To,

IITD-AIA Foundation of Smart Manufacturing

Subject: **Weekly Progress Report for Week 3**

Dear Sir,

Based on my understanding and the topics covered, I have prepared the following progress report that addresses the relevant objectives of the project.

What happened last week – Week 2 :

- Neural Network Architecture
- Model building
- Convolutional Neural Network Classifier
- Forward propagation, Gradient descent, Loss function, Activation Function
- Learned about Keras and Tensorflow libraries
- Implementation of OpenCV

What's happening this -week 3:

- Functionalities of OpenCV
- Exploratory Data Analysis (EDA)
- Tensorflow framework for deep learning
- YOLO algorithm for object detection.
- Semantic segmentation and U-Net architecture
- Model building
- Model Training

Weekly Progress:

June 19:(Monday)

Learned about various functionalities of OpenCV like Live Direct Drawing. Tried to make a cropping tool using OpenCV. Learned about how to work with videos using OpenCV. Explored about how to perform EDA on image dataset.

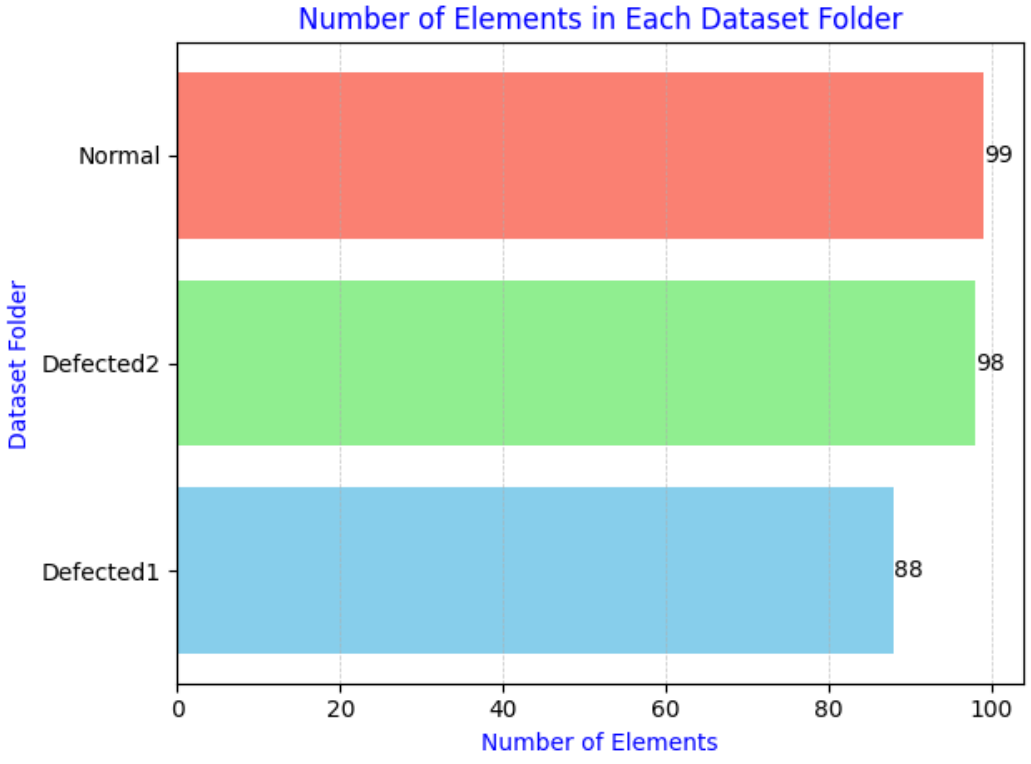
I implemented various functionalities of OpenCV like Live Direct Drawing. Tried to make a cropping tool using OpenCV.

June 20:(Tuesday)

I have gained knowledge on conducting Exploratory Data Analysis (EDA) for image datasets and successfully implemented it in practice. Also I have revisited and refreshed my understanding of important concepts in deep learning.

About the dataset

I created plots to visualize the number of elements in each dataset folder, providing an overview of the dataset. Furthermore, I experimented with annotating certain images within the dataset.



The dataset contains total 285 images.There are three groups of Folders present in the dataset.

Defected 1

It consists of different images of piston which are broken/shaped out /fallen.

Defected 2

It consists of different images of piston which are Oily/grease/rust stains.

Normal

It consists of different images of piston which are Perfectly Normal.

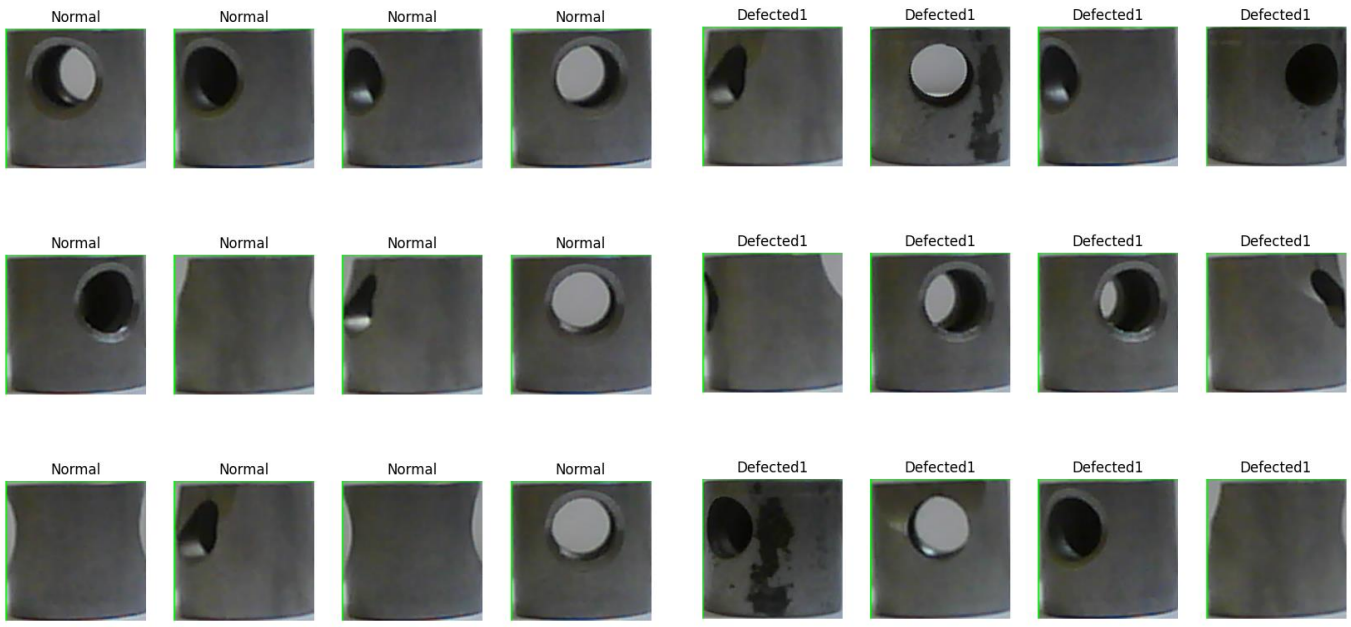
Analyzing the number of elements in each dataset folder helps me understand the distribution of images.

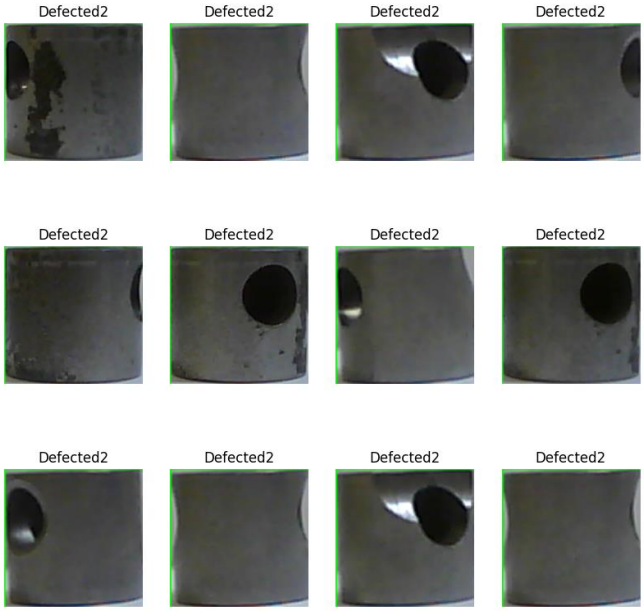
June 21:(Wednesday)

I learned more about tensorflow framework for deep learning.

And started rest of the work related to EDA.

Visualize each type of dataset





June 22:(Thursday)

Today I have learned about YOLO algorithm for object detection.

Implemented YOLO algorithm on images. And also implemented object detection using WebCam.

I can implement YOLO algo to detect piston defect.

June 23:(Friday)

Today I have learned about Semantic segmentation. And explored about U-Net architeture. Studied about the theoretical concepts of semantic segmentation and the U-Net architecture. Then I further deepened my understanding of the YOLO algorithm.

Semantic segmentation can be used to accurately identify and localize different types of defects in images.

June 24:(Saturday)

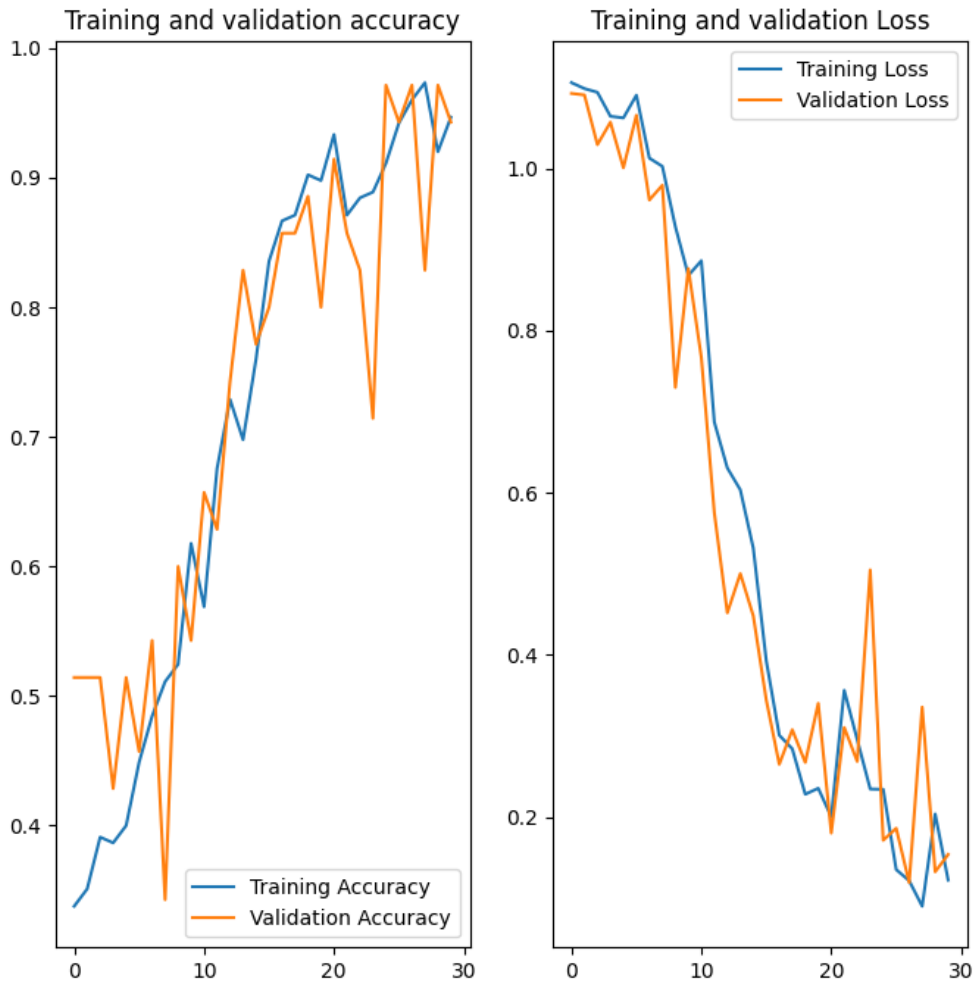
Explored about different models which can be used for the defect detection task. And trained that model using AC Piston dataset.

The dataset was preprocessed to prepare it for further analysis and modelling .Previously I have created a model using CNN, Today I have trained that model using AC Piston dataset.

June 25:(Sunday)

Trained and checked the accuracy of the model using AC Piston dataset .

Today I was mainly focused on writing the abstract of the project for the reserach papers. Checked the accuracy and loss of the model.



Gantt Chart

ID	Name
1	Numpy/Pandas
2	Basics of CNN |Convoution Operation|Padding
3	PIL Library | OpenCV
4	Image Manipulation with PIL
5	Tensorflow Data Input Pipeline|CNN
6	Model Building using CNN
7	CNN Classifiers
8	KNN for Object Detection
9	Fundamental Concepts DL
10	Implementation DL Concepts
11	Build a Model Using CNN
12	Image Manipulation with OpenCV
13	Implemented various functionalities of OpenCV
14	Exploratory Data Analysis (EDA)
15	Tensorflow framework for deep learning.
16	YOLO algorithm for object detection.
17	Semantic segmentation|U-Net architecture
18	Model Building
19	Model Training using AC piston Dataset