A parameter selection method for wind turbine health management through SCADA data

M. Du; J. Yi; P. Mazidi; L. Cheng; J. Guo

Abstract-

More and more works are using machine learning techniques while adopting supervisory control and data acquisition (SCADA) system for wind turbine anomaly or failure detection. While parameter selection is important for modelling a wind turbine’s health condition, only a few papers have been published focusing on this issue and in those papers interconnections among sub-components in a wind turbine are used to address this problem. However, merely the interconnections for decision making sometimes is too general to provide a parameter list considering the differences of each SCADA dataset. In this paper, a method is proposed to provide more detailed suggestions on parameter selection based on mutual information. Moreover, after proving that Copula, a multivariate probability distribution for which the marginal probability distribution of each variable is uniform is capable of simplifying the estimation of mutual information, an empirical copula based mutual information estimation method (ECMI) is introduced for an application. After that, a real SCADA dataset is adopted to test the method, and the results show the effectiveness of the ECMI in providing parameter selection suggestions when physical knowledge is not accurate enough.

Index Terms- wind turbine; failure detection; SCADA data; feature extraction; mutual information; copula