ARTIFICIAL NEURAL NETWORK AS A TOOL FOR PATTERN RECOGNITION AND ELECTROFACIES ANALYSIS IN POLISH PALAEOZOIC SHALE GAS FORMATIONS

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Introduction
Unconventional oil and gas reservoirs from the Lower Palaeozoic basin at the western slope of the East European Craton were taken into account in this study. The aims was to supply and improve standard well logs interpretation based on machine learning methods, especially artificial neural networks.

Methods
Artificial neural network were used on standard lab data e.g. velocity, density, resistivity, porosity, radioactivity, photoelectric factor. During the calculations, information about lithology of stratigraphy weren't take into account. We apply different methods of classification: Cluster Analysis, Support Vector Machine and Artificial Neural Network – Kohonen Algorithm. We compare the results and analyse obtained electrofacies. Machine learning method - Support vector machine SVM was used for classification.

Results
For the same data set SVM algorithm application results were compared to the results of Kohonen algorithm. The results were very similar. We obtained very good accuracy of the classification. Kohonen algorithm (ANN) was used for pattern recognition and identification of electrofacies. Kohonen algorithm was also used for geological interpretation of well log data. As a results of Kohonen algorithms application, groups corresponding to the gas bearing intervals were found.

Conclusions
Analysis showed diversification between gas-bearing formations and surrounding beds. It is also shown that internal diversification in gas-saturated beds is present. It is concluded, that Artificial Neural Network appeared to be useful and quick tool for preliminary classification of members and gas-saturated identification.