

```
In [1]: %matplotlib inline
from __future__ import print_function
import matplotlib.pyplot as plt
import numpy as np
import cv2
import glob
from matplotlib.patches import Rectangle
```

```
In [2]: # Alicia He
```

```
In [3]: stopsigns = glob.glob("stopsigns/*.jpg")
stopsigns = [cv2.imread(s, cv2.IMREAD_COLOR) for s in stopsigns]
print( "{} stop signs in dataset".format(len(stopsigns)))
```

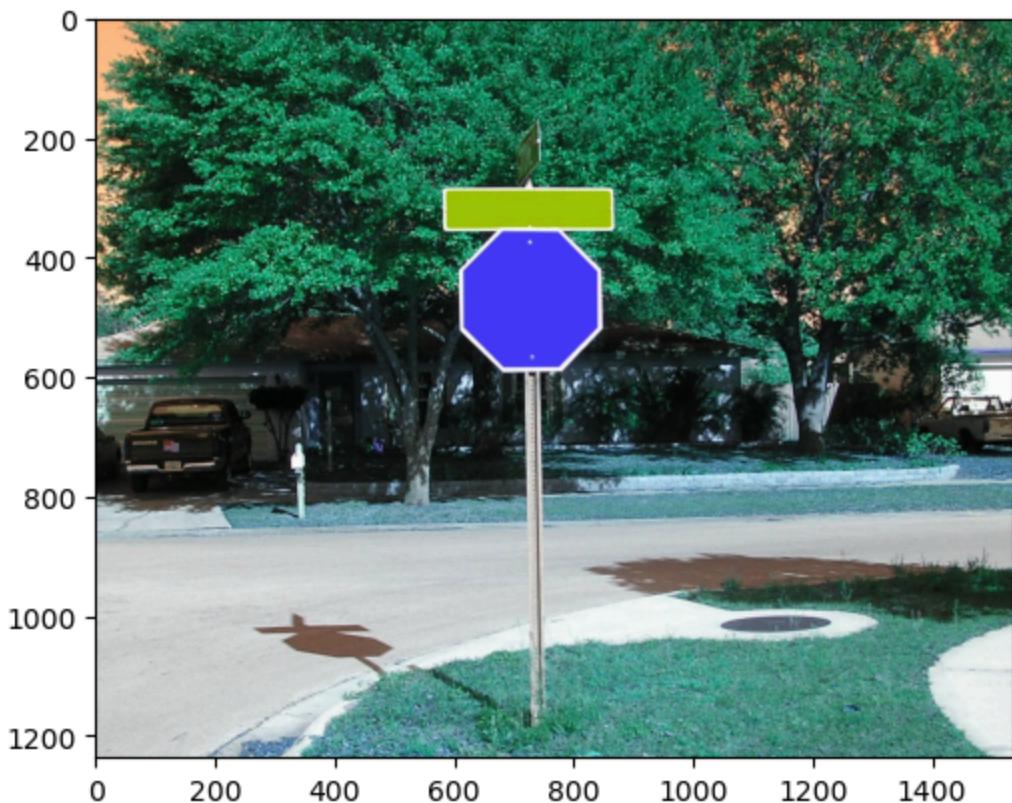
```
22 stop signs in dataset
```

## Question

We have opened these images using OpenCV. What color format are these images in? BGR or RGB? They are in BGR format.

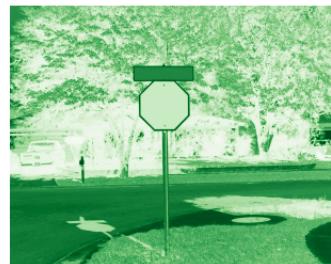
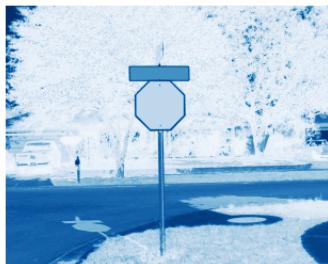
[https://docs.opencv.org/3.4.1/d3/df2/tutorial\\_py\\_basic\\_ops.html](https://docs.opencv.org/3.4.1/d3/df2/tutorial_py_basic_ops.html)

```
In [4]: plt.imshow(stopsigns[0]);
```



```
In [5]: s = stopsigns[0]
b, g, r = cv2.split(s)

fig, ax = plt.subplots(ncols=3, nrows=2)
[a.axis('off') for a in ax.flatten()]
ax[0,0].imshow(b, cmap='Blues')
ax[0,1].imshow(g, cmap='Greens')
ax[0,2].imshow(r, cmap='Reds')
ax[1,0].imshow(b, cmap='gray')
ax[1,1].imshow(g, cmap='gray')
ax[1,2].imshow(r, cmap='gray')
fig.set_size_inches(15,7);
```



## Exercise 1

Convert the first stop sign image from BGR to RGB (`cv2.cvtColor(YOUR_IMAGE, cv2.COLOR_BGR2RGB)`), to HSV, and to LAB.

For each colorspace, visualize the three channels (you probably want to use the gray colormap to compare between the three color spaces).

Which colorspace isolates the stop sign the best? HSV seems to isolate the stop sign the best

```
In [6]: fig, ax = plt.subplots(ncols=3, nrows=3)
[a.axis('off') for a in ax.flatten()]
s = stopsigns[0]

# RGB
rgb_img = cv2.cvtColor(s, cv2.COLOR_BGR2RGB)
r1, g1, b1 = cv2.split(rgb_img)
ax[0,0].imshow(r1, cmap='gray')
ax[0,1].imshow(g1, cmap="gray")
ax[0,2].imshow(b1, cmap="gray")
```

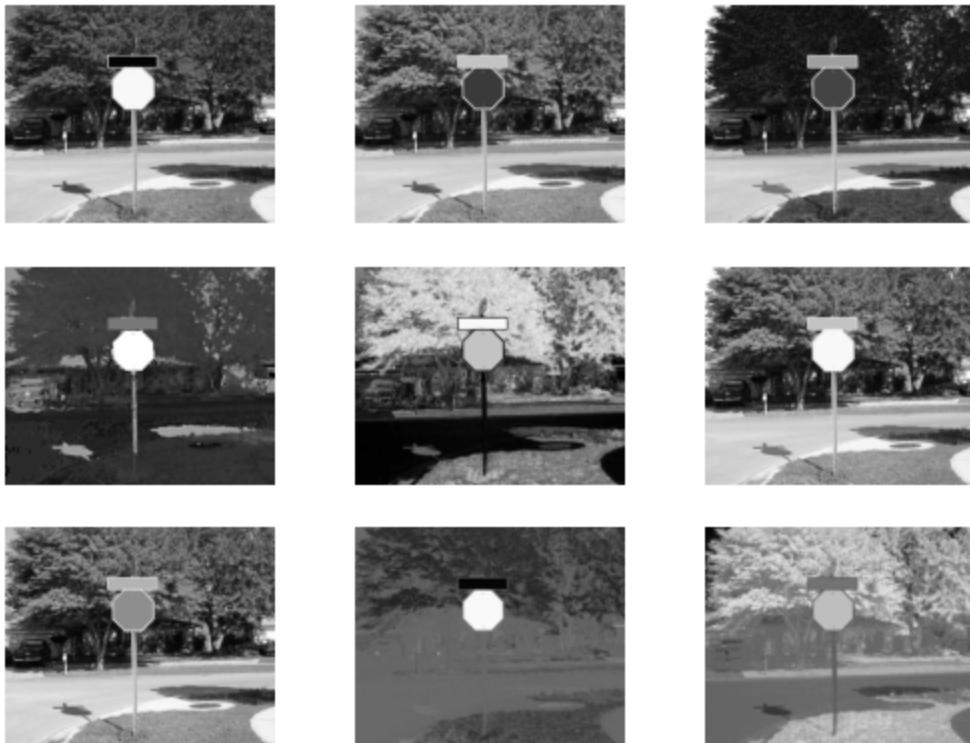
```

# HSV
hsv_img = cv2.cvtColor(s, cv2.COLOR_BGR2HSV)
h, s, v = cv2.split(hsv_img)
ax[1,0].imshow(h, cmap="gray")
ax[1,1].imshow(s, cmap="gray")
ax[1,2].imshow(v, cmap="gray")

# LAB
lab_img = cv2.cvtColor(rgb_img, cv2.COLOR_RGB2LAB)
l, a, b2 = cv2.split(lab_img)
ax[2,0].imshow(l, cmap="gray")
ax[2,1].imshow(a, cmap="gray")
ax[2,2].imshow(b2, cmap="gray")

```

Out[6]: <matplotlib.image.AxesImage at 0x725855dbbc10>



## A dataset of stop sign images

```

In [7]: fig, ax = plt.subplots(nrows=len(stopsigns))
for (a,s) in zip(ax,stopsigns):
    a.imshow(cv2.cvtColor(s, cv2.COLOR_BGR2RGB))
    a.axis('off')

fig.set_size_inches(10, 5 * len(stopsigns))

```



