Enhancing Predictive Maintenance: Integrating XGBoost and LSTM Models with Autoencoder for Improved Machine Health

PRASHANT

Department of Data Science

Christ University lavasa Pune

Abstract— **: The future of the automobile industry revolves around three basic factors: increased reliability, lower costs, and more effective operation as well as upkeep. Many manufacturers have recently placed a strong emphasis on predictive maintenance since it enables the early detection of equipment problems before they become serious. This implies increased difficulties in the car manufacturing process and, consequently, increased maintenance requirements. Artificial intelligence and machine learning applications enable the development and modernization of current maintenance techniques in the manufacturing of battery-powered car engines with condition surveillance, troubleshooting, and anticipatory maintenance; timely identification may prevent a great deal of time and money. These advances in technology and their impact in the manufacturing sector by way of the Revolution of 4.0, or Industry 4.0, for short, are interesting. This study proposes two methods that use two deep learning models for anomaly detection to enable predictive maintenance. In the first, different failure kinds are classified using an XGBOOST; in the second, different defects are classified using a Recurrent Long Short-Term Memory neural network (LSTM) with Autoencoder. While the LSTM model adjusted better at identifying high temperatures on generator bearings—a failure that occurred frequently throughout the study—it was discovered that the original model could generalize various types of failures. Look away**

Keywords:- Machine learning, Artificial neural network , Criminal Identification, CNN , neural network , deep learning,

**Introduction**

produce data indistinguishable from real samples, this paper aims to equip researchers with a foundational understanding of this powerful technique and its potential to drive innovation in various fields<https://doi.org/10.1109/cvpr.2018.00755>