

Manufacturing Anomaly Detection Using a Combination of Gated Recurrent Unit Network and Random Forest Algorithm

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Abstract : Anomaly detection is one of the essential mechanisms to control and reduce production loss, especially in today's smart manufacturing. Quick anomaly detection aids in reducing the cost of production by minimizing the possibility of producing defective products. However, developing an anomaly detection model that can rapidly detect a production change is challenging. This paper proposes Gated Recurrent Unit (GRU) combined with Random Forest (RF) to detect anomalies in the production process in real-time quickly. The GRU is used as a feature detector, and RF as a classifier using the input features from GRU. The model was tested using various synthesis and real-world datasets against benchmark methods. The results show that the proposed GRU-RF outperforms the benchmark methods with the shortest time taken to detect anomalies in the production process. Based on the investigation from the study, this proposed model can eliminate or reduce unnecessary production costs and bring a competitive advantage to manufacturing industries.

Keywords : anomaly detection, multivariate time series data, smart manufacturing, gated recurrent unit network, random forest

Conference Title : ICIMSE 2023 : International Conference on Industrial and Manufacturing Systems Engineering

Conference Location : Toronto, Canada

Conference Dates : June 19-20, 2023