Neural network and lithofacies prediction from well-logs data

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Lithofacies classification is an important step in reservoir characterization and petrophysical experts use usually core rocks sampling analyzed in laboratory which is not very economic. For that we try in this paper to show the contribution of the fractal analysis revisited by the continuous wavelet transform in the lithofacies prediction from well-logs data.

The proposed idea is to inject many ranges of input in the self-organizing map neural network model ; the goal is to choose the best input to be used for better lithofacies classification.

The ranges of input are:

-A five raw well-logs data which are: Gamma ray, Density, Neutron porosity, Photoelectric absorption coefficient and sonic well- log.

-The five raw well-logs combined with the three radioactive elements concentration.

-The estimated Holder exponent of the five well-logs data.

-The estimated Holder exponent of the five raw well-logs data and the Holder exponents of the radioactive elements concentrations.

-The estimated Holder exponent of the five raw well-logs data combined with the three radioactive elements concentration logs.

Application of the proposed idea at two boreholes located in the Algerian Sahara shows that the estimated Holder exponent are used for dominant lithology identification in each bed, however the raw well-logs as an input give more details and precision especially when we enhance this last input with the spectrometry well-logs

Keywords: Lithofacies, fractal analysis, Holder exponent, Kohonen's map, classification, spectrometry.