May 2021 – CSUR Technical Webinar

Applications of Machine Learning in Real-Time

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TECHNICAL WEBINAR SERIES

APPLICATIONS OF MACHINE LEARNING IN REAL-TIME

PRESENTED BY RAIR BARRAEZ, WELL DATA LABS

Data analytics, automation, artificial intelligence, and machine learning tools are increasingly being incorporated into all facets of our Energy Industry. In fact, as we collect more and more data from various sources utilizing progressively sophisticated tools and equipment, it is becoming humanly impossible to be able to look at, decipher and analyze what we are seeing in all the data that is being collected. For CSUR's 1st webinar for May 2021, an organization that has integrated machine learning into its workflow while looking at completion data from treatment and offset wells was invited to share their knowledge and process. Well Data Labs (WDL), which is headquartered in Denver, Colorado, has taken data from hundreds of thousands of frac stages and built models & software tools that can alert the operators manage fracture driven interactions (FDI) during operations using real time analytics.

Rair Barraez, WDL Sales Engineer who provides technical support for their clients, was on the Zoom call to offer additional insights into his organization's technology. After a brief overview of his company's history, he proceeded to describe the mechanical differences between fracture shadow effects and direct fracture interaction. Although there are many factors that influence FDIs both in occurrence and magnitude, the speaker indicated that an analysis in real-time can be utilized to adjust the subsequent unit development and completion designs to minimize / mitigate frac hits. He went on to describe that their software tools and technology are designed to extract nuances and troubling trends in the data that a human eye would potentially miss. The speaker also described how monitoring a drilled but uncompleted / unstimulated offset wellbore could provide valuable (& cleaner) data for analysis. This methodology, termed Sealed Wellbore Pressure Monitoring (SWPM), has been effective in aiding in the optimization and / or determination of various completions / reservoir parameters (i.e. cluster efficiency, frac geometry, frac closure times, depletion issues, stimulation model effectiveness, etc.).

Finally, the speaker explained the process of active well defence with the aid of an actual Bakken Shale field case. Similar to traditional well test analysis, pressure derivatives are used to provide additional sensitivities and view into the data that would otherwise seem normal. He went through various treatment charts to illustrate the tool's ability to recognize and alert the operations group of pending FDIs. For this particular development, it led to more rapid decisions during the execution of the active defence protocols where 53% of the pending FDIs were averted or defended against.

The power to *Connect*. The power to *Convene*. The power to *Inform*.

Summary

Managing fracture driven interactions (FDIs) and real-time visibility into completions operations are two of the major topics of discussion in the industry right now. Being able to bring both of these together creates a powerful tool for operators looking to position themselves at the cutting edge of upstream technology. This webinar will describe the development and application of several unique / novel machine learning tools that can be deployed in real-time to better manage the challenges presented by FDIs.
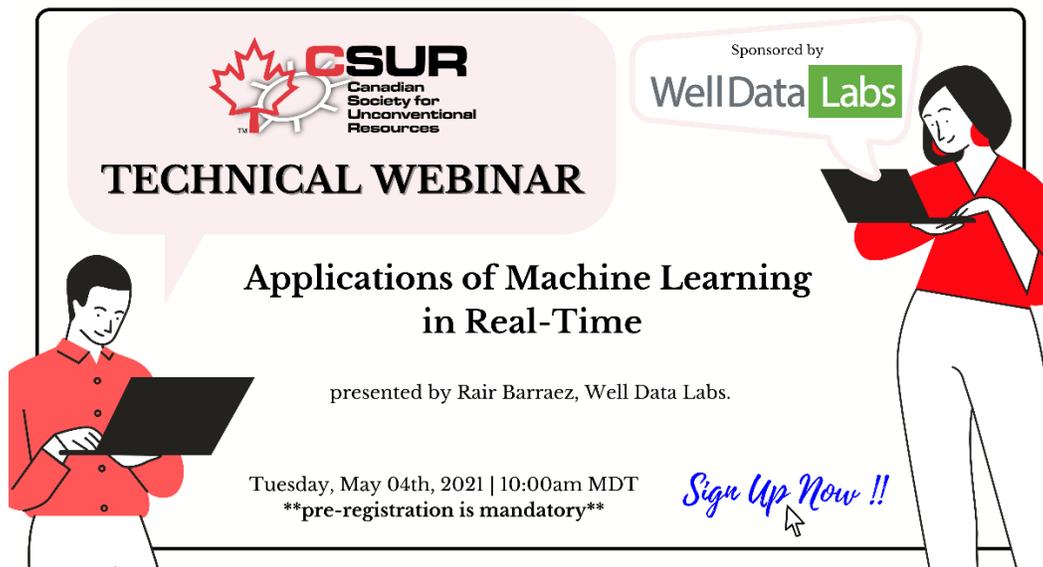
One example that we will review is using machine learning to assist with active well defense scenarios. The Society of Petroleum Engineers (SPE) paper SPE-199735 outlined a collaboration between Well Data Labs and Abraxas. Since then, machine learning has been developed that can automatically identify offset pressure responses. This removes a major component of human error and analyst bias and also provides the ability to conduct much deeper analysis in a fraction of the time.

Another example that has been developed relies on alerts that notify an operator within seconds of pressure spikes that exceed specific thresholds. Using data honed from hundreds of thousands of stages, models built and trained to identify FDIs from these enormous data sets are vastly more capable of identifying troubling trends than the human eye.

Taking this analysis from post-job to real-time creates the ability to transition much of the learnings and work that have been the realm of science experiments and move them into regular pad operations. We will review operational examples that we have worked with clients on, demonstrating how this technology and its application were validated. This allows the operator to benefit from insights and, in some cases, make adjustments on the fly.

PRESENTER: Rair Barraez, Well Data Labs

Rair Barraez has a BSc. in Petroleum Engineering, joined Well Data Labs in 2020 and serves the company as Sales Engineer. With more than 18 years in the oilfield services and management experience in growing service companies, Mr. Barraez has spent his entire career working with key Operators to drive forward new innovations and game-changing technologies, providing technical guidance and overall operations management. In addition to Well Data Labs, Mr. Barraez is an active member of the Society of Petroleum Engineers with several paper publications and serving as a member of the program committee of the SPE/ICoTA Well Intervention Conference.