To,
IITD-AIA Foundation of Smart Manufacturing

Subject: **Weekly Progress Report**

Dear sir,

Following is the required progress report to the best of my knowledge considering relevant topics to be covered.

What happened last week:

- Pandas:
- NumPy:
- Scikit-Learn:
- PyTorch

What's happening this week:

- PyTorch
- TensorFlow
- Shortlisting machine learning models.
- Flask and Django frameworks.
- Research on machine learning models.

Weekly Progress:

Following are the topics I've brushed upon and intend to learn deeper with upcoming days.

June 05:

- PyTorch:
  PyTorch is a popular deep learning library that provides a flexible and efficient platform for building and training neural networks. Supervised: classification, regression | Unsupervised: clustering
- It can be used for a variety of tasks such as supervised learning (classification, regression) and unsupervised learning.
- Explored the construction of neural networks using PyTorch.

- Investigated GPU acceleration for faster training and inference.

June 06 and June 07:

- TensorFlow:
    - TensorFlow is an open-source machine learning framework developed by Google.
    - It offers a comprehensive ecosystem for building and deploying machine learning models.
    - Explored the various tools and libraries provided by TensorFlow.
    - Focused on understanding its capabilities for model development and deployment.

June 08:

Shortlisting machine learning models for predictive maintenance:

- Explored different machine learning models suitable for predictive maintenance tasks.
- Considered models such as linear regression, support vector machines (SVM), gradient boosting models, and neural networks.
- Researched their applications and identified their strengths and weaknesses in the context of predictive maintenance.

June 09:

Flask and Django and their comparison:

- Explored Flask and Django, two popular web development frameworks in Python.
- Examined their features, functionalities, and use cases.
- Compared the strengths and weaknesses of Flask and Django to understand their suitability for different web development projects.

June 10:

Introduction to neural networks: RNN, CNN, LSTM:

- Neural Networks:
    - Neural networks are a class of machine learning models inspired by the structure and functioning of the human brain.
    - They consist of interconnected nodes called neurons, organized into layers, and each neuron performs a weighted computation on its inputs.
    - Neural networks have gained popularity due to their ability to learn complex patterns and relationships from data.
- Recurrent Neural Networks (RNN):
    - RNNs are a type of neural network specifically designed for processing sequential data.
    - Unlike traditional feedforward neural networks, RNNs have connections that form a directed cycle, allowing them to retain information about past inputs.

    - RNNs excel at tasks that require memory and capturing temporal dependencies, such as time series analysis, natural language processing, and speech recognition.
    - Applications of RNNs include language translation, sentiment analysis, and text generation.
- Convolutional Neural Networks (CNN):
    - CNNs are primarily used for processing grid-like data, most commonly images.
    - They employ convolutional layers that extract local patterns and features from the input data.
    - CNNs are particularly effective in computer vision tasks such as image classification, object detection, and image segmentation.
    - They have revolutionized the field with applications like autonomous driving, facial recognition, and medical image analysis.
- Long Short-Term Memory (LSTM):
    - LSTMs are a specialized variant of RNNs that address the vanishing gradient problem.
    - They incorporate memory cells, allowing them to capture long-term dependencies in sequential data.
    - LSTMs are widely used in tasks where maintaining context over longer sequences is crucial, such as speech recognition, machine translation, and handwriting recognition.
    - Their ability to remember relevant information over extended periods makes them ideal for time series prediction and natural language generation.

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ID	Name	Start Date	End Date	Du...	Progress %
1	Learning: Pandas	Jun 01, 2023	Jun 01, 2023	1 day	100
2	Learning: NumPy	Jun 02, 2023	Jun 02, 2023	1 day	100
3	Learning: Scikit-Learn	Jun 03, 2023	Jun 03, 2023	1 day	100
4	Learning: PyTorch	Jun 05, 2023	Jun 05, 2023	1 day	100
5	Learning: Tensorflow	Jun 06, 2023	Jun 06, 2023	1 day	100
6	Learning: Tensorflow	Jun 07, 2023	Jun 07, 2023	1 day	100
7	Research and Familiarization:	Jun 08, 2023	Jun 08, 2023	1 day	100
8	Research on machine learning mod...	Jun 09, 2023	Jun 09, 2023	1 day	100
9	Gather historical dataset on tool we...	Jun 10, 2023	Jun 10, 2023	1 day	0
10	Data Preprocessing	Jun 12, 2023	Jun 12, 2023	1 day	0
11	Data Preprocessing	Jun 13, 2023	Jun 13, 2023	1 day	0
12	Feature Selection and Engineering	Jun 14, 2023	Jun 14, 2023	1 day	0
13	Feature Selection and Engineering	Jun 15, 2023	Jun 15, 2023	1 day	0
14	Feature Selection and Engineering	Jun 16, 2023	Jun 16, 2023	1 day	0
15	Model Selection and Training	Jun 17, 2023	Jun 17, 2023	1 day	0
16	Model Selection and Training	Jun 19, 2023	Jun 19, 2023	1 day	0
17	Model Selection and Training	Jun 20, 2023	Jun 20, 2023	1 day	0
18	Model Selection and Training	Jun 21, 2023	Jun 21, 2023	1 day	0
19	Model Evaluation and Tuning	Jun 22, 2023	Jun 22, 2023	1 day	0
20	Model Evaluation and Tuning	Jun 23, 2023	Jun 23, 2023	1 day	0
21	Model Evaluation and Tuning	Jun 24, 2023	Jun 24, 2023	1 day	0
22	Model Validation and Interpretation	Jun 26, 2023	Jun 26, 2023	1 day	0
23	Model Validation and Interpretation	Jun 27, 2023	Jun 27, 2023	1 day	0
24	Model Validation and Interpretation	Jun 28, 2023	Jun 28, 2023	1 day	0
25	Implementation and Integration	Jun 29, 2023	Jun 29, 2023	1 day	0
26	Implementation and Integration	Jun 30, 2023	Jun 30, 2023	1 day	0
27	Implementation and Integration	Jul 01, 2023	Jul 01, 2023	1 day	0
28	Implementation and Integration	Jul 03, 2023	Jul 03, 2023	1 day	0
29	Implementation and Integration	Jul 04, 2023	Jul 04, 2023	1 day	0
30	Implementation and Integration	Jul 05, 2023	Jul 05, 2023	1 day	0
31	Testing and Debugging	Jul 06, 2023	Jul 06, 2023	1 day	0
32	Testing and Debugging	Jul 07, 2023	Jul 07, 2023	1 day	0
33	Testing and Debugging	Jul 08, 2023	Jul 08, 2023	1 day	0
34	Documentation and Reporting	Jul 10, 2023	Jul 10, 2023	1 day	0
35	Documentation and Reporting	Jul 11, 2023	Jul 11, 2023	1 day	0
36	Documentation and Reporting	Jul 12, 2023	Jul 12, 2023	1 day	0
37	Further Testing, Analysis and Opti...	Jul 13, 2023	Jul 13, 2023	1 day	0
38	Further Testing, Analysis and Opti...	Jul 14, 2023	Jul 14, 2023	1 day	0
39	Further Testing, Analysis and Opti...	Jul 15, 2023	Jul 15, 2023	1 day	0
40	Further Testing, Analysis and Opti...	Jul 17, 2023	Jul 17, 2023	1 day	0
41	Further Testing, Analysis and Opti...	Jul 18, 2023	Jul 18, 2023	1 day	0
42	Further Testing, Analysis and Opti...	Jul 19, 2023	Jul 19, 2023	1 day	0
43	Further Testing, Analysis and Opti...	Jul 20, 2023	Jul 20, 2023	1 day	0
44	Further Testing, Analysis and Opti...	Jul 21, 2023	Jul 21, 2023	1 day	0
45	Further Testing, Analysis and Opti...	Jul 22, 2023	Jul 22, 2023	1 day	0
46	Further Testing, Analysis and Opti...	Jul 24, 2023	Jul 24, 2023	1 day	0
47	Further Testing, Analysis and Opti...	Jul 25, 2023	Jul 25, 2023	1 day	0
48	Final Documentation and Reporting	Jul 26, 2023	Jul 26, 2023	1 day	0
49	Final Documentation and Reporting	Jul 27, 2023	Jul 27, 2023	1 day	0
50	Final Documentation and Reporting	Jul 28, 2023	Jul 28, 2023	1 day	0