Pre-processing SCADA data from wind turbines as a previous stage to the application of prognosis algorithms

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Pre-processing SCADA data from wind turbines as a previous stage to the application of prognosis algorithms

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Abstract: Modern wind turbines in operation today record more than 200 analogous variables at intervals of 5 to 10 minutes by their SCADA (Supervisory Control and Data Acquisition) system. The SCADA data often comprise temperature values from a variety of measurement positions in the turbine, pressure data, electrical quantities such as line currents and voltages or pitch-motor currents, tower vibration, etc. The Wind Turbine’s data pre-processing is a task that faces diverse difficulties. The main are the atypical values produced by a miss configuration of the SCADA, the information lost about the alarms states (activations/deactivations) and the information loss when the connection is lost between SCADA and our data capture server in some update period. This document covers the communication with an OPC (Open Platform Communication) server that is a widely used in Wind Turbine SCADAs, which implements a publisher-subscriber paradigm. Because of this paradigm we are applying two corrections over the data, the first is online and the second offline. The first correction is taking into account each wind turbine data notification frequency so the OPC must notify data variables with a timestamp difference of about 10 minutes, if not, then a correction is made applying a linear regression once the next update is received. This will create a calculated value for a missing field each time that it is lost. The second correction is offline, over the already received data, which could have a second and not less important problem that covers the wind turbine’s alarm. This step is offline because the data variable values are required, so this has to be made once the empty data variable blocks are filled.

Keywords: Wind farms; SCADA data; Logically inconsistent data management; Data cleaning.