EQUIPMENT FAILURE PREDICTION

MACHINE LEARNING 1

ABSTRACT

The technology of real-time streaming is gaining more popularity. Real-time data is streamed from devices and sensors, which is very helpful now days in predicting the upcoming failure of equipment by learning the pattern of data using machine learning Techniques. A detail statistical analysis has been caried out to investigate the data. A comparative study between several classifier has been presented with parametric tuning

Arman Bari
ERP # 23384

1. Corporate Domain of Project

This project aims to solve an important business challenge of Pakistan's leading oil refinery. National refinery limitedd (NRL) is the country's most modern and largest operating refinery and employs critical processes involved in refining. It is a petrochemical complex engaged in the manufacture and sale of asphalts, BTX, fuel products and lubes for domestic consumption and export. NRL aims to produce fuel products such as Petrol, diesel, Kerosene, and asphalt etc to meet Pakistan's energy demand.

For smooth operation and production of petroleum products it is necessary to have an auto surveillance mechanism for equipment condition and performance. Hence to achieve this goal we will use machine learning approach to deploy condition-based maintenance strategy (CBM) to reduce the risk of equipment failure.

2. Background Knowledge

- purpose of this project is detecting and supervising anomalies and failures in equipment, which prevents the possibility of critical failure and downtime. This enables deploying restrained resources, increasing device and equipment lifecycles.

- In industries a normal way of preventing equipment from failure is Preventive maintenance (PM).

- Preventive maintenance (PM) is the regular and routine maintenance of equipment and assets to keep them running and prevent any costly unplanned downtime from unexpected equipment failure

- Scheduled PM sometimes replaces unnecessary parts of equipment which could spend unnecessary time, money, and energy.

- Machine learning approach can solve this problem by effectively learning the pattern of live data coming from sensors.

- In this project, we will use compressor data which is collected through multiple sensors

- Data set consist of live streaming data which is coming from multiple sensors.

- Sensors Monitors the performance parameters of gas compressor such as, vibration, acoustic, ultrasonic, temperature, power consumption, and oil level, pressure etc.

3. Problems

- Classify the live streaming data in to two binary classes
  - Nominal (Normal condition of Gas Compressor)
  - Anomaly (Abnormal condition of Gas Compressor)

- Use two different approach two classify the data.
  - Un-Supervised (K-mean clustering)
  - Outlier detection (Required Background Knowledge)