STRESS ENGINEERING SERVICES INC.®

UPSTREAM: OIL & GAS

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Houston • Waller • Cincinnati • Calgary

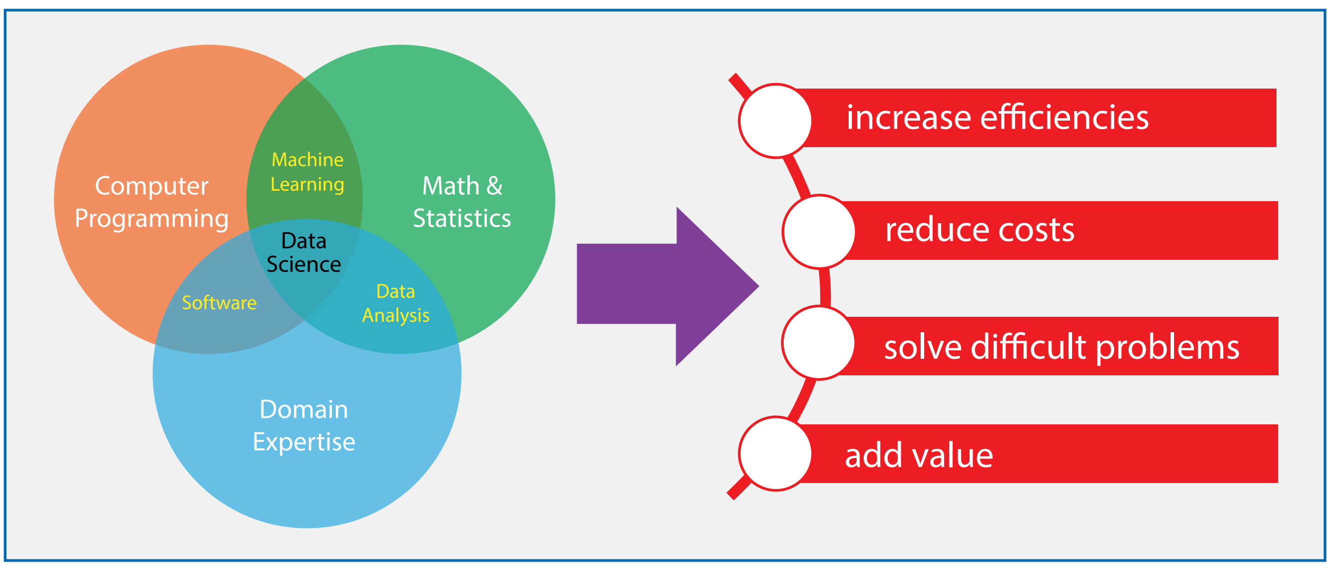
Data Science and Analytics

Stress Engineering Services, Inc. combines state-of-the-art technology with more than 50 years of experience to help clients to collect, visualize and analyze the large amounts of data necessary to make critical decisions. We use our deep and diverse engineering expertise alongside data science knowledge to deliver solutions across a wide range of industries.

In today's world of machine learning technology, it is critical that the data driven solutions predicted by the machine learning algorithms are backed by sound engineering principles. At Stress Engineering Services, we accomplish this by seamlessly merging our data analytics capabilities with physics based modeling expertise.

From writing state-of-the-art data processing algorithms customized to specific applications, to building machine learning models using the latest technology, We provide clients with the ultimate insight from their data.

Backed by nearly half a century of proven expertise in data science and engineering principles, we are ready to take on your big data challenges.



For more information, contact our Data Science team today!

or visit us @ https://www.stress.com/services/technology/data-science

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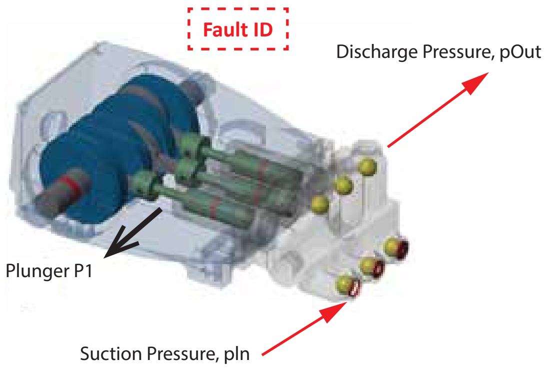
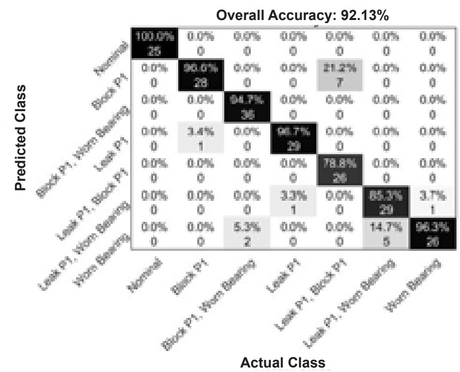
MACHINE LEARNING CASE STUDIES

Condition-based monitoring of pumps:

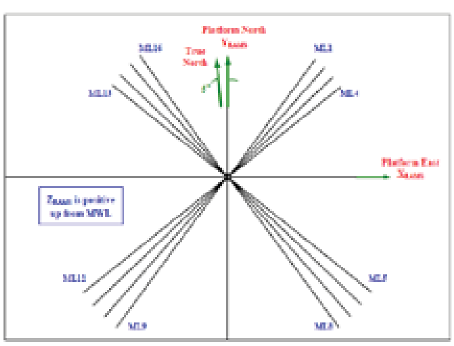
Unexpected failure of the wide variety of pumps deployed throughout the upstream, midstream and downstream sectors of the oil and gas industry can cause significant operational disruptions and revenue loss. Machine learning algorithms can identify this impending failure, in an approach also known as Condition-Based Maintenance (CBM). In this case study, a series of numerical models are run to simulate various fault states of the triplex pump. The goal is to identify a wide variety of fault states, including bearing faults, using only pressure measurements. The data in the frequency domain (using the cross spectral density) is used to fit a neural network model that is able to predict the fault states with 92% accuracy.



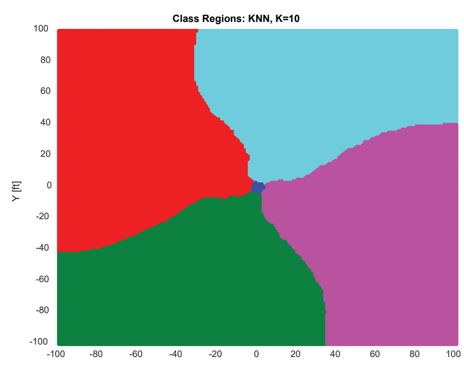


Fault detection in mooring lines:

In offshore floating platforms, mooring line tension is highly correlated to a vessel's motions. Identifying a damaged mooring line can be critical for the structural health of the floating production system. In this case study, Stress Engineering Services, Inc. used numerical models and engineered features to train a machine learning model to predict mooring line failure. The mooring line (ML) model acts as a virtual sensor, answering the following questions: Has a mooring line has failed? (If yes) Which one?



Failed mooring line classes
0 – All lines Intact
1 – Failed ML 1
5 – Failed ML 5
9 – Failed ML 9
13 – Failed ML 13



Prediction of collapse pressure of centralizer subs:

Centralizer subs are used to centralize the casing strings in subsea wells. The collapse pressure of the sub can be determined by finite element analysis or full scale testing. Using our in-house advanced finite element analysis and machine learning capabilities, a simple regression-based equation was developed to predict the collapse pressure directly from the sub geometry.