**Title: Evaluating Different Clustering Algorithms for Prediction of Rock Types and Permeability**

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**Abstract:** Rock typing has multitudes of uses, from optimizing drilling spots, to determining perforation zones, evaluating in-place volumes using static and dynamic models, to better understanding complex flow properties that take place in oil and gas reservoirs. Studies on rock typing have mainly utilized porosity and permeability measurements converted to rock typing indices, with newer studies introducing elements of supervised machine learning as well. However, a comparison of different unsupervised machine learning algorithms for rock typing applications has not been widely studied. This paper aims to perform a comparative study of the performance and outputs from 5 different unsupervised machine learning models, which we will benchmark against a modified iterative multi-linear regression (IMLR) rock typing technique. This study will be conducted on core data comprising 2000 unique data points from the United Kingdom (UK). The 5 unsupervised machine learning model are the K-Means, Self-Organising Map (SOM) + K-Means, Density-Based Spectral Clustering of Application with Noise (DBSCAN), Balanced Iterative Reducing and Clustering using Hierarchies (BIRCH) and Gaussian Mixture Models (GMM). This study’s results show that while K-Means and BIRCH rock typing have well defined/ well-spaced clusters, they do not do as good a job at predicting permeability as DBSCAN and GMM, indicating that while machine learning metrics define uniqueness of a solution, it is ultimately the interpreter that must review the data and decide on the suitability of the model.