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E-man Part II: Application of Neural Networks for Classification of Bauxite

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ABSTRACT

E-man (Evolution of Mimics of Algorithms of Nature) comprises of mapping of processes in nature (animate/inanimate) onto mathematical algorithmic domain. The software implementation of mimicking nature in functioning of brain, foraging, social interaction, , hereditary, evolution and mating brought renaissance in parametric/nonparametric data processing into information in all science/ engineering/ technological research.

Method: The classification of bauxite based on ICP-MS chemical elemental quantification in different locations is modeled using single layer perceptron (SLP-) neural network (NN) procedure with Trajan software. The processing of data set (NP=30) using five rock types in central and northern blocks with IPS, a fast solution choice of Trajan, resulted in SLP with eight hidden neurons. The classification results endorse the superiority of data driven NN over soft PC analysis.

Highlights: A progressive classification data analysis of high quality instrumental data is performed from hard linear correlation, soft dimension-reduction of correlated variables

[#] Part of the work was presented at National Seminar on Bauxite of Orissa and Andhra Pradesh, Retrospect and Prospect at Andhra university, Visakhapatnam, India (2009) July.

(PCA) and model free data driven supervised NN, a subset of natural intelligent computational paradigm. The two classes are unequivocally detected employing training, verification and test protocols.

Future scope: Data from more sampling locations and larger datasets and analysis with self organizing map (SOM), learning vector quantization (LVQ), neural gas (NG), and unsupervised/supervised auto-resonance theory (ART) will probe deep into geochemical prospects.

Keywords: Geochemistry, Transition metal/lanthanides, ICP_MS, Neural network, PCA, Bauxite, classification, E-man, Ore-benefaction