Experiment – 07

Computer Vision

1. **Aim:**

   To understand the basics of Computer Vision and implement an object detection model for industrial defects.

2. **Objectives:**

   - Train a model to detect surface defects in industrial products.

3. **Dataset:**

   Severstal steel defect detection is Kaggle based dataset that has over 6666 total images of various defects found on steel items in industries. The images are grey scale of dimensions 800x128 and in .jpg format. I have split the dataset as 70% train, 20% valid set, and 10% test set.

4. **Algorithms used:**

   I have used yolov8 to complete the task. I have used OpenCV for training and reading of dataset images.

5. **Conclusion:**

   In this computer vision project, we developed a solution for detecting steel defects using advanced object detection techniques, specifically leveraging YOLOv8 and OpenCV algorithms. The YOLOv8 model, with its state-of-the-art performance in real-time object detection, was trained on a steel defect dataset to accurately identify various types of defects, such as cracks, pitting, and inclusions. Through fine-tuning and optimization, the model achieved high accuracy in detecting these defects under different conditions. By utilizing OpenCV for image preprocessing, such as resizing, normalization, and noise reduction, we ensured that the input images were of optimal quality for the detection model. The integration of YOLOv8 with OpenCV allowed for seamless inference and efficient visualization of defect locations, enhancing the practical application of the system in industrial settings.

6. **Link to the code uploaded on:** https://github.com/Niti0209/Surface-Defect-Detection-

7. **References:**

   - https://www.kaggle.com/competitions/severstal-steel-defect-detection
   - https://youtu.be/28ZWUNcqaKk?si=1C1M_1RhmQmLDxOD
   - https://youtu.be/9s_FpMpdYW8?si=_AQj0M6bI4nWtRs-