
Predicting Log Properties from Seismic Data Using Abductive Networks

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In this study, abductive network is used to predict reservoir log properties from seismic attributes. Statistical approaches have been used to model the relationship between the seismic data and the reservoir parameters. The idea of using multiple seismic attributes to predict log properties has been widely used and several case histories have been reported in the literature using multi-linear stepwise regression and neural networks. The input to any statistical method is a series of attributes extracted from the seismic data. There is, however, a huge number of attributes that can be extracted from the seismic data. Therefore, an efficient subset of these attributes has to be selected before prediction. Exhaustive search of all attribute combinations is computationally infeasible. As a solution, linear stepwise regression has been proposed which is based on linear relationships between attribute combinations and log data. Therefore it is suitable for linear regression. For non-linear regression such as neural networks an attribute selection method that embodies the nonlinearity between attribute combinations and log data is desirable. Abductive Networks should in many ways help in this regard: 1. Abductive Networks can automatically select a statistically representative subset of optimum predictors from the available set of seismic attributes. 2. Abductive Networks are nonlinear predictors which are proven to outperform linear predictors. 3. Unlike various neural network paradigms, Abductive Networks can provide a closed form analytical relationship between the selected seismic attributes and the modeled parameter; this can help in fully understanding the geographical structure of the area.
