

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

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### ARTICLE INFO

#### Article history:

Article Type: Research paper

Received: 2024 November 19

Revised: 2025 August 2

Accepted: 2025 September 3

Available online: 2025 September 3

#### Keywords:

Blasting Optimization,

Fragmentation,

Neural Networks,

Metaheuristic Algorithms,

Mining Engineering

### 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.

**Cite this article:** Ansari Ardehjani, E., Shojaee, S., Ataei, M., & Bagherpour, R. (2025). Providing the optimal blast pattern to achieve the target crushing dimensions using a combination of neural network and optimization algorithms.. Construction science and technology, 6(2), 1-12. [DOR 20.1001.1.29812577.1404.6.2.1.7](https://doi.org/10.29812577.1404.6.2.1.7)



**Publisher:** Imam Hossein University.

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