عنوان مقاله:

A COMPARISON OF PERFORMANCE OF SEVERAL ARTIFICIAL INTELLIGENCE METHODS FOR ESTIMATION OF REQUIRED ROTATIONAL TORQUE TO OPERATE HORIZONTAL DIRECTIONAL DRILLING

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خلاصه مقاله:

Horizontal Directional Drilling (HDD) is extensively used in geothechnical engineering. In a variety of conditions it is essential to predict the torque required for performing the reaming operation. Nevertheless, there is presently not a convenient method to accomplish this task. To overcome this problem, in this research, the application of computational intelligence methods for data analysis named Support Vector Regression (SVR) optimized by differential evolution algorithm (DE) and Adaptive Neuro-Fuzzy Inference System (ANFIS) to estimate of the required rotational torque to operate horizontal directional drilling is demonstrated. Three ANFIS models were implemented, ANFIS–subtractive clustering method (ANFIS-SCM), ANFIS–grid partitioning (ANFIS-GP) and ANFIS–fuzzy c–means clustering method (ANFIS-FCM). The estimation abilities offered using SVR-DE, ANFIS-FCM, ANFIS-SCM, ANFIS-GP were presented by using field data given in open source literatures. In these models, the rotational torque (M) is used as the output parameter, while the length of drill string in the borehole (L), axial force on the cutter/bit (P), rotational speed (revolutions per minute) of the bit (N), the radius for the ith reaming operation (Di), the mud flow rate (W), the total angular change of the borehole (KL), and the mud viscosity (V) are the input parameters. To compare the performance of models for rotational torque to operate horizontal directional drilling prediction, the coefficient of correlation (R^2) and mean square error (MSE) of the models were calculated, indicating the good performance of the ANFIS-SCM model.

کلمات کلیدی: