CENTER FOR DEVELOPMENT OF ADVANCED COMPUTING

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Traffic Violation Detection (Red-light) System Using OpenCV

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A total 4,37,396 road accidents were recorded across India in 2019, resulting in the death of 1,54,732 people and injuries to another 4,39,262, according to the latest **National Crime Records Bureau** (NCRB) data.

11% Traffic violations

16 children die on Indian roads daily.

Objective

Traffic Violation Detection (Red-light) System Using OpenCV

- Traffic signal violation detection
- Make it easy for the traffic police department to monitor the traffic
- Detecting and tracking the vehicle and their activities accurately

Introduction

Traffic Violation Detection (Red-light) System Using OpenCV

The increasing number of cars and bike in cities can cause high volume of traffic, and implies that traffic violations become more critical nowadays in India

The number of accidents on the roads is due to the rule violations such as breaking traffic signals, over-speeding, driving on wrong sides etc.

The Solution

Traffic Violation Detection (Red-light) System Using OpenCV

In this proposed system, a solution for signal breaking violation is given

In this system include capture video that detect violation using OpenCV(Computer Vision) using zebra crossing line

This system capture car or bike who break red signal.

The Goal

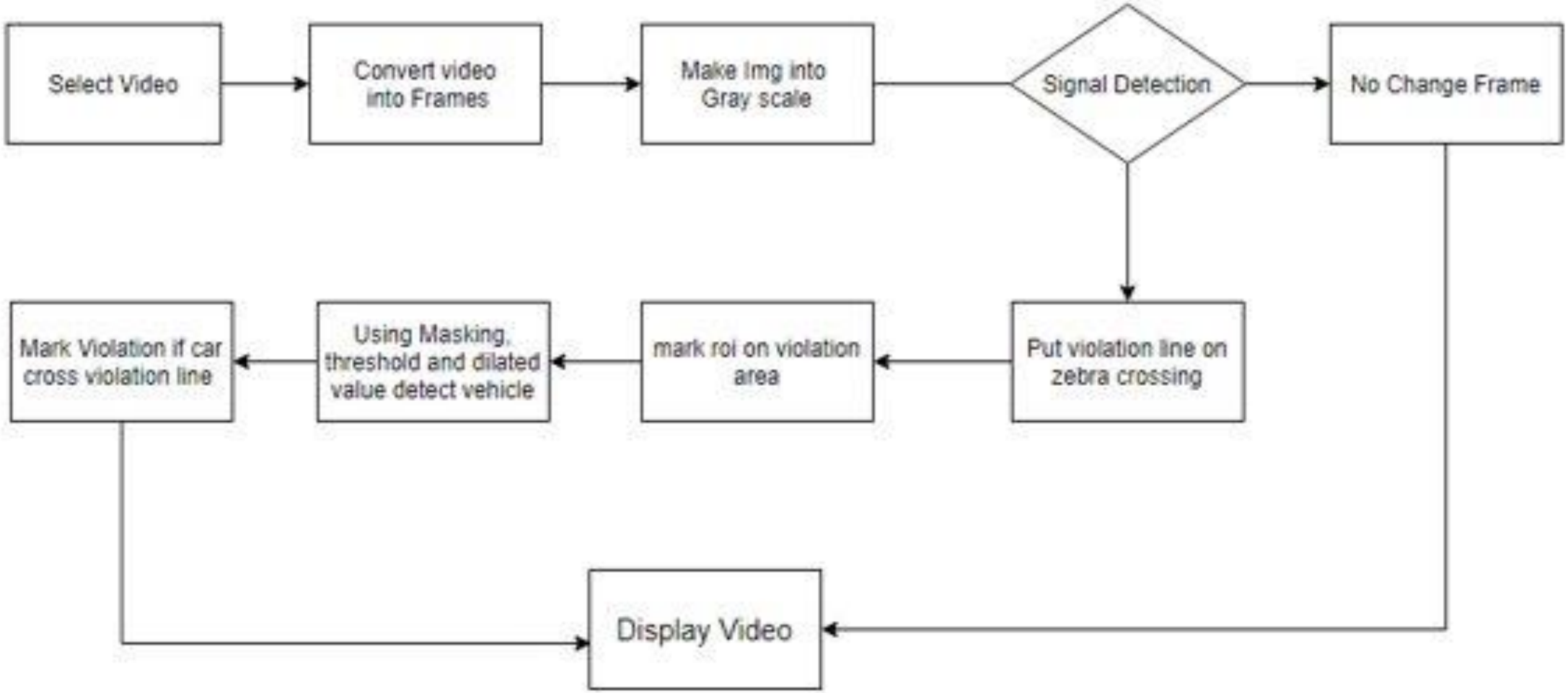
Traffic Violation Detection (Red-light) System Using OpenCV

Vehicle Detection (OpenCV)

Red traffic light detection

Proposed Methodology

Traffic Violation Detection (Red-light) System Using OpenCV



Methodology

Traffic Violation Detection (Red-light) System Using OpenCV

Signal Light Detection

For detecting red, yellow, green light we use colour lower and upper bound

```
# for red
lower_red1 = np.array([0,100,100])
upper_red1 = np.array([10,255,255])
 #for Yellow
lower_green = np.array([40,50,50])
            upper_green = np.array([90,255,255])
#for green
lower_yellow = np.array([15,150,150])
upper_yellow = np.array([35,255,255])
```

Methodology

Traffic Violation Detection (Red-light) System Using OpenCV

Object Detection:- Thresholding detect

Dilation :- Increases the object area.

Used to accentuate features.

It Increases the white region in the image or size of foreground object increases.

Methodology

Traffic Violation Detection (Red-light) System Using OpenCV

Violation Detection:

The vehicles are detected using dilation. After detecting the vehicles, violation cases are checked. A traffic line is drawn over the road in the preview of the given video footage by the user. The line specifies that the traffic light is red. Violation happens if any vehicle crosses the traffic line in red state.

The detected objects have a red bounding box. If any vehicle passes the traffic light in red state, violation happens.

Implementation

Traffic Violation Detection (Red-light) System Using OpenCV

Computer Vision:

•OpenCV is an open source computer vision and machine learning software library which is used in this project for image processing purpose

Euclidean Distance

•The Euclidean distance is the straight-line distance between two pixels.

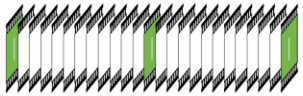
p, q =two points in Euclidean n-space

$$d(\mathbf{p},\mathbf{q}) = \sqrt{\sum_{i=1}^{n}(q_i - p_i)^2}$$

System Flow

Traffic Violation Detection (Red-light) System Using OpenCV

Video



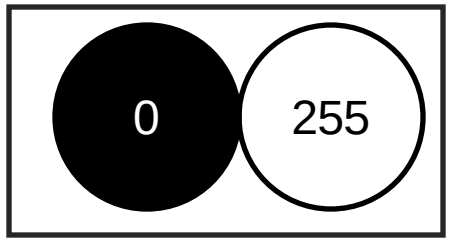
Frames

Signal

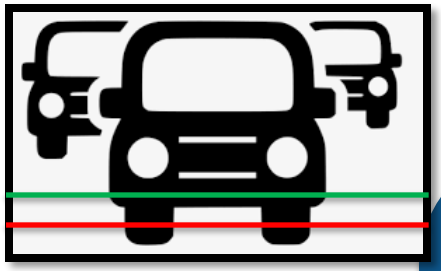
RoI

Region Of Interest

Violation Lines



Thresholding
&
Dilation



OutPut

System Output

Traffic Violation Detection (Red-light) System Using OpenCV

Future Aspects

Traffic Violation Detection (Red-light) System Using OpenCV

Adding more real life features

Making this system more robust

Adding Number Plate Detection

Adding more traffic violation conditions

Conclusion

Traffic Violation Detection (Red-light) System Using OpenCV

The designed algorithm was effectively able to detect the type of violation specified on this project which are denying traffic signal. The convergence of detection for the traffic violation mentioned is dissimilar, since it has a different threshold condition. The system provides detection for traffic signal violation.

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Thank You.