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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
- Practicing on NASA Turbofan Jet Engine Dataset
- Working on CNC Mill ware Dataset
- Data Preprocessing and Visualization data
- learning about important features of the machine which affect its working
- Implemented Random Forest, KNN, XGBoost, Light GBM, AdaBoost, LSTM
- Learning about Lazy Predict Library

My Understandings of this week:

After practicing on NASA turbofan engine Dataset, I got some knowledge about real world dataset. To gain more insights about the real-world dataset, I am working on CNC mill ware dataset. I did Data processing and started data exploratory analysis. Continuing the work, I worked on data visualization this week. Also Implemented Random Forest, KNN, AdaBoost, XGBoost, Light GBM, LSTM model. Splitting the data into 50% to 90 % and training the model on it. Comparing the performance of the implemented models. Also learnt about Lazy Predict Library and gone through some documentations on it.

Week 5

3rd July:

- Learning from the shared resources of Deep Learning
- Working on NASA turbofan jet engine dataset, analyzing the dataset and results of the implemented models
- comparing with other researchers work and tried to improve

- Visualizing the data, tried to find features which are more significant in predicting failure as compared to other features
- implementing models like Random Forest, K Nearest Neighbor, Logistic Regression, SVM, Gradient boosting and training these models from 50 % to 90 % dataset, comparing these results
- Random Forest, gradient Boost models are giving better results as compared to other models.

4th July:

- Learning from the shared resources of Deep Learning
- Working on NASA turbofan jet engine dataset, trying to improve results by studying more about features affecting engine a
- Working on CNC mill ware dataset

  - Doing Exploratory Data Analysis: trying to visualize data handling Null values and Duplicate values
  - Also checking for presence of outliers in the data, and handling them accordingly
  - Learning about the condition which affects the machine, like about tool wear wrt. material

- Training the models on 50 % to 90 % training data
- implementing classification and regression models and comparing their accuracy scores. (RF, LR, KNN, DT, GB, XGB)
- learning from research papers on similar dataset about predictive maintenance

5th July:

- Learning from the shared resources of Deep Learning
- practicing on NASA turbofan jet engine dataset
- Working on CNC mill ware dataset

  - Doing Exploratory Data Analysis: trying to visualize data handling
  - Learning about what factors are more important in predicting RUL of the machine

- Training the models on 50 % to 90 % training data
- implementing classification and regression models and comparing their accuracy scores. (RF, LR, KNN, DT)
- printing Roc Auc score of the implemented algorithms

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8th July:

- Learning from the shared resources of Deep Learning
- practicing on NASA turbofan jet engine dataset
- Working on CNC mill ware dataset

  - Doing Exploratory Data Analysis: Visualizing Data and selecting important features
  - Implementing classification Algorithms: Random Forest, Decision Tree, CNN, LSTM

- Understanding in detail about CNN and LSTM models
- Read Research paper about similar dataset in which LSTM model is implemented

9th July:

- Learning from the shared resources of Deep Learning
- practicing on NASA turbofan jet engine dataset
- Working on CNC mill ware dataset

  - Visualizing data and learning important features/ condtion which affect working of the machine
  - Implementing classification Algorithms: Light GBM, CNN, LSTM
  - Comparing accuracy of implemented models on training data (50 to 90%)

- Gone through documentations on LSTM and its application on real life dataset, also how it is better than CNN
- Exploring Lazy Predict library

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4. Understanding Long Short-Term Memory Recurrent Neural Networks – a tutorial-like introduction (arxiv.org)
5. Lazy Predict: fit and evaluate all the models from scikit-learn with a single line of code | by Eryk Lewinson | Towards Data Science
6. Usage — Lazy Predict 0.2.12 documentation
7. Lazy Predict Library |Lazy Predict - Best Suitable Model for You (analyticsvidhya.com)