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Abstract

Realtime formation evaluation in the oil and gas industry is of paramount importance in order to enhance geosteering to improve reservoir productivity from wells. Significant advances in logging while drilling (LWD) technologies have enabled accurate logging during the drilling stage, allowing to utilize the information in real-time to enhance decision making in the drilling process. Edge computing represents a paradigm shift focusing on bringing data processing and interpretation closer to where the data are collected and utilized. The objective of this study is to introduce a framework of edge computing for LWD data processing and interpretation.

Modern innovative logging tools, such as sonic, resistivity and NMR amongst others, allow to determine formation properties in real-time and provide an image of the formation around it during the drilling stage. While measurement data are readily available, current technologies do not allow for the transfer of these large amounts of data uphole for processing on surface. This represents a challenge as the information may be retrieved either after the drilling is completed, or requires data acquisition retrievals during the drilling process which reduces efficiency. In this paper, we outline a new edge computing based framework that processes the LWD data downhole and autonomously provide recommendations on the optimization of the well path to maximize reservoir productivity.

The Artificial Intelligence (AI) edge computing framework enables autonomous downhole data processing and interpretation of various LWD measurements, such as gamma ray, resistivity, density, neutron, and acoustic, and then transfers interpreted results uphole with conventional telemetry for processing in a cloud framework. This article will address some of the major challenges in the deployment of edge computing devices, as well as its integration with modern AI technologies in order to enhance decision making support and optimize data transfer rates.

The AI edge computing framework represents a key technology to utilize the power of edge and cloud computing as well as AI for geosteering and reservoir performance optimization.