

Penentuan distribusi porositas pada reservoir karbonat menggunakan neural network berdasarkan inversi impedansi akustik dan atribut seismik = Determining porosity distribution on carbonate reservoir using neural network based on acoustic impedance inversion and seismic attributes

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Abstrak

Penelitian ini menggunakan data seismik 3 dimensi dan 5 data sumur dari lapangan w. Target penelitian yaitu batuan karbonat pada formasi Tuban di cekungan Jawa Timur Utara. Penelitian bertujuan menentukan distribusi porositas karbonat, dengan menggunakan neural network berdasarkan inversi dan atribut seismik. Inversi seismik model based dan linier programming sparse spike, menghasilkan impedansi akustik pada lapisan di bawah horizon Top Carbonate hingga horizon Base Carbonate, mengalami peningkatan signifikan pada rentang 38076 - 46857 ((ft/s)*(g/cc)). Atribut seismik sweetness, rms amplitude, dan reflection intensity, digunakan sebagai atribut eksternal, untuk tahap multiatribut linier regresi dan neural network. Multiatribut linier regresi dan neural network dilakukan untuk memprediksi porositas berdasarkan atribut-atribut internal maupun eksternal.

Hasil analisis multiatribut yang diaplikasikan pada data raw seismik dan 5 volum atribut eksternal, yaitu log porositas prediksi, memiliki nilai korelasi sebesar 0.712 terhadap log porositas. Dan, nilai validasinya sebesar 0.573. Sedangkan, Probabilistic Neural Network menghasilkan porositas prediksi dengan nilai korelasi sebesar 0.661 dan nilai validasinya sebesar 0.485. Berdasarkan multiatribut linier regresi maupun probabilistic neural network, porositas rata-rata pada lapisan reservoir karbonat sebesar 10-15% di bagian utara. Sedangkan, di bagian selatan, porositas rata-rata hanya di bawah 6%.

This study uses three-dimensional seismic data and 5 well data from w field. The research target is carbonate rocks of the Tuban formation in North East Java basin. The study aims to determine the distribution of porosity carbonate, by using neural network algorithm, based on acoustic impedance inversion and seismic attributes. Models based inversion and linear programming sparse spike inversion result in acoustic impedance, in the layers below the horizon Top Carbonate to horizon Base Carbonate, experienced a significant increase impedance in the range 38076-46857 ((ft/s)(g/cc)). Some seismic attribute; sweetness, rms amplitude, and reflection intensity, are used as external attributes for multi attribute linear regression and neural network. Multi attribute linear regression and neural network is done to predict porosity based on attributes of both internal and external.*

The results of the analysis that is applied to the data multi attribute raw seismic and 5 volumes of external attributes, is called log porosity prediction, have a correlation value of 0.712 to log porosity original. And the value of its validation is 0.573. Meanwhile, Probabilistic Neural Network is producing log porosity prediction with correlation value of 0.661 and the value of its validation by 0485. Multi attribute based linear regression and probabilistic neural network, average porosity of the reservoir layer of carbonate of 10-15% in the north. Meanwhile, in the southern part, average porosity of just under 6%.