

Neuron Efficiency in Fluid Dynamics and Prediction of Groundwater Reservoirs' Properties Using Pattern Recognition

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Abstract : The application of neural network using pattern recognition to study the fluid dynamics and predict the groundwater reservoirs properties has been used in this research. The essential of geophysical survey using the manual methods has failed in basement environment, hence the need for an intelligent computing such as predicted from neural network is inevitable. A non-linear neural network with an XOR (exclusive OR) output of 8-bits configuration has been used in this research to predict the nature of groundwater reservoirs and fluid dynamics of a typical basement crystalline rock. The control variables are the apparent resistivity of weathered layer (ρ_1), fractured layer (ρ_2), and the depth (h), while the dependent variable is the flow parameter ($F = \lambda$). The algorithm that was used in training the neural network is the back-propagation coded in C++ language with 300 epoch runs. The neural network was very intelligent to map out the flow channels and detect how they behave to form viable storage within the strata. The neural network model showed that an important variable g_r (gravitational resistance) can be deduced from the elevation and apparent resistivity ρ_a . The model results from SPSS showed that the coefficients, a, b and c are statistically significant with reduced standard error at 5%.

Keywords : gravitational resistance, neural network, non-linear, pattern recognition

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