

Real-Time Object Detection for Autonomous Vehicles



Project Overview

- **Goal:** Develop a real-time object detection system for autonomous vehicles.
- **Key Functions:** Detect pedestrians, vehicles, road signs, and obstacles in various environments.
- **Challenges Addressed:** Lighting, road types, Data imbalancing, and real-time constraints.



Our Team

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Milestone 1 - Data Collection & Preprocessing

Dataset Used

- Subset of COCO dataset
- Around 30k image before cleansing
- 11 class
(Car, truck, red traffic light...etc.)

Preprocessing

- Resizing: (512,512)->(640,640)
- Normalization: (0,1)
- Data augmentation:
(augment=True)

Milestone 2 - Model Development

- **models tried:** R-CNN, YOLOv8n, YOLOv8s
- **model used:** YOLOv8n

- **Metrics Used:**
- mAP (mean Average Precision)
- IoU (Intersection over Union)
- FPS (Frames per second)

Milestone 3 - Deployment & Testing

- **Deployment:** Containerized using Docker, hosted via Railway for scalable cloud access.
- **Integration:** Model embedded in a web-based interface for real-time detection.
- **Testing Scenarios:**
Diverse conditions: urban, highways, night, and foggy environments.
Evaluated on real driving videos for accuracy, speed, and adaptability.

Milestone 4 - MLOps & Monitoring

Future Improvement

Milestone 5 - Final Deliverables

EDA Report: [Data Exploration Report](#)

Deployment Report: [Deployment Report](#)

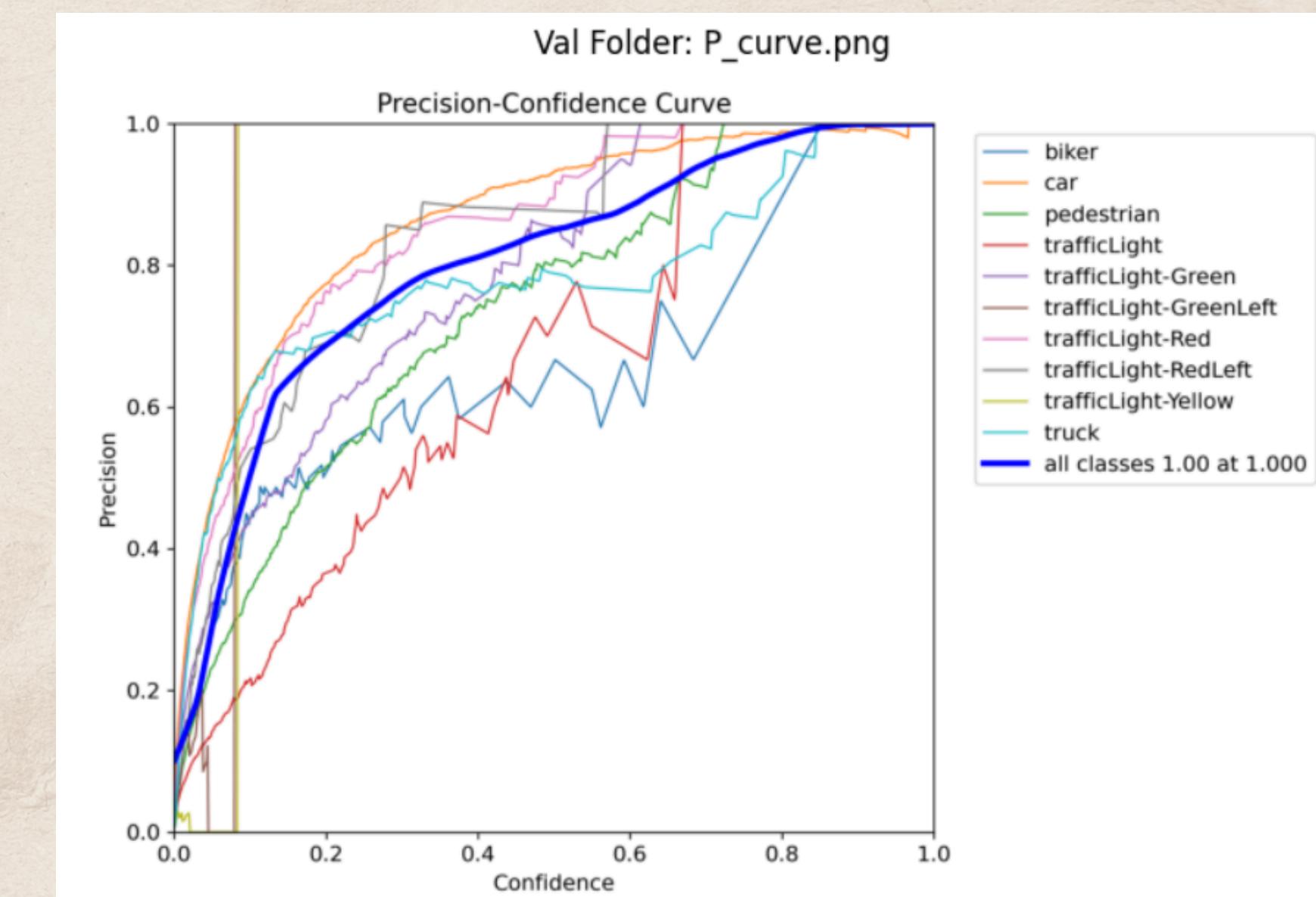
Final Report: [final report](#)

Result

- Our YOLOv8-based traffic object detection system reliably detects multiple classes including vehicles, pedestrians, and traffic lights in various states. It achieves high accuracy on video streams, effectively handling real-time scenarios.

A demo video will be linked to showcase its performance:

Github Repo: [Autonomous-vehicles-prediction](#)



Q&A Session





Thank
you