INTEL UNNATI INDUSTRIAL TRAINING PROGRAM 2024

'येथे बहुतांचे हित ।'

MARATHWADA MITRAMANDAL'S

COLLEGE OF ENGINEERING

Karvenagar, Pune, Maharashtra, India-52

- **Team name :** Team Data Dynamos
- **Name of Guide**: Prof. Sarita Sapkal
- **Title of the project :** Vehicle Movement Analysis and Insight Generation Project in College Campus using Edge AI
- **Name of Group Members :**

  Rutuja Shete

  Ashada Dabhekar

  Siddhi Kollurmath

  Sharvary Gore

  Prasad Babar

PROBLEM STATEMENT

- The rapid increase in vehicle traffic within college campuses presents significant challenges related to safety, congestion, and resource management. Traditional traffic monitoring systems, reliant on centralized data processing, often fail to provide the real-time insights necessary for efficient traffic management and prompt incident response.

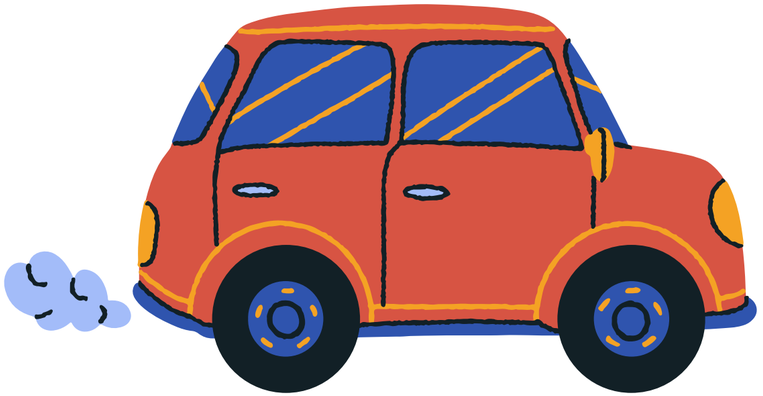
- This project, "Vehicle Movement Analysis and Insight Generation Project in College Campus using Edge AI," aims to address these challenges by leveraging Edge AI to analyze vehicle movement in real-time

- By deploying AI-enabled edge devices across the campus, we will collect and process data locally, reducing latency and enabling immediate action on traffic anomalies, security threats, and congestion issues.

- The goal is to enhance campus safety, optimize traffic flow, improve resource allocation, and support sustainable transportation practices, thereby creating a safer, more efficient, and environmentally friendly campus environment.

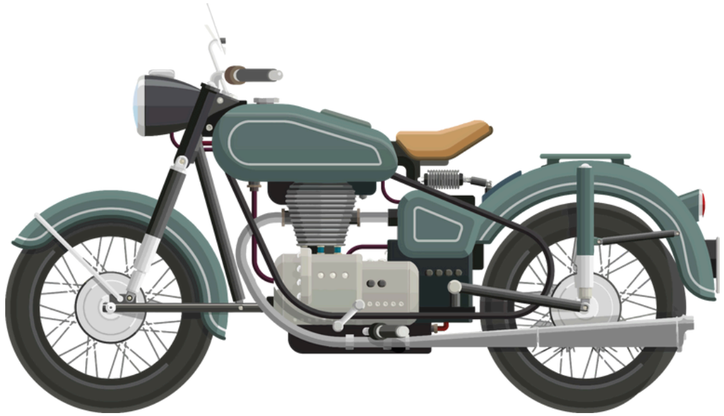
FEATURES OFFERED

- Detection of the number plates of the vehicles from the front and back side of the vehicle while entering or leaving the campus premises. It is stored in the database along with the timestamp at which it was recorded, thus to provide input to the trained model of the project.



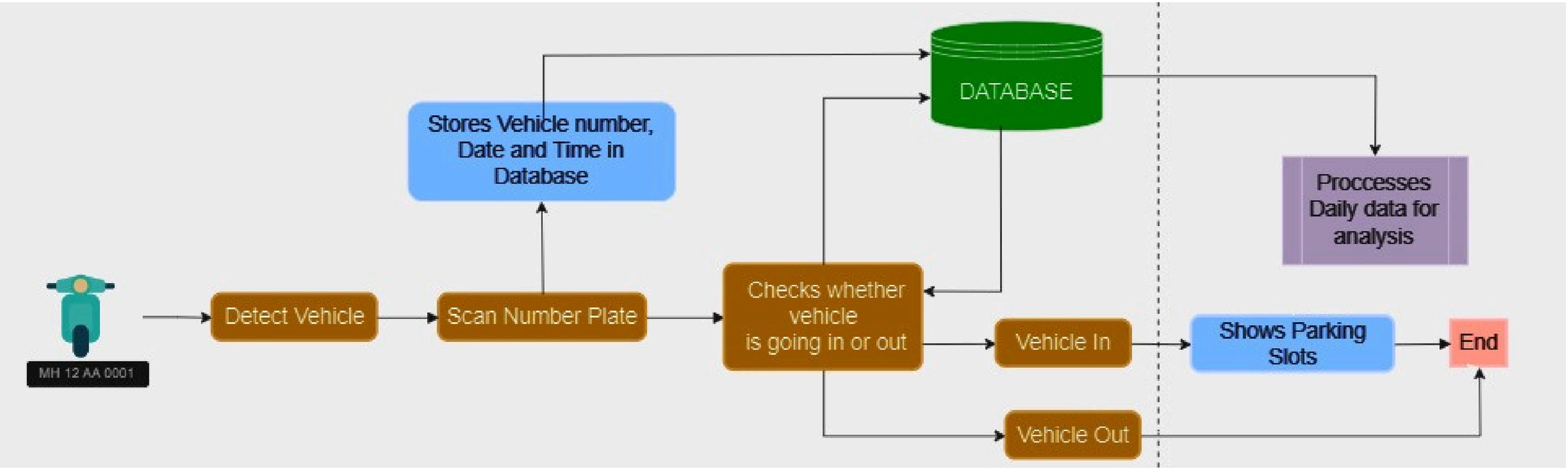
- This project also provides the feature to display the data in the form of the graphs for any user to understand the trends, patterns of the vehicles which enter or leave the campus in a particular interval of time.

- The another feature includes showcasing of the available parking slots as well as the slots which are already in use by the vehicles. It also checks whether the entered or left vehicle is registered in the database or not.



- The project thus helps in reducing the problems of traffic congestion, security, safety and parking mechanisms.

ARCHITECTURE DIAGRAM



The architecture diagram depicts a vehicle parking management system. The process begins with the detection of a vehicle, followed by the scanning of its number plate. The scanned data, including the vehicle number, date, and time, is stored in a database. The system then checks whether the vehicle is entering or exiting the parking area. If the vehicle is entering, the system records this information and displays available parking slots. If the vehicle is exiting, the system updates the database accordingly. Additionally, the system processes daily data for analysis, providing insights and reports on parking usage. The process concludes after the vehicle status is updated and parking slot information is shown.

TECHNOLOGIES USED

Languages used for development:

- HTML
- CSS
- JavaScript
- Flask

Tools/Platforms used for development

- Visual Studio Code
- Kaggle Notebook

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Libraries used for development

- Pandas
- Numpy
- Tdqm
- Cv2
- Torch
- Matplotlib
- Plotly
- Flask
- Ultralytics for YOLO model
- pytesseract
- datetime

TEAM MEMBERS & CONTRIBUTION

Rutuja Shete : Dataset Preprocessing, Model Designing, Model Building, Preparing database for the project

Ashada Dabhekar : Dataset Preprocessing, Model Planning, Image Processing, Building model in collaborating with the team member

Siddhi Kollurmath : Web development, Graphical Analysis, Model Building, Integrating the modules in collaborating with the team

Sharvary Gore : Web development, Designing of various web pages, Use of HTML and CSS to prepare user interface, Integrating the frontend with backend in collaborating with the team

Prasad Babar : Web development, Model Planning & Testing, Project Management, Documenting report, outcomes and presentation

CONCLUSION OF THE PROJECT

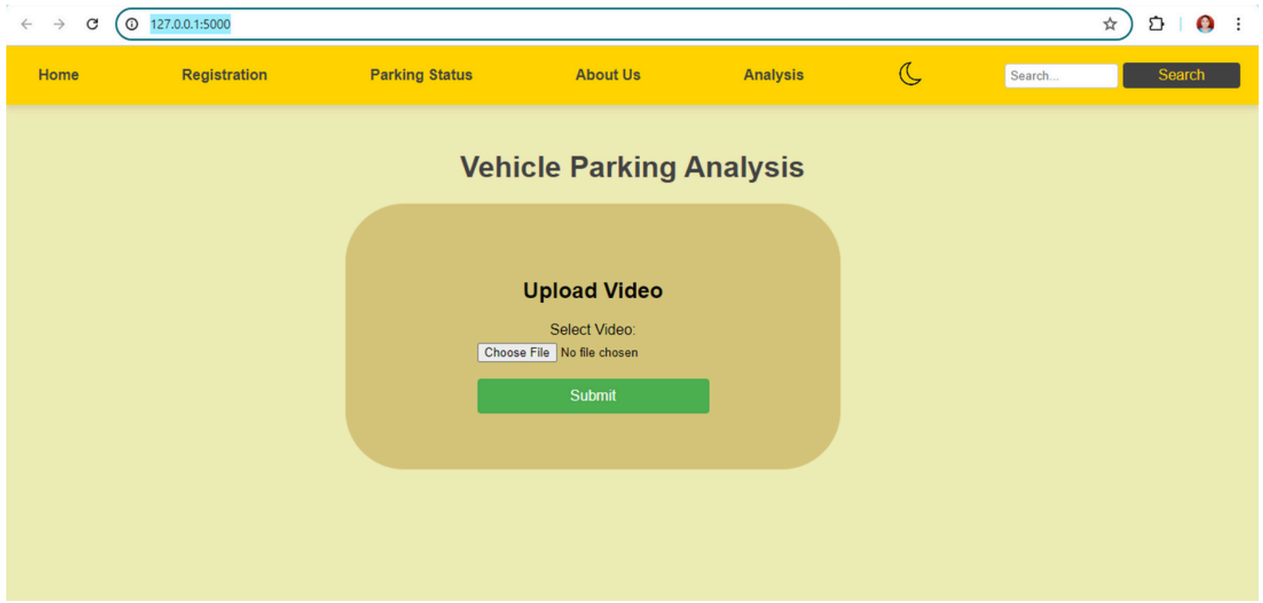
There are always a lot of traffic movements in and around the college; parking is also another challenge and responding to emergencies. These problems are compounded by the absence of real time tracking and analytical information thereby making traffic patterns poor, chance of occurrence of accidents high and resource management inefficient. It is with such traditional technique based on the observation and control of vehicle movement in the facility through monitoring and processing of data manually and from a central point that the process is usually slow and riddled with errors.

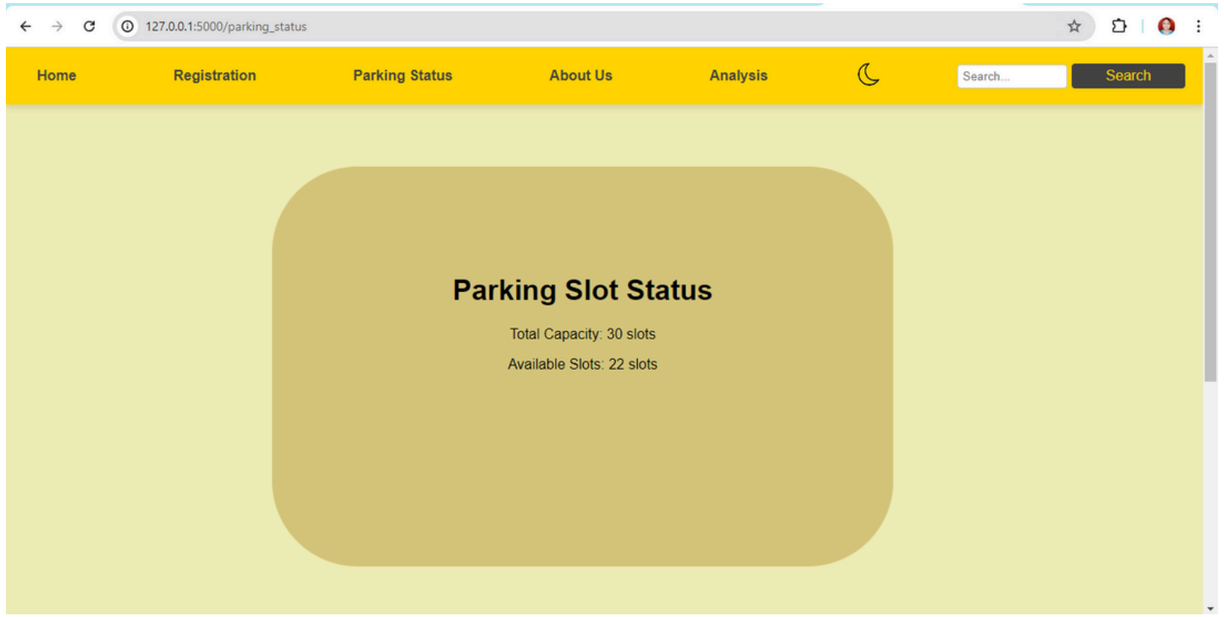
The key challenges include:

- Traffic Congestion
- Parking Management
- Safety and Security

To address these issues, the team has build the intelligent system that can continuously monitor vehicle movement, analyze data in real-time, and generate actionable insights to enhance traffic management, improve safety and security, and promote sustainable practices.

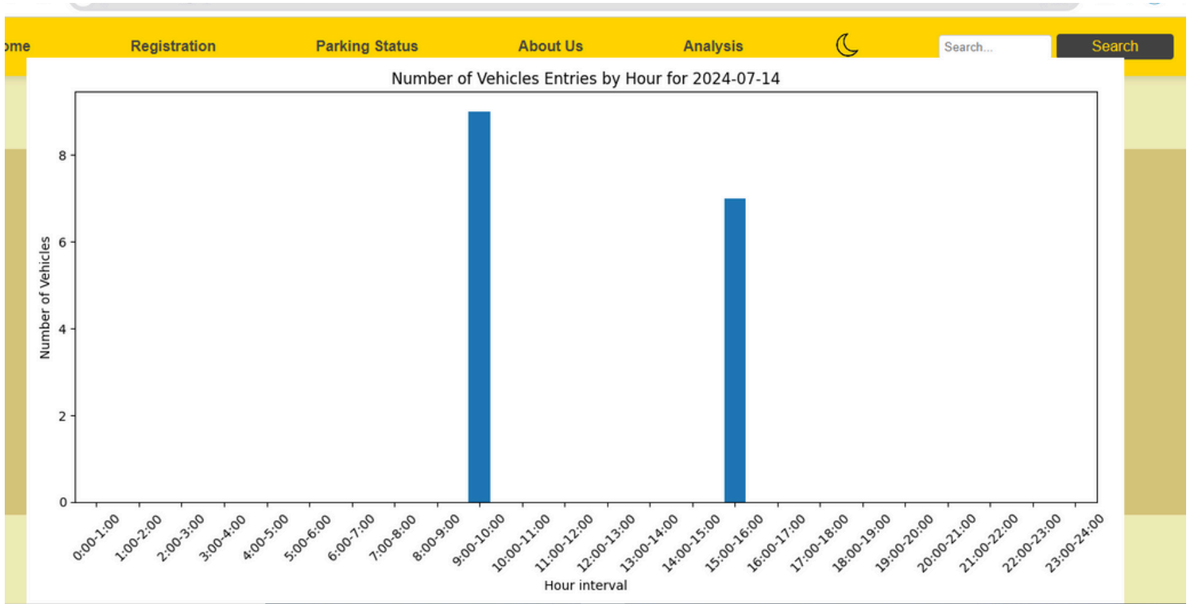
PROJECT SCREENSHOTS



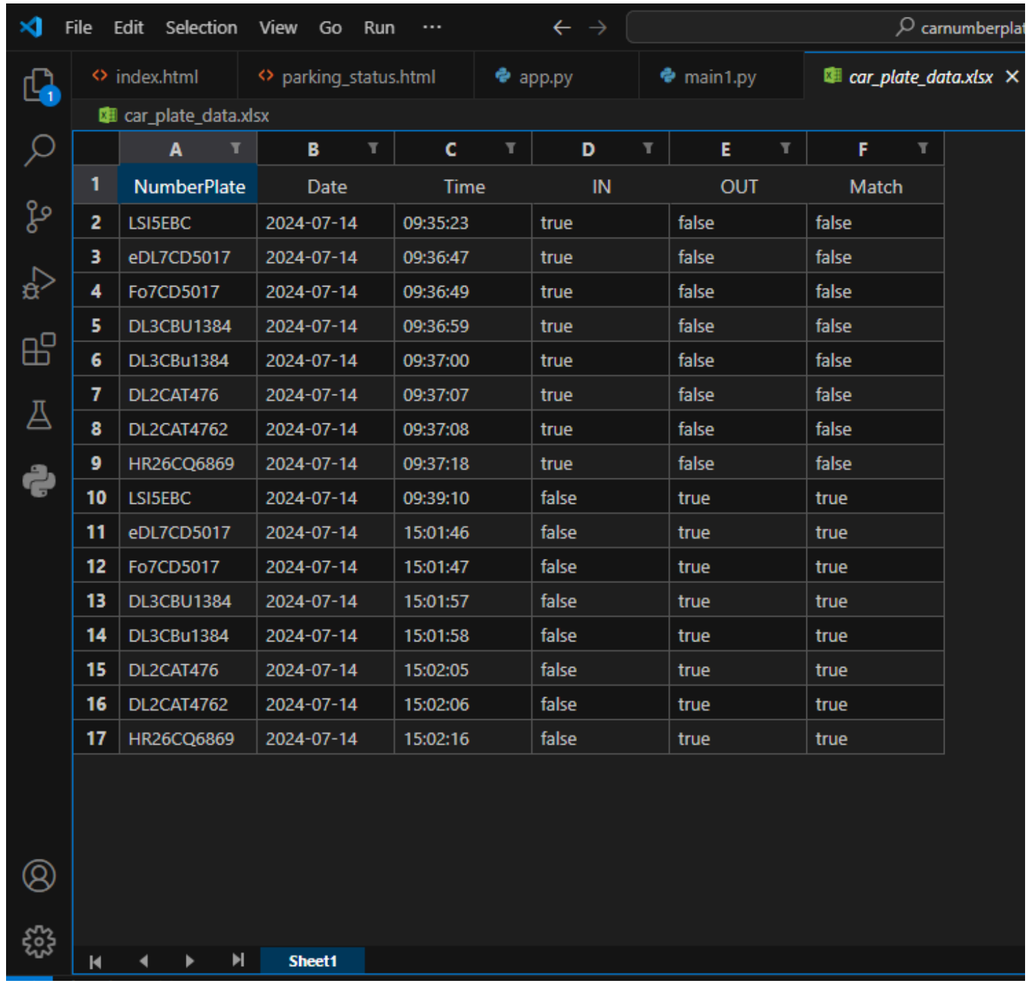


Detected Number Plates and their Status

Number Plate	Date	Time	IN	OUT	Match
LSI5EBC	2024-07-14	09:35:23	True	False	False
eDL7CD5017	2024-07-14	09:36:47	True	False	False
Fo7CD5017	2024-07-14	09:36:49	True	False	False
DL3CBU1384	2024-07-14	09:36:59	True	False	False
DL3CBu1384	2024-07-14	09:37:00	True	False	False
DL2CAT476	2024-07-14	09:37:07	True	False	False
DL2CAT4762	2024-07-14	09:37:08	True	False	False
HR26CQ6869	2024-07-14	09:37:18	True	False	False
LSI5EBC	2024-07-14	09:39:10	False	True	True
eDL7CD5017	2024-07-14	15:01:46	False	True	True
Fo7CD5017	2024-07-14	15:01:47	False	True	True
DL3CBU1384	2024-07-14	15:01:57	False	True	True
DL3CBu1384	2024-07-14	15:01:58	False	True	True
DL2CAT476	2024-07-14	15:02:05	False	True	True
DL2CAT4762	2024-07-14	15:02:06	False	True	True



PROJECT SCREENSHOTS



	A	B	C	D	E	F
1	NumberPlate	Date	Time	IN	OUT	Match
2	LSI5EBC	2024-07-14	09:35:23	true	false	false
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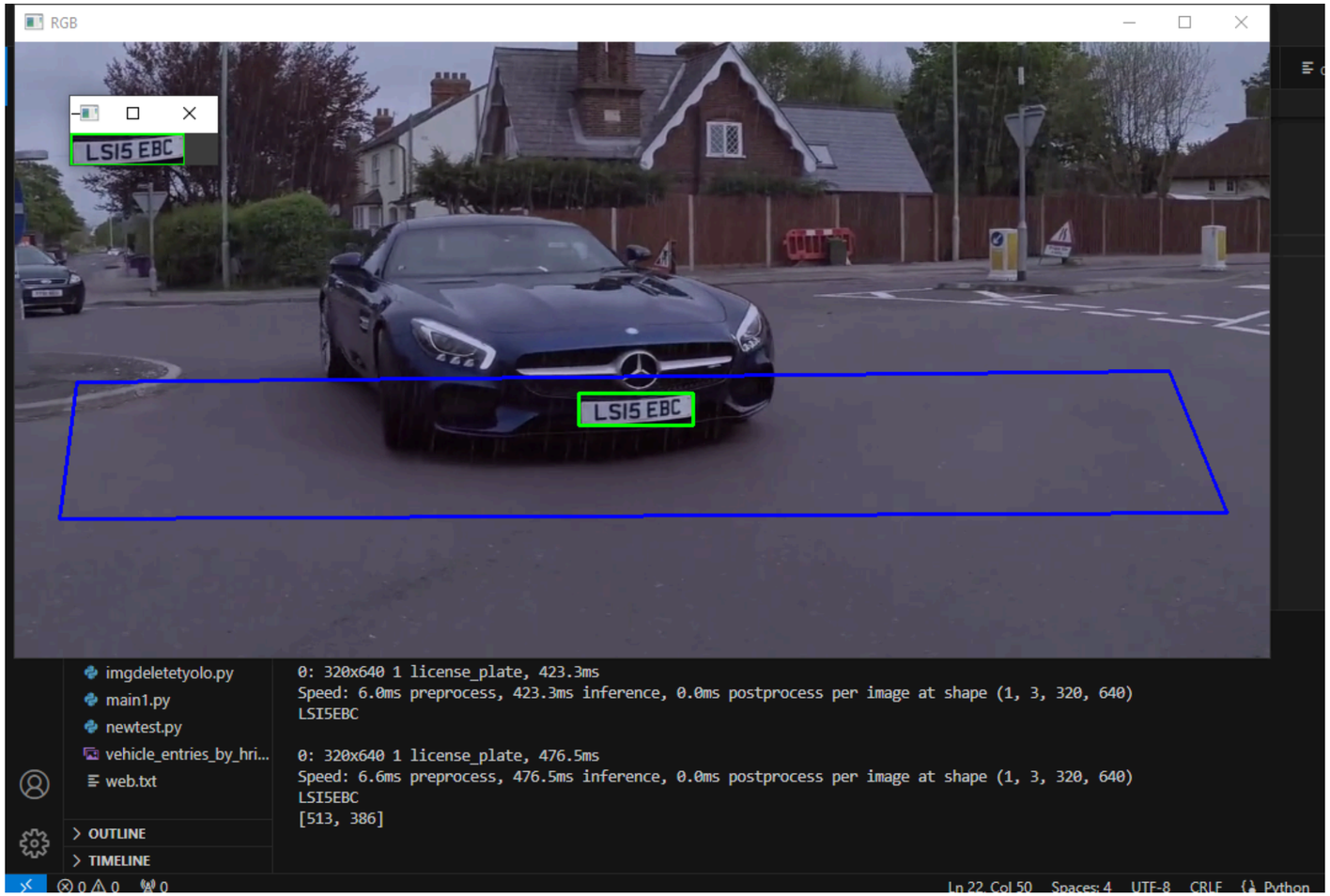
13	DL3CBU1384	2024-07-14	15:01:57	false	true	true
14	DL3CBu1384	2024-07-14	15:01:58	false	true	true
15	DL2CAT476	2024-07-14	15:02:05	false	true	true
16	DL2CAT4762	2024-07-14	15:02:06	false	true	true
17	HR26CQ6869	2024-07-14	15:02:16	false	true	true



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THANK YOU