a comparison between the results of field investigation and ANN models to estimate the clay sensitivity. The reason of using the clay sensitivity parameter in this study is due to its relation to landslides in Sweden.A special high sensitive clay namely quick clay is considered as the main responsible for experienced landslides in Sweden which has high sensitivity and prone to slide.
The training and testing program was started with 3-2-1 ANN architecture structure. By testing and trying several various architecture structures and changing the hidden layer in order to have a higher output resolution the 3-4-4-3-1 architecture structure for ANN in this study was confirmed. The tested algorithm showed that increasing the hidden layers up to 4 layers in ANN can improve the results and the 3-4-4-3-1 architecture structure ANNs for prediction of clay sensitivity represent reliable and reasonable response. The obtained results showed that the conjugate gradient descent algorithm with R2=0.897 has the best performance among the tested algorithms.
Keywords: clay sensitivity, landslide, Artificial Neural Network