Part 1

import cv2

import numpy as np

import numpy.linalg as la

def calculate\_hue(c\_max\_string, r\_val, g\_val, b\_val, delta):

hue\_value = 0.0

if delta == 0:

return hue\_value

elif c\_max\_string == 'r\_val':

hue\_value = (((g\_val-b\_val)/delta)%6)\*60

elif c\_max\_string == 'g\_val':

hue\_value = (((b\_val-r\_val)/delta)+2)\*60

elif c\_max\_string == 'b\_val':

hue\_value = (((r\_val-g\_val)/delta)+4)\*60

hue\_value = (hue\_value/360.0)\*255

return hue\_value

def find\_saturation(c\_max, delta):

saturation\_value = 0.0

if c\_max == 0:

return saturation\_value

else:

saturation\_value = (float(delta)/float(c\_max))\*255

return saturation\_value

file\_name = raw\_input('Enter file name: ')

file\_string = 'lab2\_pictures/' + file\_name

image = cv2.imread(file\_string)

rows\_for\_image = len(image[:,0])

columns\_for\_image = len(image[0,:])

hue\_image\_array = np.zeros([rows\_for\_image, columns\_for\_image])

saturation\_array = np.zeros([rows\_for\_image, columns\_for\_image])

v\_array = np.zeros([rows\_for\_image, columns\_for\_image])

for i in range(rows\_for\_image):

for j in range(columns\_for\_image):

current\_pixel = image[i][j]

red = current\_pixel[0]

green = current\_pixel[1]

blue = current\_pixel[2]

r\_val = red / 255.0

g\_val = green / 255.0

b\_val = blue / 255.0

dict\_val = {'r\_val':r\_val, 'g\_val':g\_val, 'b\_val':b\_val}

c\_max = max(r\_val, g\_val, b\_val)

c\_min = min(r\_val, g\_val, b\_val)

c\_max\_string = max(dict\_val, key=dict\_val.get)

c\_min\_string = min(dict\_val, key=dict\_val.get)

delta = c\_max - c\_min

hue\_value = calculate\_hue(c\_max\_string, r\_val, g\_val, b\_val, delta)

saturation\_value = find\_saturation(c\_max, delta)

v\_value = c\_max\*255

print hue\_value

print saturation\_value

print v\_value

hue\_image\_array[i][j] = hue\_value

saturation\_array[i][j] = saturation\_value

v\_array[i][j] = v\_value

if file\_name == 'concert.jpg':

cv2.imwrite('concert\_hue.jpg', hue\_image\_array)

cv2.imwrite('concert\_saturation.jpg', saturation\_array)

cv2.imwrite('concert\_brightness.jpg', v\_array)

elif file\_name == 'sea1.jpg':

cv2.imwrite('sea1\_hue.jpg', hue\_image\_array)

cv2.imwrite('sea1\_saturation.jpg', saturation\_array)

cv2.imwrite('sea1\_brightness.jpg', v\_array)

elif file\_name == 'sea2.jpg':

cv2.imwrite('sea2\_hue.jpg', hue\_image\_array)

cv2.imwrite('sea2\_saturation.jpg', saturation\_array)

cv2.imwrite('sea2\_brightness.jpg', v\_array)