

Incorporating Anomaly Detection in a Digital Twin Scenario Using Symbolic Regression

Authors : Manuel Alves, Angelica Reis, Armindo Lobo, Valdemar Leiras

Abstract : In industry 4.0, it is common to have a lot of sensor data. In this deluge of data, hints of possible problems are difficult to spot. The digital twin concept aims to help answer this problem, but it is mainly used as a monitoring tool to handle the visualisation of data. Failure detection is of paramount importance in any industry, and it consumes a lot of resources. Any improvement in this regard is of tangible value to the organisation. The aim of this paper is to add the ability to forecast test failures, curtailing detection times. To achieve this, several anomaly detection algorithms were compared with a symbolic regression approach. To this end, Isolation Forest, One-Class SVM and an auto-encoder have been explored. For the symbolic regression PySR library was used. The first results show that this approach is valid and can be added to the tools available in this context as a low resource anomaly detection method since, after training, the only requirement is the calculation of a polynomial, a useful feature in the digital twin context.

Keywords : anomaly detection, digital twin, industry 4.0, symbolic regression

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