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# Vehicle Number Recognition System

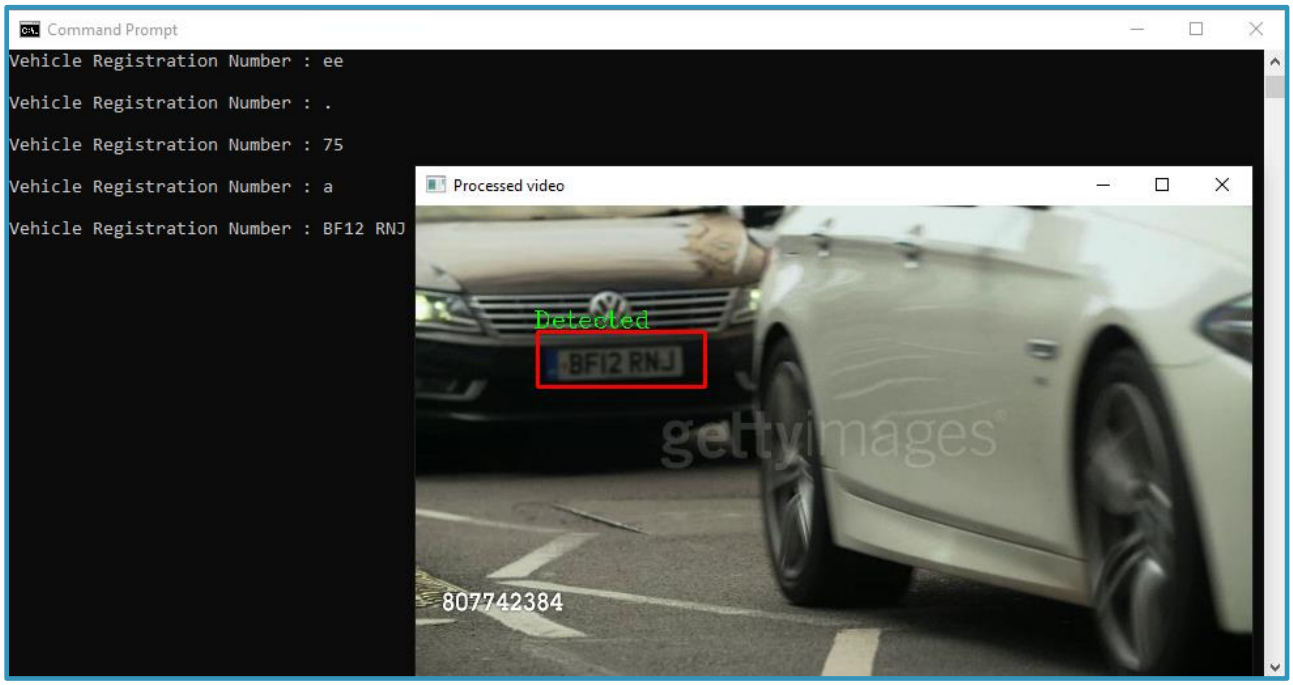
## Project Overview

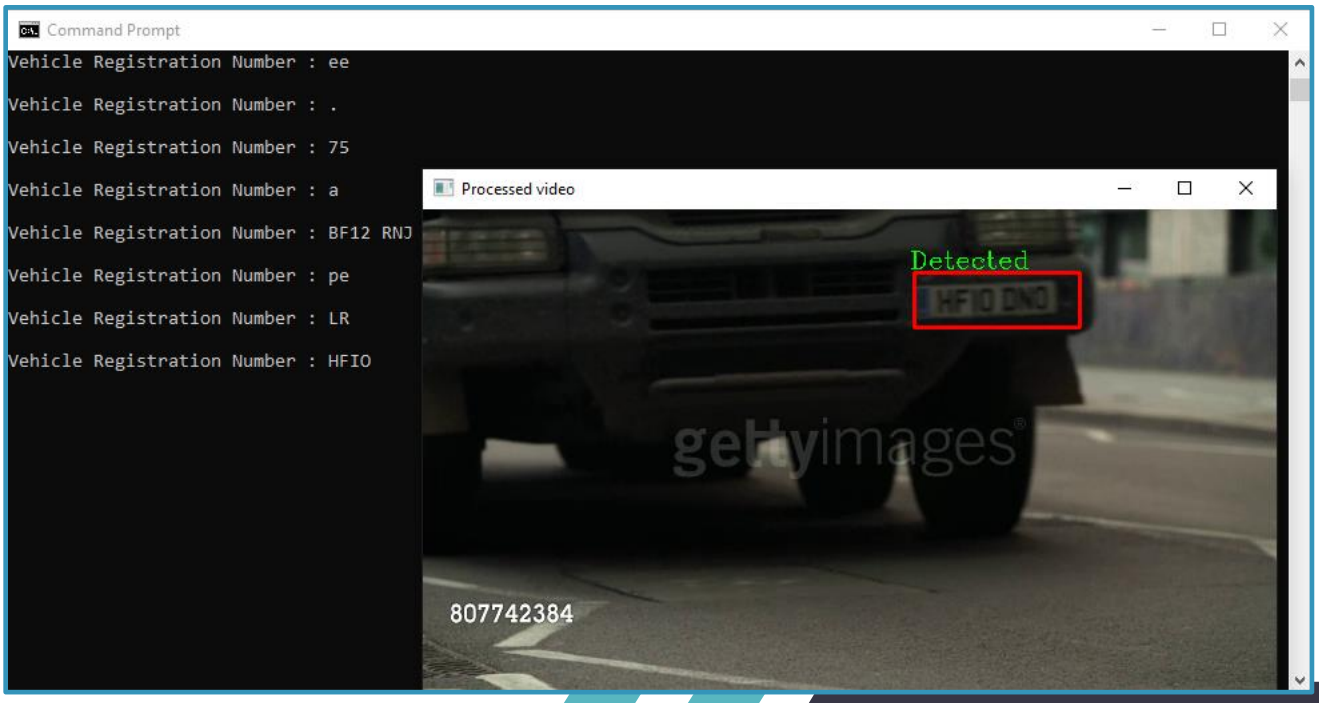
- ✓ Designed a PyTesseract vehicle licence plate number detector using OpenCV & enhanced performance by 76% by utilizing suitable Haar Cascade Classifiers.
- ✓ Performance can be further improved by the Intel® OpenVINO™ toolkit.

## Accomplishments

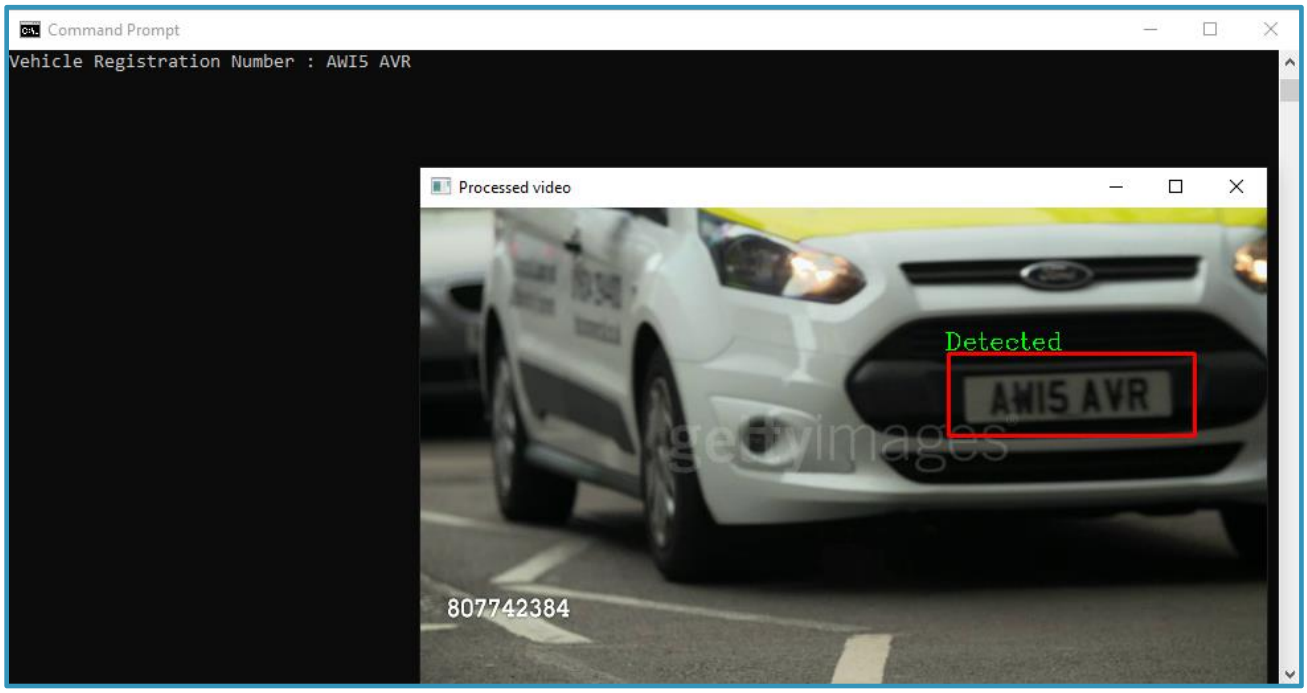
- **`License Plate Detection`**
  - ✓ Haar Cascade Classifiers is an effective object detection method.
  - ✓ It's a machine-learning method in which a cascade function is learned using many positive images and negative images.
  - ✓ After then, it's utilized to find things in other images.
  - ✓ Here we're using License plate Haar Cascade Classifiers to detect the licence plate easily.
- **`Converting the image into a string using PyTesseract`**
  - ✓ PyTesseract is an optical character recognition (OCR) programme.
  - ✓ It will be able to read and recognize text in pictures.
- **`Multiple license plate detection in a single frame`**
  - ✓ Haar Cascade Classifiers can detect multiple license plates in a single frame, thus making the process easy for the user.
  - ✓ It gives an excellent improvement to the performance of the system.
- **`License plate number will be displayed only once`**
  - ✓ Since the exact vehicle can be spotted in multiple frames, there is a chance of duplicate in the record.
  - ✓ To avoid that, we're using a hashtable to keep track of the vehicles which are already noted; thus, we're entering each vehicle's registration number only once to the directory.

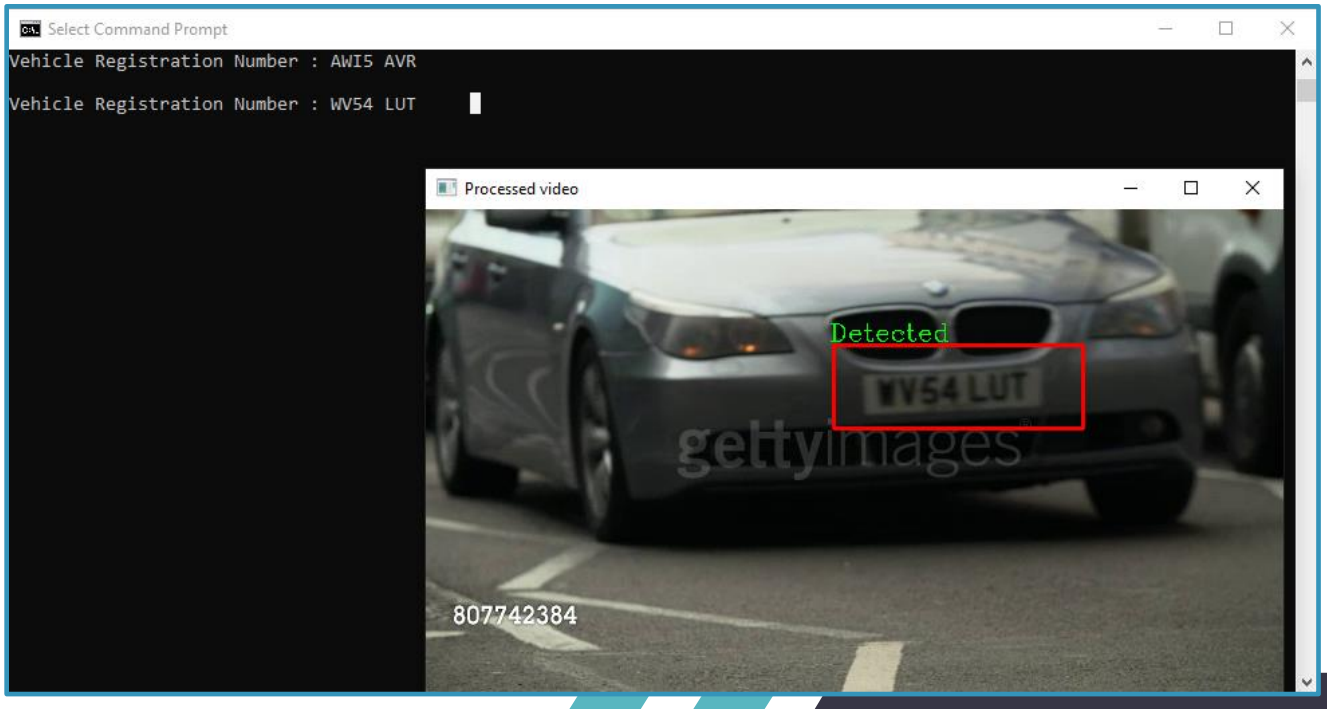
# Without Haar Cascade Classifiers

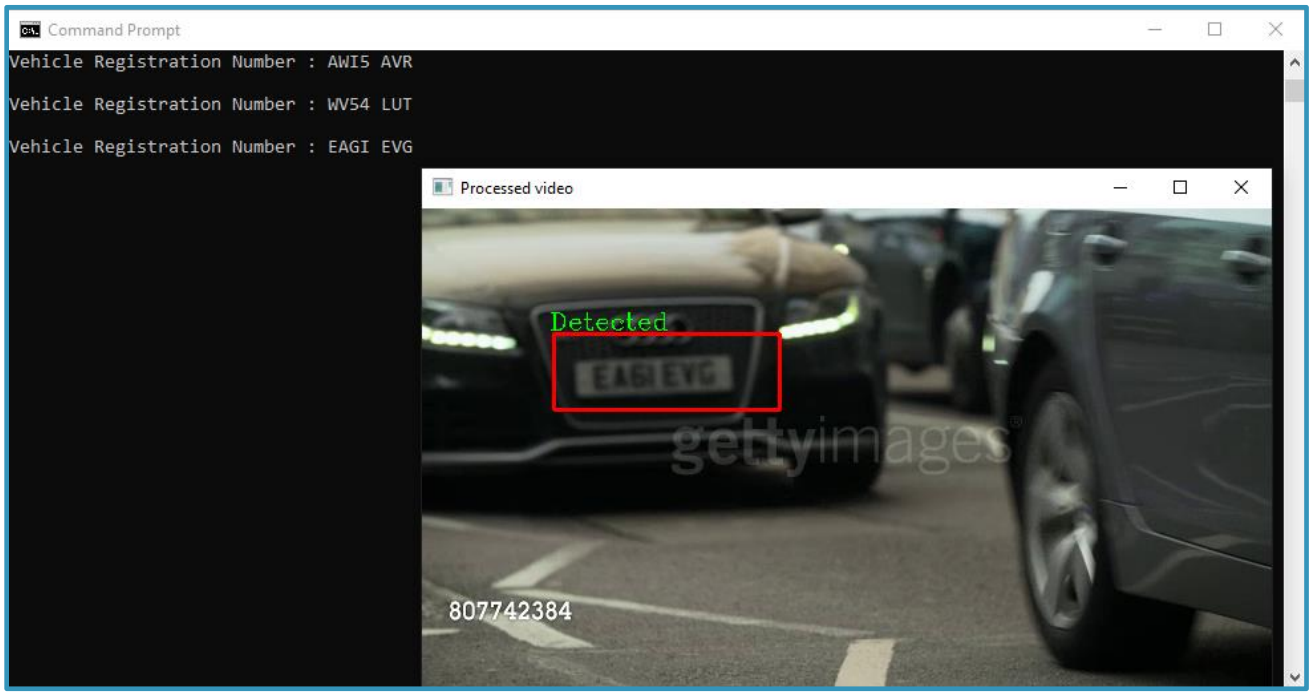


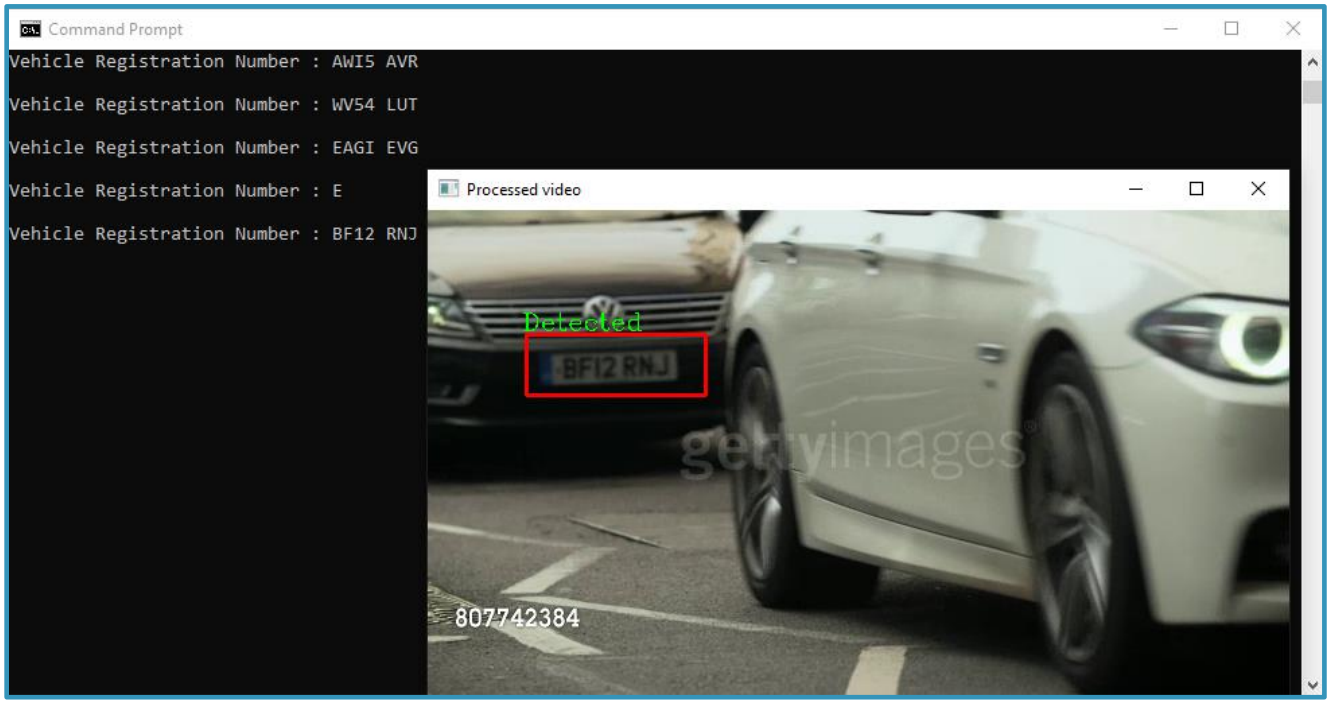



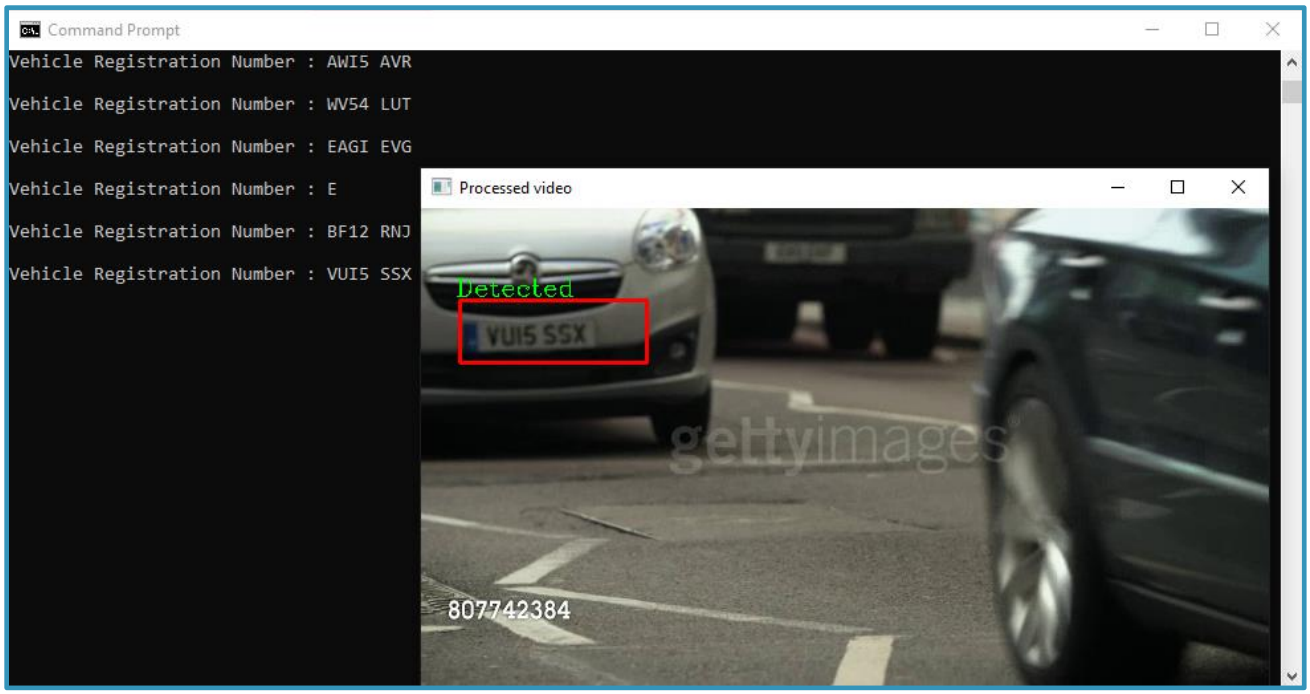
# With Haar Cascade Classifiers

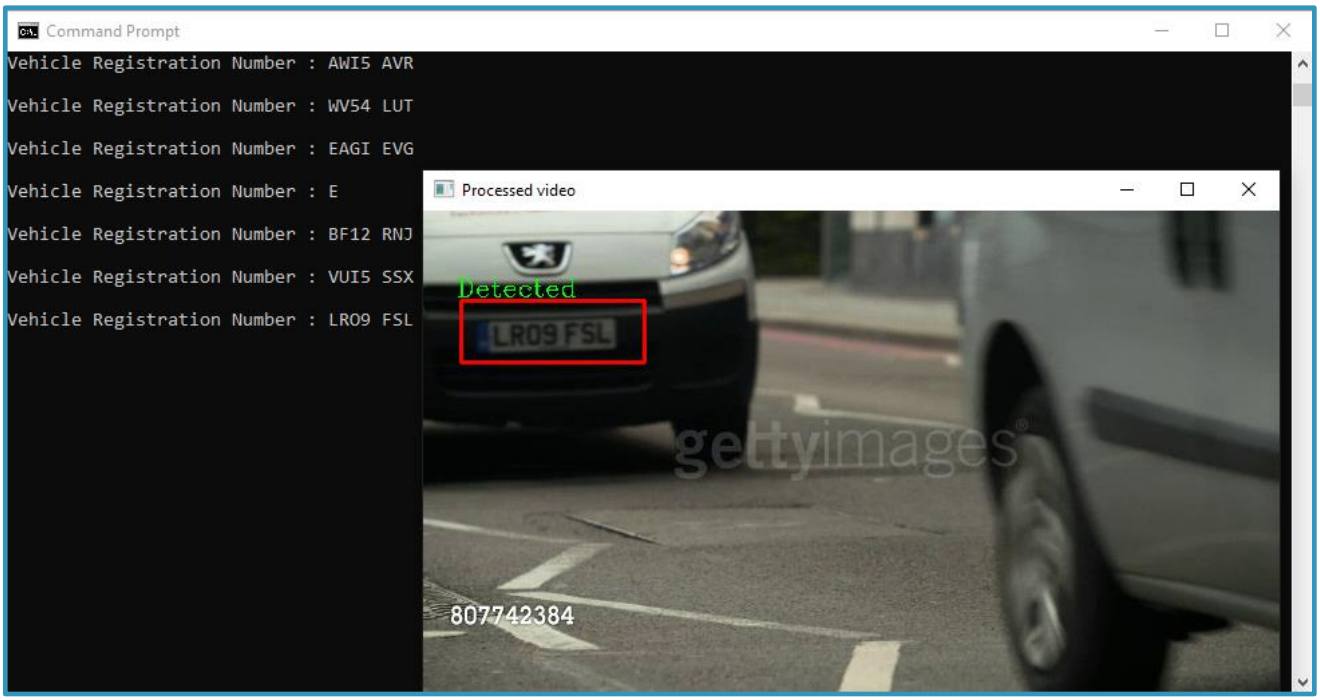


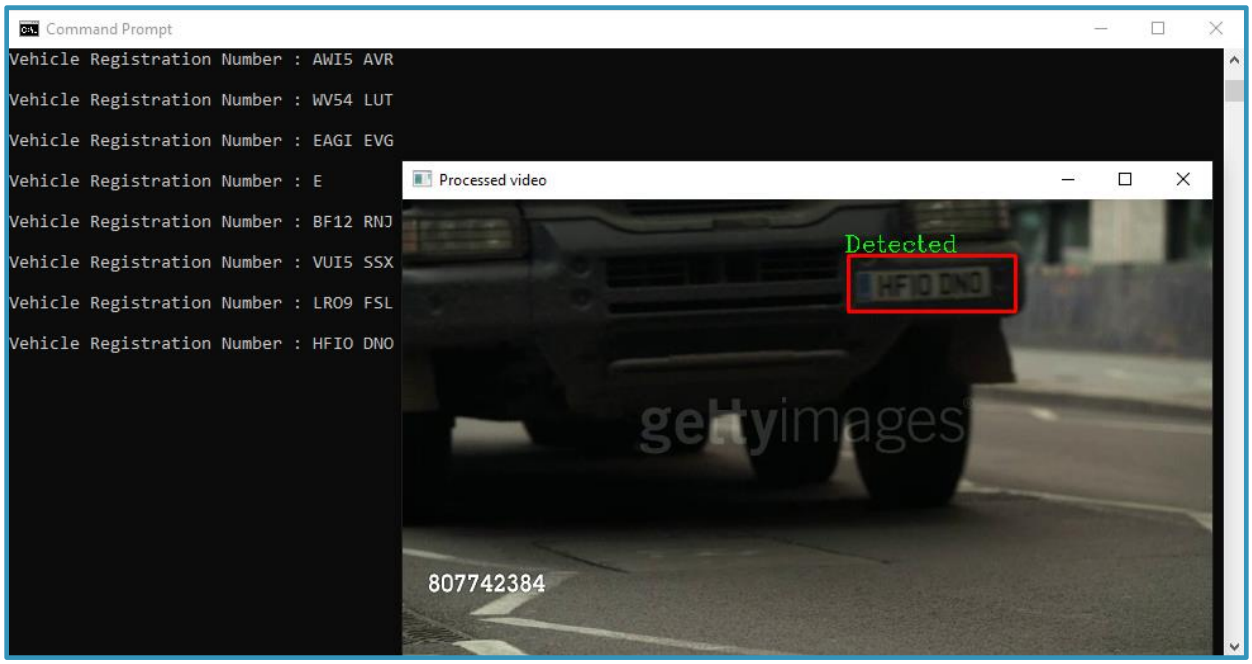




Command Prompt
Vehicle Registration Number : AWI5 AVR
Vehicle Registration Number : WV54 LUT
Vehicle Registration Number : EAGI EVG
Processed video
Detected
EAGI EVG
807742384


Command Prompt
Vehicle Registration Number : AWI5 AVR
Vehicle Registration Number : WV54 LUT
Vehicle Registration Number : EAGI EVG
Vehicle Registration Number : E
Vehicle Registration Number : BF12 RNJ
Processed video
Detected
BF12 RNJ
807742384


Command Prompt
Vehicle Registration Number : AWI5 AVR
Vehicle Registration Number : WV54 LUT
Vehicle Registration Number : EAGI EVG
Vehicle Registration Number : E
Vehicle Registration Number : BF12 RNJ
Vehicle Registration Number : VUI5 SSX
Processed video
Detected
VUI5 SSX
807742384


Command Prompt
Vehicle Registration Number : AWI5 AVR
Vehicle Registration Number : WV54 LUT
Vehicle Registration Number : EAGI EVG
Vehicle Registration Number : E
Vehicle Registration Number : BF12 RNJ
Vehicle Registration Number : VUI5 SSX
Vehicle Registration Number : LRO9 FSL
Processed video
Detected
LRO9 FSL
807742384




## Observations

- The first two images show the result obtained without Haar Cascading Classifiers, and it gives wildly inaccurate results; also, it takes much time to process.
- While the remaining gives a very high accurate result, as Haar Cascade Classifiers is used.
- Haar Cascade Classifiers detects the plate, and the PyTesseract convert the image into a string and displays it in the terminal, which can be recorded and saved.

## Conclusion

- ✓ The entire project is done in Python with the help of PyTesseract & Haar Cascade Classifiers for better performance.
- ✓ By repeating the process several times with different video inputs, we see a 76% enhanced performance by utilizing suitable Haar Cascade Classifiers.
- ✓ **Future Scope :** Intel® OpenVINO™ toolkit enables Convolutional Neural Networks (CNN)-based deep learning inference; thus, it can be utilized to increase the system's performance.