



Traffic Monitoring and Detection System

DS510 AI/ML Lab

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Problem Statement: *The increasing complexity of urban traffic systems demands sophisticated technological solutions for monitoring, violation detection, and safety enhancement. This project presents an integrated computer vision approach combining advanced machine learning techniques to address critical challenges in traffic management.*

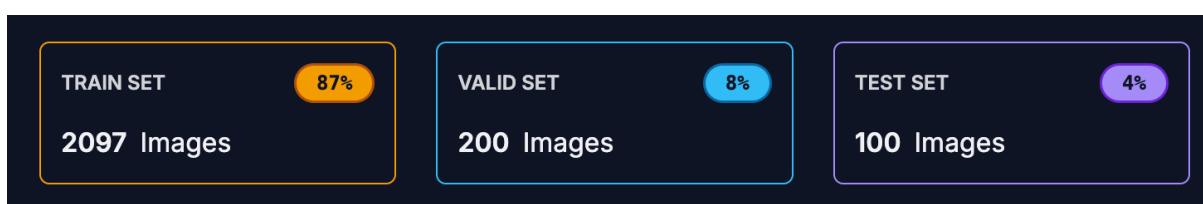
Github Repo : [Red-Stop](#)

Objective

To create an system capable of detecting traffic violations by identifying traffic light signals, extracting license plate information, and flagging offending vehicles using OCR (Optical Character Recognition) technology.

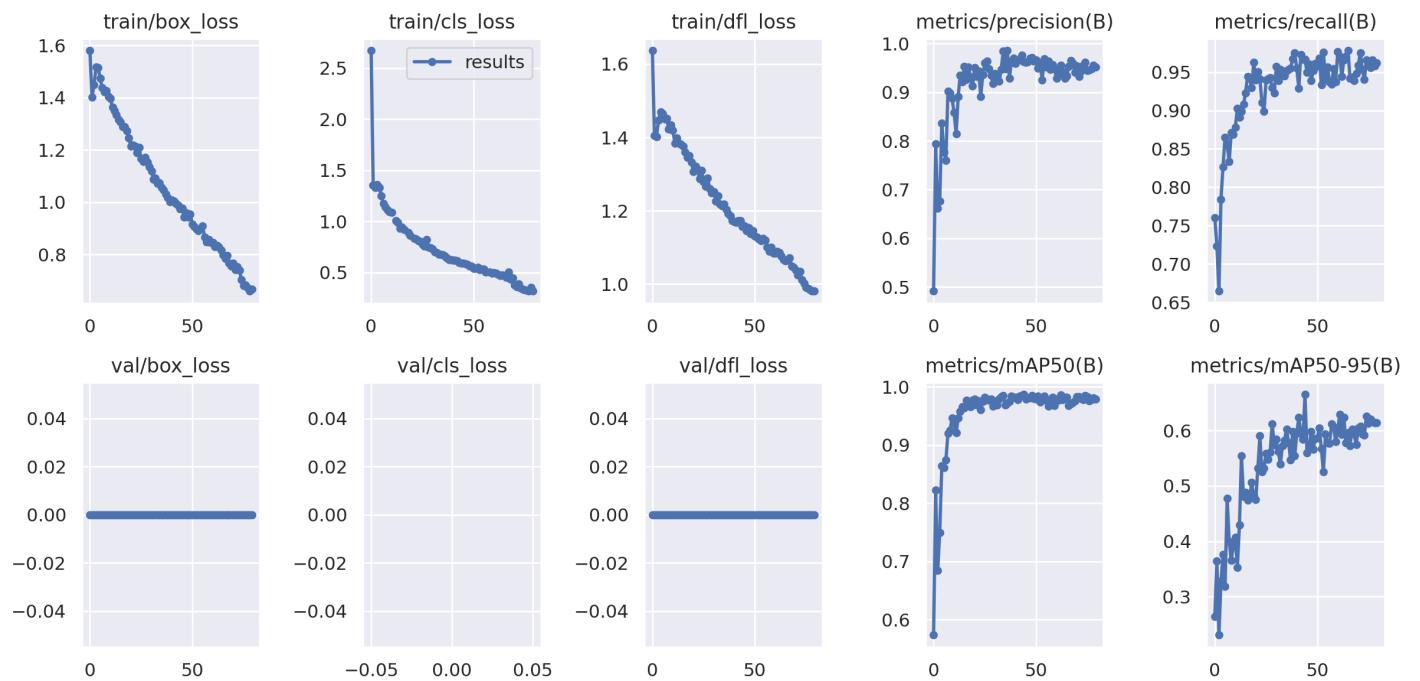
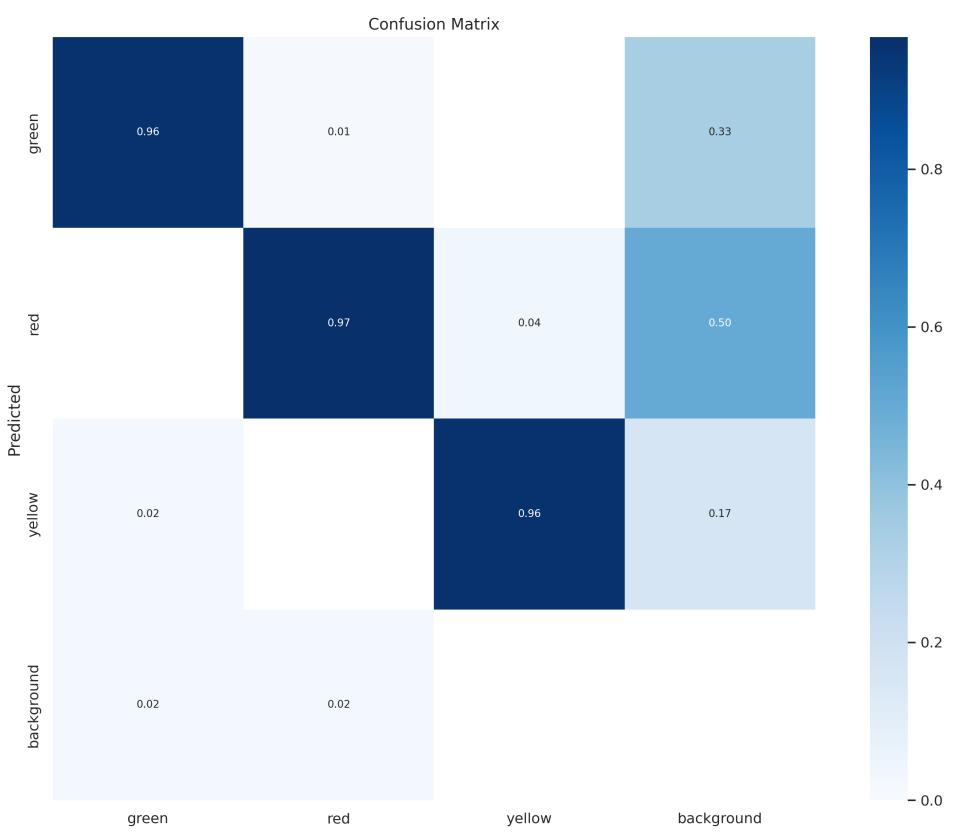
Traffic Light Detection

- We trained YOLOv8 for Traffic light detection.
 - Used pre-trained YOLOv8 to leverage transfer learning.
- Used roboflow dataset which contains Contains 2397 images.



Model Training

- Customized training with 80 epochs and image size of 640 pixels.
- Confusion matrix is the chart that shows how our model handles different classes
- 96% of the time the model detected correctly that currently the green light is on, while 2% of the time we get the Bounding Box but the green light is

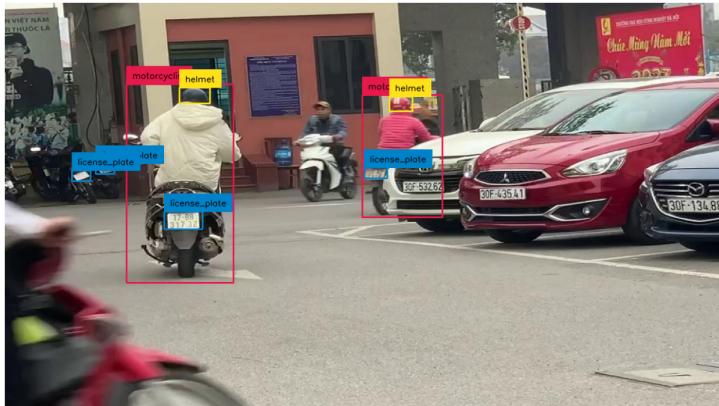


🚦 Training and Validation Loss

incorrectly classified as red light, while 1% of the time we also get the bounding box but the green light is incorrectly classified as yellow, light while 1% of the time when the green light is on the model is unable to detect it.

Helmet Detection

We trained yolo model for Helmet detection.



Results for Traffic Light Detection



LICENSE PLATE EXTRACTION

- Focuses on the area below the detected white line.
- Enhances the image using CLAHE and noise removal.
- Applies a Haar Cascade classifier to detect license plate regions.
- Crops and returns each detected license plate image.

Fined license plate: YB 6433



Fined license plate: AW 773



Video Frame Showing Fined License Plate



To watch full video [Click here](#)

- See the demo video on Github repo Link is provide above and here also
https://drive.google.com/file/d/1qZVJEEyROtR1NBq51-6c7vDJ2B_pi-FG/view?usp=sharing