Traffic Light Recognition By Pixel Level Classification

Updated 156 Days Ago All Users

Actions

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Subscribers *None*

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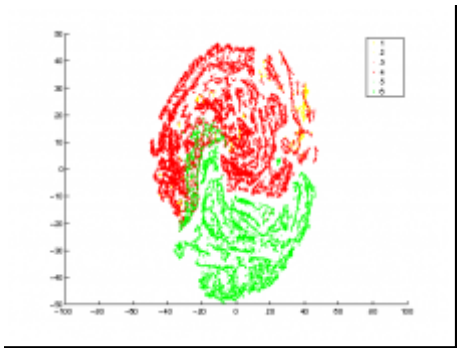
YCbCr colorspace



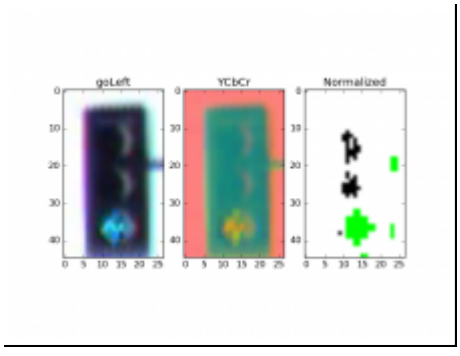
(R, G, B) ===> (Y, Cb, Cr)

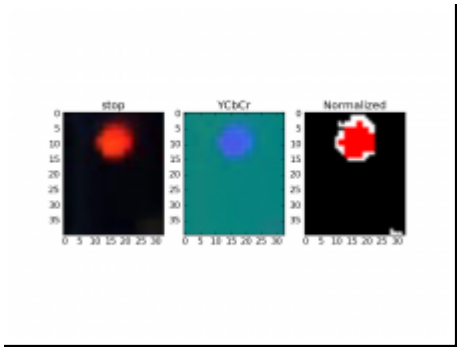
```
Y =  0.299 R + 0.587 G + 0.114 B
Cr = (R - Y) *0.713 + 128
Cb = (B - Y)* 0.564 + 128
```

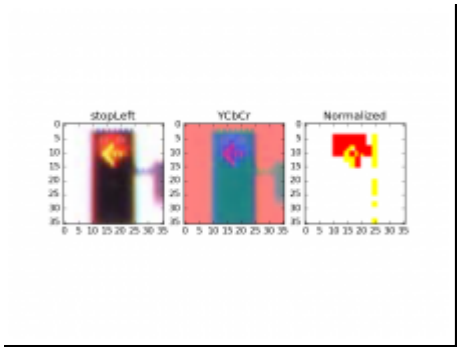
Pixel Extraction

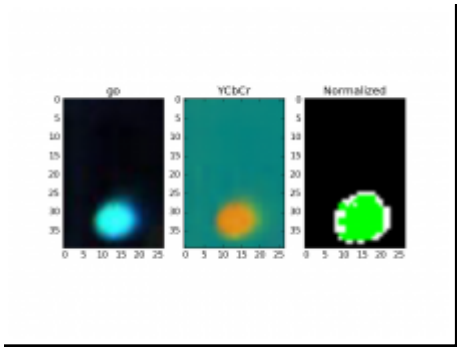
For each pixel (r, g, b) or (Y, Cb, Cr).

```
r + g + b < 90 : background
Cr > 180  or (y <40 and Cr >155) : Red
100 <Cr <180, Cb < 107 : Yellow
Cr <99, Cb > 100, y <100 : Green
Others: background
```









Shape Filter

Consider only the center area along the shorter direction to filter out boundary noise. Assume that H > W, then only points (x, y) meet the fllowing condition are considered:

```
W/3 < y < 2W/3
```

Method

- Classify each pixel into R, G, Y and background,
- Compute the number of R, G, Y pixels in the region of interests,
- class with the largest number of pixels is the color of this TL.

Results

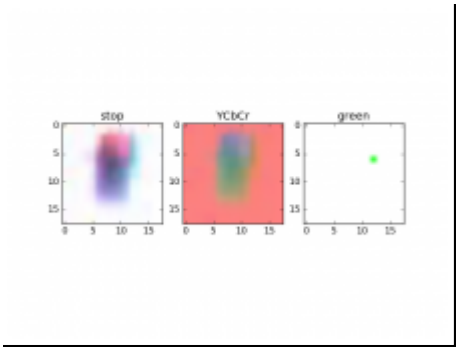
Tested on 37,810 frames from Lisa dataset.

method	accuracy

YCbCr	0.82
YCbCr + Shape	0.96

FP cases and Possible Solution

- Pixel extraction failure



Picture is too dim and blur.
Solution Smarter color extraction tool would help to improve.

- Position filter failure

The box is not drawed correctly.
Solution Cluster the extracted R, G, B pixels, take the cluster center and radius into consideration.

- Confusing cases

Including colors between R and Y.
Solution have no idea right now.