Prediction of the Lateral Bearing Capacity of Short Piles in Clayey Soils Using Imperialist Competitive Algorithm-Based Artificial Neural Networks

Authors : Reza Dinarvand, Mahdi Sadeghian, Somaye Sadeghian

Abstract : Prediction of the ultimate bearing capacity of piles (Qu) is one of the basic issues in geotechnical engineering. So far, several methods have been used to estimate Qu, including the recently developed artificial intelligence methods. In recent years, optimization algorithms have been used to minimize artificial network errors, such as colony algorithms, genetic algorithms, imperialist competitive algorithms, and so on. In the present research, artificial neural networks based on colonial competition algorithm (ANN-ICA) were used, and their results were compared with other methods. The results of laboratory tests of short piles in clayey soils with parameters such as pile diameter, pile buried length, eccentricity of load and undrained shear resistance of soil were used for modeling and evaluation. The results showed that ICA-based artificial neural networks predicted lateral bearing capacity of short piles with a correlation coefficient of 0.9865 for training data and 0.975 for test data. Furthermore, the results of the model indicated the superiority of ICA-based artificial neural networks compared to back-propagation artificial neural networks as well as the Broms and Hansen methods.