Untitled4

April 27, 2020

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In [1]: import numpy as np
        import skimage
        import matplotlib.pyplot as plt
        import matplotlib.image as mpimg
        import os
        import scipy.misc as sm
        from scipy import ndimage
        from scipy.ndimage.filters import convolve
        from scipy import misc
        import imageio

In [2]:

In [3]: def gaussian_kernel(size, sigma=1):
                size = int(size) // 2
                x, y = np.mgrid[-size:size+1, -size:size+1]
                normal = 1 / (2.0 * np.pi * sigma**2)
                g =  np.exp(-((x**2 + y**2) / (2.0*sigma**2))) * normal
                return g

In [4]: def sobel_filters(img):
                Kx = np.array([[-1, 0, 1], [-2, 0, 2], [-1, 0, 1]], np.float32)
                Ky = np.array([[1, 2, 1], [0, 0, 0], [-1, -2, -1]], np.float32)

                Ix = ndimage.filters.convolve(img, Kx)
                Iy = ndimage.filters.convolve(img, Ky)

                G = np.hypot(Ix, Iy)
                G = G / G.max() * 255
                theta = np.arctan2(Iy, Ix)
                return (G, theta)

In [5]: def non_max_suppression(img, D):
            M, N = img.shape
            Z = np.zeros((M,N), dtype=np.int32)
            angle = D * 180. / np.pi
            angle[angle < 0] += 180
            for i in range(1,M-1):
                for j in range(1,N-1):
                    try:
                        q = 255
                        r = 255

                       #angle 0
                        if (0 <= angle[i,j] < 22.5) or (157.5 <= angle[i,j] <= 180):
                            q = img[i, j+1]
                            r = img[i, j-1]
                        #angle 45
                        elif (22.5 <= angle[i,j] < 67.5):
                            q = img[i+1, j-1]
                            r = img[i-1, j+1]
                        #angle 90
                        elif (67.5 <= angle[i,j] < 112.5):
                            q = img[i+1, j]
                            r = img[i-1, j]
                        #angle 135
                        elif (112.5 <= angle[i,j] < 157.5):
                            q = img[i-1, j-1]
                            r = img[i+1, j+1]

                        if (img[i,j] >= q) and (img[i,j] >= r):
                            Z[i,j] = img[i,j]
                        else:
                            Z[i,j] = 0

                    except IndexError as e:
                        pass

            return Z
```

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In [28]: def threshold(img):

             highThreshold = img.max() * 0.15;
             lowThreshold = highThreshold * 0.09;

             M, N = img.shape
             res = np.zeros((M,N), dtype=np.int32)

             weak = np.int32(25)
             strong = np.int32(255)

             strong_i, strong_j = np.where(img >= highThreshold)
             zeros_i, zeros_j = np.where(img < lowThreshold)
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            weak_i, weak_j = np.where((img <= highThreshold) & (img >= lowThreshold))

            res[strong_i, strong_j] = strong
            res[weak_i, weak_j] = weak

            return (res, weak, strong)
```

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In [ ]:
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In [ ]:
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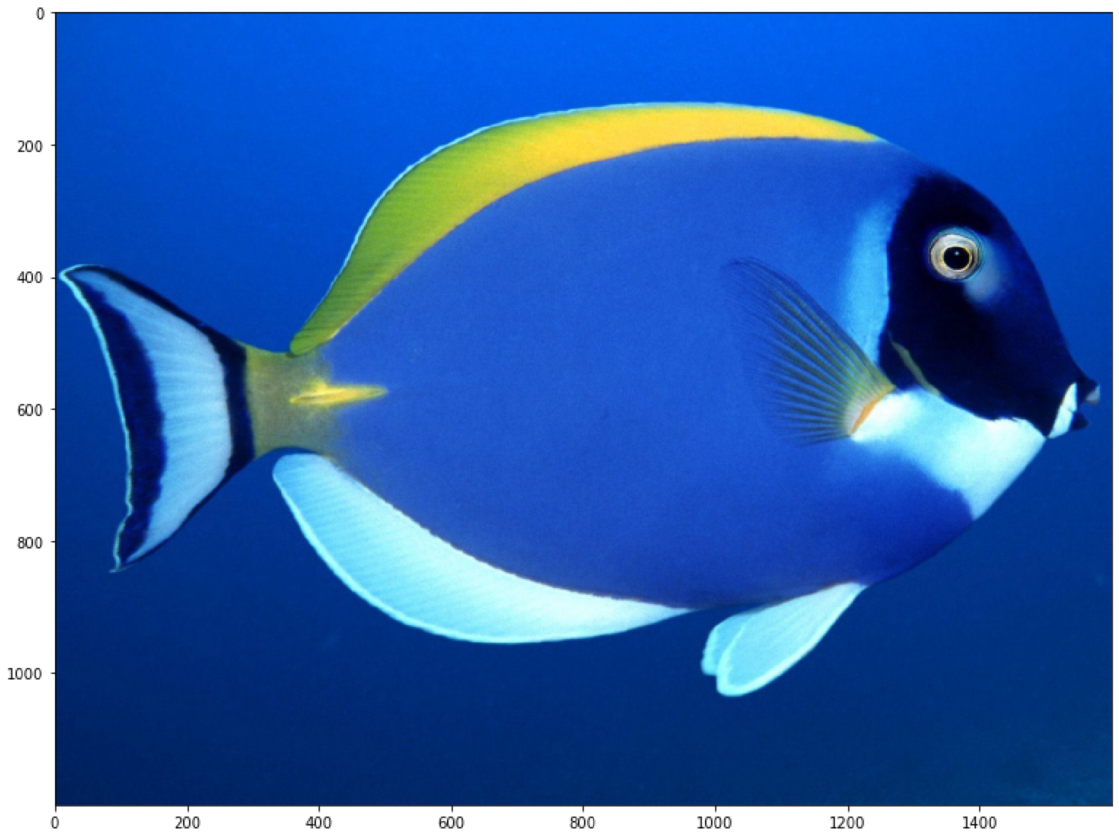
In [7]: def hysteresis(img, weak, strong=255):
            M, N = img.shape
            for i in range(1, M-1):
                for j in range(1, N-1):
                    if (img[i,j] == weak):
                        try:
                            if ((img[i+1, j-1] == strong) or (img[i+1, j] == strong) or (img[i
                                or (img[i, j-1] == strong) or (img[i, j+1] == strong)
                                or (img[i-1, j-1] == strong) or (img[i-1, j] == strong) or (img
                                img[i, j] = strong
                            else:
                                img[i, j] = 0
                        except IndexError as e:
                            pass
            return img
```

```
In [20]: img = imageio.imread("2_fish.jpg")
         img = img.astype('int32')
         plt.imshow(img, cmap = plt.get_cmap('gray'))
         plt.show()
```



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In [ ]:

In [21]: img_gray = np.dot(img[...,:3], [0.299, 0.587, 0.114])
         plt.imshow(img_gray, cmap = plt.get_cmap('gray'))
         plt.show()
```

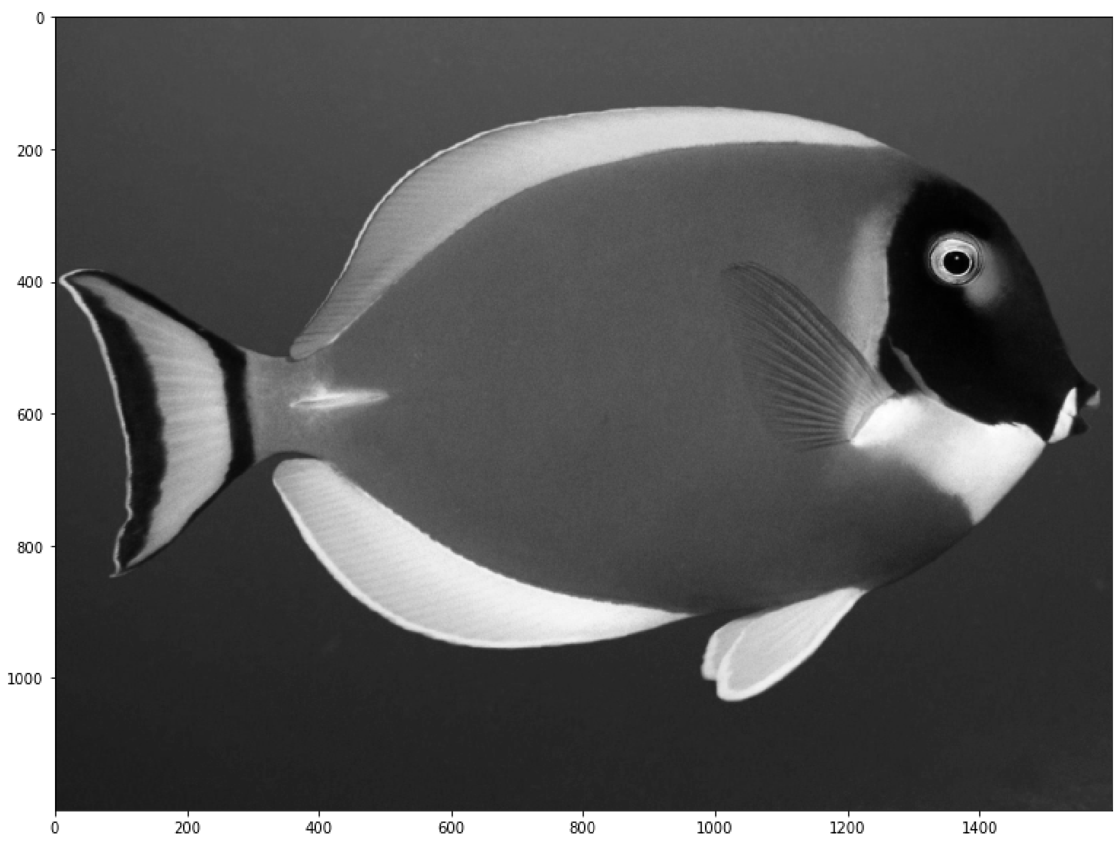

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In [ ]:
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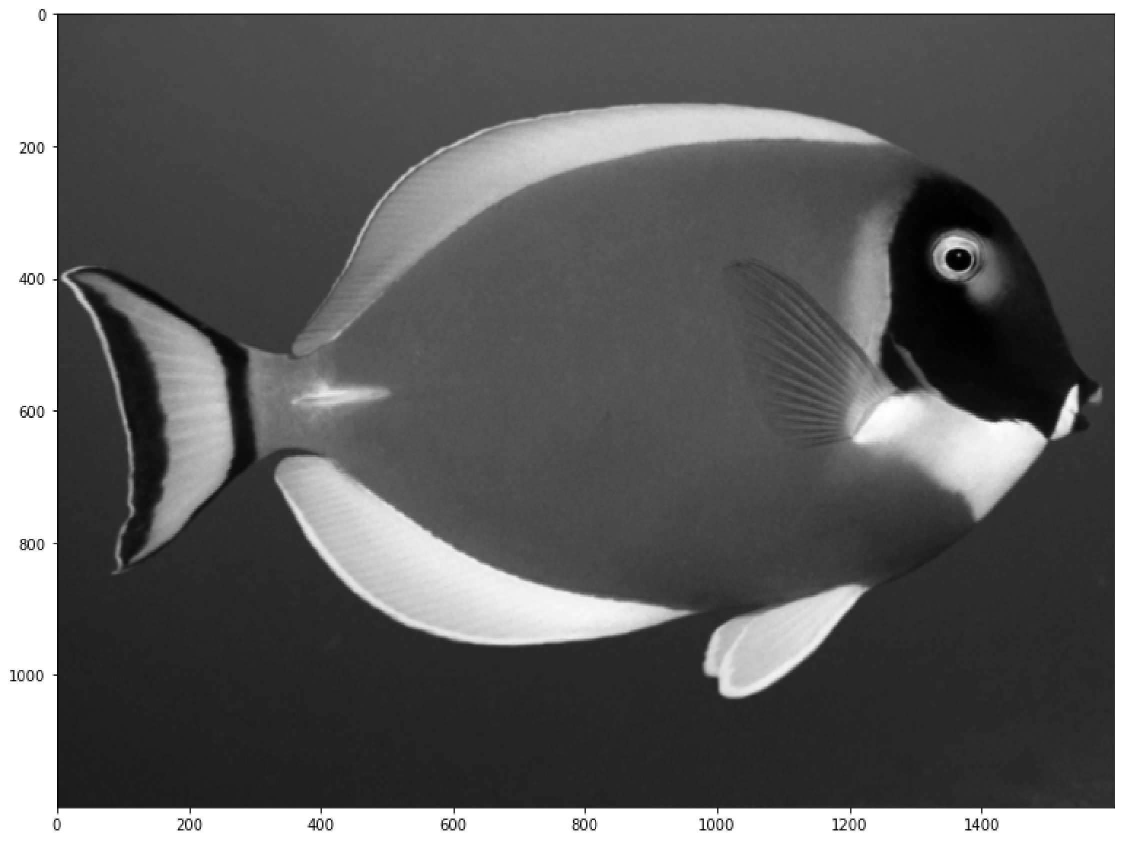
In [22]: img_guassian_filter=convolve(img_gray,gaussian_kernel(size=5, sigma=1.4))
         plt.imshow(img_guassian_filter, cmap = plt.get_cmap('gray'))
         plt.show()
```



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In [ ]:
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In [23]: Mag2,Gradient2 =sobel_filters(img_guassian_filter)
         Mag2.shape
         plt.imshow(Mag2, cmap = plt.get_cmap('gray'))
         plt.show()
```

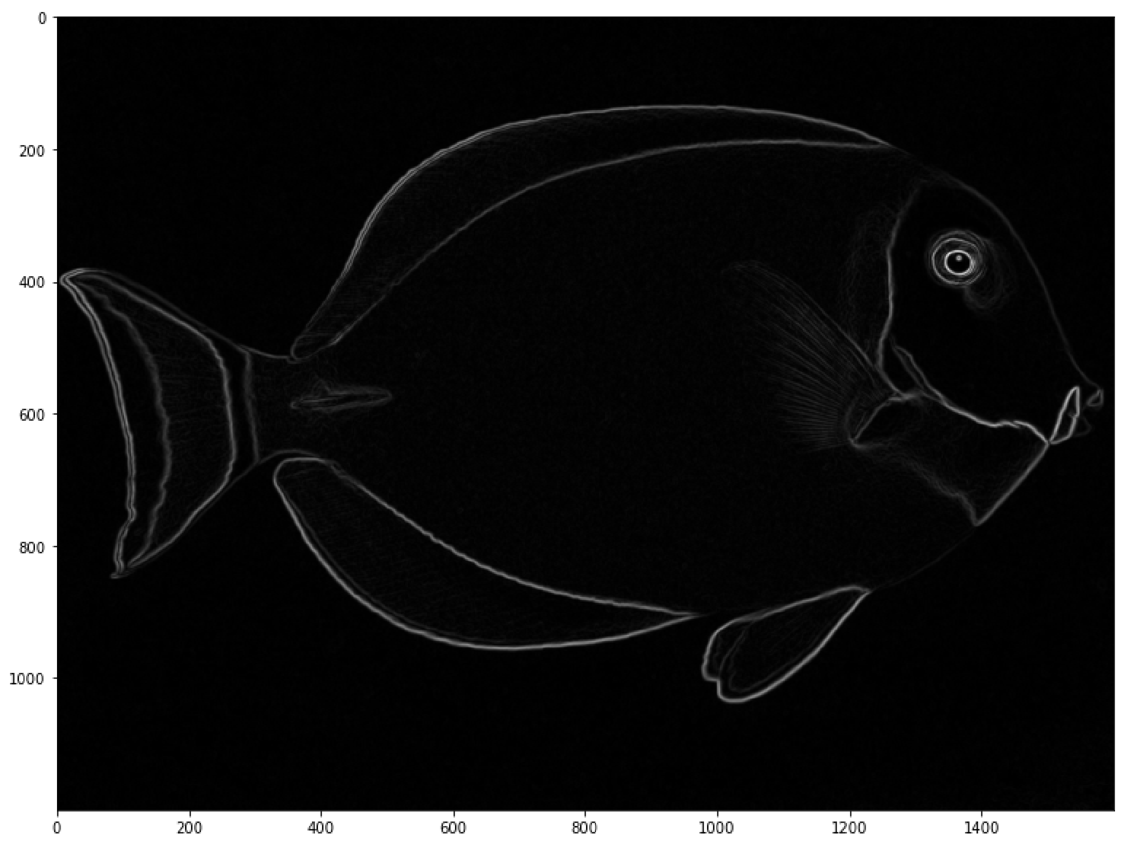

```
In [ ]:
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In [24]: WINMS =non_max_suppression(Mag2,Gradient2)
         #WINMS = Normalize(WINMS)
         plt.imshow(WINMS, cmap = plt.get_cmap('gray'))
         plt.show()
```
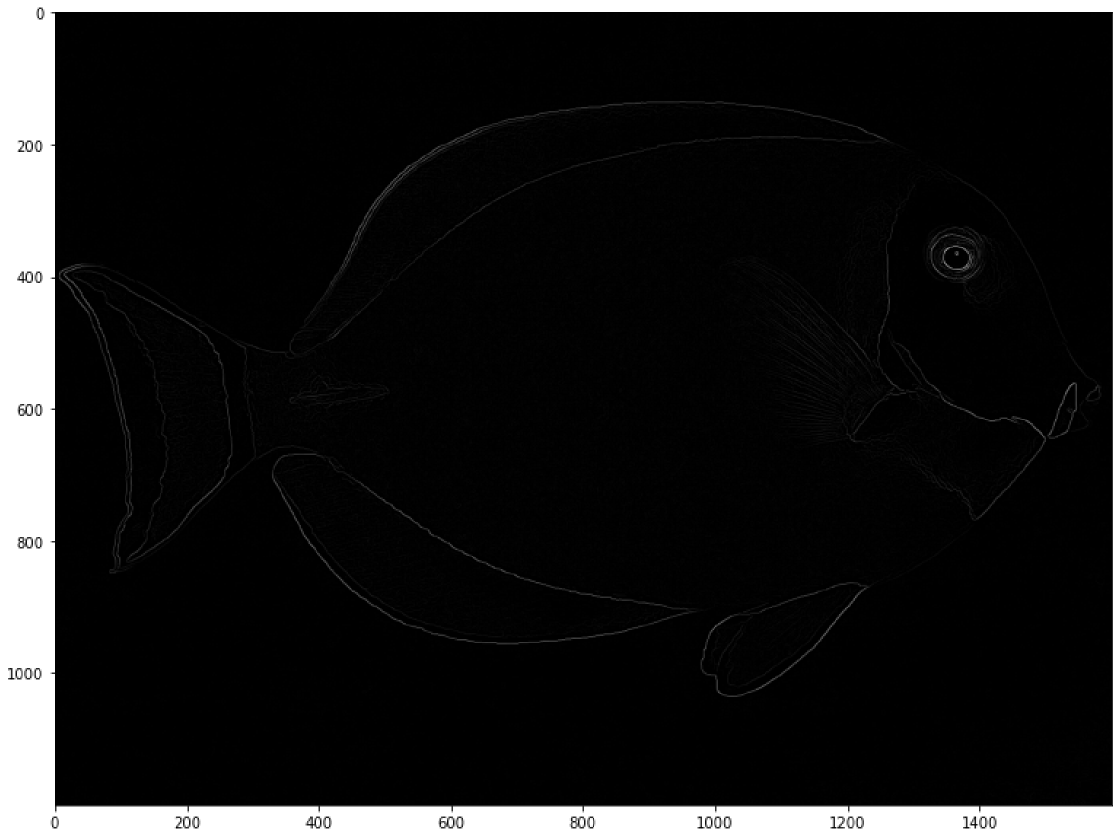
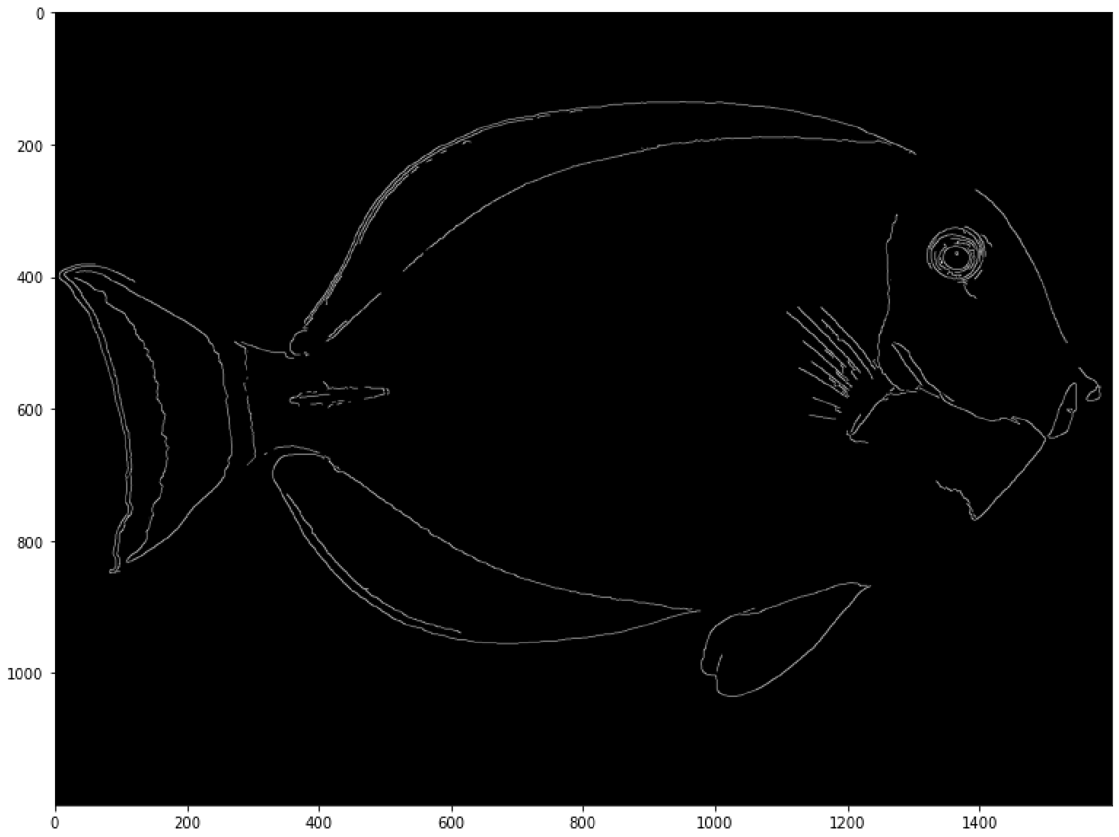



```
In [ ]:

In [29]: res, weak, strong =threshold(WINMS)
         Final_Image2 =hysteresis(res,weak,strong)
         plt.rcParams['figure.figsize'] = [16, 10]
         plt.imshow(Final_Image2, cmap = plt.get_cmap('gray'))
         plt.show()
```


0
200
400
600
800
1000
0
200
400
600
800
1000
1200
1400