Computer vision	Section (1)Con.

Section Content:

- Install anaconda
- Install opencv library
- Getting Started with Images
- Getting Started with Videos

OpenCV-Python Installation

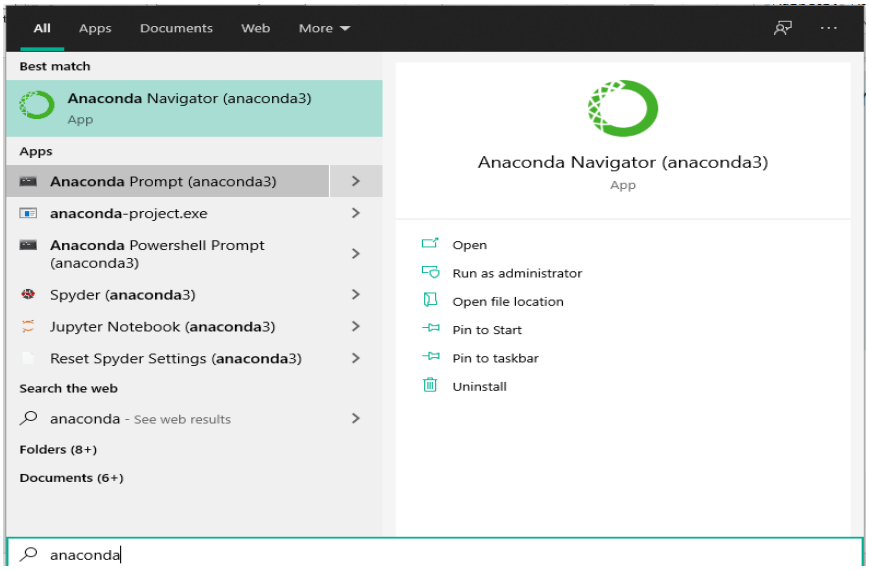
Windows:

1. Install anaconda environment Python 3.8:

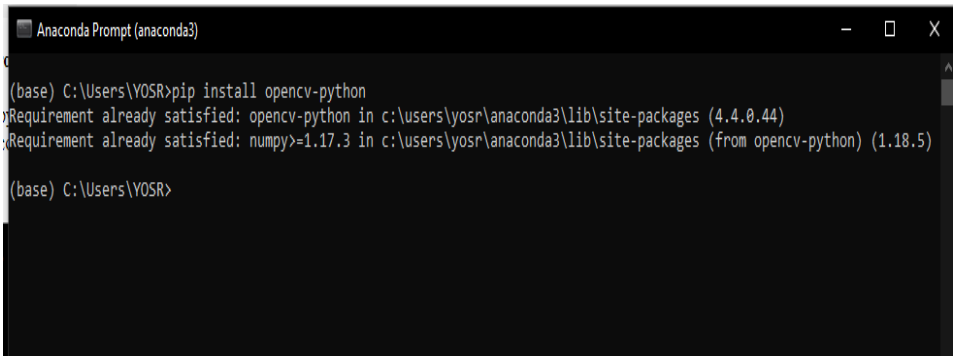
Install: https://www.anaconda.com/products/individual#windows

2. Open Anaconda Prompt

Start Menu / Anaconda / Anaconda Prompt



3. In Anaconda Prompt, type commands to install opencv library:
pip install opencv-python



Getting Started with Images

Goals: -

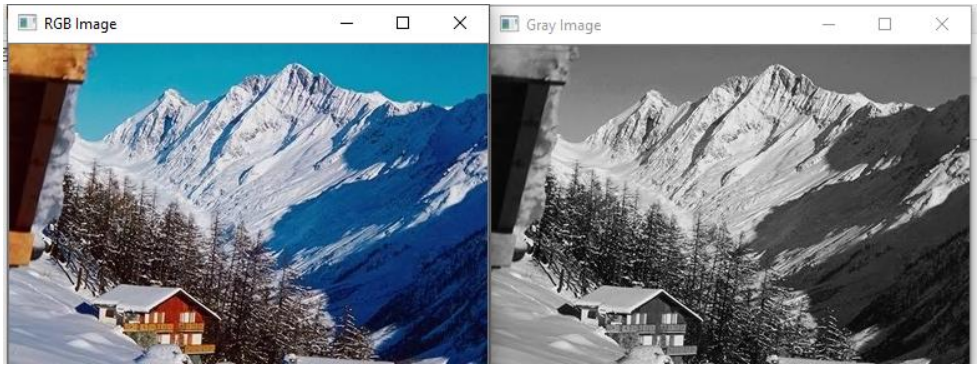
- How to read an image, how to display it and how to save it back
- Functions: cv2.imread(), cv2.imshow(), cv2.imwrite()
- Display images with Matplotlib

Read an image

- Use the function **cv2.imread()** to read an image. The image should be in the working directory or a full path of image should be given.
- Second argument is a flag which specifies the way the image should be read.
  cv2.IMREAD_COLOR: Loads a color image. Any transparency of image will be neglected. It is the default flag.
  cv2.IMREAD_GRAYSCALE: Loads image in grayscale mode
  cv2.IMREAD_UNCHANGED: Loads image as such including alpha channel

  CODE

```
# import libraries
import numpy as np
import cv2
# Load a color image in grayscale
img = cv2.imread('pic.jpg',cv2.IMREAD_GRAYSCALE)
```



Note
Instead of these three flags, you can simply pass integers 1, 0 or -1 respectively.

Display an image

- Use the function **cv2.imshow()**

CODE

```
cv2.imshow('image',img)
cv2.waitKey(0)
cv2.destroyAllWindows()
```

Note
cv2.waitKey() is a keyboard binding function. Its argument is the time in milliseconds. The function waits for specified milliseconds for any keyboard event. If you press any key at that time, the program continues. If 0 is passed, it waits indefinitely for a keystroke.
cv2.destroyAllWindows() simply destroys all the windows we created. If you want to destroy any specific window.

Write an image

- Use the function **cv2.imwrite()** to save an image.

CODE

```
cv2.imwrite('picName.png',img)
```

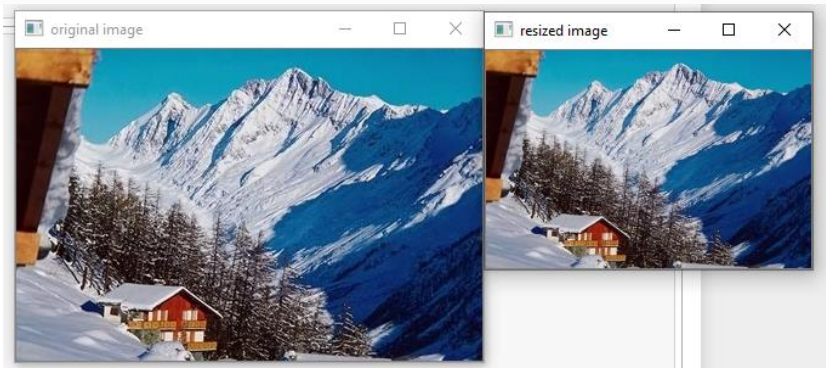
Resize an image

- Use the function cv2.resize().

CODE

```
img = cv2.imread('800.jpg', -1)
#percent by which the image is resized
scale_percent = 50
#calculate the 50 percent of original dimensions
```

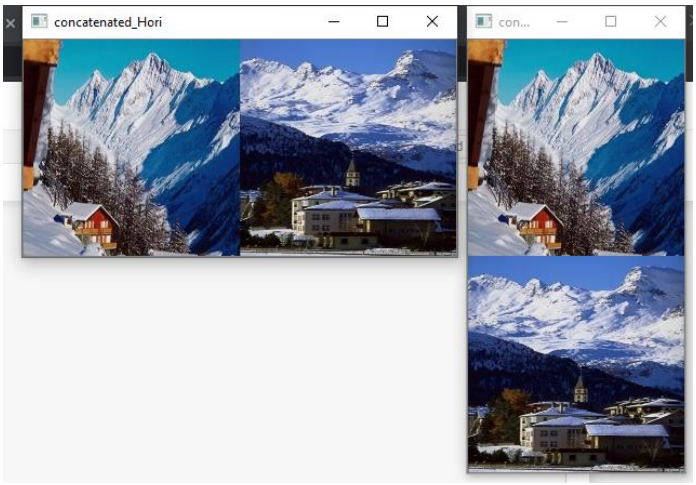
```
width = int(img.shape[1] * scale_percent / 100)
height = int(img.shape[0] * scale_percent / 100)
# dsize
dsize = (width, height)
# resize image
output = cv2.resize(img, dsize)
cv2.imshow('original image',img)
cv2.imshow('resized image',output)
cv2.waitKey()
cv2.destroyAllWindows()
```



How to display multiple images in one window

```
img = cv2.imread('800.jpg',-1)
img2= cv2.imread('801.jpg',-1)
#to display 2 images in one window should in the same size
img_resize=cv2.resize(img,(200,200))
img_resize2=cv2.resize(img2,(200,200))
#concatanate image Horizontally
img_concate_Hori=np.concatenate((img_resize,img_resize2),axis=1)
#concatanate image Vertically
img_concate_Verti=np.concatenate((img_resize,img_resize2),axis=0)
cv2.imshow('concatenated_Hori',img_concate_Hori)
cv2.imshow('concatenated_Verti',img_concate_Verti)

cv2.waitKey()
cv2.destroyAllWindows()
```



program loads an image in grayscale, displays it, saves the image if you press ‘s’ and exit, or simply exit without saving if you press ESC key.

CODE

```
import numpy as np
import cv2
img = cv2.imread('pic.jpg',0)
cv2.imshow('image',img)
k = cv2.waitKey(0)
if k == 27:         # wait for ESC key to exit
   cv2.destroyAllWindows()
elif k == ord('s'): # wait for 's' key to save and exit
   cv2.imwrite('saved image.png',img)
   cv2.destroyAllWindows()
```

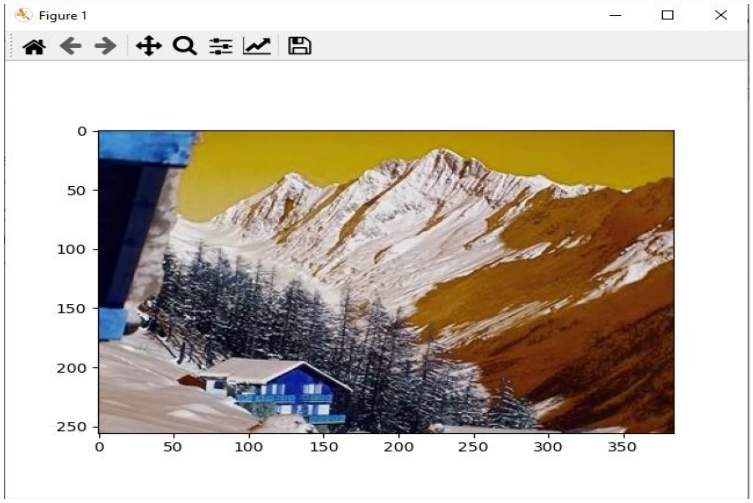
Using Matplotlib

- Matplotlib is a plotting library for Python which gives you a wide variety of plotting methods. Here, you will learn how to display images with Matplotlib. You can zoom images, save it etc using Matplotlib.

CODE

```
# import libraries
import numpy as np
import cv2
import matplotlib.pyplot as plt
%matplotlib
#reading the image
image= cv2.imread('pic.jpg',1)
#plotting the image
plt.imshow(image)
```

```
#saving image
cv2.imwrite('test_write.jpg',image)
```



Access image matrix

- To know shape of image (image.shape)and size(image.size) of matrix

CODE

```
#shape of matrix
print('shape of image',img.shape)
#size of matrix
print('size=',img.size)
#To Acccess any pixel in matrix
values=img[100,250]
print("Value of pixel= ",values)
```

```
shape of image (384, 256, 3)
size= 294912
Value of pixel=  [228 213 211]
```

Getting Started with Videos

Goal: -

- Read video, display video and save video.
- Capture from Camera and display it.
- Functions: cv2.VideoCapture(), cv2.VideoWriter()

Capture Video from Camera

- To capture a video, you need to create a VideoCapture object

CODE

```
# import libraries
import numpy as np
import cv2
cap = cv2.VideoCapture(0)
while(True):
#Capture frame-by-frame
   ret, frame = cap.read()
#Our operations on the frame come here
   gray = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)
#Display the resulting frame
   cv2.imshow('frame',gray)
   if cv2.waitKey(1) & 0xFF == ord('q'):
      break
# When everything done, release the capture
cap.release()
cv2.destroyAllWindows()
```

Playing Video from file

CODE

```
import numpy as np
import cv2
cap = cv2.VideoCapture('AmazonGo.Mp4')
while(cap.isOpened()):
   ret, frame = cap.read()
   gray = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)
   cv2.imshow('frame',gray)
   if cv2.waitKey(1) & 0xFF == ord('q'):
      break
cap.release()
cv2.destroyAllWindows()
```