DATA SCIENCE FOR OIL AND GAS

Energy—its sources, consumption patterns, and economic and ecological impact—has become one of the defining issues of our time. The oil and gas industry faces pressure from many sources: from markets to operate profitably, and from regulations and society to operate with minimal environmental risk. Sometimes it feels as if alleviating those pressures is a mutually exclusive choice.

The good news is that the industry's unprecedented volume of data can improve the processes and decisions related to oil and natural gas exploration, production, and refinement. The data volume grows daily, driven by the development of new devices to track a wider array of reservoir, machinery, and personnel performance. This creates an opportunity for the industry to deliver more for less – and faster – while reducing environmental impact.

Data Science Improves Oil and Gas Operations In:

Precision Exploration and Extraction - Companies can use data science to create a clearer picture of the potential of different areas of exploration, and the volumes and lifetime production of discovered reservoirs. They can also improve the precision and efficiency of drilling, fracking, and completion approaches to ensure cost-effective extraction. And they can assess the risk of each well and adjust hedging strategies to minimize unexpected losses or other complications.

Optimized Refinement and Production - By using data science to forecast demand and market prices, companies can set profit-maximizing production levels. They can also maximize labor productivity and personnel levels to avoid over- or understaffing in refineries, plants, and in supporting departments. Data science can also optimize each step of the refinement process to improve the flow of product to market and make certain that the right capital assets are in place at the right time to streamline operations.

Predictive Maintenance of Field Equipment - Data science can empower companies to predict which equipment in the field or refinery will go down before it actually happens. This gives them the opportunity to perform predictive repair and maintenance so they can avoid operational disruptions. Picking the most cost-effective moment to conduct repairs further optimizes maintenance budgets while taking the guesswork out of planning for capital reinvestment.

Data Science Also Helps Organizations:

Drive Revenue

- Analyze upstream energy assets and processes to boost exploration and production success and efficiency
- Forecast production and demand to handle spikes while also avoiding idle capacity
- Shift refinery optimization to real-time to quickly adapt to production, market, and supply conditions

Cut Costs

- Optimize asset utilization to get maximum output from capital investments
- Apply predictive maintenance to midstream infrastructure to minimize loss during transportation
- Analyze and streamline every process in the value chain to minimize costs

Avoid Risks

- Profile environmental, health, and safety risks and prescribe environmental protection measures
- Improve energy trading and risk management with smarter analysis
- Ensure pipeline integrity by integrating predictions of asset vulnerabilities with exposures

CASE STUDY: Major Oil and Gas Company Increases Yield by 2% While Maintaining Quality

The refinement process is delicate and requires a precise mixture of elements to ensure a high-quality product and avoid equipment damage. A major oil and gas company—like so many in the industry—relied heavily on its personnel's intuition and experience to get it right. Using Altair® RapidMiner®, the company switched to modeling the entire process to predict product quality based on machinery configurations. It then used the model's insights to adjust its process continuously, making millisecond adjustments to equipment based on real-time (sub-30 milliseconds) guidance from its model. The result: a 2% increase in yield without any loss of product quality.

How Altair RapidMiner Optimizes Oil and Gas

The Altair RapidMiner platform helps oil and gas companies unlock previously unseen potential in all their projects. Using the power of machine learning – and a platform that doesn't require experienced data science and data engineering teams – oil and gas companies can be more precise with exploration and extraction, streamline production processes, and predict and prevent equipment failure to drive greater revenue, reduce costs, and avoid unanticipated risks.

Altair RapidMiner: Our Data Analytics and AI Platform

Altair RapidMiner offers comprehensive, end-to-end solutions from data ingestion and modeling to operationalization and visualization. The platform delivers breadth and depth across the analytics lifecycle with unique capabilities that overcome the most challenging obstacles organizations face along their digital transformation journey.

$1.7 ▲
TRILLION VALUE TO OIL AND GAS INDUSTRY FROM DATA-DRIVEN TRANSFORMATION ('16-'25)

$1.2 ▲
MILLION TONS OF CARBON REDUCTION FROM SAME TRANSFORMATION

15% ▲
ANNUAL GROWTH IN OIL AND GAS-RELATED SOFTWARE PATENTS

#1 ▲
INDUSTRY AMONG COMMODITY INDUSTRIES IN PACE OF DATA SCIENCE HIRING

With it, organizations can scale AI initiatives without requiring a big team of data scientists or expensive services engagements. Upskill your workforce so users from novice to expert can leverage the tools needed to provide data-driven insights. Extract and prep data easily from any source, even difficult reports and PDFs. Create, maintain, and run SAS language programs, models, and workflows directly in a multi-language environment (e.g. Python, R, and SQL). Operationalize models faster and monitor them continuously across one shared MLOps environment. Process and display massive amounts of fast-changing data with easy to build sub-second streaming, batch, and business intelligence (BI) data applications.

Whether an organization requires end-to-end or composable analytics, Altair RapidMiner enables customers to deliver the right tool at the right time to their diverse teams.

To learn more, go to altair.com/energy.