Transforming seismic data into lateral sonic properties using artificial neural network: A case study of real data set

Abdul Haris, author

Abstrak

Transforming seismic data into lateral sonic log properties was carried out successfully using the artificial neural network (ANN). This work is related to a detailed investigation of reservoir properties that requires complete data. The objective of this paper is to build a geological model that has vertical and lateral distribution representing the framework of geological change of sonic log properties. However, detailed well log data analysis only provides information of vertical distribution, therefore effective application of seismic data is required to construct a spatial distribution model that represents the lateral sonic log properties away from a well. This paper presents a strategy for transforming seismic data into pseudo-sonic log data by using ANN approaches rather than a simple approach of empirical relationship. The ANN approach defines a specific function that correlates a series of attributes generated from seismic data, such as amplitude envelope, instantaneous frequency, instantaneous phase, and acoustic impedance by a training mechanism based on the sonic log data as a target parameter. The probabilistic neural network (PNN) as one ANN algorithm is applied to transform seismic attributes into a lateral sonic log. An example of an ANN approach using a real data set from the Indonesian field was presented. The pseudo-sonic log shows a good agreement with the real sonic log data, which is represented with a correlation coefficient of 0.91. Further, the seismic line data was successfully transformed into the pseudo lateral sonic log data that covers the whole seismic line.