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Pre-drill Pore pressure estimation in shale gas reservoirs using seismic genetic inversion: Application to Barnett shale.

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In this paper, the seismic genetic inversion is used for estimation of the pore pressure before drilling, the first stage is to invert the 3D seismic cube recorded in the Fot Worth basin located in the United States of America using the artificial neural network.
The Multilayer Perceptron neural network is trained in a supervised mode using the stacked 3D seismic amplitudes near three wells as an input and
the calculated acoustic impedances derived from the density and sonic logs recorded in these wells as an output. During the training the weights of connections between neurons are optimized, then the whole seismic cube is propagated though the neural machine. The output of this machine is the cube of the acoustic impedance.
A linear relationship between the depth and velocity are derived using sonic well-log data of a vertical well, this relationship will be us
ed as a vertical trend in the Eaton's model. The acoustic impedances are used to deduce the pore pressure from the Eaton's model. The proposed process is applied to derive the pore pressure in the Lower Barnett shale, obtained results can be used for well-bore stability and hydraulic fracture planning and simulation.