MULTIVIZ VIBRATION

Detecting atypical
assets in a wind farm

VIKING ANALYTICS
Data made clear.

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BLACKSHEEP DETECTION

DETECTING ATYPICAL ASSETS IN A WIND FARM

Based on vibration data collected by sensors in bearings, **MultiViz Vibration** was able to identify the two most atypical wind turbines in a wind farm. The behavior was caused by electrical problems with sensor installation and a major failure that ultimately led to the replacement of an entire gearbox.

BACKGROUND

Data from a group of six wind turbines was collected during 46 months from a vibration sensor located at the axial direction of the high-speed shaft rolling element bearing. Vibration waveforms were recorded approximately every 12 hours during the three-to-four years period. Each segment is 1.28 seconds long and was recorded with a sampling rate of 12.8 kHz. The assets had different entry-into-service but experience similar operating and environmental conditions during their life.

BLACKSHEEP DETECTION

The Blacksheep Detection feature identifies assets that behave differently from the rest of the population, based on our Automatic Mode Identification (AMI) algorithm for multivariate time series data.

From all modes identified in the population, the most uncommon ones will be considered atypical. Assets with the largest portion of uncommon modes are then labeled as atypical – the Black Sheep of the population.

To perform BlackSheep Detection with MultiViz Vibration, the user simply needs to upload vibration time series data for a population of machines and request, via API or Python package, an analysis for the population of sources.

RESULTS

MultiViz Vibration identified that two wind turbines out of six were the most atypical, Turbine2 and Turbine5. While Turbine2 was most atypical during entry-into-service, Turbine 5 displayed a failure for a longer time.

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The behavior in **Turbine2** was caused by a minor electrical issue affecting the sensor recording the vibration signal. MultiViz Vibration was able to detect the problem even in data that would normally be considered healthy, as the turbine had just entered operation.

Turbine5 displays a major failure during the entire recorded time. After 1.2 years of operation, the high-speed shaft bearing had to be replaced due to an inner raceway failure.

However, after this replacement, the failure had already propagated through the entire gearbox, which had to be replaced after approximately 2 years of operation. After this, the turbine got into a healthy condition.

The image shows the analysis of the entire population of assets in the wind farm, as well as their detected modes. The circled areas indicate the faulty periods.
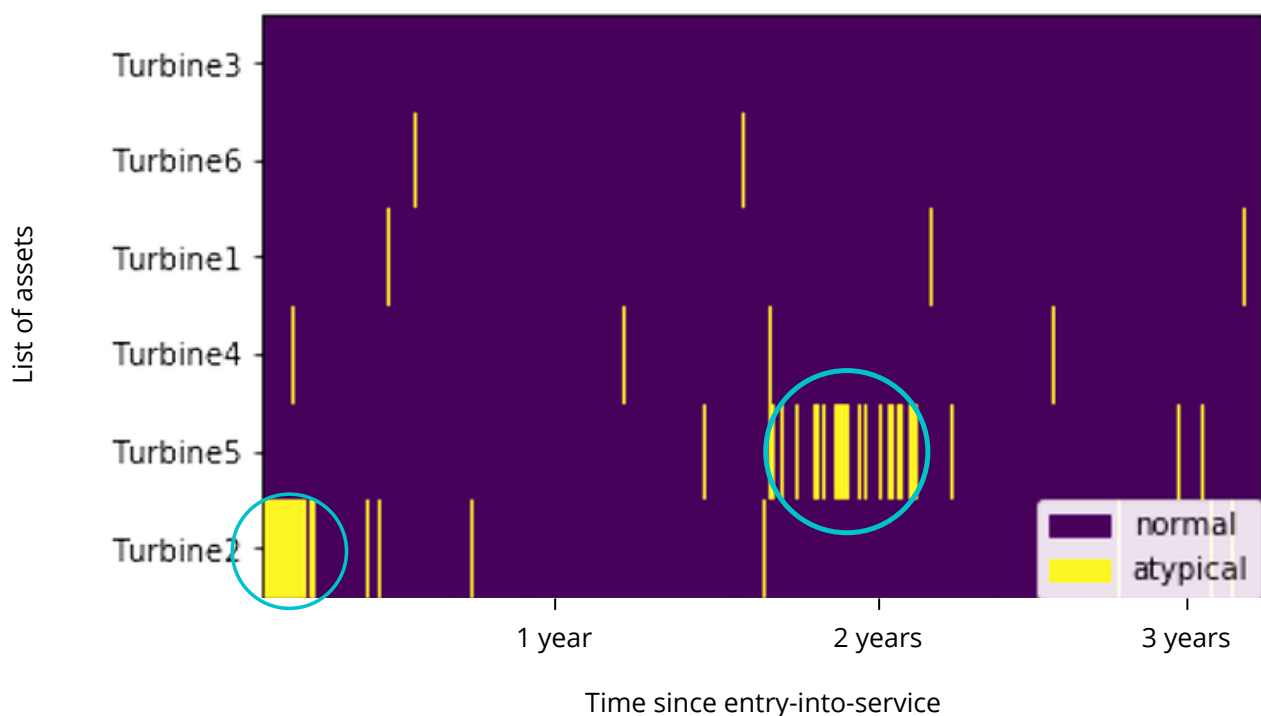
MULTIVIZ VIBRATION enables OEMs and maintenance companies to to add value to their offer through analytics features powered by Machine Learning algorithms. Available as an API and Python Package, it allows large-scale unsupervised analysis of the history of an asset or a population of assets. Scan the QR code to learn more.