WIND ENERGY SCIENCE DISCUSSIONS

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Interactive comment

Interactive comment on "The Power Curve Working Group's Assessment of Wind Turbine Power Performance Prediction Methods" *by* Joseph C. Y. Lee et al.

Joseph C. Y. Lee et al.

chle6805@colorado.edu

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We thank the reviewer for providing valuable comments to improve our manuscript. In the following, the reviewer's comments are numbered, followed by our comments beginning with "Response:".

1. Baseline method i.e, binning though being used by most turbine operators but has its own flaws such as data averaging issue, slow to respond, As discussed in below paper. The author should explore more about the weakness that baseline method had. Comparing the proposed technique with a technique that already have some issue, may affect the proposed model accuracy as compare to binning.

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Response: We now included the following, between lines 584 and 586, to describe the shortcomings of the binning method:

"The interpolation requires the separation of data into different discrete bins, and inevitably averages out the sample variations within a bin. The predefined bin width also determines the dependency of power on wind speed, which can introduce systematic error (Pandit and Infield, 2018a, 2018b)."

The "slow to respond" feature of binning (Pandit and Infield, 2018a), mentioned by the reviewer, does not apply to our context because the correction methods we propose aim to correct for long-term bias in power curve modeling rather than turbine condition monitoring and fault detection.

2. Power is well known to be influenced by air density and this is reflected in the IEC Standard air density correction procedure. IEC standard recommended air density correction does not give the most accurate power curve as suggested by the following articles. They have shown, power curve accuracy and uncertainty can be improved by adding air density correction instead of doing IEC precorrection. I think the paper must discuss this to improve the qualities of papers.

Response: To discuss the other preferred methods of density correction, we added the following from lines 608 to 613:

"Note that the air density correction in the IEC 61400-12-1 standard, although often used in practice, assumes the air density remains constant within the 10-minute period (Bulaevskaya et al., 2015). Such assumption oversimplifies real-world meteorological conditions, especially when the observed air density substantially differs from $_0$ (Pandit et al., 2019). Therefore, Using air density as an independent input in statistical models such as Gaussian process, neural network, and random forest, can lead to smaller power-curve prediction errors than using the air-density-adjusted wind speed (Bulaevskaya et al., 2015; Pandit et al., 2019)."

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3. It would be great if the sample of data made public for a wide audience for improving the power performance of turbines.

Response: The participating members of the Power Curve Working Group agreed to keep their raw data and the error statistics confidential, so unfortunately, we cannot disclose their data to the public.

References

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Pandit, R. and Infield, D.: Comparative analysis of binning and support vector regression for wind turbine rotor speed based power curve use in condition monitoring, in 2018 53rd International Universities Power Engineering Conference (UPEC), pp. 1–6, IEEE., 2018a.

Pandit, R. K. and Infield, D.: Comparative analysis of binning and Gaussian Process based blade pitch angle curve of a wind turbine for the purpose of condition monitoring, J. Phys. Conf. Ser., 1102(1), 012037, doi:10.1088/1742-6596/1102/1/012037, 2018b.

Pandit, R. K., Infield, D. and Carroll, J.: Incorporating air density into a Gaussian process wind turbine power curve model for improving fitting accuracy, Wind Energy, 22(2), 302–315, doi:10.1002/we.2285, 2019.

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