

Vehicle Number plate detection



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<https://github.com/FirefoxSRV/Vehicle-Number-plate-recognition>

Reference Papers

| Paper Title | Authors | Year | Algorithm used | Key Findings |
|--|--|------|--|--|
| Vehicle Detection with a Mobile Camera: Spotting Midrange, Distant, and Passing Cars | Marinus B. van Leeuwen, Frans C.A. Groen | 2003 | Motion Detection, Kalman Filter, Template Matching | The paper discusses a mobile camera-based system for vehicle detection, emphasizing the effectiveness of the Kalman filter in tracking moving objects. This system successfully identifies vehicles at varying distances with reasonable accuracy. |
| Comparative Study on Real-Time Vehicle Classification | Dilip Kumar Sharma, Rahul Pradhan, Ruchi Agrawal | 2022 | SVM, YOLO | YOLO outperforms SVM in real-time applications due to higher processing speed. |
| Vehicle Detection and Classification Using Deep Networks | Shuba Chowdhury, Shithi Chowdhury, Jeba Tahsin Ifty, Riasat Khan | 2022 | VGG16, VGG19, YOLOv5 | YOLOv5 shows best performance among the tested models due to effective real-time processing and high accuracy. |

Problem statement and its significance

The project aims to develop an automated system that captures vehicle images through a mobile application to detect vehicle type and gather owner information.

Registered vehicles are recognised instantly on subsequent visits, eliminating the need for re-registration and streamlining access management. This approach enhances efficiency and security by reducing manual effort and providing real-

time monitoring of vehicle entry.

In an organisation, efficient management of vehicle access is crucial for security. The current manual processes of vehicle registration and monitoring are time-consuming and prone to errors, leading to delays and inefficiencies. To address these challenges, we propose the development of an automated vehicle detection and recognition system that leverages mobile-based image capture technology.

The system will allow for the following:

Initial Registration: New vehicles entering the company premises will be registered by capturing an image of the vehicle using a mobile device. The system will identify the vehicle type and store relevant details, including the owner's information, in a secure database using the vehicle's number plate.

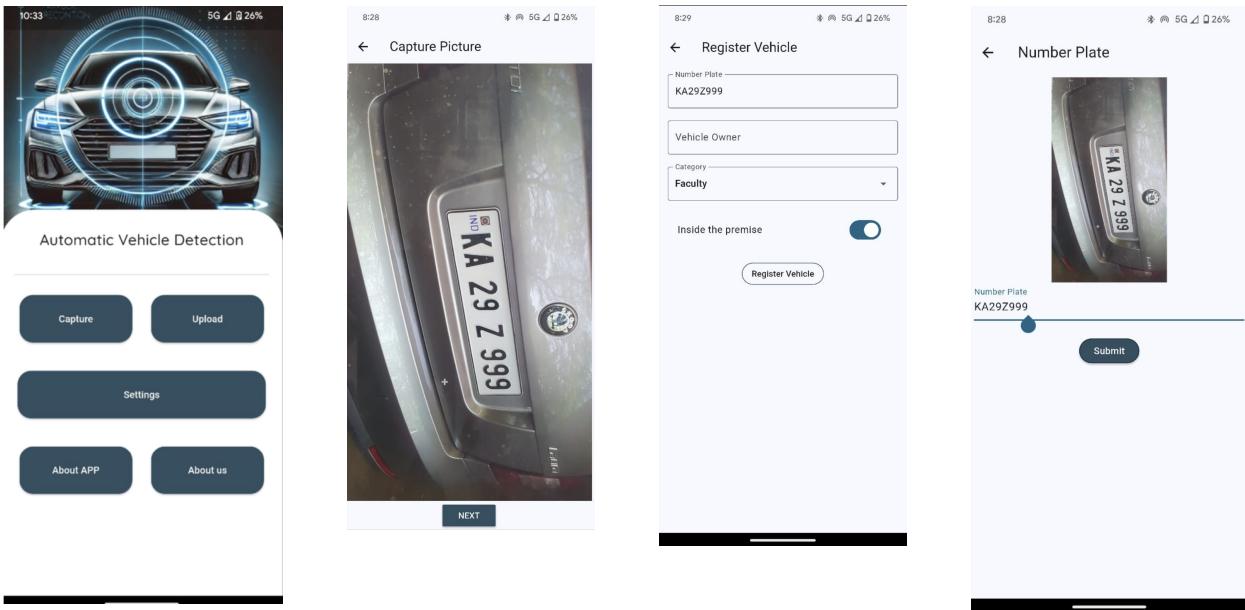
Automated Recognition: On subsequent visits, the system will automatically detect the vehicle by matching the captured image with the stored template. If the vehicle is already registered, it will be granted access without the need for re-registration.

Time Efficiency and Monitoring: This system significantly reduces the time required for vehicle entry, as registered vehicles are recognised instantly. It also enhances the security and monitoring of vehicle access, allowing company personnel to efficiently manage and track vehicle movements

Dataset for our project

<https://www.kaggle.com/datasets/dataclusterlabs/indian-number-plates-dataset>

Mobile app and its implementation



← Register Vehicle

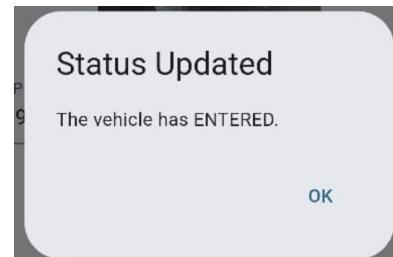
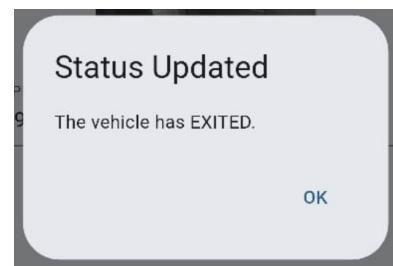
Number Plate
KA29Z999

Vehicle Owner
Joe

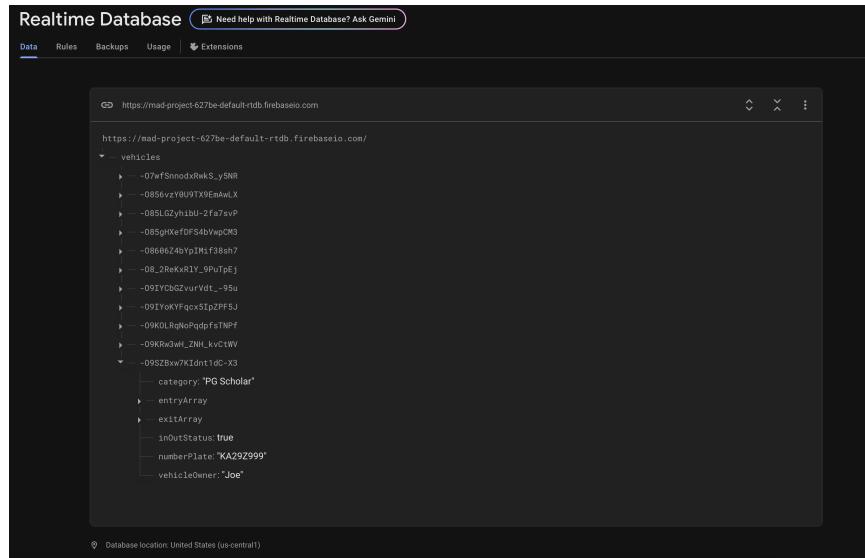
Category
PG Scholar

Inside the premise

Vehicle registered successfully!

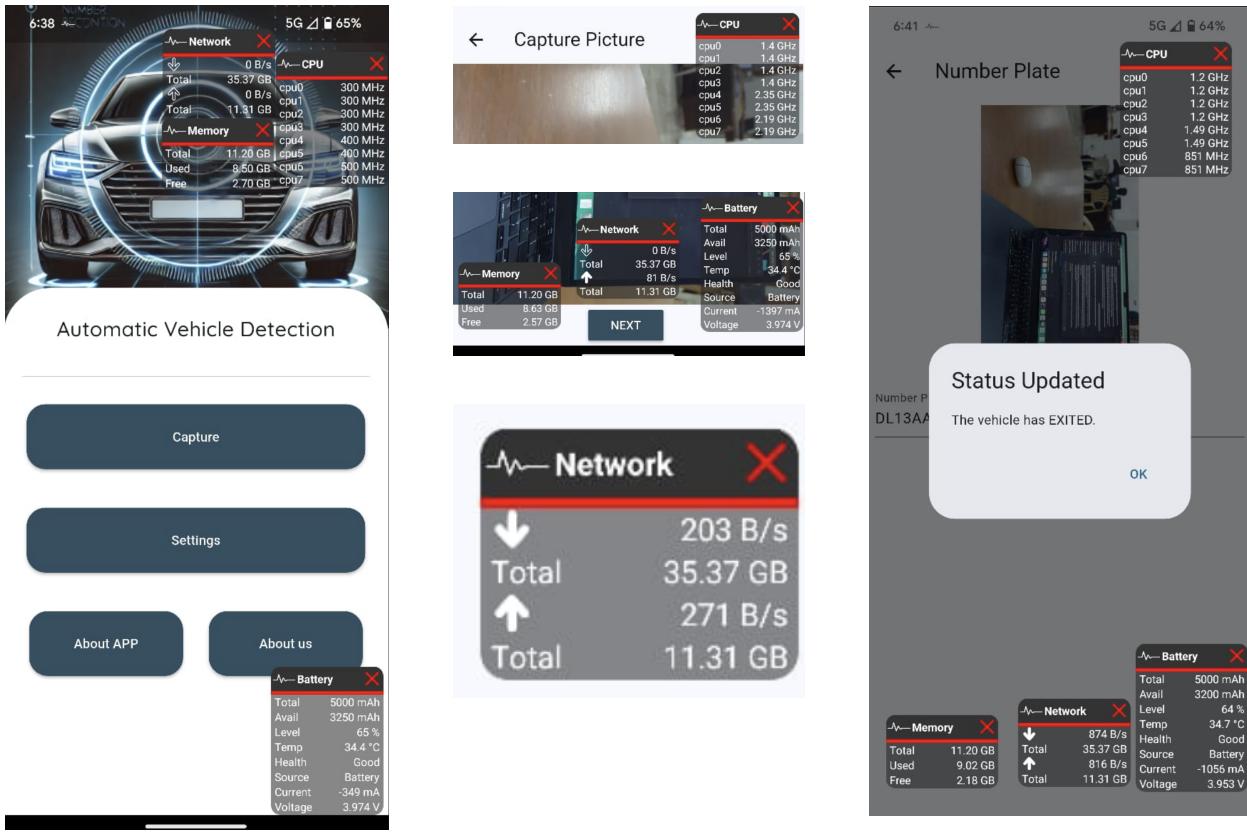


Now, these data are not left alone.....we have a database in the backend. With firebase realtime database, we are able to implement it with ease. Here is the database from firebase.google.com.

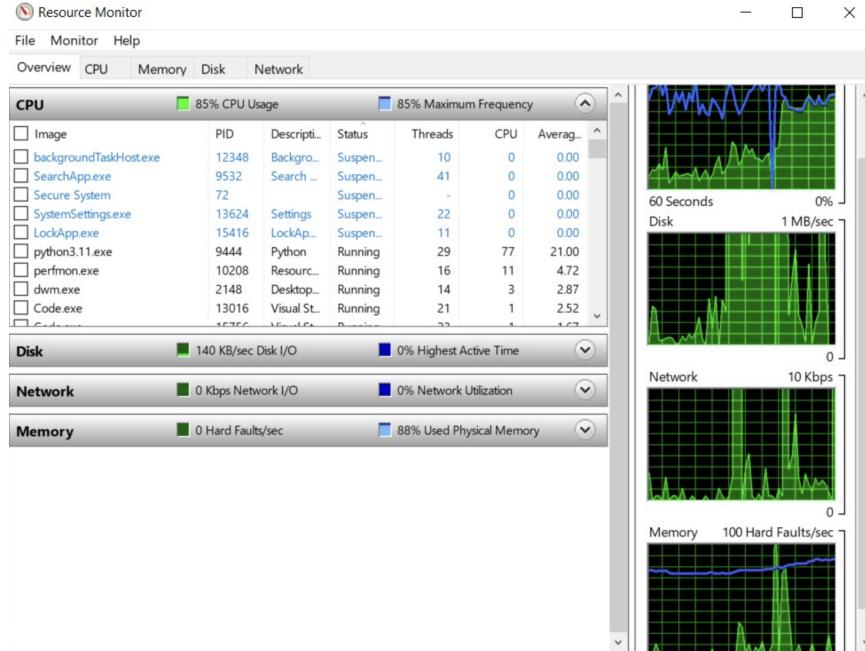
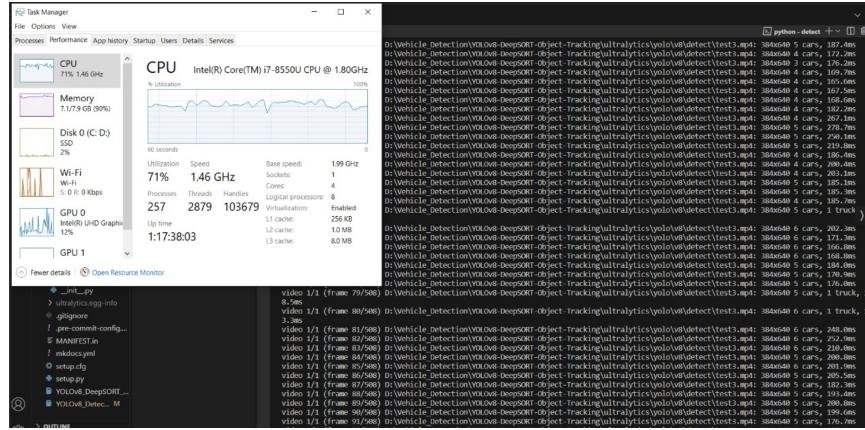


Performance metrics

We have recorded the performance of the app using the android app “SysFloat”.
Here are the screenshots for the same :



Well, we used a different AI model for our app, as yolo v8 was very CPU and Memory intensive. Hence, running edge applications with deep learning models are quite a difficult task....not for the developer, but for the user. There is also a risk of temp rising when these models run. Anyway, here is the metrics and graphs for the execution of yolov8 model when run on a windows machine.



Conclusion

Hence, with this project, we were able to learn the intricacies of app development and the integration of AI models with pickle and tensorflow lite. We have also a clear understanding of why many applications with deep learning does not exist in

the mobile era currently. With this project, our understanding on the inpainting and object recognition is immensely improved.