

To,

IITD-AIA Foundation of Smart Manufacturing

Subject: Weekly Progress Report for Week 0

My understanding of INTP23-ML-09: Piston Defect Detection using Computer Vision

Defect in Piston

A defect in a piston refers to any abnormality or flaw that compromises the functionality, performance, or durability of the piston. Pistons are crucial components in internal combustion engines, where they play a critical role in converting the pressure generated by the combustion process into mechanical energy.

How to solve the defect in Piston using Computer Vision?

To solve defects in a piston using computer vision, we can employ image analysis techniques to automatically detect and classify abnormalities. By training a computer vision model with a dataset of labelled images containing normal and defective pistons, the model can learn to recognize different types of defects. Once trained, the model can be used to analyse images of pistons in real-time, identifying any defects present.

Benefits

By solving the defect in the Piston allows for efficient and automated defect detection and ensure the production of high-quality pistons.

Weekly Progress:

June 01:

Exploring open Source:

Researching and finding courses and resources related to computer vision.

Revising Important Machine Learning Concepts:

Revising important machine concepts such as supervised and unsupervised learning, feature extraction, model evaluation, overfitting and underfitting, and other key concepts

June 02:

Gaining a deeper understanding about the libraries like NumPy, Pandas and Matplotlib. By knowing the functionalities of NumPy, Pandas, and Matplotlib, we can efficiently handle, preprocess, visualize, and analyse image data, which are essential steps in solving computer vision problems effectively.

NumPy for Array Manipulation:

Computer vision often involves working with large arrays of image data. NumPy's powerful array operations and efficient memory management enable us to perform mathematical computations, manipulate image data, and implement algorithms efficiently.

Pandas for Data Preprocessing:

Before feeding image data into computer vision models, it's crucial to preprocess and organize the data. Pandas offers flexible data structures, such as DataFrames, that facilitate cleaning, filtering, and transforming datasets.

Matplotlib for Visualization:

Visualizing image data and their corresponding annotations is essential for understanding the problem space, exploring datasets, and evaluating model performance.

June 03:

Learning about Basics Computer Vision through an OpenCV course.

Learned about Image Processing and Object Detection.

OpenCV offers a wide range of image processing functions and algorithms.

Learned about operations like image filtering, edge detection, image segmentation.

Object detection is a fundamental task in computer vision, and OpenCV provides various algorithms and methods to accomplish it.

June 04:

Learned about CNNs in Computer Vision:

By utilizing convolution operations and CNN architectures, computer vision systems can automatically learn and extract meaningful features from images, leading to improved performance in tasks such as image classification, object detection, and image analysis.

CNNs can learn and generalize from a large amount of labelled training data, allowing them to achieve state-of-the-art performance on various computer vision tasks.