Providing the optimal blast pattern to achieve the target crushing dimensions using a combination of neural network and optimization algorithms

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ABSTRACT

Optimal mining means doing the best possible way to extract a mineral. This is achieved by choosing the right extraction method and implementing it in the best possible way. This reduces both fixed and variable extraction costs and increases the profit from mining operations. This research focuses on optimizing blasting parameters to improve crushing efficiency and reduce costs in the mining industry. For this purpose, data from the Rockfill dam sedimentation in Dar Alo mine was used to conduct this research. A neural network model was developed to predict the crushing results based on various blasting parameters. Then, metaheuristic algorithms, including the Whale Optimization Algorithm (WOA) and the Firefly Algorithm (FA), were used to optimize blasting patterns. Three different patterns from metaheuristic algorithm methods were proposed to the mine. The results show that the WOA optimized pattern performs better than the FA optimized pattern in terms of dispersion and cost-effectiveness.