From SCADA to lifetime assessment and performance optimization: how to use models and machine learning to extract useful insights from limited data

A common challenge in the decision making process regarding operation and life extension of existing wind farms is the lack of accurate information about the actual dynamic states of the turbines in terms of its operation from inception. SCADA records normally contain limited number of channels, and are not necessarily kept for the entire operating period of the wind farm; design and site data may be outdated or inaccessible. Nevertheless, as long as a minimum amount of information is available, statistical analysis and augmentation with artificial intelligence based simulation can be used to supplement the information. In the present study, we delineate a combination of data analysis, physical modelling and machine learning, that produces a detailed assessment of the operating conditions experienced by a wind farm and establishes the corresponding power performance, loads and fatigue damage accumulation.

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