EURASIA CONFERENCES

3rd World Conference on
ARTIFICIAL INTELLIGENCE, MACHINE LEARNING AND DATA SCIENCE
May 23, 2024 | Rome, Italy
https://doi.org/10.62422/978-81-970290-9-7-009

Fault Diagnosis in Wind Turbine Blades using Machine Learning Models through Filtered Cultivation Data

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Wind turbines are increasingly deployed in remote onshore and offshore locations due to abundant wind resources and the benefits of mitigating land use with visual impact concerns. The crucial role played by a wind turbine's rotor blades in converting wind energy into electricity cannot be overstated. Any damage to these blades directly impacts power generation and can lead to turbine shutdowns. In addition to the ongoing efforts to reduce the cost of wind energy, there is a growing emphasis on condition monitoring as a promising solution to address maintenance issues. Regular detection of blade faults can reduce downtime and enhance overall efficiency. Machine learning approaches, particularly pattern recognition systems, prove effective in identifying and diagnosing faults in wind turbine blades. This research study aims to demonstrate the effectiveness of machine learning models in detecting blade faults by analyzing filtered and unfiltered vibration signals. Among the tested models, the logistic regression model utilizing resample filter-based vibration signals achieved the highest classification accuracy, reaching an impressive 99.75% within a mere 0.69 seconds.

Biography:

Manas Ranjan Sethi has received his B.E and M.Tech degrees in Electronics and Telecommunication Engineering from Biju Patnaik University of Technology, India in 2006 and 2012, respectively. Currently, he is pursuing his Ph.D. from the National Institute of Technology Silchar, India. He is a lifetime member of Indian Society for Technical Education and Institute of Engineers. His research interests include condition monitoring, fault diagnosis, and fault prognosis. He has published many conference and journal papers.