To,

IITD-AIA Foundation of Smart Manufacturing

Subject: **Weekly Progress Report**

INTP23-ML-05: Equipment Failure Prediction for Predictive Maintenance

What is happening this week:

- Continued Learning more about Deep Learning
- Working on NASA Turbofan Jet Engine Dataset
  - ➢ Implemented models like Light GBM, LSTM
  - ➢ Comparing results of various models
  - ➢ Tried to conclude my learning from the dataset
- Learning about CNC mill machine
- The CNC Mill ware dataset is similar to ours, so working on it to learn about how to deal with industrial data
- Did exploratory data analysis of the dataset
- Implemented basic models on CNC mill dataset

Week 4

26th June:
- Learning from the shared resources of Deep Learning
- Learnt about SMOTEENN and SMOTE-Tomek
- Working on NASA turbofan jet engine dataset
  i) Leant about AdaBoost, Gradient Boost and XGBoost classifier
  ii) Experimenting with the different models
  iii) Comparing results of implemented models
- Searched for some more research papers and other material on similar dataset to gain more knowledge

27th June:
- Learning from the shared resources of Deep Learning
- Working on NASA turbofan jet engine dataset
  i) implementing AdaBoost, Gradient Boost and XGBoost classifier
  ii) Experimenting with the different models and trying to understand them better (their parameters, and in which condition they will give better

results)

iii) Comparing results of implemented models

- Gone through some more research papers on Predictive maintenance
- Learnt more about time series
- Again, gone through documentation of LSTM and understand the network model better

28th June:

- Learning from the shared resources of Deep Learning
- Working on NASA turbofan jet engine dataset
- Splitting the dataset into 50% to 90 % for training data and compare results of multiple models
- Learning in detail about the implemented models
- Gone through a research paper on implementation of CNN model on similar dataset
- Gone through some more research papers on Predictive maintenance

29th June:

- Learning from the shared resources of Deep Learning
- Working on NASA turbofan jet engine dataset
- Learning more about time series analysis
- Gone through a research paper on implementation of CNN model and tried to learn and understand it working
- Gone through some more research papers on implementation of LSTM model
- Comparing RNN and LSTM and learning about shortcomings of RNN which was solved by LSTM model

30th June:

- Learning from the shared resources of Deep Learning
- Working on NASA turbofan jet engine dataset
- Understand more about the features of the dataset. Listed out important features by experimenting with the dataset
- Realized that only 10 features are the most important features which plays significant role in predicting the occurrence of failure
- Learnt about Boosting methods
- tried to implement AdaBoost, XGBoost, Light GBM models on the dataset
- learning more about correlation metrics

1st July:

- Learning from the shared resources of Deep Learning
- Working on NASA turbofan jet engine dataset, analyzing the dataset and the implemented models
- compared the results with the results of other implemented models by other researchers
- learnt about CNC mill machine
- Downloaded the dataset, did EDA
- Implemented basic models Random Forest, Decision Tree, XGB classifier

2nd July:

- Searching for similar dataset
- Working on CNC mill ware dataset as suggested by mentor
- Implemented models like Gradient Boosting, XGB, LGBM
- Compare results and did some experimentation for feature selection

Reference:

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7) MIT 6.S191: Introduction to Deep Learning - YouTube
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9) https://www.rapiddirect.com/blog/what-is-cnc-milling/
10) https://www.kaggle.com/datasets/shasun/tool-wear-detection-in-cnc-mill