To,

# IITD-AIA Foundation of Smart Manufacturing

## Subject: Weekly Progress Report for Week 0

Dear sir,

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

## What's happening this week:

- Researching for the scopes and uses of Deep Learning and Fast AI
- Introduction to Deep Learning and Libraries like TensorFlow and Keras
- Deep Neural networks with stack layers
- Types of neural networks

# **Weekly Progress:**

#### **June 01:**

Domain based Learning: Machine Learning and Deep Learning

- Searched the scope of deep learning and Fast AI.
- Discovered various resources for the learning.
- Fast AI: It is a high-level deep learning library built on the top of PyTorch and provides us the pre-built models that simplify the process of training and deploying the deep learning models.
- Introduction to Deep Learning: It is an approach to machine learning characterized by deep stacks of computations and neural networks that enable us to solve complex problems specially with respect to real world.

#### **June 02:**

Starting from the basics of the Deep Learning, I searched and studied the following topics:

- Neural network in Deep Learning: Neural networks are composed of neurons, where each neuron individually performs only a simple computation and helps in handling the large-scale datasets mainly.
- Studied about a neuron-the building block of neural network using linear unit(simplest form of neural network and performs a linear operation on its inputs
- TensorFlow:
  - o It is an open-source machine learning framework developed by Google.
  - o It has two major categories i.e., Low level API and high-level API.
  - o Mathematical operations can be done using this library.
  - o It includes building block of neural network.
  - o It supports training and building models on CPU and GPU.
  - o Contains pre-trained models and datasets for all kind of devices.

o Also have inbuilt functionalities for data visualization and debugging.

#### • Keras:

- Keras is a high-level neural networks library that provides user-friendly API for building and training deep Learning models.
- o It runs on the top of the TensorFlow library.
- Model can build, complied, trained, evaluate and prediction can be made using this library.

### • PyTorch:

- o It is an open-source deep learning framework that provides a flexible and efficient platform for building and training neural networks.
- o used in both research and industry due to its simplicity, dynamic computational graph, and strong support for GPU acceleration.
- o Comparison between TensorFlow, Keras and PyTorch.

### **June 03:**

Searched and gained some good practical knowledge on the following topic:

- Did hands on practice of neuron on Kaggle and made a linear model with Keras and TensorFlow on red wine dataset.
- Studied deep neural network, its dense layers and sequential modelling.

#### **June 04:**

Learned about many things like various types of neural network. Brief about the learning is given below:

- Did hands on practice of neuron on Kaggle and made a deep neural network with Keras and TensorFlow on concreate dataset using sequential modelling.
- Studied types of neural network i.e., Feedforward neural network (FNN), Convolutional neural network (CNN), Recurrent Neural Network (RNN)
- Feedforward neural network (FNN): Feedforward neural network (FNN) is a multilayer perceptron where, as occurs in the single neuron, the decision flow is unidirectional, advancing from the input to the output in successive layers, without cycles or loops.
- Convolutional neural network (CNN): It utilizes convolutional layers to automatically extract local spatial patterns and hierarchical representations from the input. A CNN is a kind of network architecture for deep learning algorithms and is specifically used for image recognition and tasks that involve the processing of pixel data.
- Recurrent Neural Network (RNN): It is a type of Neural Network where the output from the previous step is fed as input to the current step. RNNs are suitable for tasks such as natural language processing, speech recognition, and time series analysis.