Ministry/ Organization name : Madhya Pradesh Police
Problem Statement : Vehicle Number Recognition by Using Existing General Surveillance Cameras
Team Name : CFS BEL
Team Leader Name : Rupal Debnath
College Code : S-18481

Problem Statement :

In India, ANPR is used by polices for law enforcement purposes, including to check if a vehicle is registered or licensed. Sometimes, it is also used for vehicle parking, electronic toll collection on pay-per-use roads and as a method of cataloguing the movements of traffic. But in western countries, ANPR is also used to detect many offences, including locating stolen vehicles, tackling uninsured vehicle use and solving cases of terrorism, major and organized crime etc.

As part of making Smart India, we have proposed a solution where ANPR is used to trace all kinds of vehicle movement and to detect blacklisted vehicle (i.e., vehicles involved in criminal activities) with high accuracy.

Solution Details :

Whenever a vehicle passes an ANPR camera, the photograph is captured, its registration number is read and instantly verified against database records of blacklisted vehicles. Police officers gets the blacklisted vehicle number from the proposed system and traces the blacklisted vehicle movement from camera location and timestamp. A record for all vehicles passing by a camera is stored, including those for vehicles that are not known to be of interest at the time of the read that may in appropriate circumstances be accessed for investigative purposes.

The basic steps are as follows:

1. Real time frame acquisition in the computer system from the ANPR camera.
2. License plate localization using YOLO deep learning algorithm.
3. Converting the frame/image in grayscale.
4. Sharpening the frame/image to remove blurriness.
5. Cropping out the license plate according to the co-ordinates of the license plate provided by the YOLO algorithm.
6. Then the cropped license plate is processed for character recognition with easyOCR and the vehicle registration number in the form of alphanumeric characters are extracted out.
7. The extracted number is then checked against the list of blacklisted vehicle registration numbers provided by authority.
8. If the number is found in the blacklisted vehicle registration number list, then the Vehicle registration number along with location of the camera and time stamp of the blacklisted vehicle is sent to the authorities as audio, in a formatted way. For example :
   Blacklisted Vehicle Number WB 12345 is last seen in 57.2456° longitude and 64.782° latitude at 8 : 46 PM 02/06/2022.
9. This audio data may be propagated to the police officials through police radio telephony for further course of action.
10. If the number is not found in the blacklisted list , it is stored in a database for future investigation purpose.

Technology Stacks :

Hardware : General Surveillance Camera of 2 MP – 4 MP, Laptop/Desktop with NVIDIA GPU.

Software :

Programming Language	:	Python v3.9
Libraries	:	openCV, matplotlib etc.
Deep Learning Algorithm	:	YOLO
OCR	:	easyOCR

Dependencies :

In India, there are a very few roads of two or four lanes without any divider, which may confuse the ANPR detection and reporting since we have not considered the direction of movement, which may later cause ambiguous results in investigations .

In future, we have planned to take care of this into consideration.