Predictive Maintenance and Customer Voice Analysis for Utilities

The Energy industry holds multiple predictive analytics and data science opportunities. With the rise of the Internet of Things (IoT) and data collection technologies becoming more accessible, utility companies have a wealth of data to mine. Companies can use predictive analysis and optimization algorithms on these data sets to apply data-driven guidance and decision making to improve efficiency and quality, and to reduce costs.

Utilities can run Proof of Concept (PoC) projects to prove value and garner larger investment before spending multiple millions of dollars on an analytics infrastructure. Many companies turn to an expert analytics consulting firm like Mosaic to help them in developing a PoC plan and executing on that plan. Documents from a PoC typically include narrative sections, explaining best practices and processes for various issues, lists of guidelines, checklists for important items to consider each time working on a model, and other instructive elements identified through discussions concerning analyst's needs.

Mosaic, a leading big data consulting firm, has had the pleasure of working with two of North America's largest utilities. Our data scientists see two PoC ideas that are not currently being taken advantage of by most the big players in the Energy market.

Predictive Maintenance:

Current maintenance paradigms fall into two primary categories:

- Preventive maintenance, which is typically performed according to a fixed schedule and
- Reactive maintenance, which is performed after a failure or drop in performance is observed. This unscheduled maintenance translates to higher maintenance costs, greater downtime and opportunity cost, and increased customer dissatisfaction.

The ideal approach to maintenance is a predictive model, in which equipment sensors and advanced statistical models are used to estimate the likelihood of failure, based on historical conditions and usage, and to plan the optimal time for maintenance to be conducted. Fortunately, as the cost of sensors and data storage has decreased a wealth of real-time equipment and line data has become available.

As an organization begins to build out a predictive maintenance capability, they can begin to take advantage of some of the monetary benefits that this solution offers. If a company can predict the likelihood of mechanical assets failure, they can optimize their maintenance response with scheduled, as opposed to unscheduled, maintenance. Organizations can now ensure increased equipment availability, effectiveness and run time

predictability through understanding historical, current and predicted part availability and replenishment requirements. With greater visibility into equipment health, companies can extend

preventive maintenance cycles. Users can start monitoring equipment performance leveraging real time sensor data to accurately predict run time failures and take action to prevent them, as well as identifying maintenance needs that cannot be completed during planned downtime periods. Date-driven diagnostics shorten downtime by ensuring that the right skills, parts, and tools are part of the maintenance response the first time around. Mosaic's predictive real-time capabilities allow for businesses to start predicting mechanical degradation and failures in time to do something about it – stage inventory, schedule maintenance, and deploy field engineers.

A proof of concept use case would involve the following steps:

- Identification of available data regarding production lines and equipment, including historical maintenance and failures, as well as a gap analysis to identify desirable data that is currently unavailable.
- Decision analysis to determine the maintenance decisions that can be changed based on probability of failure and the operational influences of those decisions.
- Statistical mapping of possible maintenance decisions and outcomes to the available historical data.
- Model development and testing
- Design of the deployment environment for the model (e.g., integration into an overall operations management dashboard)

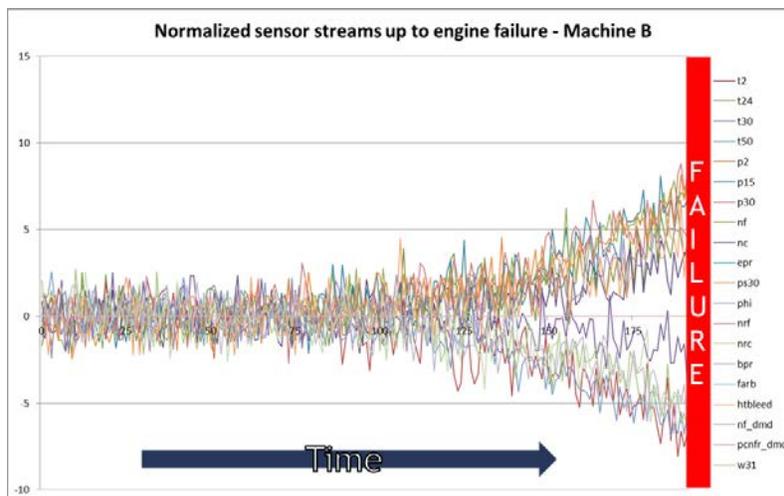[Click here to read more about our Predictive Maintenance Solution!](#)

Figure 1 – Image of Mosaic's Predictive Maintenance Solution

Customer Voice Prediction

The old adage is 'data is king.' But how can data be king if you can't make sense of it? To stay ahead of your competition and provide the best value to your customers you need information – not just data. The IoT, Social Web, and Customer Feedback logs are some of the best sources of data about your customers, but you need to convert the text from these sources into actionable information using machine learning and natural language processing algorithms.

Mosaic brings the capability to take that unstructured text or voice data and feed it into predictive models to be able to influence and/or predict consumer behavior. Being able to predict and/or understand sentiment is a powerful way to optimize decision making and improve the customer experience.

Key example applications include:
- Automatic processing of user feedback submissions
- Social web comment processing
- Online market analysis
- Matching of help desk tickets to optimal agent
- Categorization of web pages according to topic
- Identification of a referenced product or service

Figure 2 – Mosaic Analyzed 2017 Presidential Candidates Speech Patterns

Click here to see more about our Customer Voice Prediction Capabilities!