



\* ; \*\* ; \*

## Matlab

SKOI@stir.ac.uk : ; \*  
[basi@kavoshgaran-mine.com](mailto:basi@kavoshgaran-mine.com) : ; \*\*  
[asadi6@yahoo.com](mailto:asadi6@yahoo.com) : ; \*

---



[ ]

(GoldSize 2.0)

Goldsize

MATLAB

( )

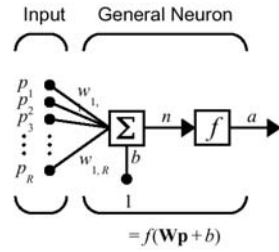
		Spacing	Burden		
		$d_{50}$	$d_{63.5}$	$d_{80}$	

(w)

R

( )

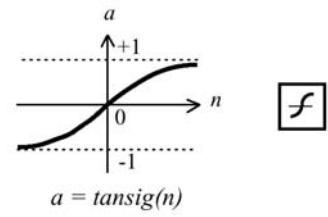
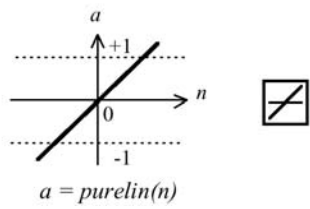
f [ ].



Where...  
R = Number of elements in input vector

( )

( )



( ) purelin

purelin

newff MATLAB

[ ]





d80

( )

/	/	/	/	/	/	/	/	/	/		
/	/	/	/	/	/	/	/	/	/		
/	/	/	/	/	/	/	/	/	/		
/	/	/	/	/	/	/	/	/	/		

spacing

/

d<sub>80</sub>

/ / spacing

Spacing

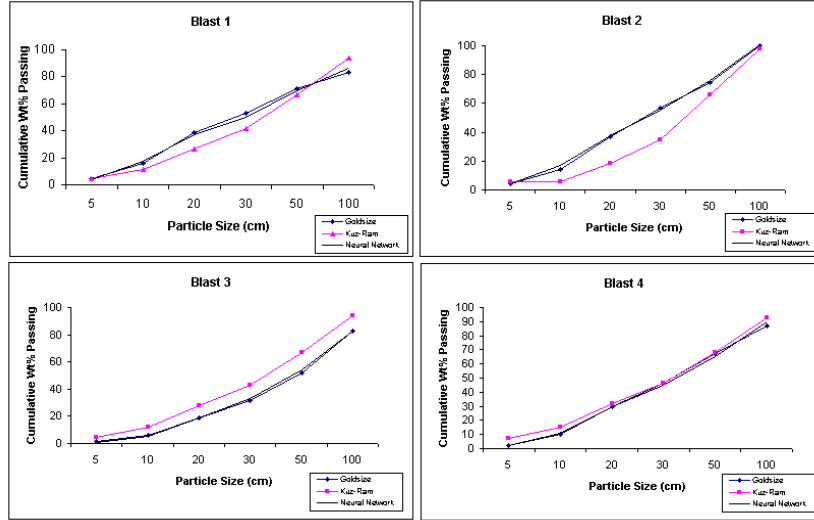
/ spacing

spacing

/

( )

(.)



Kuz-Ram (Goldsize )

)

(

- [1] Hekmat, A. 2003, *Prediction of Loading system (shovel) efficiency based up on large fragmented rock caused by blasting operation*, MSc. Thesis, Amirkabir University of Technology, Tehran, Iran
- [2] Philip, P., Wasserman, 1987, " *Neural Networks Theory and Practice.*"
- [3] Haykin, S., *Neural Networks. A Comprehensive Foundation.*, Second Edition, Prentice-Hall, Inc., New Jersey,

## Neural Network Analysis in Rock Fragmentation

Kazem Oraee<sup>1</sup>, Bahareh Asi<sup>2</sup>, Ahmad Asadi<sup>3</sup>

Drilling and blasting costs constitute up to 50% of the total operational costs in open pit mines. Fragmentation of rock after blasting is an important determinant of the cost associated with these two components of mine development. In this paper, fragmentation of the rock after blasting is estimated analytically by the use of neural network method. The outcomes are compared with those predicted by Kuz-Ram and image analysis methods. The method has then been tested using real data from Gol-e-Gohar iron ore mine in Iran. It is shown that neural network method can be used efficiently in real cases and the final results can be expected to have a high degree of accuracy. The results obtained in this study and the methodology introduced, can assist the mining design engineer to decide on a drilling and blasting pattern that produces the most suitable fragmentation of the blasted ore, and hence minimize the total cost of the mining operations.

**Key word** :Neural Network, Kuz-Ram, Rosin-Rammler , Blasting, Fragmentation, Open pit mine

---

<sup>1</sup> Assistant professor, Islamic Azad University- South Tehran Branch, Tehran, Iran, E-mail: sko1@stir.ac.uk

<sup>2</sup> MSc. in mining engineering, Kavoshgaran Consulting Engineers, Tehran, Iran, E-mail: Basi56@kavoshgaran-mine.com

<sup>3</sup> Assistant professor, Islamic Azad University- South Tehran Branch, Tehran, Iran, E-mail: asadi6@yahoo.com