

Behavior anomaly indicators based on reference patterns - application to the gearbox and electrical generator of a wind turbine

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Abstract-

This paper presents indicators of non-expected behavior in components of a wind turbine. These indicators are used to alert about the working conditions of these components that are not usual, according to the normal behavior observed for similar conditions of wind speed and power generated. In order to obtain these indicators, reference patterns of behavior for the components studied were defined. The patterns were obtained from real data of the wind turbine covering all of the possible working conditions. The technique of self-organized maps was used for discovering such reference patterns. Once they were obtained, new data, not included in the training set, was passed through the patterns in order to verify if the behavior observed corresponds or not to that expected. If they do not coincide, an anomaly of behavior is detected than can be useful for soon alert of possible failure mode or at least to know that the component was under working conditions that could cause risk of fault. The periods of unexpected behavior are the base for the indicators proposed in this paper. Real cases to show the elaboration of the indicators, and their corresponding results are provided.

Index Terms- anomaly detection; pattern discovering; self-organized maps; wind turbine; normal behavior characterization

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