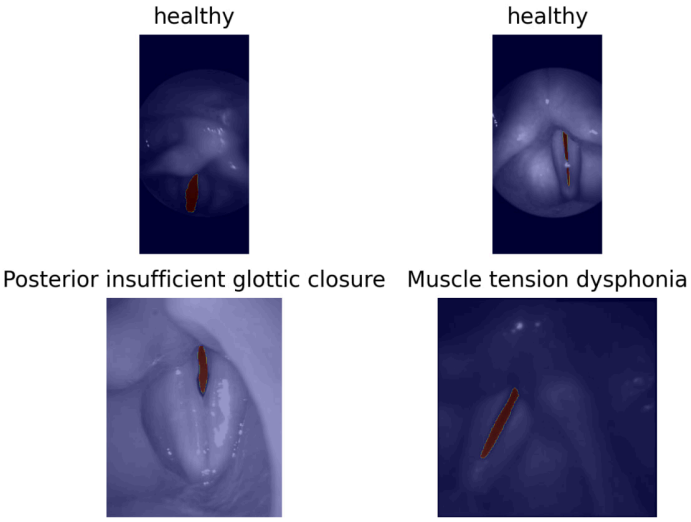
Task 1:

```python
from math import ceil
import os
import random
import matplotlib.pyplot as plt
import json
bagal_list = os.listdir('./Mini_BAGLS_dataset')
ids = list(map(lambda x:x[:-5] , filter( lambda x: x[-4:]=='meta',bagal_list)))
def get_random_ids(l:list,k:int)->list:
    random_choices = random.choices(l,k=k)
    return random_choices
    pass

x = get_random_ids(ids,4)
print(x)
def seg_id(id:str):
    seg_id = f'{id}_seg.png'
    return seg_id
    pass

def img_id(id:str):
    img_id = f'{id}.png'
    return img_id
    pass

def meta_id(id:str):
    meta_id = f'{id}.meta'
    return meta_id
    pass

def plot_show(ids:list):
    k = len(ids)
    for i in range(k):
        plt.subplot(ceil(k/2),ceil(k/2),i+1)
        plt.axis('off')


        img2 = plt.imread(f'./Mini_BAGLS_dataset/{seg_id(ids[i])}')
        plt.imshow(img2,alpha=1,cmap='jet')

        img = plt.imread(f'./Mini_BAGLS_dataset/{img_id(ids[i])}')
        print(img)
        plt.imshow(img,alpha=0.6)


        f = open(f'./Mini_BAGLS_dataset/{meta_id(ids[i])}','r')
        js = json.load(f)
        f.close()
        plt.title(js['Subject disorder status'])

    plt.show()
    pass

plot_show(get_random_ids(ids,4))
```

Task 2:

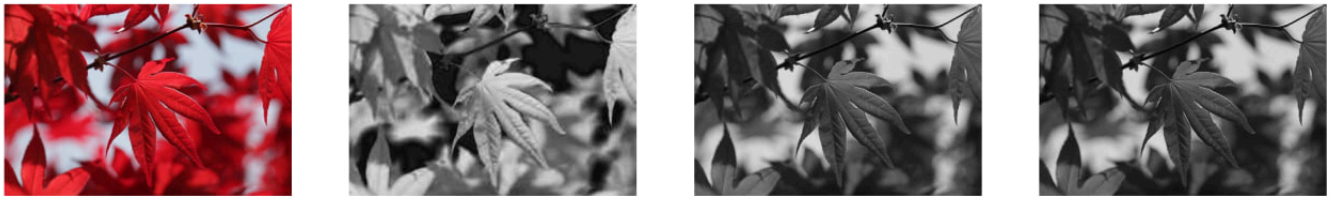


Task 4:

Lightness creates some edges and artifacts in the image and Luminosity is a weighted average and those weights are unique for each image domain for example images of nature have some weights while images of houses may have other weights. So, I prefer the average method because it doesn't need weight initialization and it doesn't create sharp edges in the image.

Task 3:

```python
leaves  = plt.imread('./leaves.jpg')

def same(img):
    return img
def lightness(img):
    img = np.max(img,axis=-1) - np.min(img,-1)
    return img/2
    pass

def average(img):
    return np.average(img,-1)
    pass

def luminosity(img):
    return 0.2989*img[:,:,0]  + 0.5870 * img[:,:,1] + 0.1140 * img[:,:,2]
    pass
i = 1
for f in [same,lightness,average,luminosity]:

    plt.subplot(1,4,i)
    plt.axis('off')

    plt.imshow(f(leaves),'gray')
    i+=1

plt.show()
```



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