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Monitoring the power curve of wind energy systems

The power curve of a wind turbine describes the generated power as a function of wind speed, and typically exhibits an increasing, S-shaped profile. We suggest to utilize this functional relation to monitor the wind energy systems for faults, sub-optimal controls, or unreported curtailment. The problem is formulated as a regression changepoint model with isotonic shape constraints on the model function, and we devise a multi-scale segmentation scheme which is able to detect both small and persistent deviations as well as short-lived anomalies. The application to real generation data as well as a simulation study illustrate the benefits of the methodology.

Special/ Invited session

Classification

Both methodology and application

Keywords

change point, renewable energy, segmentation

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