Image Processing Project Proposal

Project :

1. Idea

The idea of the project is to recognize the plate number of a car & identify the numbers/characters in it.

2. Need

The project can be used in identifying specific cars which are allowed for example to enter a garage/place to unlock the entrance for these cars automatically or to record the cars which pass by a specific gate for security purposes .

Block Diagram **“maybe adjusted during project implementation” :**

- **Inputs:**
  Our input will be an image which contains the car image which is taken from a front view perpendicular to the car’s plate number with a clear light condition.
- **Outputs:**
  Our output will decide whether to open the gate or not .
- **Methods:**
  - Segmentation
  - Gradient operator “to make edges more clear & git rid of low frequencies”
  - RGB to Gray
  - Contrast enhancement
  - Edge detection
  - Gray to Binary
  - Contours
- **Block Names:**
  - **Localize The Plate :** this can be done using the edge detection method because the plate will have a different color/theme than the car.
  - **Extract The Plate Image :** I should here search on contours/rectangular shapes outlines & then using getperspective transform i will be able to get a cropped image containing only the plate .
  - **Extracting The Plate’s Numbers/Characters :** change image from rgb to gray then from gray to binary , then using contours will try to search each character/number in plate then using a classifier to know the result of searching .

Non-primitive Functions :

- If it’s accepted to use openCV :
  1. DetectMultiScale
     - **Detects objects of different sizes in the input image**. The detected objects are returned as a list of rectangles.(detected objects depends on parameters Passed to the function minSize&maxSize)
  2. FindContours.
     - Detecting contours of object in image.
  3. Grab_contour //verify
     - To clear contour from noise and false positives.
  4. ApproximatePolyDP

    - approximating the shape of a contour of **a** given polygon to the shape of the original polygon
5. BoundaryRect
    - draw an approximate rectangle around the binary image and returns sides length of the drawn rectangle (used to calculate aspects ratio to determine if this object is a rectangle or square)
6. Smoothing
7. Thresholding (before detecting numbers).
8. getperspective transform
    - Takes four points of the corner edges of an object and put that object in a separated image.

Scientific Paper/References :

- Image Processing, Analysis and Machine Vision 4th edition by
- Milan SonkaVaclav HlavacRoger Boyle
- Digital Image Processing 4th edition by Rafael C. Gonzalez and Richard E. Woods
- https://drive.google.com/file/d/1BoaKwd6FtLmDiIZm4mK7Gf90hdjjz2hF/view?usp=sharing
- https://www.koreascience.or.kr/article/JAKO201218646779545.pdf

//camera degree
//different cars
//complex data simple
//different brightness