

HOW CAN WIND FARM OWNERS MAXIMIZE TURBINE ENERGY PERFORMANCE?

PROBLEM

Wind turbine power production depends on many disparate factors and sources of error, making it challenging to maximize performance

SOLUTION

An artificial intelligence (AI)-enabled solution that can detect performance issues and continually monitor turbine power performance automatically

RESULTS

Quickly identify underperforming turbines while also providing the most likely root cause and suggest corrective actions

Wind turbine power performance is often measured by evaluating the turbine power curve, which shows power production vs. wind speed. However, the power that a wind turbine is capable of producing depends on many factors in addition to wind speed, such as air density, turbulence intensity, wind shear, wind inflow direction, terrain, wake effects, and other factors. Additionally, the wind speed measurement used in the power curve analysis comes from an anemometer that is behind the rotor of the turbine, which affects the accuracy of the measurements.

PAST APPROACHES FOR EVALUATING TURBINE PERFORMANCE

One approach to evaluating turbine performance is to collect data for an extended period of time and have trained analysts detect underperformance. There are two shortcomings of this approach. First, the large amount of data required means that the turbine must operate below its potential for an extended period of time, potentially resulting in a large amount of lost production. Another shortcoming of this approach is that it is manually-intensive and costly, often offsetting much of the gains that result from the analysis itself. Another approach is to simply accept underperformance and live with lower revenue, which is clearly not an ideal outcome.

AN EFFECTIVE SOLUTION FOR EVALUATING TURBINE PERFORMANCE

Identifying underperforming turbines quickly and cost-effectively enables wind farm owners and operators to maximize profitability. SparkCognition helps its customers do exactly that by leveraging SparkCognition's Ensemble Energy platform and its powerful machine learning models to continually monitor customers' turbine power performance automatically. This platform quickly and accurately detects performance issues and automatically alerts customers to these issues. The platform also provides customers a visual indication of turbine performance in the form of a power curve "health score." A health score of 1.0 means

FIGURE 1
TYPICAL POWER CURVE SCATTER

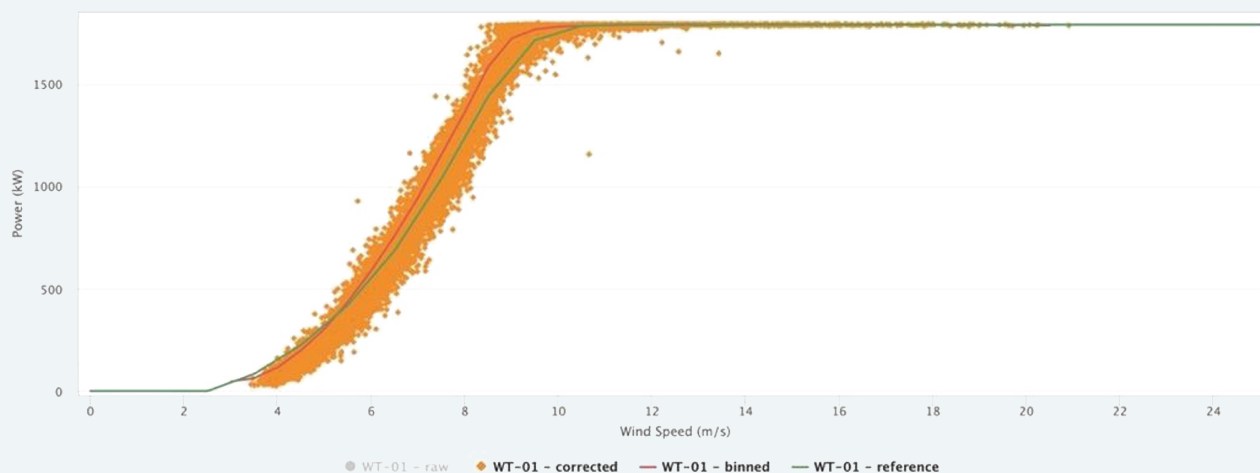


FIGURE 2
EXAMPLE OF POWER CURVE HEALTH SCORE



that the turbine is producing as expected for the given operating conditions. If the turbine begins underperforming, the health score declines and the customer is notified. The platform even classifies the underperformance and provides customers with the most likely reason and a suggested corrective action.

BENEFITS

The automated monitoring of turbine power performance provided by SparkCognition's Ensemble Energy platform quickly identifies underperforming turbines and notifies operators, while also providing the most likely root cause and suggested corrective actions. Since the algorithms run on a cloud computing platform with no analyst input required, large numbers of turbines can be monitored more efficiently. This allows operators to maximize energy production and increase the profitability of their assets.

To learn more, please contact us at info@sparkcognition.com or visit our website at www.sparkcognition.com.

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We catalyze sustainable growth for our clients throughout the world with proven artificial intelligence (AI) systems, award-winning machine learning technology, and a multinational team of AI thought leaders. Our clients partner with SparkCognition to understand their industry's most pressing challenges, analyze complex data, empower decision-making, and transform human and industrial productivity. Our vision is to build scalable AI solutions to solve the problems that matter most. We collaborate with organizations to help them reduce environmental impact creating a better, smarter, and more sustainable world.

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