

INTEL ONE API CHALLENGE

Team Name: DATA DOCTORS

Problem Statement: Pothole Detection in Real-time Environment.

Team Details:

KAVIN V
HARISH R

Problem statement:

Pothole Detection in Real-time Environment

Description:

- Over the past few years, Sihao has seen exponential growth in the number of vehicles on the road. As a result, the increase in the number of vehicles on road gave rise to the number of road accidents. According to a study, one fatal road accident occurs every 5 minutes in the country, and 8 die on roads every hour. This has become a major concern in the country. One of the primary causes of these road accidents is the management and maintenance of the roads.
- Potholes on roads can cause serious accidents, and any vehicle traveling at some decent speed can lose its track due to them. In the case of four-wheeler vehicles, potholes can cause severe damage to wheels and tires. More specifically, when it comes to two-wheelers like motorbikes, these vehicles are more prone to accidents due to potholes as the tendency to cause imbalance is very high and can lead to fatalities.
- Concerned by the increasing number of accidents caused by potholes, the government of Sihao has started initiatives and campaigns to install cameras in the most accident-prone cities and capture the feed to detect the potholes. In this hackathon, as a Computer Vision Learner or Expert, you will apply image processing techniques to process the images and detect the potholes. This will assist the government to identify the extreme potholes depending on their size and handle them as the earliest.

Problem statement:

Pothole Detection in Real-time Environment

Expected Outcome:

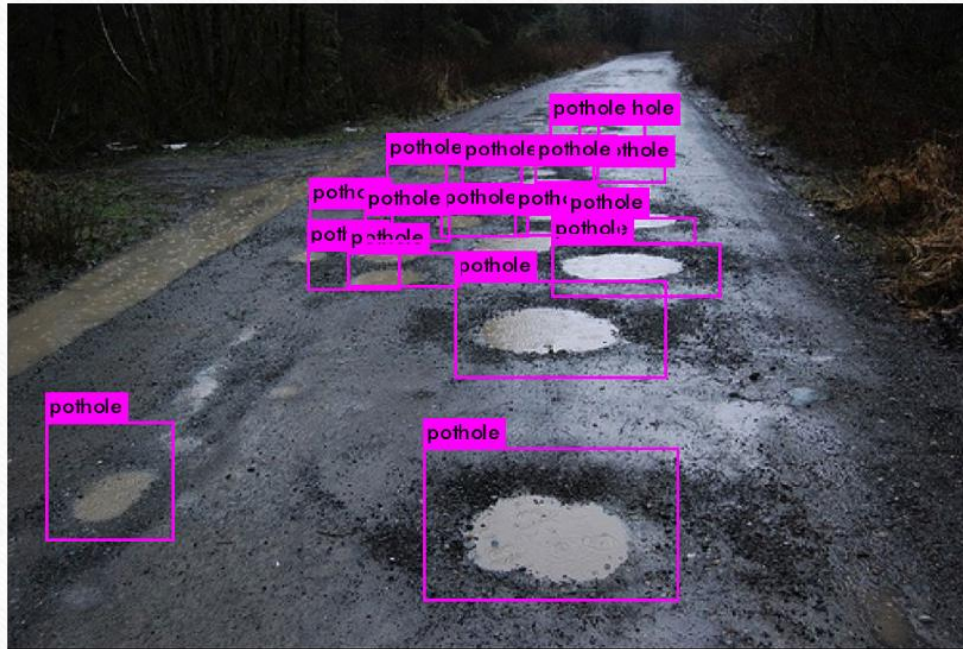
- Pothole Detection is to accurately identify the location and size of potholes in real-time using computer vision technology. YOLO is an object detection algorithm that uses a deep neural network to detect and classify objects in images or video streams.
- Pothole Detection is detected using YOLO v8 algorithm to improve road safety and reduce vehicle damage by enabling more efficient identification and repair of potholes.

Abstract:

The goal of this project is to develop a model that is capable of detecting Potholes in real-time environments for the purpose of improving online maps and deciding perfect route for travel. The model uses machine learning and deep learning techniques to identify these Pothole. We have used optimized and customized YOLOv8 which is used to train custom dataset as provided. The real-time aspect allows us to choose good roads and avoid the bad roads. The system is intended to integrated it with existing industrial environments to enhance the user to choose the best route for travel.

Proposed Solution:

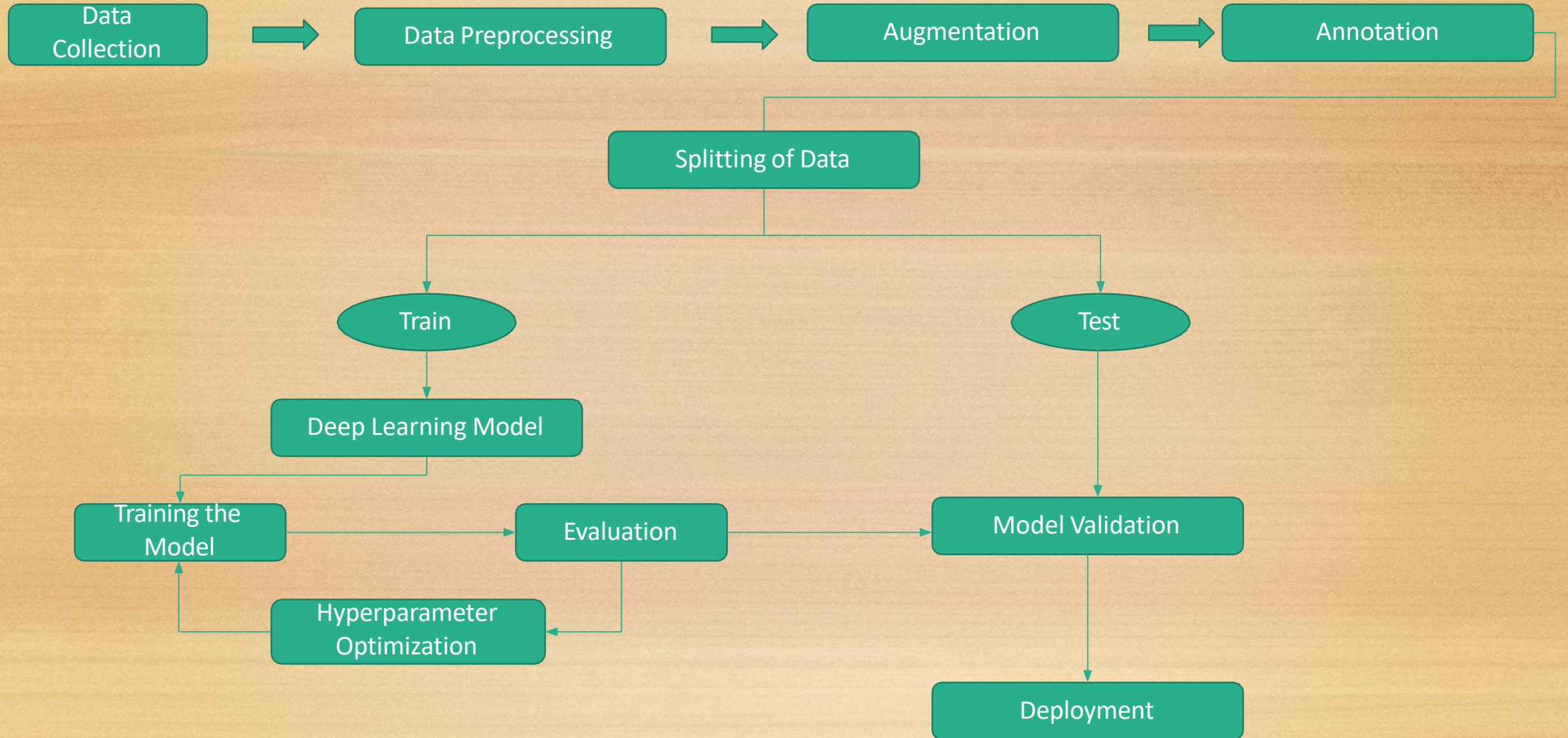
- ❖ We have customized yoloV8 to train and test our object detection model for detecting potholes, because it can process images at higher rate of FPS(Frames Per Second) gives precised output.
- ❖ The model will take the real time inputs from the surveillance camera and the objects will be detected .
- ❖ The model gives the output in form of value of 1 or 0 to decide the route is efficient to travel or not.
- ❖ We also deploy the model in the Streamlit which is an user-interface.
- ❖ As a prototype our proposed model will be deployed with an user-interface.



Approach

(Working in a flow/block diagram)

WORK FLOW



- ❑ **Data collection:** The Data is being fetched as per the given problem statement.
- ❑ **Data Preprocessing:** In this state the data is augmented and annotated.
- ❑ **Splitting of data:** The data is splitted to training and testing sets.
- ❑ **Model Architecture:** By applying suitable models of algorithms , the model is developed.
- ❑ **Training :** The data is being trained with the help of the model.
- ❑ **Tuning Hyperparameters:** By tuning the hyperparameters of the selected model the accuracy is maintained and model is optimized.
- ❑ **Evaluation :** In this Stage the accuracy of the model is obtained with the help of precision,f1 score , recall and etc....
- ❑ **Model Validation:** The data is being validated with the help of the test set in model.
- ❑ **Model Deployment :** Finally the model is deployed in the Streamlit user-interface.