Abstract Title: Turbulence impact assessment and decision making for offshore wind parks O&M

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Abstract

Turbulent wind flow affecting the wind turbines structure and significantly reducing the energy production. Traditional modelling methods of this complex phenomena require enormous computational resources and time, and therefore not widely used by wind farm operators. On the other side, artificial intelligence based tools for wind energy yield and failure prediction are rather standard nowadays, at least at the major turbine manufacturers. But none of those models were taking a turbulent flow into account until now.
Here we are presenting a new approach, where machine learning is applied to stream data processing. Time series data of wind turbine gearbox censors are utilised to assess whether a wind turbine experiences an excess load due to a turbulent flow and to estimate turbulence intensity. This information used further for classification of turbulence impact and decision support for turbine cut-off to prevent structural damage to gearbox mechanism.
The approach has been validated on real production data from several offshore wind turbines.
In this approach kernel based reinforced learning is optimized to fit a time frame of real-time data analysis and unsupervised learning is used to cluster data sets and forecast possible turbine overload.

Keywords—*artificial intelligence, decision support, stream data analysis, timeseries analysis*

Professional Biography (100-150 words)

Alla Sapronova is an experienced data scientist with a demonstrated history of work in data science and machine learning applications for both academic and industrial sectors. Dr. Sapronova completed her PhD in Physics and Mathematics at the age of 29 from Moscow State University, Russia and postdoctoral studies from UniFob, University of Bergen, Norway. Currently she is the Head of Data Science at Center for Big Data Analysis, Uni Research, a multidisciplinary research institute in Bergen, Norway. Last 5 years she has published more than 15 papers in reputed journals and has been serving as an external censor for University of Bergen, Norway. Her scientific interests lie in the areas of Big Data Mining, Machine Learning, Knowledge Extraction, Time Series Analysis, Classification and Predictive Modeling.



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Any Comments: