Sarvajanik College
Of
Engineering & Technology

Electronics & Communication (sem 07)

PROJECT-II (2170001)

Real time driver assistance system using Python and Open CV

GROUP ID : 2302

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Aim

- To design a system for real time driver assistance.
- To implement real time system for detection of lane and traffic signal and sign detection.
- To implement a system which will detect its nearby objects i.e. cars and pedestrians.

Work Done up till last semester

- Detected pedestrians using Haar cascade
- Detected cars using Haar cascade transform as well as HOG transform.
- Compared the above algorithms based on IOU and processing time(frame rate).
- From the result analysis, we concluded that the processing time for Haar cascade is relatively less than that of HOG transform.
- We learnt that an intersection over union score > 0.5 is normally considered a good prediction. Therefore, as per our results accuracy of HOG is more than Haar.

Results of Pedestrian Detection using Haar Cascade Transform from a Video

Figure : Pedestrian Detection

Car Detection using HOG Transform from a Image

Figure : Sliding Window

Figure : Raw Detection

Figure : Non Maximum Suppression(NMS) Detection

Intersection over Union(IoU) Analysis

Figure : Haar IoU (1)

Figure : Haar IoU (2)

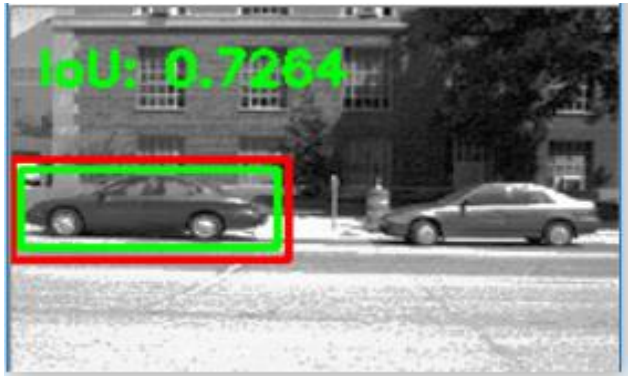


Figure : HOG IoU (1)

Figure :HOG IoU (2)

Template Matching

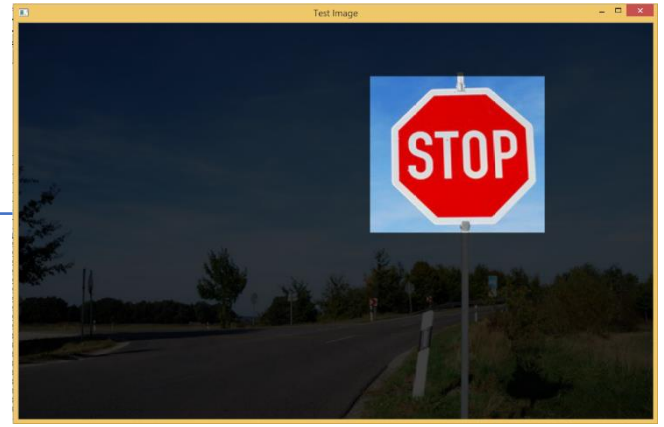
- Template Matching is a method for searching and finding the location of a template image in a larger image.

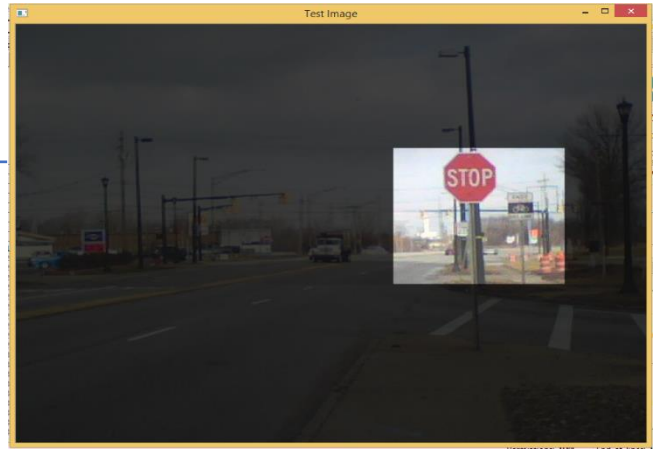
- It simply slides the template image over the input image (as in 2D convolution) and compares the template and patch of input image under the template image.

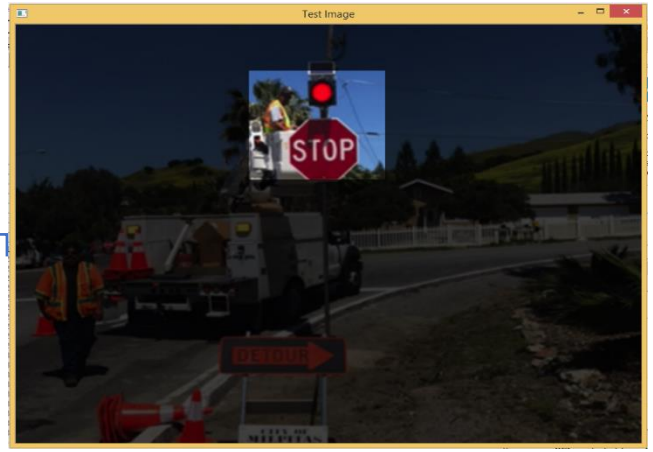
- It returns a grayscale image, where each pixel denotes how much does the neighbourhood of that pixel match with template.

Original Images

Detected Images







Pyramid Method

- Pyramid representation is a type of multi-scale signal representation developed by the computer vision, image processing and signal processing communities, in which a signal or an image is subject to repeated smoothing and sub sampling

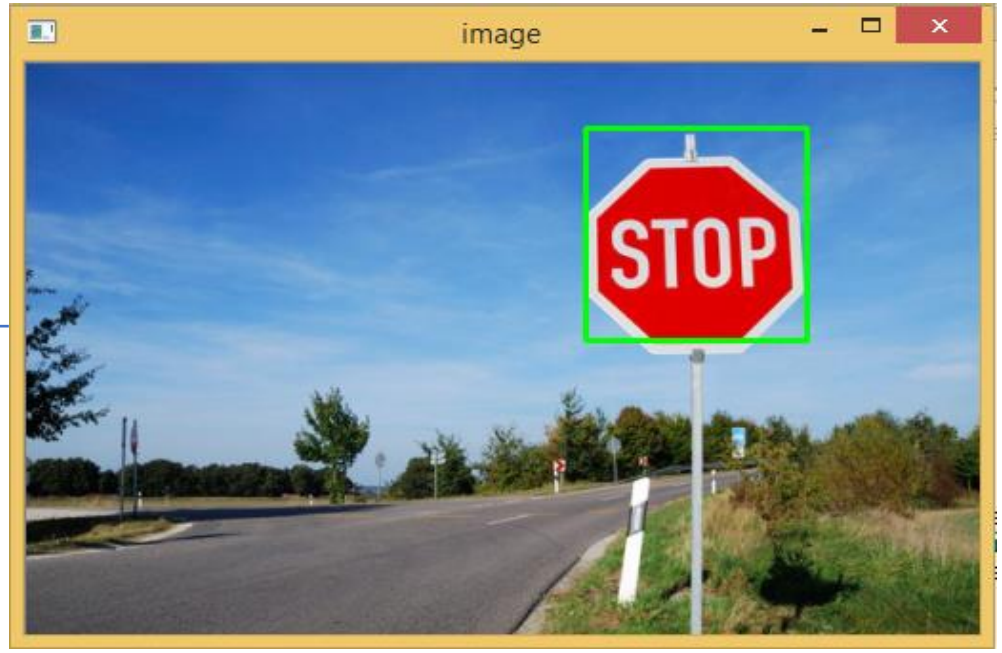
- It takes a "prototype" stop sign and creates a pyramid out of it by down sampling

- Then it slides the pyramid one slice at a time over the target image, computing the mean square error.

- The slice with the mean square error is determined to be the stop sign.

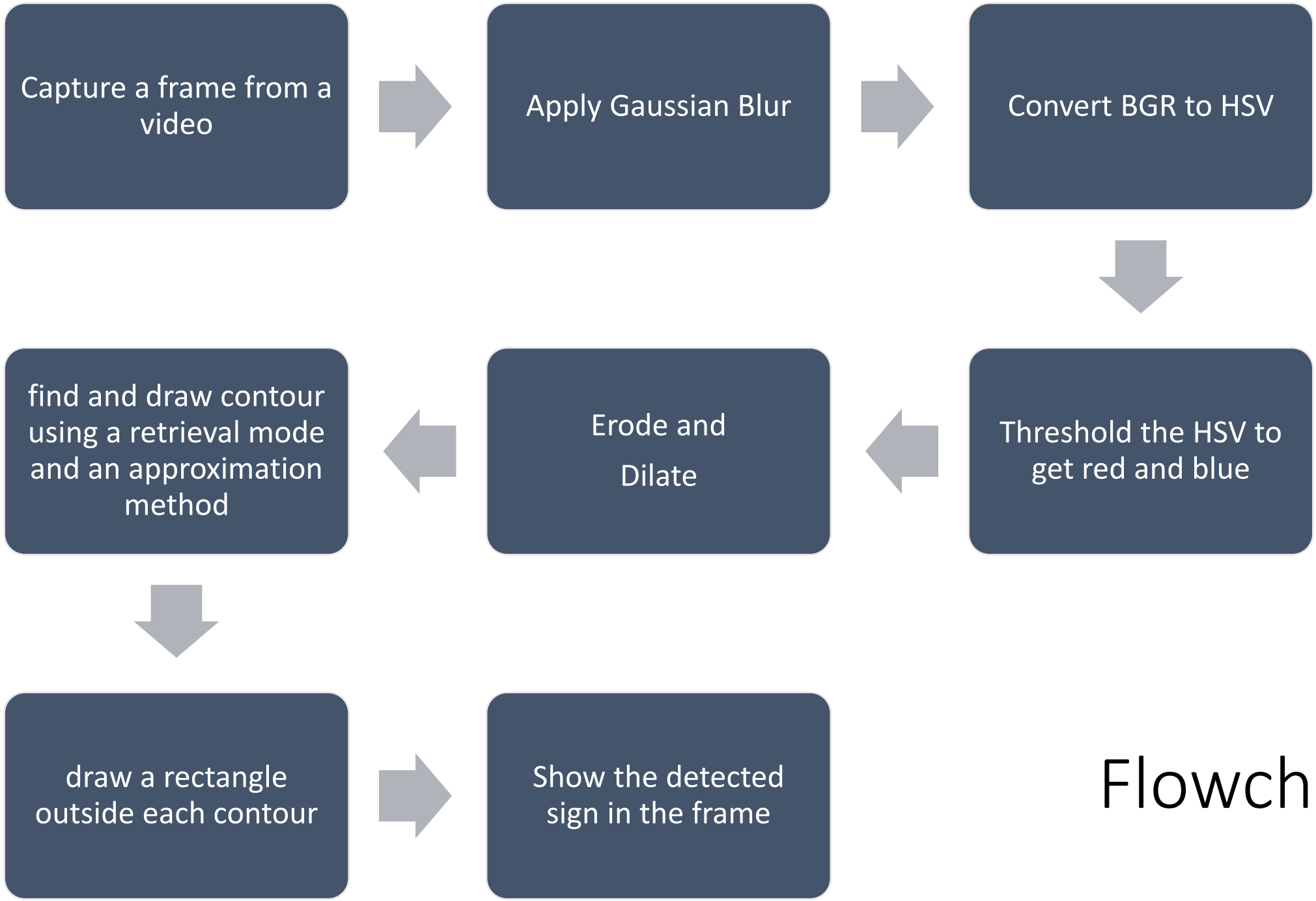
Original Images

Detected Images



Traffic sign detection and recognition using Contour

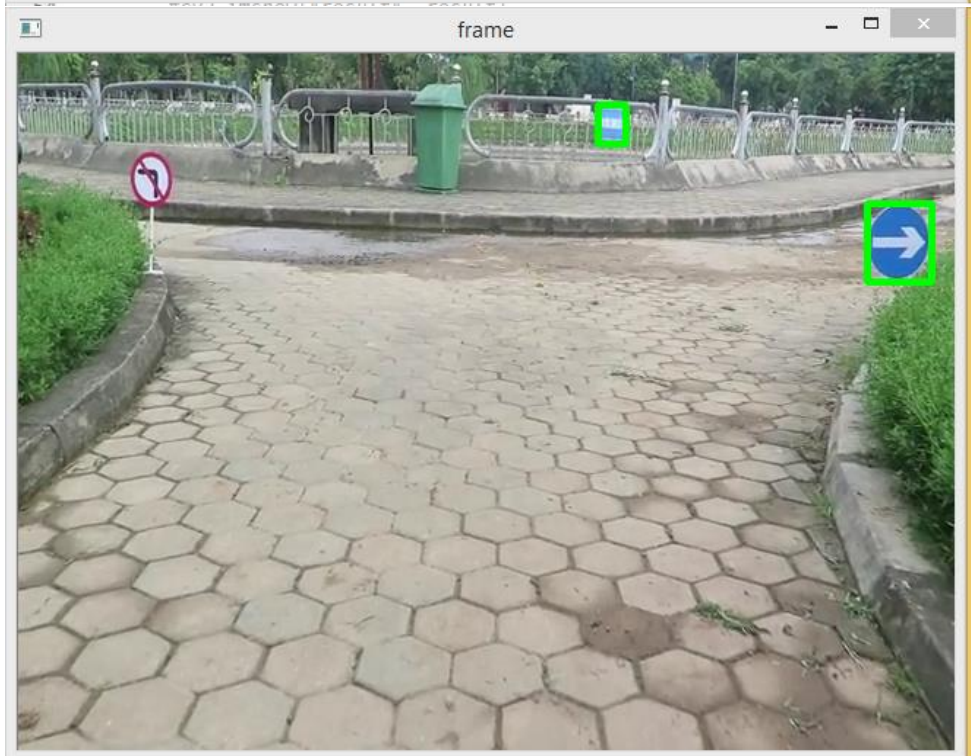
- Traffic sign detection is based on colour analysis, using the HSV colour space.
- The detected ROIs are then tested for their shape, which allows discarding most false positive initial detections, resulting from non-sign image areas sharing sign colours.
- Circles are identified exploiting the fast radial symmetry, while triangles and squares are identified by finding shape corners.
- Classification into danger, information, obligation or prohibition classes is then performed combining colour and shape information.

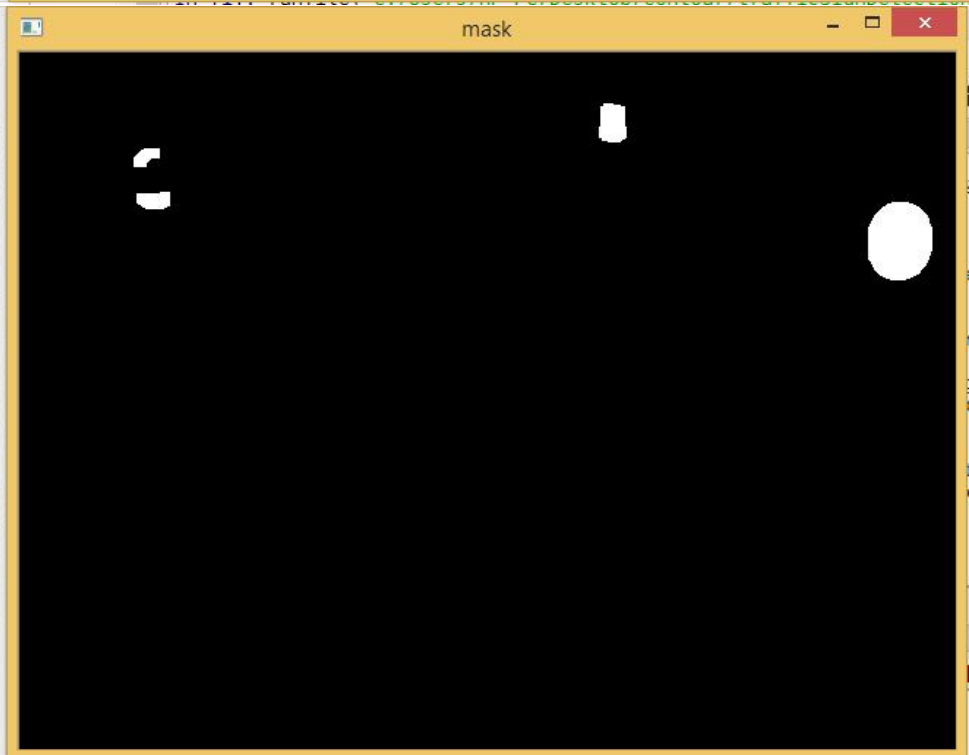

Capture a frame from a video
Apply Gaussian Blur
Convert BGR to HSV
Threshold the HSV to get red and blue
Erode and
Dilate
find and draw contour using a retrieval mode and an approximation method
draw a rectangle outside each contour
Show the detected sign in the frame

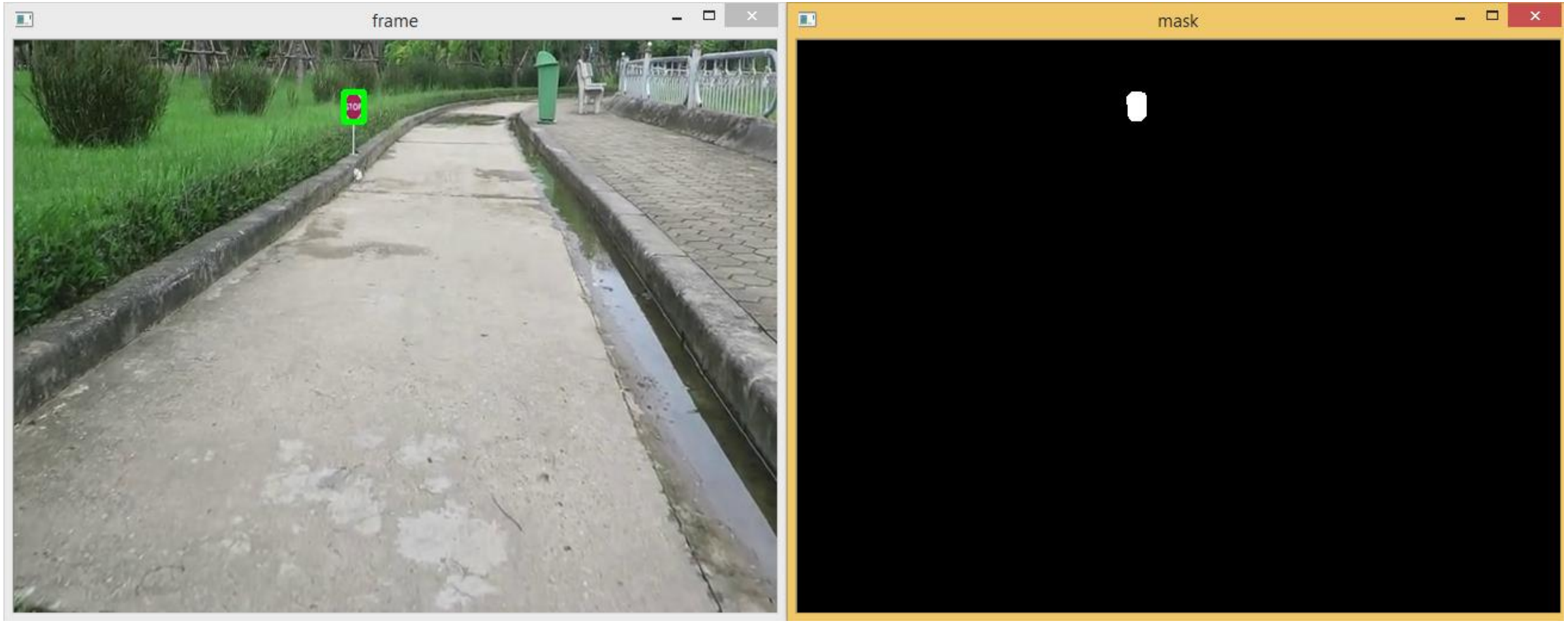
Flowchart

Results :

Detected output as sign with its masked frame in **HSV representation**







Detected output as sign with its masked frame in **HSV representation.**

Traffic sign Classification

- Color: Usage of different colors for different signs are important. The most commonly used colors are red, green, yellow, black, blue, and brown . These are used to code certain devices and to reinforce specific messages. Consistent use of colors helps the drivers to identify the presence of sign board ahead.

RED : Either signals you to stop your vehicle or prohibits entry.

BLUE : Signals that you can proceed, or provides you with direction on where to proceed.

YELLOW : Serves as a general warning.

ORANGE : Signals construction time.

- Shape : The categories of shapes normally used are circular, triangular, rectangular, and diamond shape. Two exceptional shapes used in traffic signs are octagonal shape for STOP sign and use of inverted triangle for GIVE WAY (YIELD) sign. Diamond shape signs are not generally used in India.



- Legend : Symbols are normally used as legends so that even a person unable to read the language will be able to understand that. There is no need of it in the case of traffic signals and road markings.



- Pattern: It is normally used in the application of road markings, complementing traffic signs. Generally solid, double solid and dotted lines are used. Each pattern conveys different type of meaning.

Work plan ahead

- We plan to further classify the traffic signs into different classes.
- We will be integrating all the modules by bringing all the detection cases together like car detection, pedestrian detection, sign board detection such that it works as a single unit.

THANK YOU