**Vehicle Number Detection Solution Using Open CV, Tesseract packages in Python**

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# Background

The intent of this document is to explain the steps/solution used to recognize the vehicle number plate detection from an image and do OCR to extract characters.

# Your Understanding

To build a solution to recognize the vehicle number from image and extract number using Open Computer Vision (Open CV) and Tesseract in Python

# Scope

Scope is limited to number plate detection and character recognition from a chosen dataset

# Out of Scope

Classifying images with vehicles and visible number plates

Classify images with text

Neural network models can be trained with Tensorflow and keras can be used classifying image with vehicles / images with vehicles and text

AWS Rekognition is a service in AWS which can be leveraged to extract text from image.

These are not used in current implementation

# Assumptions

General Assumptions

* Image should be captured using high resolution camera.
* Identifies license-plates with black characters in white plate and black characters in yellow plate
* Manually configure white and yellow number plates to images

Technical Assumptions

# Solution Approach

High Level Solution Approach

* 1. Object detection (Out of scope for this implementation)
* Identify images with vehicles
* Filter out image which does not have vehicles
  1. Image pre-processing
* Filter images by threshold
* Identify the shape
* Remove noise
* Enhance image contrast
  1. Spam Classification (Out of scope for this implementation)
* Identify images which have text
* Filter out images with no or not useful text
  1. Text extraction/Pattern matching
* Extract text from filtered images
* OCR can be used to extract text from an image
* Check if the text extracted matched license plate number format
* Use a simple regular expression to match license plate number format

# Implementation Framework

General Implementation Approach

* 1. Read the car images with visible number plates
  2. Process the image by filtering using different threshold for white and yellow plates
  3. Mark contours around the number plate
  4. Crop the portion of the image with number plate
  5. Enhance the image again to remove noise and blurs (Not implemented)
  6. Use pytesseract to extract the text from the cropped image
  7. Write the cropped image to output folder
  8. Store the image to license plate number mapping in dictionary

Hardware:

Processor:cpu @1.60GHz

RAM:4.00GB

OS:Windows10

Software:

1. Python 3
   1. <https://realpython.com/installing-python/#windows>
2. Numpy
   1. pip install numpy
   2. pip install scipy
3. Matplotlib
   1. pip install matplotlib
4. Open CV
   1. pip install opencv-pyton
5. Pytesseract
   1. pip install pytesseract
6. Solution Submission

Share the link with the code uploaded on GitHub.\\ <https://github.com/kiruthi981/license_plate_detection>

1. Appendix

Additional details

1. References

Useful Links:

1.  <https://medium.com/@keynekassapa13/locating-number-plates-in-cars-opencv-python-d6894deb5408>

2. <https://scipy-lectures.org/packages/scikit-image/index.html>

3. <https://pypi.org/project/pytesseract/>)