Applications of Artificial Neural Networks Technology in Petroleum Geosciences and Engineering

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For the past few years Artificial Neural Networks (ANNs) Technology has made a strong comeback to the scientific community. The natural complexities of deepwater petroleum reservoir systems continue to provide a challenge to geoscientists. In particular, ANNs have been applied with some degree of success to many complex, non-linear and dynamic petroleum geosciences and engineering problems in an attempt to elucidate proper understanding of the hydrocarbon reservoirs. There has been a handful of papers suggesting the use of artificial neural networks in the petroleum industry. Paper categories range from recommended use of ANNs, employment of ANNs to the introduction of new implementation of neuro-computing technology in petroleum studies. A review of the literature reveals that ANNs have been used successfully in the prediction of porosity, permeability, oil, gas and water saturation of hydrocarbon bearing rocks, lithofacies classifications, identification of velocity variation in a seismic cube, prediction of shear wave velocity from wire line log data, prediction reservoir properties based on seismic data as well as advances in reservoir modelling and real-time reservoir management. The objective of this paper is to provide a general view of some ANN applications for solving some types of petroleum geosciences and engineering problems. It is not intended to describe the ANNs modelling issues in petroleum studies.

The paper also does not intend to cover every single application or scientific paper found in the literature. For brevity, some works are selected to be described in some details, while others are acknowledged for reference purposes. The paper then investigates and presents the applicability as well as accuracy, strengths and limitations of ANNs compared with the other modelling approaches with vivid illustrations.