

To,

IITD-AIA Foundation of Smart Manufacturing

Subject: Weekly Progress Report for Week 0

What is happening this week:

- Project Allocation
- Discovering Resources and learning material
- Choosing Relevant dataset
- Understanding Problem

My understanding of **INTP23-ML-5: Equipment Failure Prediction** for Predictive maintenance

Scope:

Predictive maintenance predicts failure, helps in detecting issues in advance and resolve problems before equipment failure can occur. The actions could include corrective actions, the replacement of the system, or even planned failure. This can lead to major cost savings, higher predictability, and the increased availability of the systems. It has many other benefits such as

- Reduced downtime and maintenance costs
- Increased equipment lifespan
- Improved safety and reliability
- Increased efficiency and productivity.

At present, mathematical, and statistical modeling are the prominent approaches used for failure predictions. These are based on equipment degradation physical models and machine learning methods, respectively. But none of these approaches ensures failure predictions well before their occurrence to provide sufficient time to treat potential causes proactively.

Solution/Approach:

To develop a machine learning model to predict equipment failures by analyzing historical sensor data, maintenance records, and operational parameters of industrial equipment, the model will identify patterns and indicators that precede equipment failure.

Weekly Progress:

June 01:

INTP allocation - Equipment Failure Prediction for Predictive maintenance

- Discovering Resources and learning material that would be helpful
- Searching for relevant dataset
NASA Turbofan Jet Engine Dataset

June 02:

Searching for resources across the internet.

- Gone through resources available on internet.
- Learn about Machine Learning technique for Predictive maintenance.
Predictive maintenance can be formulated in one of the two ways:
 - i) Classification approach - predicts whether there is a possibility of failure in next n-steps.
 - ii) Regression approach - predicts how much time is left before the next failure, what we call, Remaining Useful Life (RUL).
- Explore how you can build a machine learning model to do predictive maintenance of systems

June 03:

Learnt about NumPy, Pandas and scikit learn libraries in greater detail.

- Tried to implemented them to some extent too.
- Gone through Deep Learning resources
- Deep Learning algorithm can be used in both classification and regression applications.
- Learnt about multi layered feed forward neural network that is trained with stochastic gradient descent using back-propagation.

Not sure if I understand it quite well. I have to go through the resources again to understand it better.

June 04:

- Learn from resources on deep learning
- Read a research paper on machine learning technique on NASA Turbofan Jet Engine Dataset to predict failure.
- Tried to implement a Logistic regression and Random Forest model on the chosen dataset.