



Lane Guard

AI-POWERED LANE-SWITCHING VIOLATION DETECTION SYSTEM

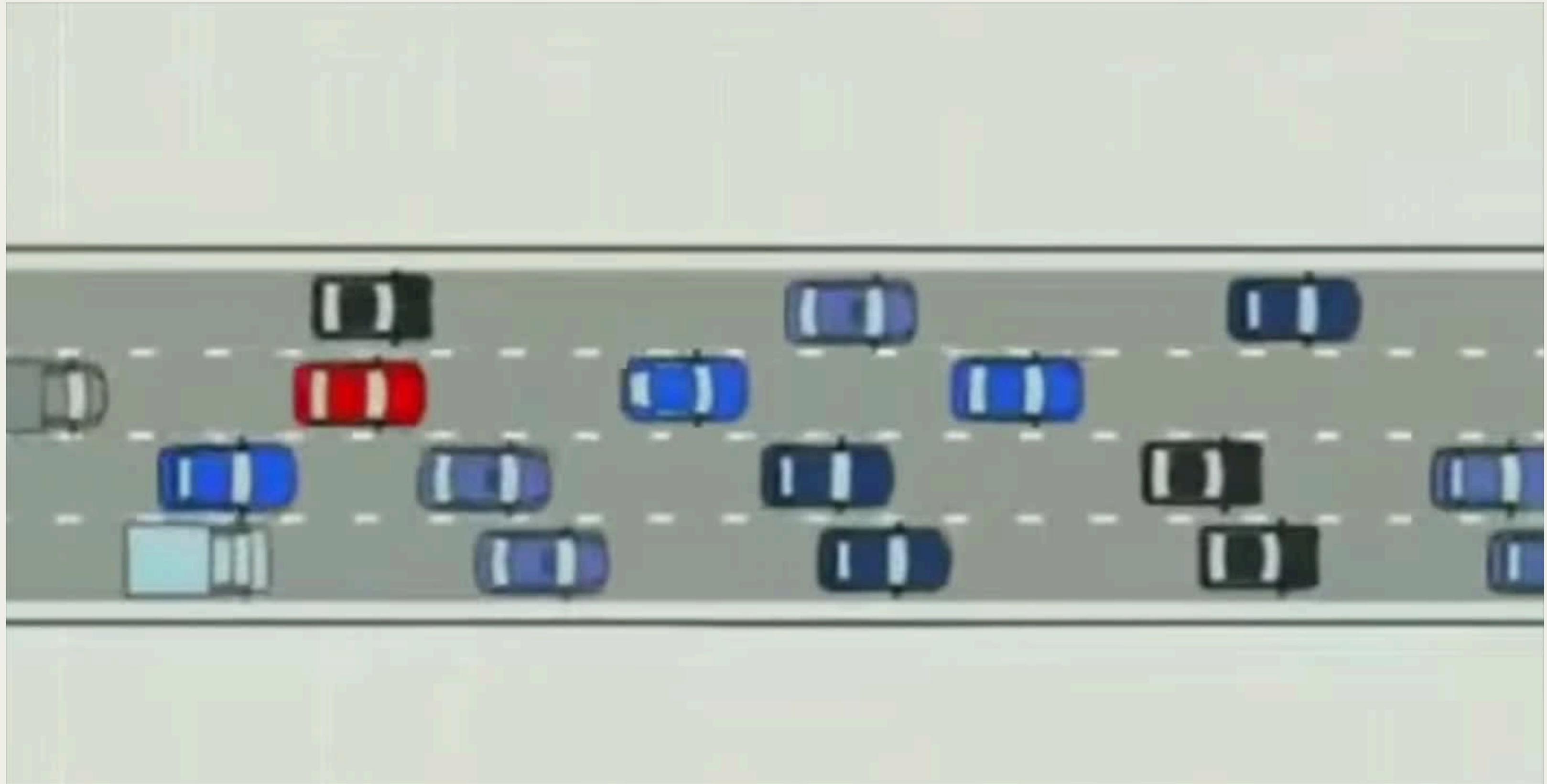
A G E N D A



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OUR MISSION





PROBLEM

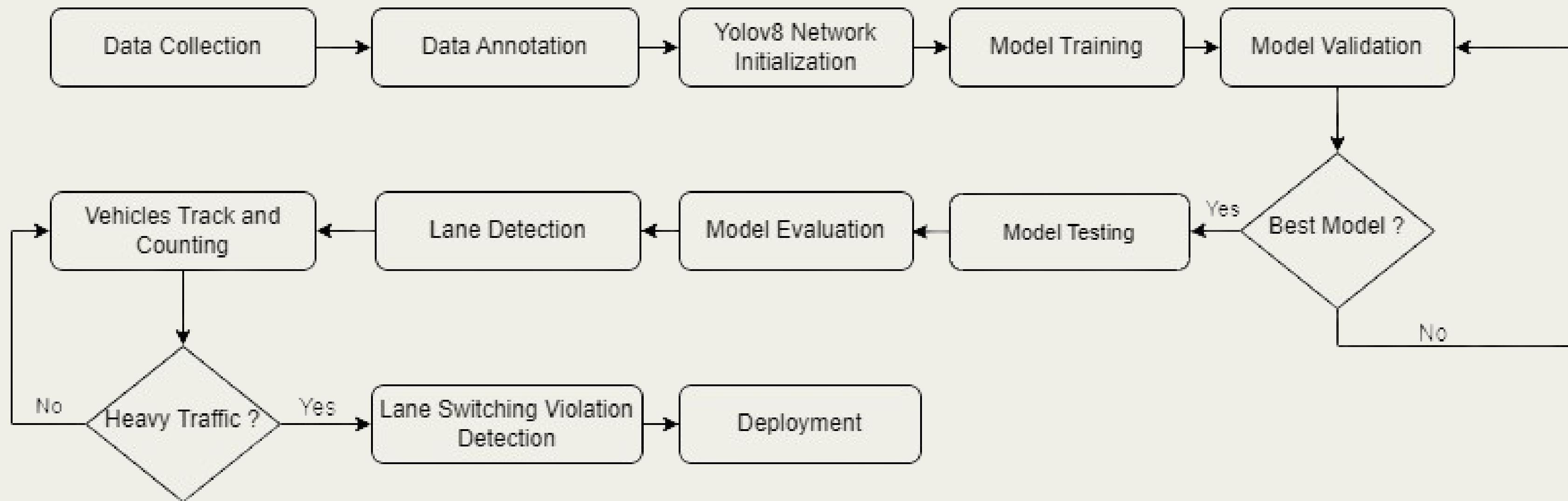
- Traffic congestion on highways is often worsened by **drivers changing lanes** during **peak hours** or **high congestion**.
- Changing during severe congestion exacerbates the situation **ripple effect** of lane changes that **leads to further delays** and **disrupt traffic flow**.

SOLUTION

A computer vision-based system using highway camera feeds and a pretrained YOLOv8 model will **detect and track** vehicles, **identifying** lane-switching violations **during severe congestion** while allowing lane changes when traffic is light, helping authorities regulate lane behavior and reduce congestion.



PROPOSED FRAMEWORK





DATA DESCRIPTION

Datasets name :

1. Traffic vehicles Object Detection - Highway
2. Traffic Videos

Datasets Source :

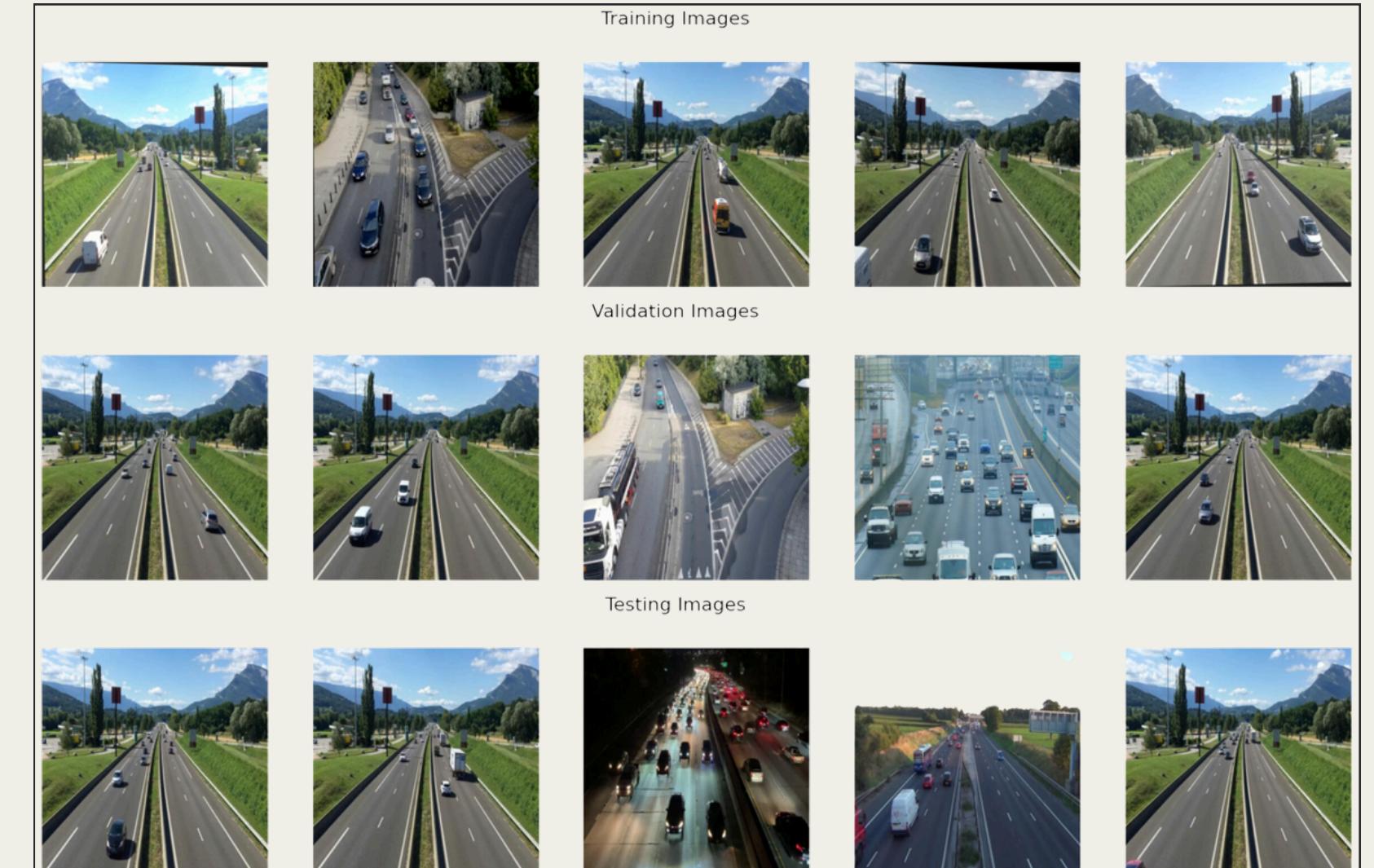
- Kaggle - YouTube

Classes :

- Vehicle

Framework :

- Yolo object detection



DATA DESCRIPTION





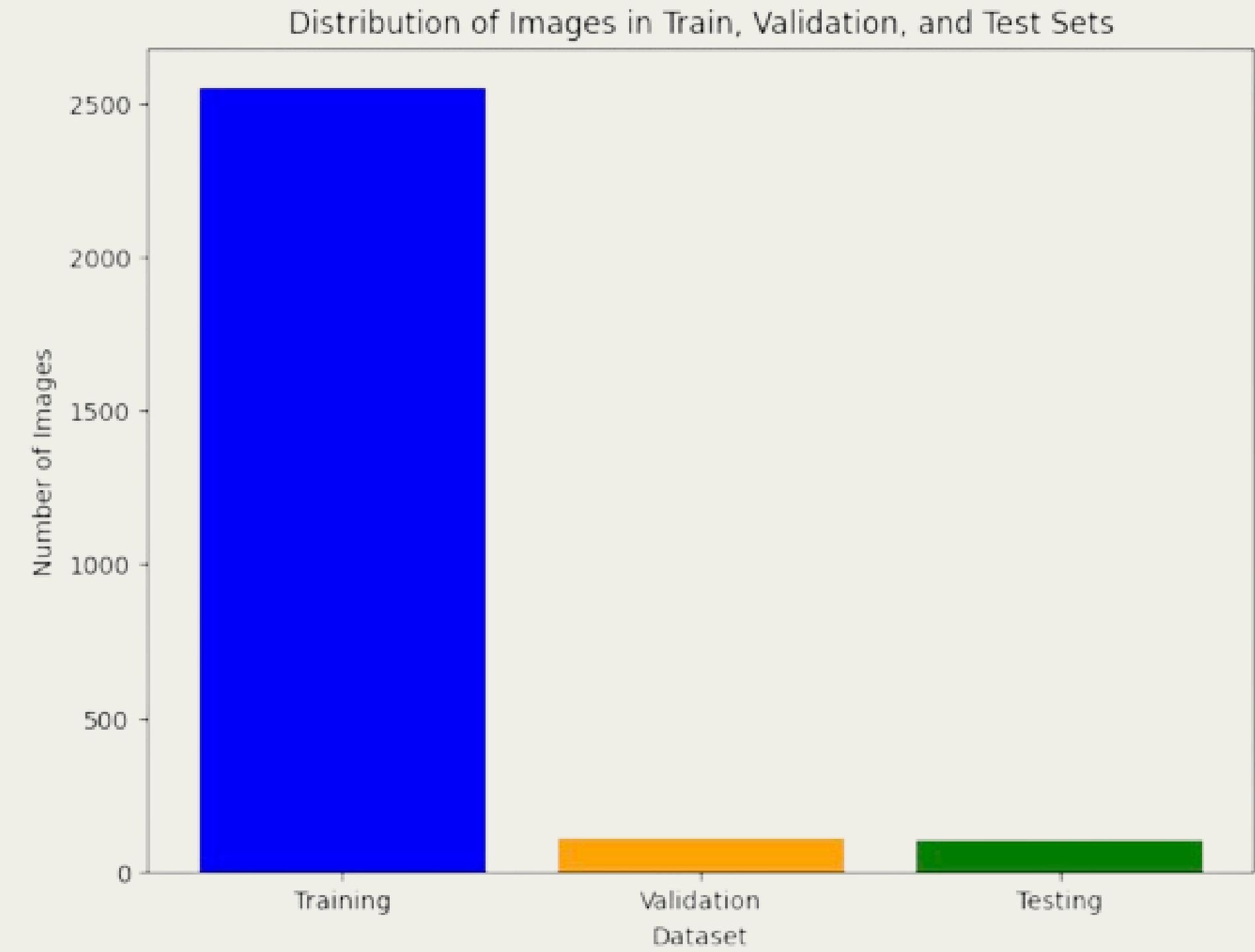
EXPLORATORY DATA ANALYSIS(EDA)

Resize images:

640 * 640 pixels

Data Splitting:

Train, Validation and Test Sets (80/10/10)





DATA AUGMENTATION

Techniques

Flip

Horizontal



Crop

*0% Min Zoom,
20% Max Zoom*



Shear

*$\pm 10^\circ$ Horizontal,
 $\pm 10^\circ$ Vertical*



Saturation

*Between -25%
and +25%*



Brightness

*Between -15% and
+15%*



DETECTION MODEL



Used Model:

YOLOv8 (You Only Look Once, Version 8)

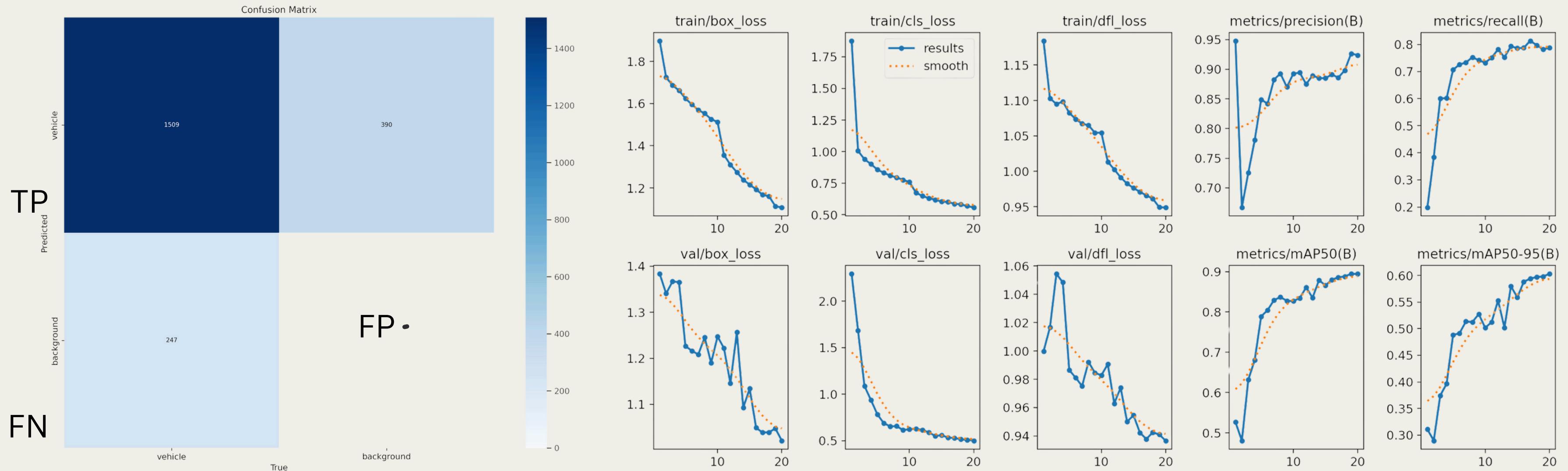


Training Details:

- Training Task: Object Detection
- Dataset: Custom dataset
- Epochs: 20
- Batch Size: 64

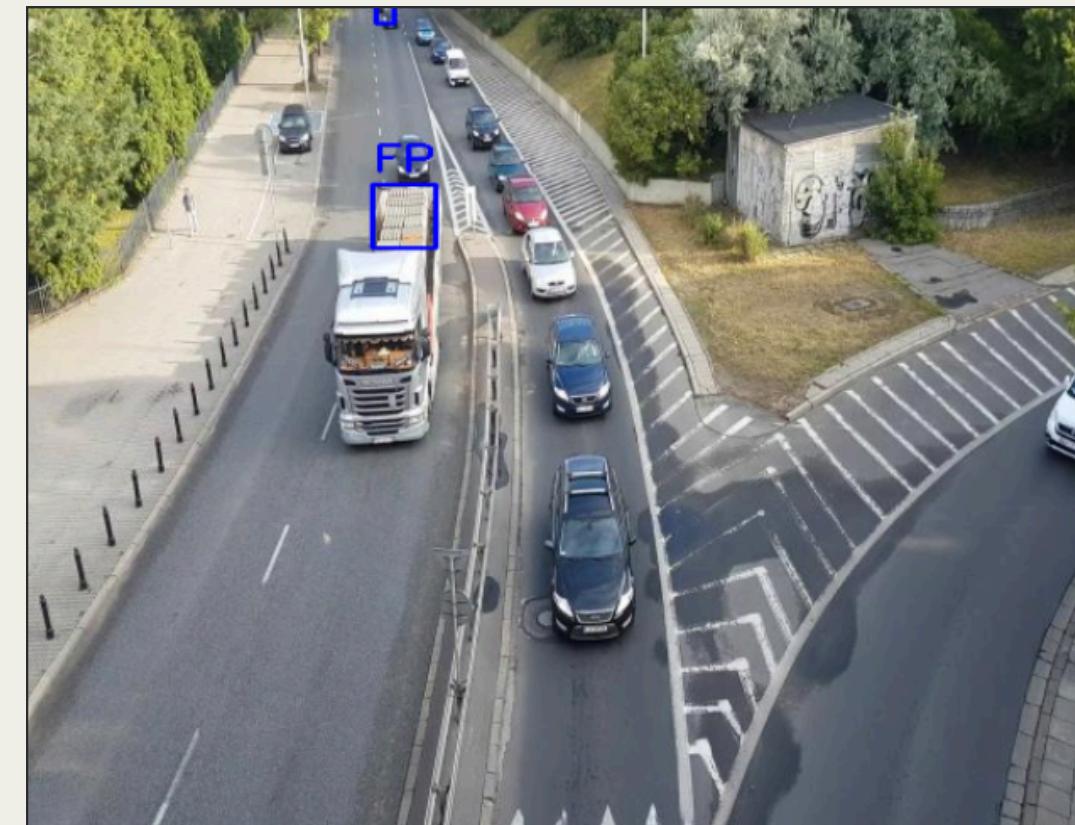
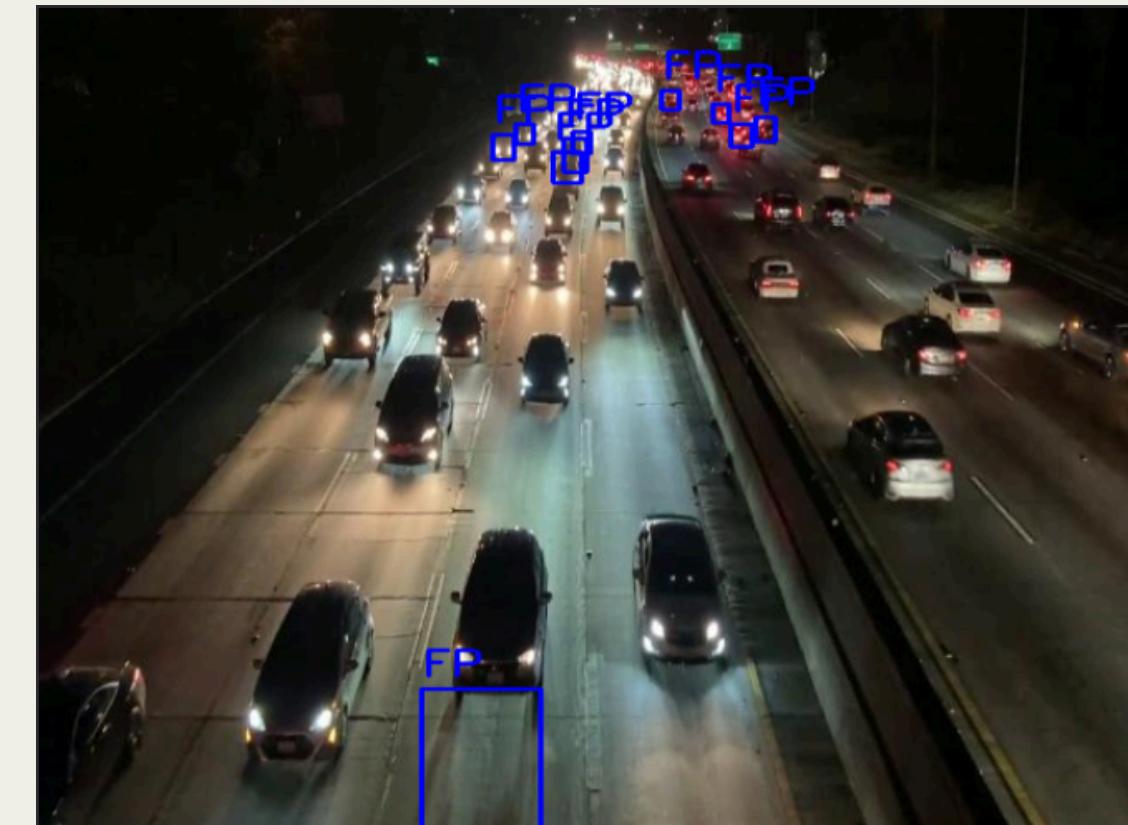
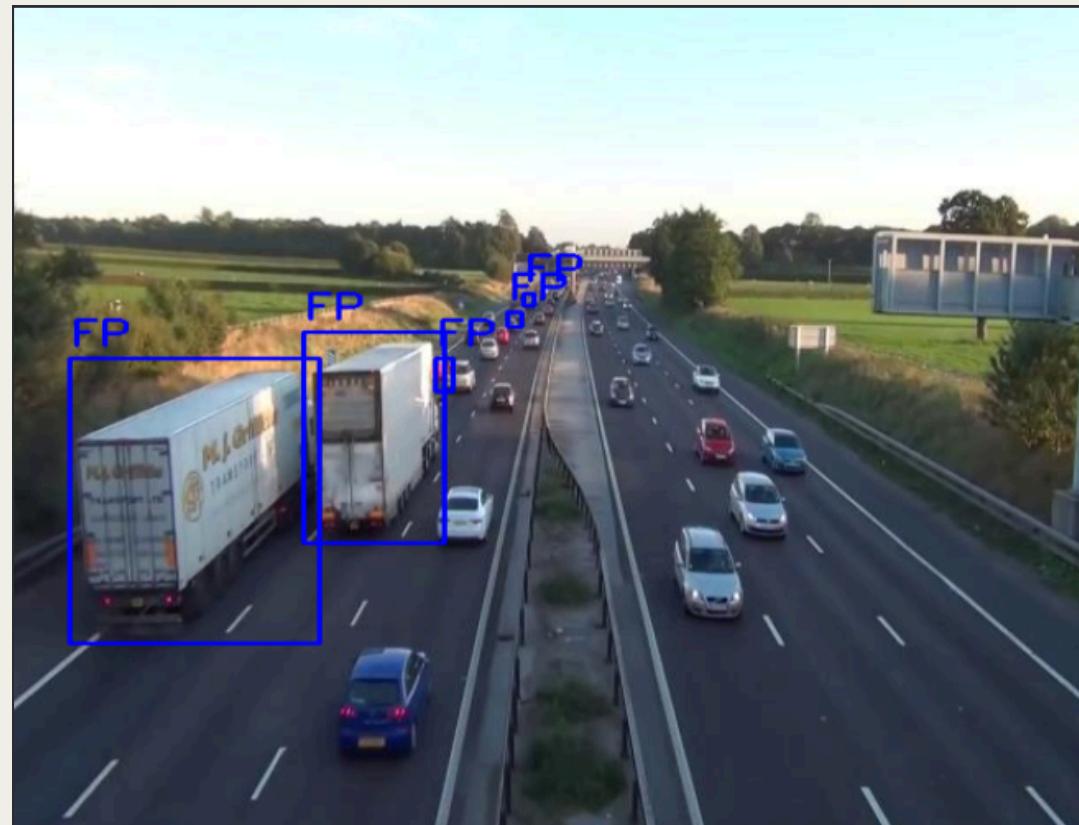


DETECTION MODEL RESULTS

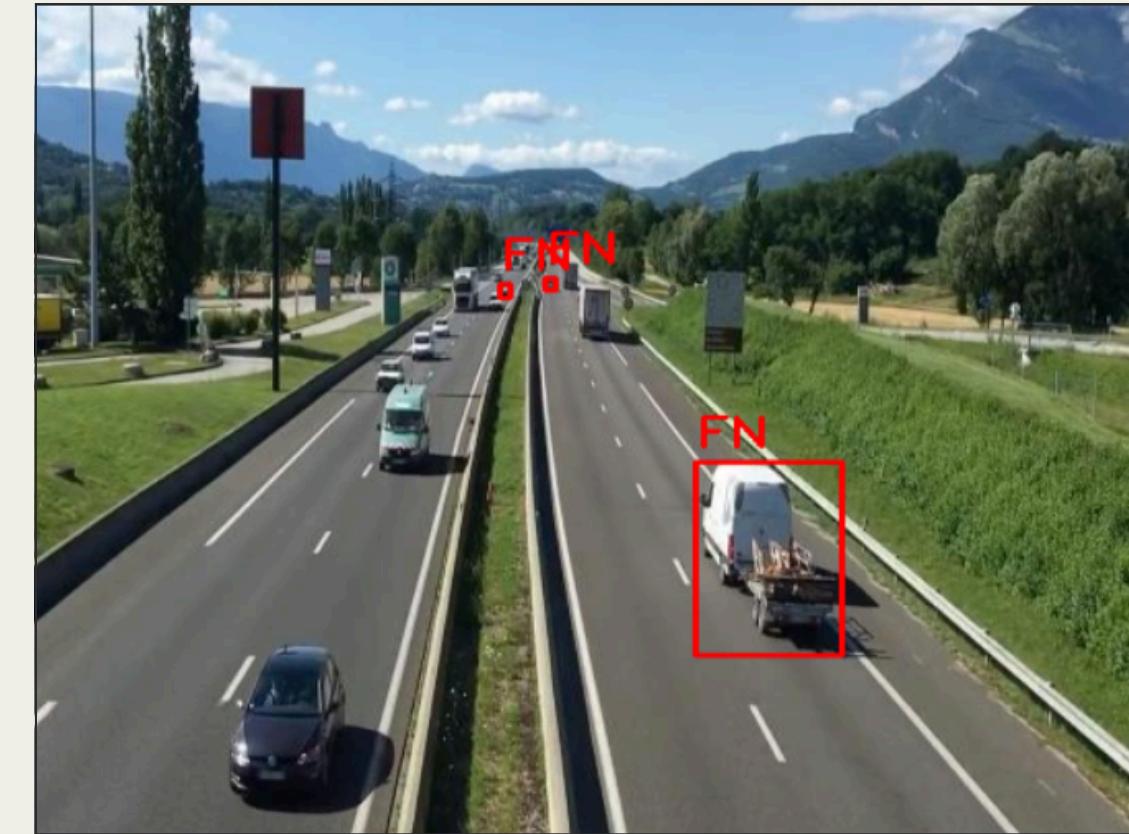




DETECTION MODEL RESULTS



DETECTION MODEL RESULTS





T A S K S

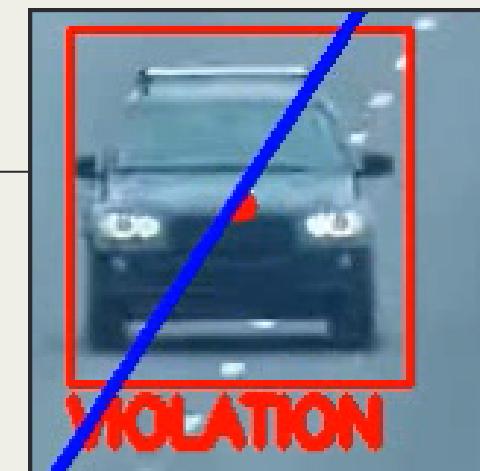
Vehicle Detection



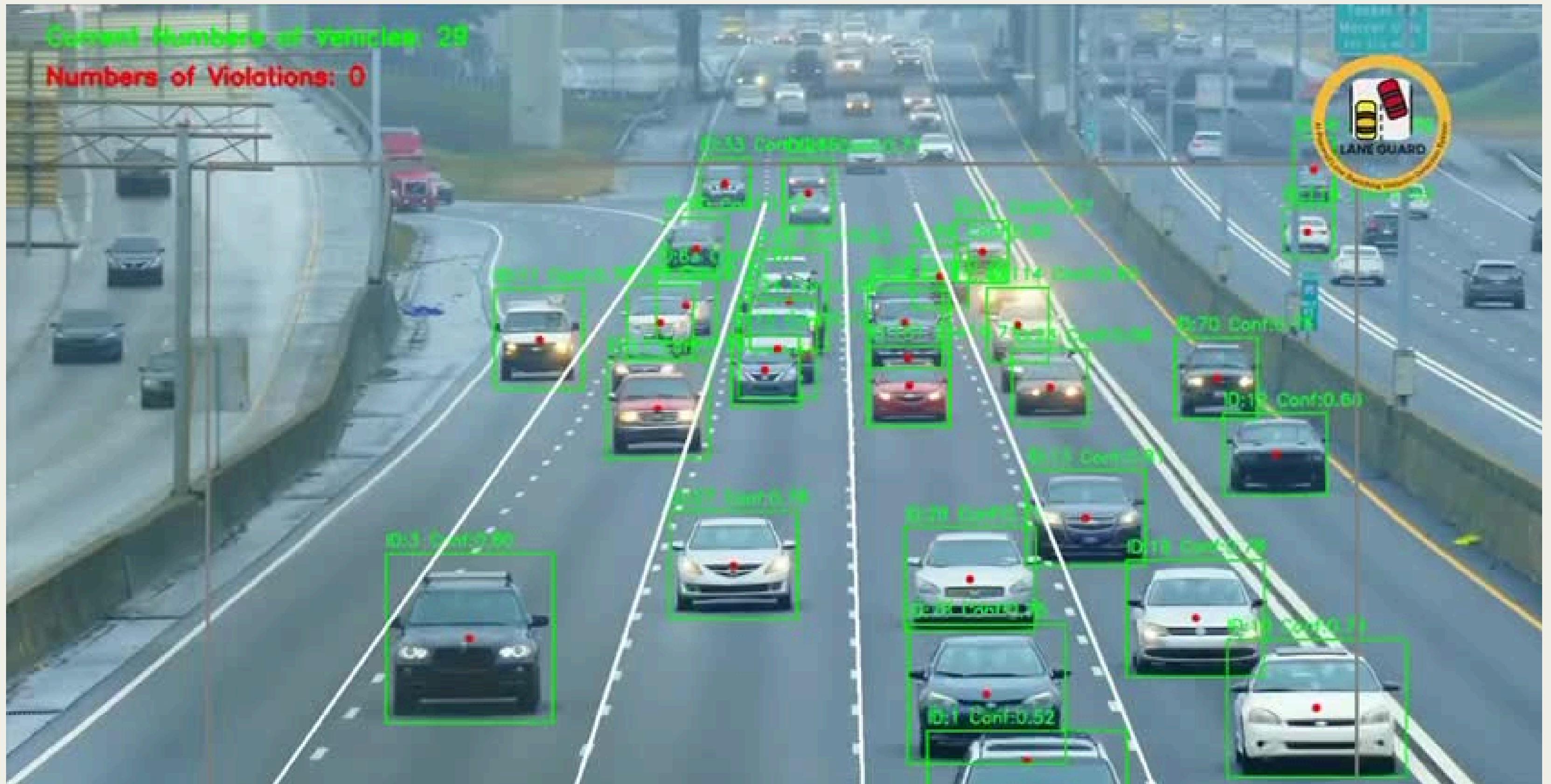
**Vehicle Tracking
and Counting**



**Lane-Switching
Violation
Detection**



DEMO



DEPLOYMENT



Lane Guard App:

1. Analysis Page

2. Dashboard Page



Streamlit

CHALLENGES



- 1. Accurate Violation Detection**
- 2. Setting Proper Condition to Start Counting Violation**
- 3. Long processing Time for Large Video Files**



FUTURE WORK

-
- 1
 - 2
 - 3
 - 4
- Collect More Data Lane Segmentation License Plate Recognition Real-time Violation Detection*
- Vehicles Highway footage in Saudi Arabia
 - Segmentation task instead of ROI lane lines
 - OCR to capture violated vehicles
 - Process live traffic videos

TEAM



Connect with The Founders of Lane Guard!



IAU fresh graduate
Shahad Alotaibi

Bachelor's Degree in
Artificial Intelligence



PNU fresh graduate
Maram Alshehri

Bachelor's Degree in
Artificial Intelligence



IMAMU fresh graduate
Fai Aladhyani

Bachelor's Degree in
Information Management



email : inquiries.laneguard@outlook.com

Thank you!
