

Analysis of Production Forecasting in Unconventional Gas Resources Development Using Machine Learning and Data-Driven Approach

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Abstract : Unconventional gas resources have dramatically changed the future energy landscape. Unlike conventional gas resources, the key challenges in unconventional gas have been the requirement that applies to advanced approaches for production forecasting due to uncertainty and complexity of fluid flow. In this study, artificial neural network (ANN) model which integrates machine learning and data-driven approach was developed to predict productivity in shale gas. The database of 129 wells of Eagle Ford shale basin used for testing and training of the ANN model. The Input data related to hydraulic fracturing, well completion and productivity of shale gas were selected and the output data is a cumulative production. The performance of the ANN using all data sets, clustering and variables importance (VI) models were compared in the mean absolute percentage error (MAPE). ANN model using all data sets, clustering, and VI were obtained as 44.22%, 10.08% (cluster 1), 5.26% (cluster 2), 6.35%(cluster 3), and 32.23% (ANN VI), 23.19% (SVM VI), respectively. The results showed that the pre-trained ANN model provides more accurate results than the ANN model using all data sets.

Keywords : unconventional gas, artificial neural network, machine learning, clustering, variables importance

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