Drill Bit Performance Monitoring And Optimization Using Advanced Artificial Intelligence

Shan E Zehra Lashari and **Ali Takbiri Borujeni**
West Virginia University, USA

Optimization of drilling process is crucial in reducing the overall cost of an oil and gas project. Even after rigorous process of planning, drilling phase of any project can be hindered by unanticipated drilling problems. The objective of this paper is to acknowledge and implement application of artificial intelligence to produce a better drilling performance monitoring method. The drill bit data used for this project consists of different variables (WOB, RPM, GPM, Swivel, Choke and Borehole Pressure) that are monitored every millisecond. Since these observations are a function of time, this set was characterized as time series and underwent time series analysis and prediction. Starting with time series forecasting, this "multivariate" time series data is modelled using recurrent neural networks (RNN). The predictions are generated to identify the possibility of any bit balling in sandstone and shale, using the same drill bit. The rate of penetration and torque are used as output parameters to characterize bit balling. The essential deliverable of this work is deriving a methodology to optimize drilling parameters to avoid bit balling. The paper also provides an outline to use real time drilling data to optimize the drilling parameters instantaneously. The results produced through neural network models has enables to view the impact of different parameters on over all drilling performance and gauge the degree of influence by each parameter. The work also aims to highlight the importance of utilizing micro data to develop better understanding of drilling process under different operating conditions.

sl0026@mix.wvu.edu

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