Computer Vision
Fall 2018
Problem Set #2

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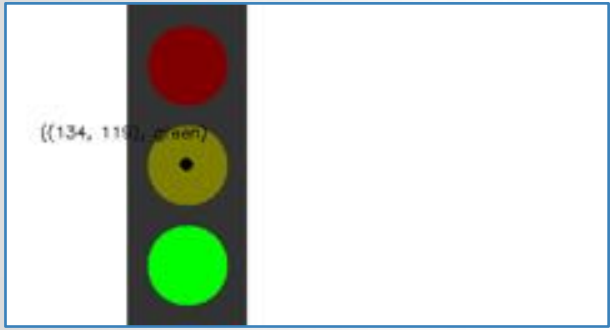
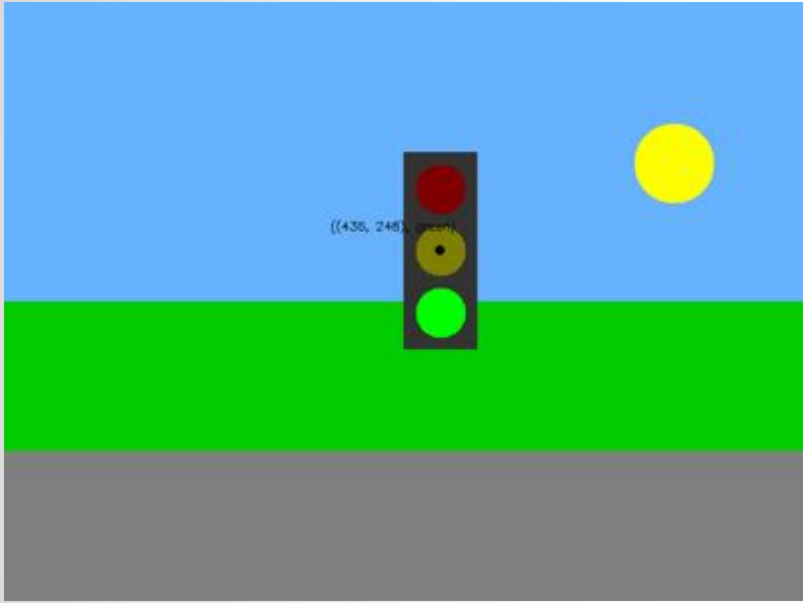
Traffic Light Detection

((134,119), ‘green’)



ps2-1-a-1.png

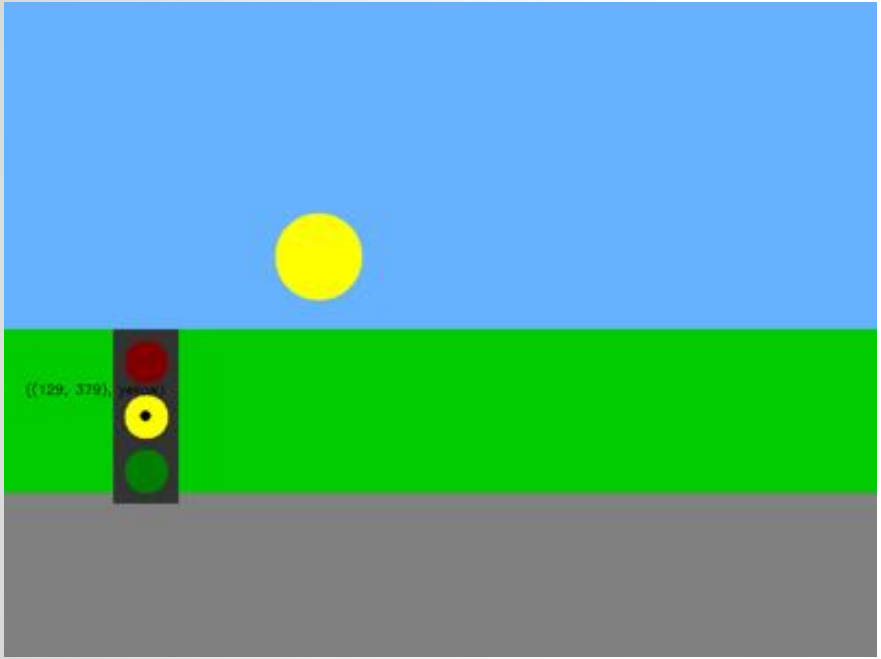
Traffic Light Detection



((436,248), ‘green’))

ps2-1-a-2.png

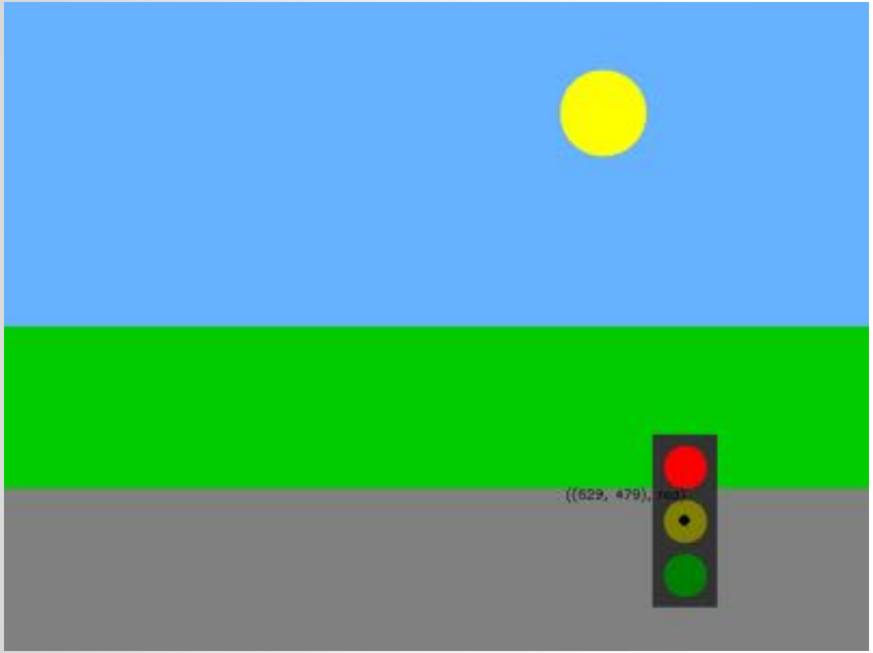
Traffic Light Detection



((129,379), ‘yellow’)

ps2-1-a-3.png

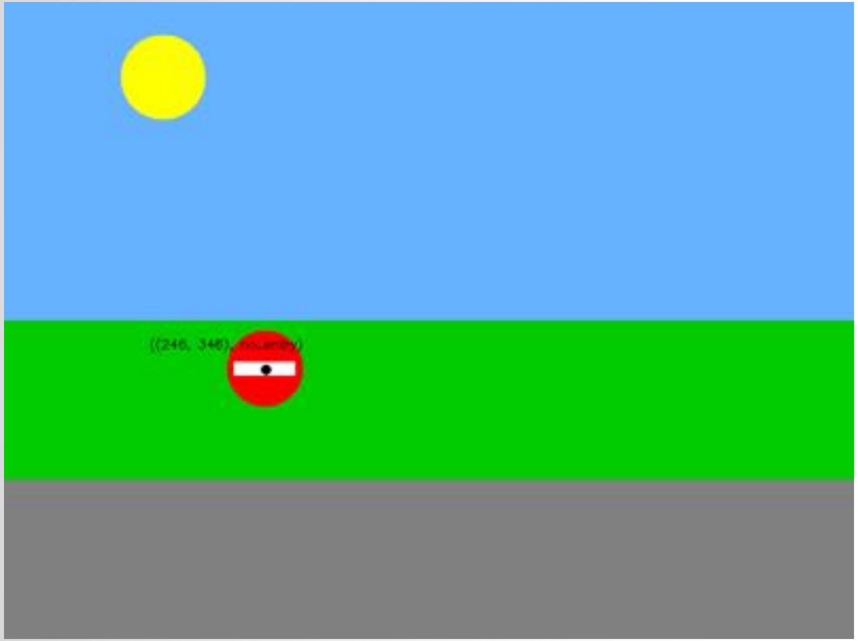
Traffic Light Detection



((629,479),red)

ps2-1-a-4.png

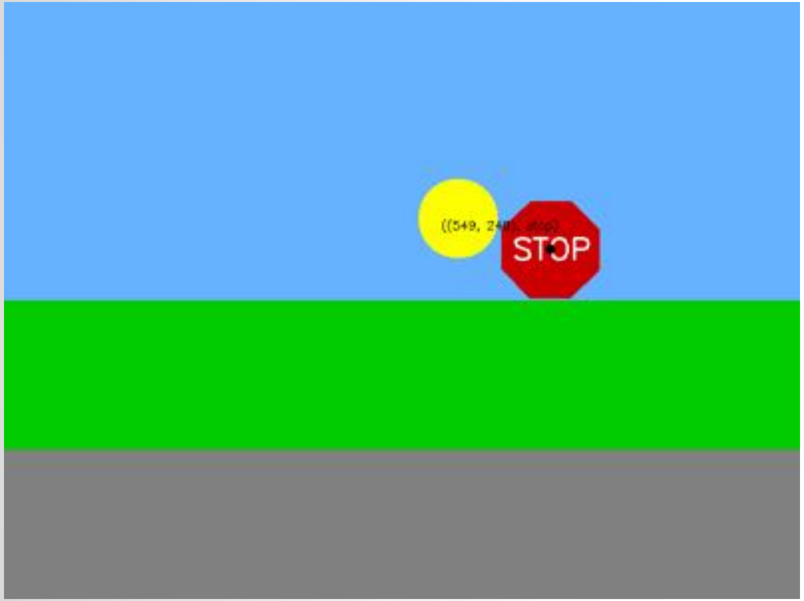
Traffic Sign Detection - Do not enter



(246,346)

ps2-2-a-1.png

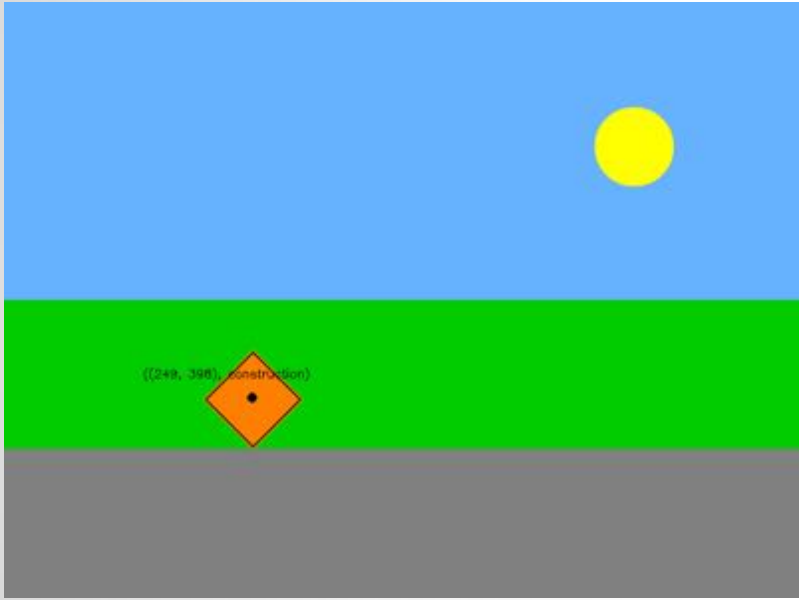
Traffic Sign Detection - Stop



(549,248)

ps2-2-a-2.png

Traffic Sign Detection - Construction

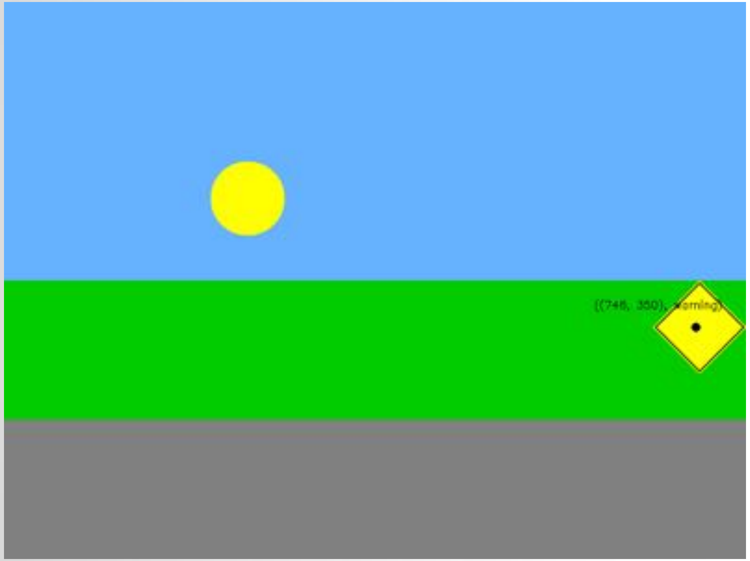


ps2-2-a-3.png

(249,398)

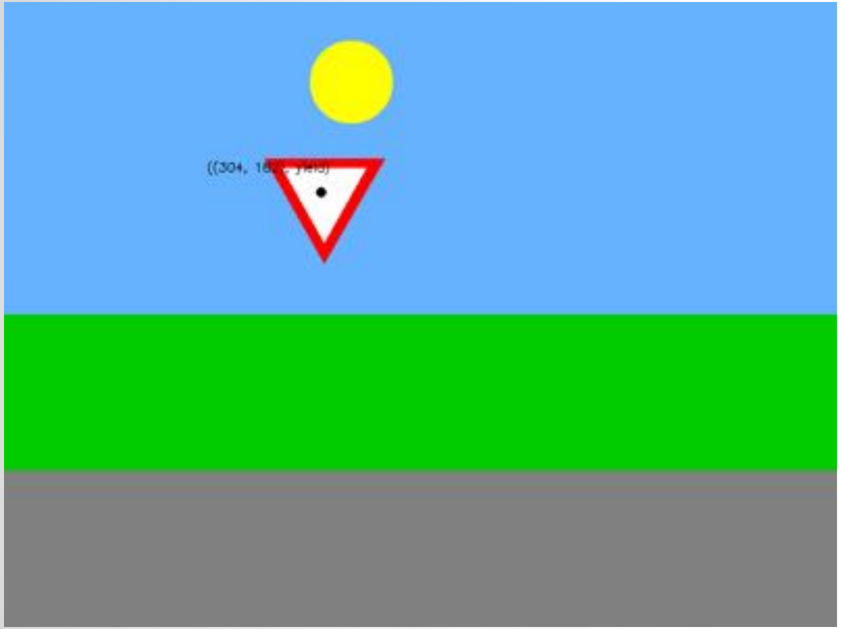
Traffic Sign Detection - Warning

(746,350)



ps2-2-a-4.png

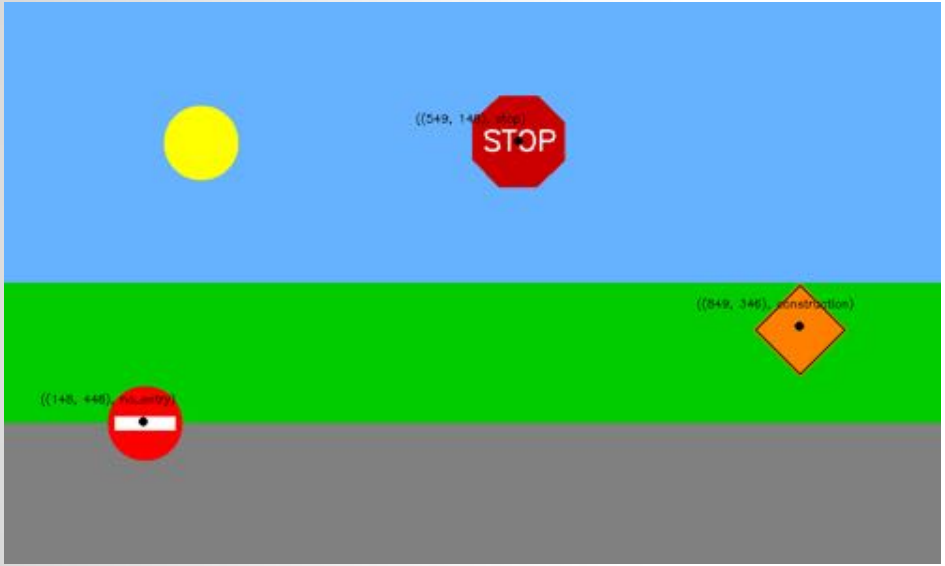
Traffic Sign Detection - Yield



(304,182)

ps2-2-a-5.png

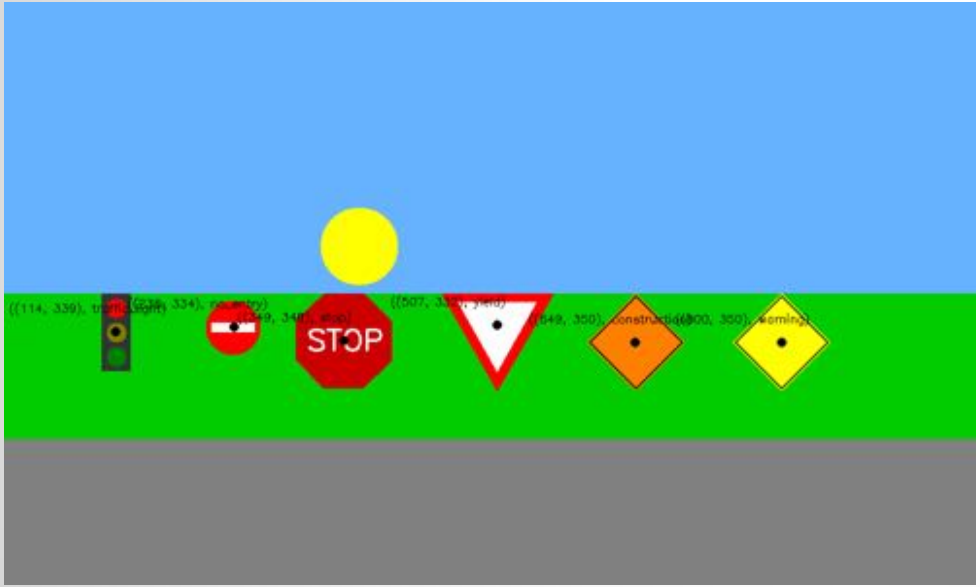
Multiple sign detection



((549,148),stop)
((148,448),no_entry)
((849,346),construction)

ps2-3-a-1.png

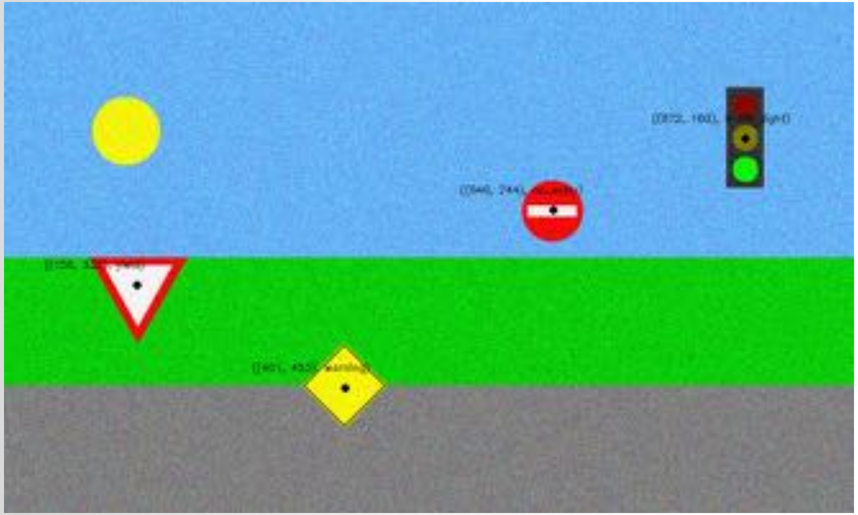
Multiple sign detection



((114,339),traffic_light)
((236,334),no_entry)
((349,348),stop)
((507,332),yield)
((649,350),construction)
((800,350),warning)

ps2-3-a-2.png

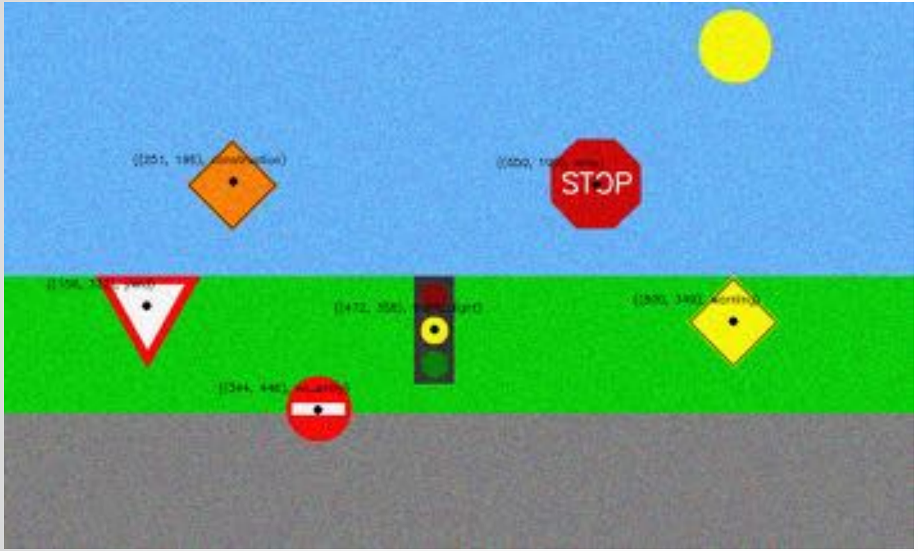
Multiple sign detection with noise



ps2-4-a-1.png

```
((872,160),traffic_light)
((646,244),no_entry)
((156,332),yield)
((401,453),warning)
```

Multiple sign detection with noise



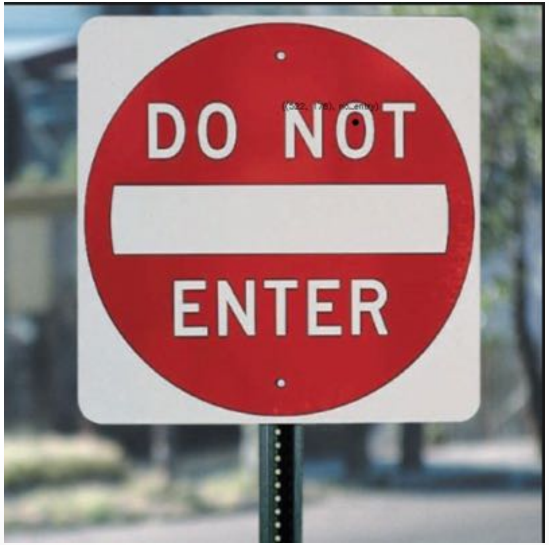
ps2-4-a-2.png

((472,358),traffic_light)
((344,446),no_entry)
((650,199),stop)
((156,332),yield)
((251,196),construction)
((800,349),warning)

Challenge Problem

(522,178), no_entry

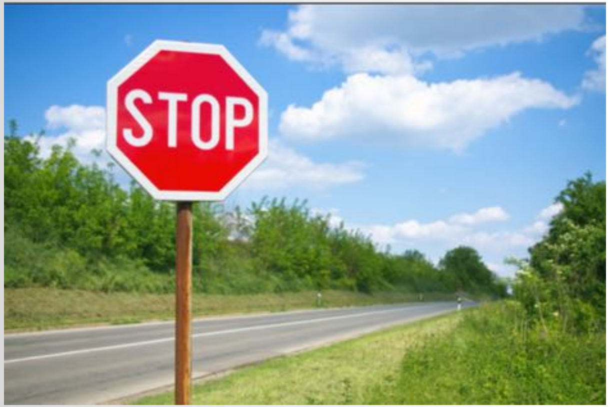
Img-5-a-1.png

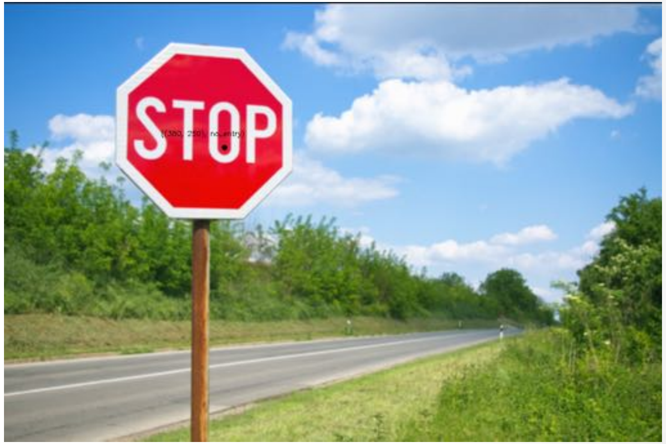


Output image

Challenge Problem

(380,250), no_entry



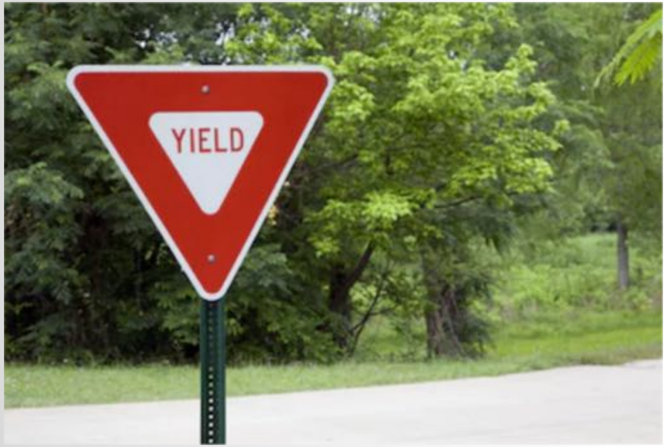


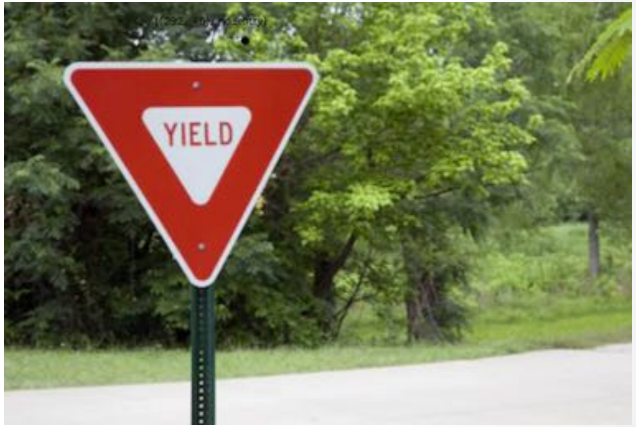
Img-5-a-2.png

Output image

Challenge Problem

(292,46), no_entry



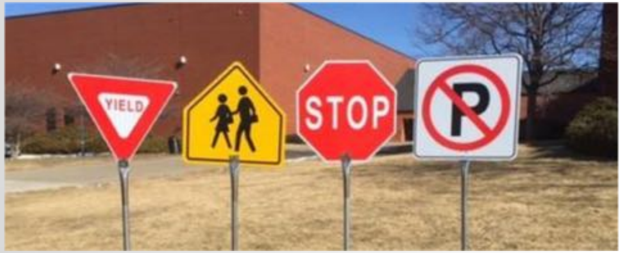


Img-5-a-3.png

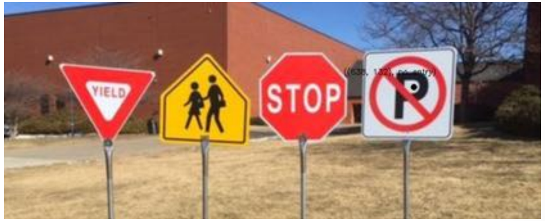
Output image

Challenge Problem

(638,132), no_entry



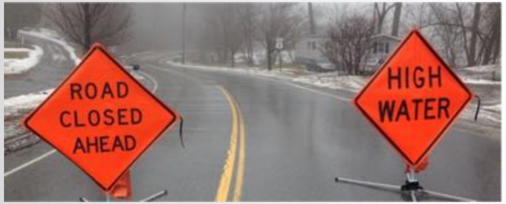
Img-5-b-1.png



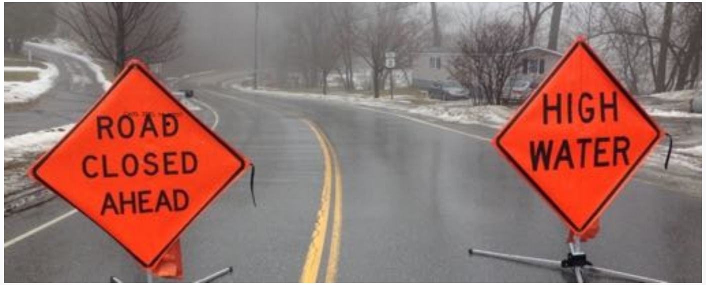
Output image

Challenge Problem

(400,296) no_entry

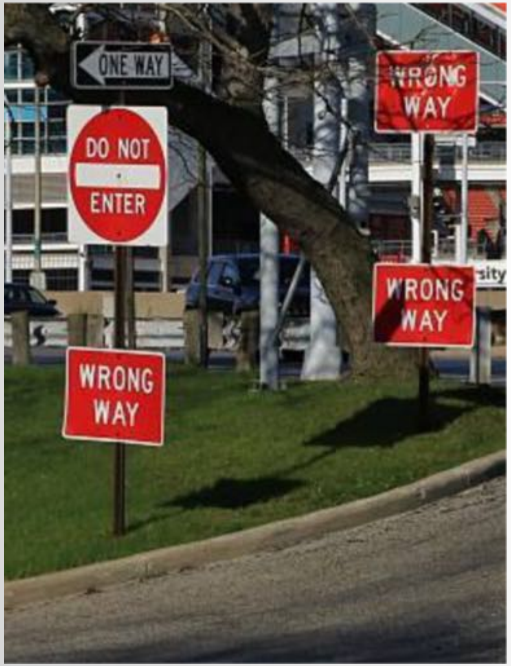


Img-5-a-2

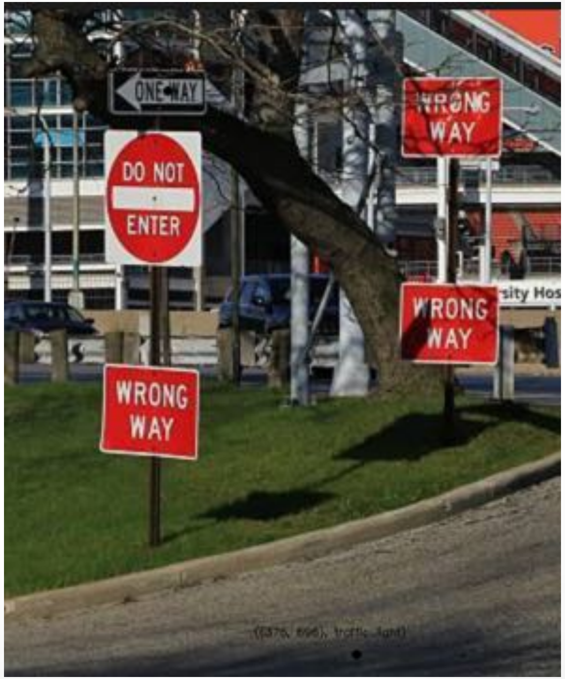


Output image

Challenge Problem



Input image



Output image

(376,696), traffic_light
(174,345), no_entry

Challenge Problem

Describe what you had to do to adapt your code for this task. How does the difference between simulated and real-world images affect your method?

- Due to the nature of the algorithm and implementation, the detection method is very sensitive to the parameters such HSV color range and Hough Transform parameters.
- Most of my detections are inaccurate and failed to find the centroid. My implementation has been tuned specially to the provided input images for part 1 to part 4. For real-images, the signs may have different color, size, and orientation. The background object may also be identified. This method can certainly be tuned for each real image but it does not seem to be very robust for real-time video detection.

If you used other functions/methods, explain why that was better(or why your previous implementation did not work)

- I did not continue with other method. There are method will do a much better job such as CNN or other Machine Learning techniques. Those method has training set/data can be utilized for different real-time images.