TrendMiner
A SOFTWARE AG COMPANY

INDUSTRY
Chemical

PROCESS TYPE
Continuou

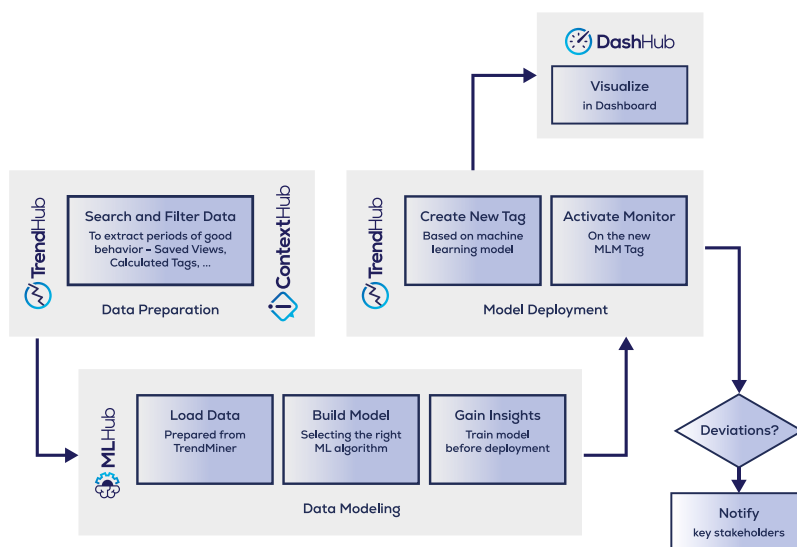**ANALYTICS TYPE**
Predictive
Analytics

KEY OBJECTIVE
Prevent compressor
damage and plant
shutdown

Creating an Anomaly Detection Model to Prevent Plant Shutdown

BACKGROUND

Some anomalies are much more difficult to detect and predict. In certain situations, for example, an anomaly might occur even when a process appears to be functioning normally. For these more involved cases, data scientists can apply a machine learning technique known as an anomaly detection model. Anomaly detection models can identify rare items, events, or observations that deviate significantly from the rest of the time-series dataset and that are known to be outside normal operating behavior. They can be used to set up monitors and alerts when special deviations occur.

CHALLENGE

At this chemical plant, fluid from one process occasionally was leaking into a compressor and damaging it. This led to a full-plant shutdown and significant loss of production. Engineers already had determined that vibrations were causing the leak, but they had no way to monitor for this problem to occur. Furthermore, operational experts could not intervene in time to prevent damage and avoid the costly shutdown.

SOLUTION

- Attach vibration sensors to the compressor

- Load time-series data into MLHub

- Train the TrendMiner Anomaly Model with different types of vibrations

- Create a new machine learning model tag based on the trained model

- Activate a monitor on the newly created tag to detect for irregular vibrations

- Set alerts to allow key stakeholders time to intervene before it was too late

RESULT

- The soft sensors created through machine learning models detected an anomaly at the compressor that indicated there was a leak, even though other process parameters appeared to be normal

- When the anomaly was detected, process experts received an alert with enough time to make changes before the compressor was damaged

- Engineers were able to avoid a complete plant shutdown

TRENDMINER FEATURES USED

GOOGLE-LIKE SEARCH/FAST FILTERING

TrendMiner allows for an easy click and search for tags, just like using Google. While typing, our software auto fills best matching terms to speed up the analysis search. TrendMiner also makes it easy to exclude irrelevant time periods from an analysis. Time based filters are static filters applied to certain time periods. These filters can be created manually or on top of search results. Furthermore, dynamic criteria-based filters can be created and are automatically applied to both historical and new/incoming data.

ALERTS & NOTIFICATIONS

Process experts can use TrendMiner to create batch fingerprints and monitor production processes in relation to these fingerprints. Automatic notifications can be inputted into our software to alert engineers and operators when patterns of interest are detected. TrendMiner supports various notification mechanisms, including embedded inbox and email alerts. These notifications also include suggested courses of action and can be designated to trigger a webhook to fire a workflow in other business applications, such as the maintenance management system.

f(x) TAG BUILDER

TrendMiner's tag builder allows the creation of time-series data using formulas on and aggregations of the tags. Additionally, machine learning tags can be built from machine learning models created in MLHub. The results of these tags can be visualized just like any other tag. The tag builder can also be used for importing time series data via a CSV file.

PERSONALIZED OPERATIONAL DASHBOARDS

Each operational stakeholder is interested in a different part of the production processing and likes to create personal dashboards to monitor performance. Trend views or context item listings created by engineers can be added to their dashboard. In that way everybody gets empowered with actionable analytics-driven information, from the shop floor to boardroom.

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