

Car Document Validation through Automated Number Plate Monitoring using Yolo

Title: Car Document Validation through Automated Number Plate Monitoring using Yolo

Abstract: The project aims to facilitate efficient monitoring of vehicles on the road by verifying the presence of essential documents such as the Pollution Under Control (PUC) certificate and car registration details. Additionally, it provides information about the number of years remaining for a vehicle to legally operate on the road.

It captures the car's number plate using a camera and then extracts the alphanumeric characters from the image. These characters are then compared against a database in CSV or Excel format containing relevant information about registered vehicles and their associated documents.

The project focuses on three key documents: PUC certificates, car registration details, and the remaining years of validity for a vehicle on the road. The system checks whether the captured vehicle's number plate corresponds to a valid entry in the database and then verifies the presence of the necessary documents. Upon successful validation, the system provides real-time feedback indicating that the vehicle has all the required documents and is compliant with the regulations. In cases where a vehicle fails to meet the necessary criteria, an alert is generated, highlighting the specific missing or expired document.

The project serves as an effective tool for law enforcement agencies, traffic authorities ensuring compliance with necessary regulations. By automating the verification process, it enhances efficiency, reduces manual errors, and contributes to better management of vehicle-related documentation.

Problem Statement:

The current process of manually checking and verifying a vehicle's documentation, such as pollution under control certificates, car registrations, and remaining years of road eligibility, is time-consuming, inefficient, and prone to human error. This leads to potential violations of road regulations and difficulties in enforcing compliance.

Therefore, there is a need for a system that can automate the process of monitoring and verifying vehicle documentation using computer vision techniques and database integration. The system should be capable of capturing and processing the number plate of a passing vehicle, extracting the license plate number, and cross-referencing it with a provided CSV or Excel database. The system should then retrieve and display relevant information about the vehicle's documents, including the pollution under control certificate, car registration details, and the number of years remaining for the vehicle to legally operate on the road.

The project aims to address these challenges by providing a streamlined, accurate, and efficient solution for monitoring vehicle compliance. By automating the verification process, it will help ensure that vehicles on the road have proper documentation, contributing to enhanced road safety and improved regulatory enforcement.

Motivation:

The motivation behind developing the project stems from several key factors:

- 1. Enhancing Road Safety:** Proper documentation and compliance with road regulations are vital for ensuring road safety. By automating the process of monitoring and verifying vehicle documentation, the project aims to contribute to safer roads by reducing the chances of unregistered or non-compliant vehicles operating on the road.
- 2. Efficiency and Time-Saving:** The current manual process of checking vehicle documentation is time-consuming and inefficient. Automating this process through computer vision techniques and database integration can significantly streamline the verification process, saving time for both authorities and vehicle owners.
- 3. Minimizing Human Error:** Manual verification of vehicle documents is susceptible to human error, such as misreading or misinterpreting information. Automating the process reduces the chances of errors and ensures more accurate and reliable results.
- 4. Regulatory Enforcement:** By implementing this project, regulatory authorities can strengthen their enforcement efforts by quickly identifying and taking action against vehicles that do not possess the required documents or

are non-compliant with road regulations. This project can provide a valuable tool to enforce compliance effectively.

5. Technological Advancements: The project leverages advancements in computer vision, image processing, and database management techniques to create a practical and innovative solution. By applying these technologies to the monitoring and verification of vehicle documentation, the project showcases the potential of emerging technologies in addressing real-world challenges.

The project aims to improve road safety, efficiency, accuracy, and regulatory enforcement by automating the process of monitoring and verifying vehicle documentation. By leveraging technology, it provides a practical solution to enhance compliance with road regulations and contribute to safer and more efficient roadways.

Contributions:

The project makes several significant contributions:

1. Automation of Verification Process: The project automates the process of monitoring and verifying vehicle documentation, eliminating the need for manual checks. By utilizing computer vision techniques and database integration, it can quickly capture, extract, and process license plate information, cross-referencing it with relevant documentation data.

2. Improved Efficiency and Time Savings: The project significantly enhances efficiency by reducing the time required for document verification. Automated processing of license plate information and database lookup enables faster and more streamlined verification, benefiting both authorities and vehicle owners.

3. Enhanced Accuracy and Reduced Human Error: Manual verification processes are prone to human error, leading to incorrect interpretations and potential mistakes in identifying non-compliant vehicles. By automating the process, the project minimizes the risk of human error, ensuring more accurate and reliable results.

The contributions of the project lie in its ability to automate, streamline, and improve the verification process, leading to enhanced efficiency, accuracy, and regulatory enforcement. By leveraging technology and advanced

techniques, it presents a valuable solution with the potential for broader implementation and positive impacts on road safety and compliance.

Working of the Project

The working of the Car Document Validation through Automated Number Plate Monitoring using Yolo:

Dataset Collection: Collect a dataset of car documents like pollution under control certificate, car registration, and number of years left for the car to run on the road.

Model Training: Use the YOLO algorithm to train a deep learning model specifically for car number plate detection. This involves annotating the number plates in the dataset and training the model to accurately detect them in images.

Real-time Number Plate Detection: Implement the trained YOLO model to detect car number plates in real-time from images or video frames. This involves processing the input images or frames, running them through the YOLO model, and extracting the detected number plates.

Document Verification: Once a number plate is detected, extract the number plate text and use it to search the CSV or Excel file for the corresponding car entry. Retrieve the associated documents' details for that car, including the pollution under control certificate, car registration, and number of years left for the car to run.

Document Validation: Perform validation checks on the retrieved documents. Verify if the pollution under control certificate is valid, the car registration is up to date, and the remaining years for the car to run on the road meet the required criteria.

Display Results: Finally, display the results of the document verification process, indicating whether the car has proper documents or not.

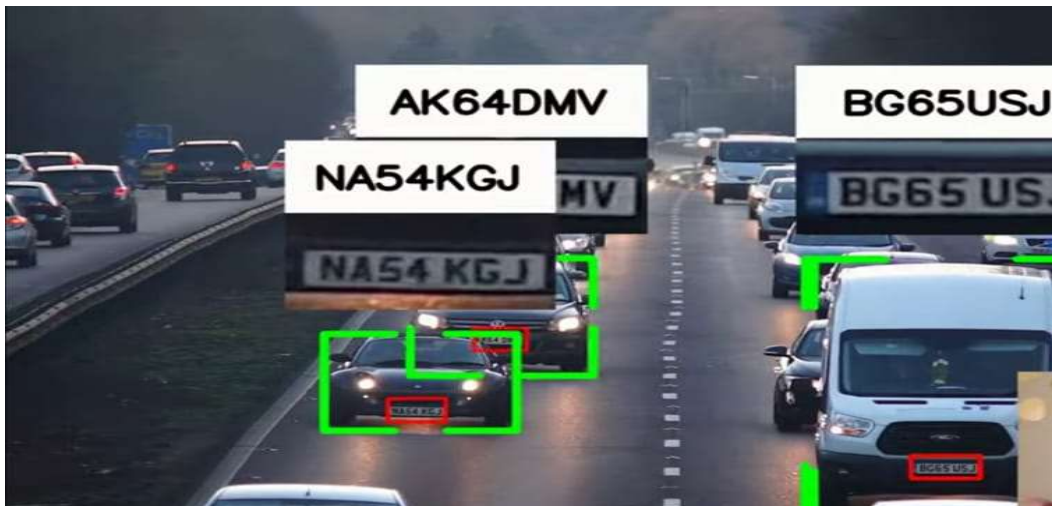


Fig.1 detection of car number plate using Yolo

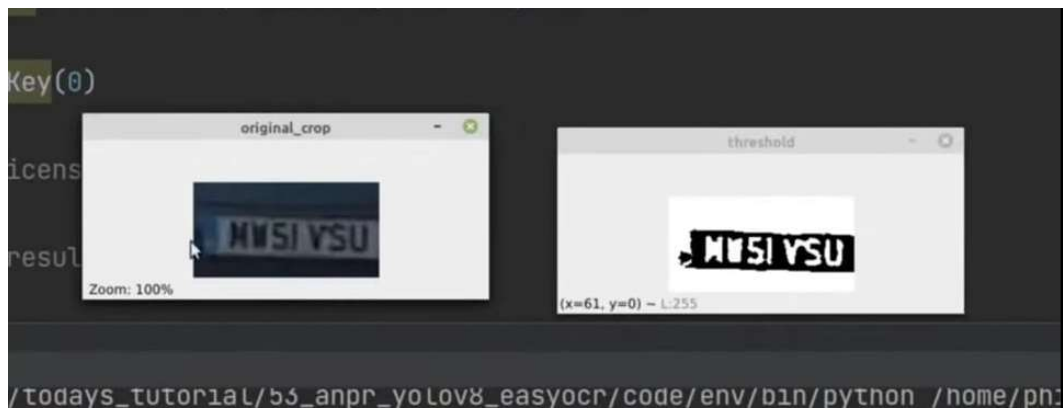


Fig.2 extracting the number plate text

license_plate_bbox	license_plate_bbox_score	license_number	license_number_score
[2407.939697265625 1551.4271240234375 2576.87939453125 1638.404052734375]	0.594431698322296	0	0
[973.7655639648438 1753.3370361328125 1199.7279052734375 1851.6199951171]	0.565712571144104	0	0
[2407.91455078125 1551.371337890625 2576.935791015625 1638.369873046875]	0.595081508159637	0	0
[973.757080078125 1753.3359375 1199.621337890625 1851.615234375]	0.565663397312164	0	0
[2411.8359375 1549.122802734375 2583.56640625 1641.9364013671875]	0.586198747158051	0	0
[974.7024536132812 1764.763916015625 1203.420166015625 1862.90625]	0.5311550498000873	0	0
[971.7612915039062 1775.4940185546875 1188.535400390625 1863.69299316406]	0.544636845588684	0	0
[2416.8408203125 1559.7335205078125 2584.547607421875 1648.22802734375]	0.49529504776001	0	0
[963.6485595703125 1783.3861083984375 1184.638916015625 1873.41833496093]	0.49994307756424	0	0
[2410.735107421875 1562.9150390625 2585.170654296875 1653.1937255859375]	0.42640033364296	0	0
[967.8922119140625 1783.9281005859375 1191.7177734375 1882.6552734375]	0.542987406253815	0	0
[2411.282470703125 1562.439453125 2586.256591796875 1652.39111328125]	0.497613430023193	0	0

Fig.2 storing data in excel format for document verification