Applied Method of Anomaly Detection for Machine Health Prognosis

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AI practitioners are finding Anomaly detection techniques as significant tool for identifying abnormal instances. Mainly, due to its ability to mitigate future risks. Anomalies are data patterns that have different data characteristics from normal instances. The detection of anomalies has significant relevance and often provides critical actionable information. Time series telematics data shall be utilized to monitor the sub-system performance. As big volume of unlabeled data (1Hz) is getting generated. Unsupervised Machine Learning approach such as Isolation Forest becomes imperative. Anomaly detection model shall provide anomaly label and confidence of abnormality.

The practical approach on anomaly detection is presented on one sub-system of a vehicle / machine. Un-supervised method with isolation forest algorithm is most suitable for a large unlabeled timeseries data. This is data first approach for tracking performance deviation for sub-system components has many advantages compared to field failure claims. Outcome of partially validated anomalies can be used as alternate to warranty data for creating prognosis opportunities using machine learning. Faster response to prognostics by reducing wait time as warranty data has its procedural latency. Anticipate major failure modes/ parts in field, equip After sales & Customer Support for parts availability and support response to field failures.

Keywords— Anomaly Detection, Machine Learning, Isolation Forest, Machine Health Monitoring.

Biography:

Yuvraj is a highly accomplished engineer with an impressive educational and professional background. He graduated with a Bachelor's degree in Mechanical Engineering from Mumbai University in 2005 and pursued a Master's degree in Mechanical Engineering (Thermal Design) from Pune University in 2007. In 2021, he advanced his skills by completing a specialization in Artificial Intelligence from IIT Roorkee.

Yuvraj's professional journey has been remarkable, starting with LG Electronics India Pvt. Ltd followed by roles with increasing responsibilities at Behr India Ltd., Tata Motors Ltd., and FCA Engineering India Pvt. Ltd. His expertise encompasses key projects such as HVAC system simulation for TATA Nano, leading CFD simulations for TATA cars, and working on aerothermal system integration for Jeep Compass. He is currently working as Data Scientist with John Deere.