

Recent Developments in the Use of Big Data, Deep Learning and Artificial Intelligence in Upstream E&P

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ABSTRACT

When many people think of Big Data, with deep learning / artificial intelligence, they may not actually think of the oil industry, and even less about geosciences. Yet, Big Data is increasingly used in the geosciences in areas that range from developing 3D reservoir models, reservoir characterization, and identifying sweet spots, fracture networks, geochemical markers, and more. Big Data and new analytics are also used for ranking prospects, evaluating acreage, and integrating disparate data sets. This paper investigates the advances in analytics and Big Data, and it looks at the way that neural networks are used for “deep learning” and “machine learning” in the exploration and development cycle of upstream, as well as later work in enhanced oil recovery. The paper analyzes the results and examines cases of successful application and describes the data sets used, the construction of the algorithm (or utilization of an application) and how / where the analytics were performed. The focus is on cloud-based analytics which can be implemented at a relatively low cost, and yet can powerfully and quickly process massive data sets of wildly diverging sources and quality. In addition to looking at the goals of Big Data analytics in the exploration and development process, the paper looks at data quality and the ways in which bad data and “noise” are identified and eliminated. Finally, the paper reviews new directions in Big Data, and the ways in which some of the most persistent problems / ambiguities in the oil field are being addressed, with pros, cons, costs, and benefits.