## Experiment – 2

## Basic Concepts in OpenCV Image and Video Handling

**Aim:**

1. To code the following tasks in OpenCV
   a) To read and display an image by using OpenCV
   b) To resize an image using OpenCV
2. To capture video from Camera, play a video from a file and save a video file.

**Software/ Package Used:**

1. Pycharm IDE
2. Libraries used:
   a) NumPy
   b) opencv-python
   c) matplotlib
   d) scipy

**Programs:**

### 1. Read and Display image using OpenCV:

#### a) Read and display

```
# import all the libraries
import cv2 as cv
import sys

#load an image using imread function
img=cv.imread(r" C:/Users/21r228\Downloads\download.jpg ")
print(img)

#image not found
if img is None:
   sys.exit("Could not read the image")

#display the image
cv.imshow("Final",img)
k=cv.waitKey(0)
l=cv.destroyAllWindows()
```

**Input : Color image**

**Output : Color image**

**Image matrix in form of pixels**

[[[255 255 255]

[255 255 255]

[255 255 255]

b) **Colour to Grayscale image**

```
#import all libraries
import cv2 as cv
import sys

#load an image
img=cv.imread(r" C:/Users/21r228\Downloads\download.jpg ",0) # 0 indicates
grayscale
print(img)
if img is None:
   sys.exit("Could not read the image") #image location not found

#display the image in grayscale
cv.imshow("Final",img)
k=cv.waitKey(0)
l=cv.destroyAllWindows()
```

**Input: Color image**

**Output: Grayscale image**

**Image matrix**

```
[[  0   0   0 ... 252 254 254]
 [  0   0   0 ... 252 254 254]
 [  0   0   0 ... 252 254 254] ...
 [ 49  45  42 ... 246 247 250]
 [ 61  56  52 ... 246 247 250]
 [ 76  70  65 ... 246 247 250]]
```

### a) Write an image

```
import cv2 as cv
import sys
# Load an image
image =cv.imread(r" C:/Users/21r228\Downloads\download.jpg ",0)  # image path
# Check if the image was successfully loaded
if image is not None:
   # Display the image in a window
   cv.imshow("Dark", image) # name of the output window
else:
   print("Image not found")  # image not found in target location
k = cv.waitKey(0)
if k == ord('s'):
   cv.imwrite(r" C:/Users/21r228\Downloads\download.jpg ", image)
   cv.destroyAllWindows()  # Close all OpenCV windows
```

**Input : Colour image**

**Output : Saved image**

## 2. Resize an Image Using OpenCV:

```
# import all the libraries
import cv2 as cv
import sys

# load an image
img=cv.imread(r" C:/Users/21r228\Downloads\download.jpg ")
# resize the image using scaling factor
img2=cv.resize(img,(0,0),fx=0.5,fy=0.5)
# resize the image by varying the width and height of the image
img3=cv.resize(img,(300,500))
if img is None:
   sys.exit("Could not read the image") # image location not found

# display the output
cv.imshow("Original",img)
cv.imshow("Scaling Factor",img2)
cv.imshow("Bigger",img3)
k=cv.waitKey(0)

# display the height, width and channels of the images
dim= img.shape
print("Dimensions of original image :",dim)
print("Height : ",img.shape[0])
print("Width : ",img.shape[1])
print("Channels : ",img.shape[2],"\n")
dim1= img2.shape
print("Dimensions of scaled factor image:",dim1)
print("Height : ",img2.shape[0])
print("Width : ",img2.shape[1])
print("Channels : ",img2.shape[2],"\n")
dim2= img3.shape
print("Dimensions of resized image:",dim2)
print("Height : ",img3.shape[0])
print("Width : ",img3.shape[1])
print("Channels : ",img3.shape[2])
```

**Input:**

**Output:**

a) **Original image**

b) **Scaled image**

## c) Varying the parameters

**Shape of the images**

Dimensions of original image : (250, 150, 3)
Height : 250
Width : 150
Channels : 3

Dimensions of scaled factor image: (178, 100, 3)
Height : 178
Width : 100
Channels : 3

Dimensions of resized image: (500, 300, 3)
Height : 500
Width : 300
Channels : 3

## 3. Video Handling

**a)** Read, display, Gray scaling, resizing of the video

```
#import all libraries

import cv2 as cv
import sys

# connection between the camera and the system
cap=cv.VideoCapture(0)
while cap.isOpened():
   ret,frame = cap.read()
   if not ret:
      print("cannot receive frame(stream end?).Exiting..")
      break

#display the video
   cv.imshow("camera",frame)
   if cv.waitKey(1)==ord("q"):
      break

#convert colour video to grayscale video
   gray=cv.cvtColor(frame,cv.COLOR_BGR2GRAY)
   cv.imshow("gray",gray)

# resize the video
   res=cv.resize(frame,(1050,640)) # by varying the parameters
   res1=cv.resize(frame,None,fx=2,fy=1) # using scaling factor

#display the resized video
   cv.imshow("bigger",res)
   cv.imshow("scaled",res1)
cap.release()
cv.destroyAllWindows()
```

**Input :**

From the USB camera

**Output:**

**Output: Grayscale video**

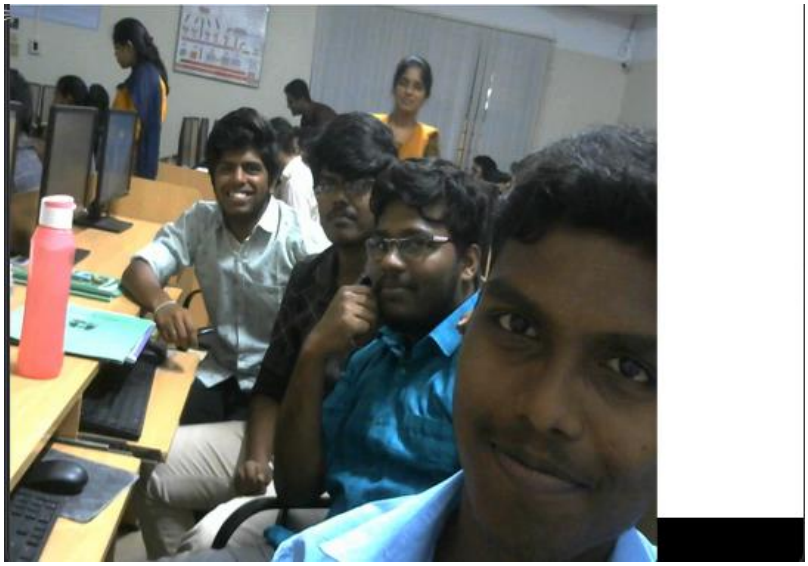
**Output: Resized video by varying the parameters**

**Output: resized video by using scaling factors**

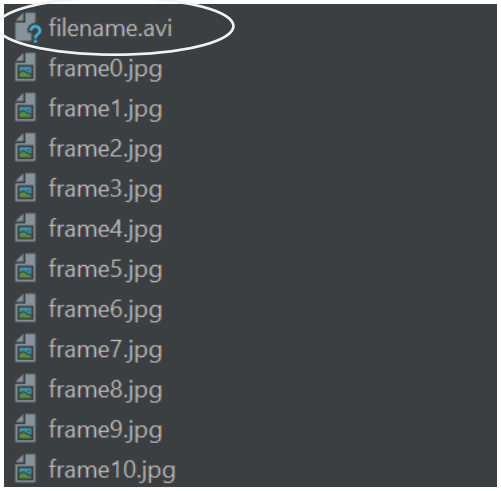
## 4. Writing the video

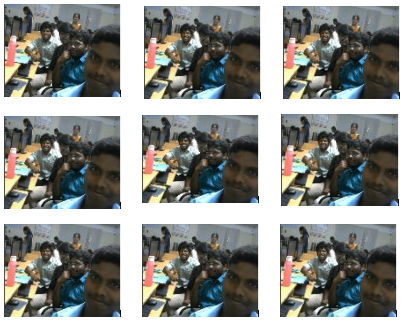
```
import cv2
#import the video
video= cv2.VideoCapture(C:/Users/21r228\Downloads/tech [MConverter.eu].mp4')
#read the video
success,image = video.read()
count = 0
success = True
while success:

 success,image = video.read()
 frame_width = int(video.get(3))
 frame_height = int(video.get(4))
 size = (frame_width, frame_height)
 result = cv2.VideoWriter('filename.avi',
                  cv2.VideoWriter_fourcc(*'MPEG'),10, size)
 cv2.imwrite("frame%d.jpg" % count, image)  # save frame as JPEG file
 cv2.imshow('Frame',image)
 if cv2.waitKey(10) == 27:                  # exit if Escape is hit
    break
 count += 1
```

## Input:



## Output: Saved in file



## 5. Split and Merge Image

```
import cv2
image = cv2.imread("C:/Users/21r228\Downloads\download.jpg")
(b_channel, g_channel, r_channel) = cv2.split(image)


#display the images
cv2.imshow('blue channel',b_channel)
cv2.imshow('green channel',g_channel)
cv2.imshow('red channel',r_channel)
# merge the image


image_merged = cv2.merge((b_channel,g_channel,r_channel))
cv2.imshow('merged image',image_merged)
cv2.waitKey(0)
cv2.destroyAllWindows()
```

**Input Image :**

**Output Image :**

**<u>Split Image :</u>**

RED GREEN BLUE

**<u>MERGED IMAGE :</u>**

| Department of RAE | | | |
|---|---|---|---|
| **Criteria** | **Excellent (75% - 100%)** | **Good (50 – 75%)** | **Poor (<50%)** |
| **Preparation (30)** | | | |
| **Performance (30)** | | | |
| **Evaluation (20)** | | | |
| **Report (20)** | | | |
| **Sign:** | | **Total (100)** | |

## Result:

The basics of OpenCV Image and Video Handling were learnt using OpenCV- python in Pycharm IDE.