Model for Preventive Maintenance based on Predictive Analytics

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https://github.com/rajk2888/DSC-680

INTRODUCTION

As demand for dependability grows across an expanding spectrum of tools, failure analysis is quickly becoming a complex, costly, and time-consuming must-do operation. The cost of constructing a modern semiconductor manufacturing facility can easily exceed a billion dollars, integrated circuit manufacturers have a strong incentive to quickly diagnose and resolve any problems that arise during the manufacturing process to keep their investment producing products that can be sold.

Downtime for heavy machinery costs a lot of money in the manufacturing industry, both in terms of idle time wasted due to maintenance work and in terms of repair costs. It would be a significant boost to the bottom line if firms could be proactive and undertake routine maintenance activities proactively, as well as predict concerns ahead of time using previous data.

Goal

The ultimate goal is to develop a proactive maintenance plan that attempts to predict future component failures in heavy machinery. It benefits businesses by lowering operational costs, long-term maintenance costs, and increasing output hours, as previously stated.

Approaches

This supervised learning work can be performed using the CRISP – DM Methodology.

Techniques planned to use:

The below modules in python to accomplish this supervised classification task.

- pandas
- numpy
- sklearn
- matplotlib
- seaborn
- joblib
- os

Data set variables:

- datetime
- machineID
- volt
- rotate
- pressure
- vibration

Machines:

- machineID
- model
- age

Errors:

- datetime
- machineID
- errorID

Failures:

- datetime
- machineID
- failure

Maintenance:

- datetime
- machineID
- comp

Understanding the Data:

For the creation of this Predictive Maintenance Model, the following data sources were used.

Telemetry

Time series data containing a variety of metrics from various equipment, such as voltage, rotation, pressure, and vibration.

Machines

Machine-related information.

Failures

A list of components that have failed.

Maintenance

Machine component replacement records resulting from routine maintenance or breakdowns.

Errors

Errors made by machines throughout history.

Data Preparation & Model

- **Future engineering**
- **Predictive Model**
- **Evaluation**
- **Model Turning**
- **Deployment**

Data sets


telemetry.csv


maint.csv


machines.csv


failures.csv


errors.csv