

REAL TIME AI-DRIVEN AUTOMATION FOR FRACTURING SLEEVE CONDITION MONITORING

● Overview

NCS Multistage, a leading B2B company specializing in oilfield services, partnered with our AI Services company to enhance the efficiency of their fracturing operations. The project focused on real-time detection of sleeve open and closed states, aiming to reduce the workload on Subject Matter Experts (SMEs) and streamline the fracturing process.

● Customer

NCS Multistage, USA

Country: USA

Industry: B2B

Customer Size: 500-1000

Publish Date: 12/02/2024

● Problem Statement

The traditional method of monitoring sleeve conditions during fracturing relied heavily on SMEs, who manually analyzed data to determine the sleeve states. This approach was not only time-consuming but also prone to human error, impacting the overall efficiency and effectiveness of the operations. The challenge was to develop an automated system capable of accurately predicting sleeve states in real time, thereby reducing the dependency on SMEs.

● Technical Solution

To address this challenge, we integrated the existing system with the cloud through an Azure IoT hub, enabling real-time data streaming during fracturing operations. Initially, we collected data from various fracturing jobs across different sites, storing it in a database. Conducting Exploratory Data Analysis (EDA) helped us understand the available features and their scales.

Next, we collaborated with SMEs to label specific fracturing jobs, creating a labeled dataset for training purposes. We iterated through multiple machine learning pipelines, experimenting with different models and hyperparameters. After thorough testing, we selected Random Forest and Light GBM as the final models due to their superior performance.

We then established an inference pipeline using Azure Durable Functions, which listened to IoT hub data streams and made real-time predictions about the sleeve state during fracturing jobs. This automated system successfully reduced the need for SME involvement in predicting sleeve states.

● Results

The deployed real-time system for predicting sleeve states in fracturing operations achieved an impressive 86 F1-Score, closely trailing the SME benchmark of 92 F1-Score. This significant improvement in operational efficiency highlighted the effectiveness of our AI-driven solution, demonstrating comparable performance to human experts and streamlining the fracturing process for NCS Multistage.

● Technologies

- Azure ML
- Azure IoT
- Azure Repos
- Matplotlib
- Light GBM
- Azure Durable Functions
- Pandas
- CI/CD
- Microsoft Azure SQL
- Random Forest
- Scikit-learn
- Python

● Domains

- Data Science
- Anomaly Detection
- Predictive Analytics
- Classification