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Reservoir characterization from well-logs data using neural network models

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The first part of this work consists to use the three neural network models in a supervised learning to estimate petrophysical parameters from well-logs data. Parameters to be estimated are: Porosity, Permeability and Water saturation.
The neural network machines used consist of the Multilayer perceptron (MLP), the Radial Basis Function (RBF) and Hopfield model (HPF). The main input used to train these neural models is the raw well-logs data recorded in a borehole located in the Algerian Sahara.
A comparison between the three neural machines shows that the MLP is the most suitable for petrophysical parameters prediction.
The second part consists to combine between the Self-Organizing Map (SOM) neural network model and the MLP for lithofacies classification from well-logs data. Firstly, the self organizing map is trained in an unsupervised learning; the input is the raw well-logs data. The SOM will give in the output, a set of classes of lithology. After that the core rocks data are used for the map indexation.
The set of lithology classes are generalized for the full depth interval, including depths where core rock analysis doesn't exist. This last will be used as an input to train an MLP model. Obtained results show that the coupled neural network models can give a more precise classification than the SOM or the MLP.
Keywords: Well-logs data, MLP, SOM, RBF, HPF, Supervised, Unsupervised.