pil10

March 23, 2017

In [1]:
```
from PIL import Image
import numpy as np
import matplotlib.pyplot as plt
import time
import functools as ft
from collections import Counter
```

In [2]:
```
def createExamples():
    numberArrayExamples=open('numArEx.txt','a')
    numbersWeHave=range(0,10)
    versionsWeHave=range(1,10)

    for eachNum in numbersWeHave:
        for eachVer in versionsWeHave:
            print(str(eachNum)+'.'+str(eachVer))
            imgFilePath='images/numbers/'+str(eachNum)+'.'+str(eachVer)+'.png'
            ei=Image.open(imgFilePath)
            eiar=np.array(ei)
            eiar1=str(eiar.tolist())

            lineToWrite=str(eachNum)+'::'+eiar1+'\n'
            numberArrayExamples.write(lineToWrite)
```

In [3]:
```
def threshold(imageArray):
    balanceAr=[]
    newAr=imageArray

    for eachRow in imageArray:
        for eachPix in eachRow:
            avgNum=ft.reduce(lambda x,y:x+y,eachPix[:3])/len(eachPix[:3])
            balanceAr.append(avgNum)
    balance=ft.reduce(lambda x,y:x+y,balanceAr)/len(balanceAr)

    for eachRow in newAr:
        for eachPix in eachRow:
            if ft.reduce(lambda x,y:x+y,eachPix[:3])/len(eachPix[:3])>balance:
                eachPix[0]=255
```

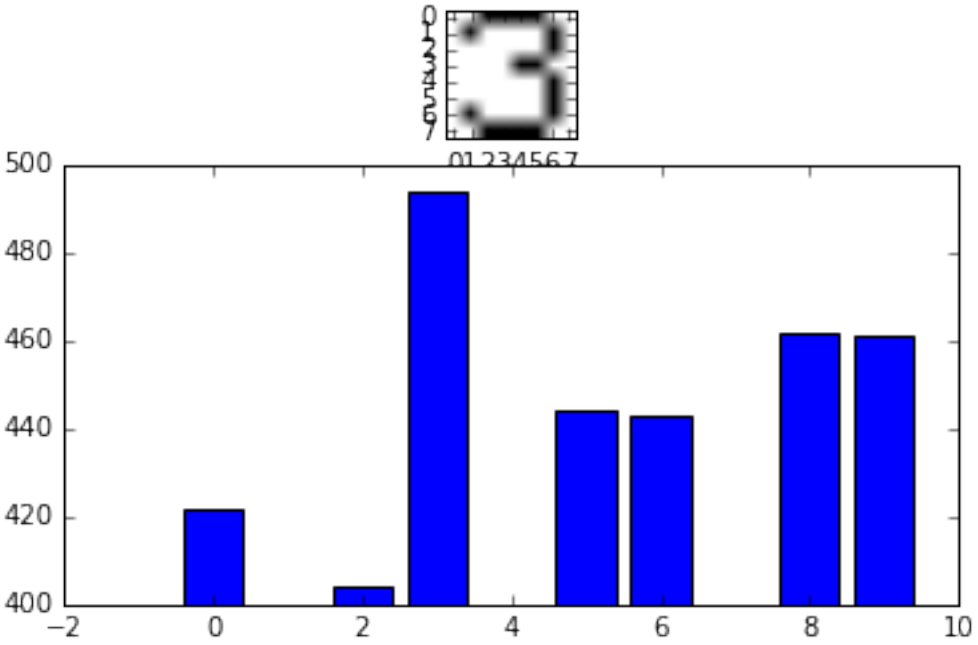
```
                    eachPix[1]=255
                    eachPix[2]=255
                    eachPix[3]=255
                else:
                    eachPix[0]=0
                    eachPix[1]=0
                    eachPix[2]=0
                    eachPix[3]=255
        return newAr
```

In [19]:
```
def whatNumIsThis(filePath):
    matchedAr=[]
    loadExamps=open('numArEx.txt','r').read()
    loadExamps=loadExamps.split('\n')

    i=Image.open(filePath)
    iar=np.array(i)
    iarl=iar.tolist()

    inQuestion=str(iarl)

    for eachExample in loadExamps:
        if len(eachExample)>3:
            splitEx = eachExample.split('::')
            currentNum=splitEx[0]
            currentAr=splitEx[1]

            eachPixEx=currentAr.split('],')
            eachPixInQ=inQuestion.split('],')

            x=0
            while x<len(eachPixEx):
                if eachPixEx[x]==eachPixInQ[x]:
                    matchedAr.append(int(currentNum))
                x+=1

    print(matchedAr)
    x=Counter(matchedAr)
    print(x)

    graphX=[]
    graphY=[]

    for eachThing in x:
        print(eachThing)
        graphX.append(eachThing)
        print(x[eachThing])
        graphY.append(x[eachThing])
```

```
fig=plt.figure()
ax1=plt.subplot2grid((4,4),(0,0),rowspan=1,colspan=4)
ax2=plt.subplot2grid((4,4),(1,0),rowspan=3,colspan=4)
ax1.imshow(iar)
ax2.bar(graphX,graphY,align='center')
plt.ylim(400)

plt.show()
```

```
In [20]: whatNumIsThis('images/blank.png')
```

```
9, 9, 9, 9, 9[0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9,0,9
Counter({3: 494, 8: 462, 9: 461, 5: 444, 6: 443, 0: 422, 2: 404, 7: 393, 4: 368, 1: 351})
0
422
1
351
2
404
3
494
4
368
5
444
6
443
7
393
8
462
9
461
```



In [ ]: