

## **DEVELOPMENT OF SOFT COMPUTING-BASED MATHEMATICAL MODELS FOR ESTIMATING THE DEFORMATION MODULUS OF WEAK ROCKS**

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The deformation properties of rocks play a crucial role in most geomechanical problems as they are one of the most critical input parameters when analysing the stability of rock slopes, tunnels, mine galleries, and other underground excavations. In this study, comprehensive predictive models are introduced to estimate the tangential Young modulus ( $E_{ti}$ ) of weak rocks. For this purpose, an extensive literature survey is conducted to compile datasets including critical physical and mechanical rock properties. Based on the collected data, various soft computing methods are employed. As a result of soft computing analyses, robust predictive models are developed based on artificial neural networks (ANN), genetic algorithm (GA), adaptive neuro-fuzzy inference system (ANFIS), and multivariate adaptive regression splines (MARS) methodologies. The performance of the established predictive models was assessed using several statistical indicators; it is concluded that the empirical models based on ANN, and ANFIS methodologies are found to be the most convenient tools for estimating the  $E_{ti}$  of weak rocks.