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Estimation of cohesion for intact rock materials using regression and soft computing analyses

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Keywords: cohesion, intact rock material, regression, soft computing

Shear strength parameters such as cohesion (c) and internal friction angle (ϕ) are among the most critical rock properties used in the geotechnical design of most engineering projects. However, the determination of these properties is laboring and requires special equipment. Therefore, this study introduces several predictive models to estimate the c of different rock types based on regression and artificial intelligence methods.

For this purpose, a comprehensive literature survey is carried out to collect quantitative data on the shear strength properties of different rock types. Then, regression and soft computing analyses are performed to establish several predictive models based on the collected data. As a result of these analyses, five different predictive models (M1–M5) were established. Based on the performance of the established predictive models, the artificial neural network-based predictive model (model 5, M5) was found to be the most suitable choice for the evaluation of the c for different rock types.

In addition, mathematical expressions behind the M5 model are also presented in this study to let users implement it more efficiently. In this regard, the present study can be declared a case study showing the applicability of regression and soft computing analyses to evaluate the c of different rock types. However, the number of datasets employed in this study should be increased to get more comprehensive predictive models in future studies.

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