Traffic Detection System using YOLOv8

by Sejal Dabre

Introduction

- Name: Sejal Dabre
- Course: B.Tech in Artificial Intelligence
- Project: Traffic Detection System
- Tools Used: YOLOv8, OpenCV, Streamlit, Python

"Why Traffic Detection?"

- Urban traffic congestion is increasing.
- Need for real-time vehicle monitoring.

Project Goals:

- Detect and count vehicles in images/videos.
- Annotate and visualize results.
- Provide downloadable reports and user-friendly interface.

Code Overview & Architecture

Project Modules:

- **detector.py**
  - Performs detection on images/videos
  - Draws bounding boxes and overlays counts
- **vehicle_app.py**
  - Streamlit web interface
  - Upload images and view detection live
  - Download annotated output
- **utils.py**
  - Saves vehicle counts as CSV
  - Generates bar chart visualizations
- **config.py**
  - Stores class labels, confidence threshold, color codes
  - Manages directory paths and font settings
- **main.ipynb**
  - Jupyter notebook for testing and debugging
  - Used during development phase

System Flow:

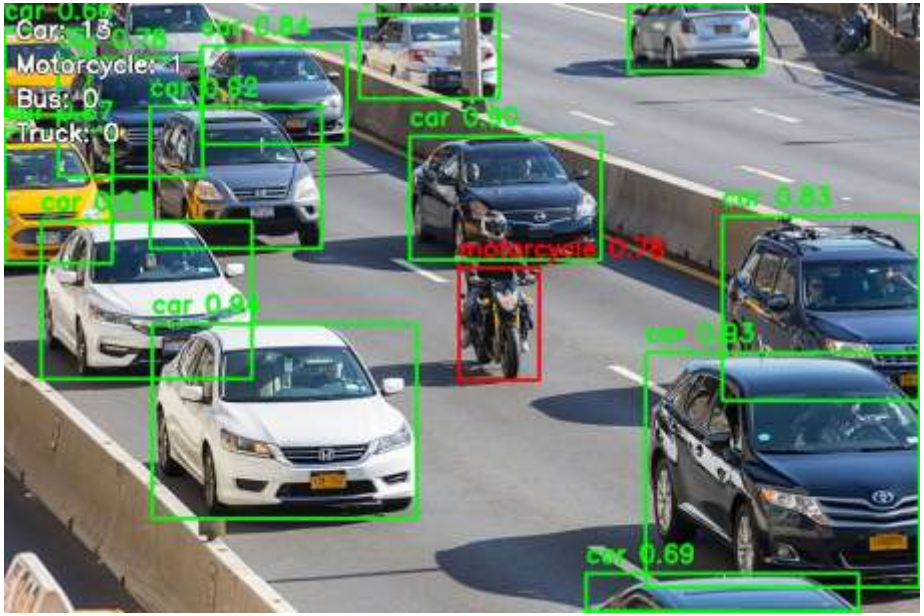
- Upload image via Streamlit
- YOLOv8 model processes input
- Annotated result + vehicle count returned
- CSV & chart generated for report

Model & Class Configuration

- Model Used: yolov8l.pt
- Confidence Threshold: 0.5
- Vehicle Classes Filtered:
- - 2: Car
- - 3: Motorcycle
- - 5: Bus
- - 7: Truck

Core Detection Logic

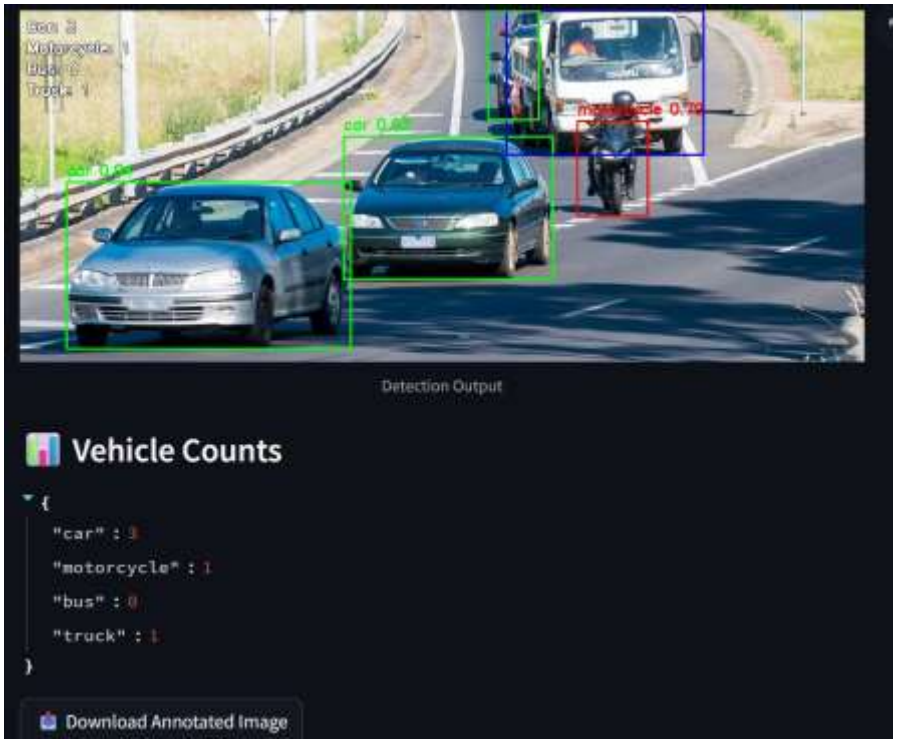
- Load YOLO model
- Read image via OpenCV
- Run inference and filter results
- Draw bounding boxes and labels
- Overlay vehicle count summary
- Save annotated image

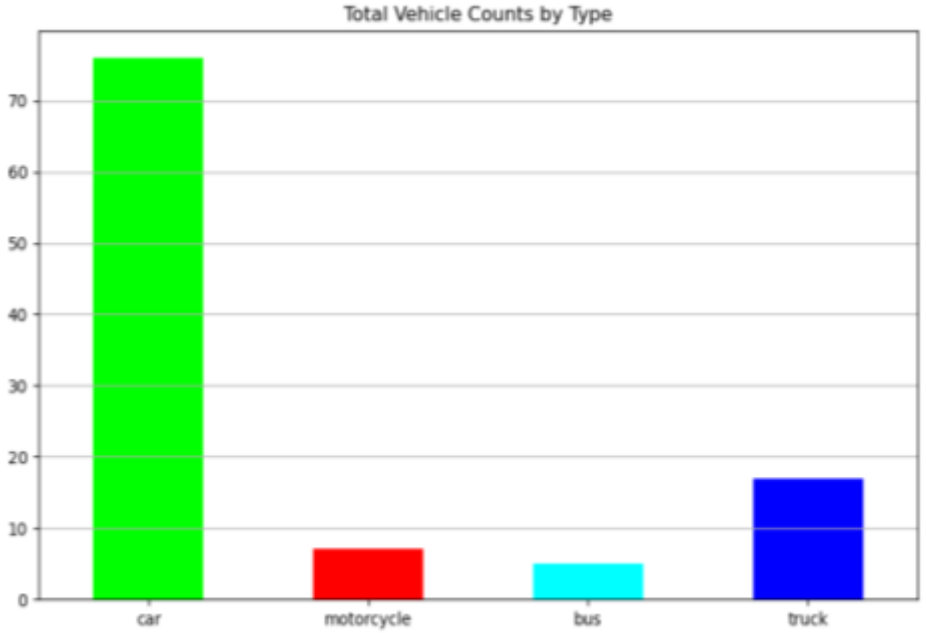


Streamlit Web Interface

Results & Reports

- Accurate vehicle detection in images/videos
- CSV report with image-wise counts
- Bar chart visualization using matplotlib
- Example Output: traffic1.jpg → Car: 3, Bus: 1, Motorcycle: 2





Challenges & Improvements

- Dealt with slow frame processing
- Streamlit file I/O & temp management

Improvements :

- Add vehicle tracking (e.g., Deep SORT)
- Integrate real-time CCTV stream input
- License plate recognition
- Improve UI and mobile responsiveness

Thank you!