

عنوان مقاله:

Application of Artificial Neural Networks (ANN) to Predict Geomechanical Properties of Asmari Limestones

محل انتشار:

دوفصلنامه زمین شناسی ژئوتکنیک، دوره 12، شماره 1 (سال: 1395)

تعداد صفحات اصل مقاله: 20

نویسندگان:

m Razifard - Department of Engineering Geology, Tarbiat Modares University, P.O. Box 14115-175, Tehran, Iran

m Khamechian - Department of Engineering Geology, Tarbiat Modares University, P.O. Box 14115-175, Tehran, Iran

m.r. AminNasari - Department of Industrial Engineering, Tarbiat Modares University, P.O. Box 14115-143, Tehran, Iran

خلاصه مقاله:

A number of common laboratory rock mechanics tests are carried out in all geotechnical projects such as dams, to determine parameters such as porosity, density, water absorption, sonic velocity, Brazilian tensile strength, uniaxial compressive strength, and triaxial compressive strength. In this paper, data obtained from two dams in Asmari Formation including Khersan 1 and Karun 4 - both located in Chahar-MahalVaBakhtiari Province, Iran - have been subjected to a series of statistical analyses. Then, using Multivariate Linear Regression (MLR) and Artificial Neural Networks values of UCS, E, C, and ϕ were predicted using the input parameters including depth, compression ultrasonic velocity, porosity, density, and Brazilian tensile strength. The designed ANN in this research was a feedforward backpropagation network which is powerful tool to solve prediction problems. Designed network had two hidden layer (hidden layer 1: 18 neurons and hidden layer 2: 20 neurons). Via comparing designed MLR and ANN models, it was revealed that ANNs (R^2 UCS= 0.91, R^2 E = 0.87, R^2 C = 0.78, R^2 ϕ = 0.61) are more efficient than MLR models (R^2 UCS= 0.69, R^2 E = 0.69, R^2 C = 0.66, and R^2 ϕ = 0.50) in predicting strength and shear parameters of the intact rock. Also, to enhance the credibility of this study, some extra tests were carried out to evaluate the efficiency of network designed for prediction of strength parameters. The results obtained from this network were as: R^2 UCS= 0.85, R^2 E = 0.81

کلمات کلیدی:

Artificial Neural networks (ANN), Feedforward Backpropagation; Multivariate Linear Regression (MLR); Asmari Formation; Uniaxial Compressive Strength (USC); Modulus of Elasticity (E); Cohesive Strength (C); ϕ (Internal Friction Angle)

لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/705360>

