Assignment 4: Data Visualtization

Assigning Date : 25-01-2021

Due Date: 31-Jan-2021

Student Name: Rohit Byas Sherwan

Roll No : 181210043

Agenda for the Assignment 4

1. Development of 2D-Gait Analysis System :

-Extract the joint paramters/coordinates (x,y) from the image after applying pre-preocessing methods on it.

2. Pre-Process the tabular data

Google CoLab Instructions

The following code ensures that Google CoLab is running the correct version of TensorFlow.

```
#Currently using Jupyter Notebook
try:
  from google.colab import drive
  %tensorflow_version 2.x
  COLAB = True
  print("Hello World")
  print("Note: using Google CoLab")
except:
  print("Hello NITD")
  print("Note: not using Google CoLab")
  COLAB = False

# Print your name and Roll No.
print("Name: Rohit byas")
print("Roll Number: 181210043")
```

```
Hello World
Note: using Google CoLab
Name: Rohit byas
Roll Number: 181210043
```

PART 1: Image Pre-processing : Development of 2D-Gait Analysis System

Development of 2D-Gait Analysis System :

-Extract the joint paramters/coordinates (x,y) from the image after applying pre-preocessing methods on it.

-In the pre-processing phase, identify the set of 5 red colored passive markers attached to the clothes of the target subject at anatomical points of concern i.e. shoulder, hip, knee, ankle and toe.

```
!pip install wget
```

```
Collecting wget
  Downloading https://files.pythonhosted.org/packages/47/6a/62e288da7bcda82b935ff0c6cfe5
Building wheels for collected packages: wget
  Building wheel for wget (setup.py) ... done
  Created wheel for wget: filename=wget-3.2-cp36-none-any.whl size=9682 sha256=f25365dac
  Stored in directory: /root/.cache/pip/wheels/40/15/30/7d8f7cea2902b4db79e3fea550d7d7b8
Successfully built wget
Installing collected packages: wget
Successfully installed wget-3.2
```

Task 1: Load and Read image

```
#importing the files
import matplotlib.pyplot as plt
import matplotlib.image as mtimg
from PIL import Image
import cv2
import wget


#to load and read the image
img = wget.download("https://cprakash86.files.wordpress.com/2021/01/s1_1.png")
img=Image.open(img)
plt.imshow(img)
```

```
<matplotlib.image.AxesImage at 0x7fd6639171d0>
```

Task 2. Crop the image to get Area Of Intrest (AOI) as shown in expected output figure

```
image.size
```

```
(1920, 1080)
```

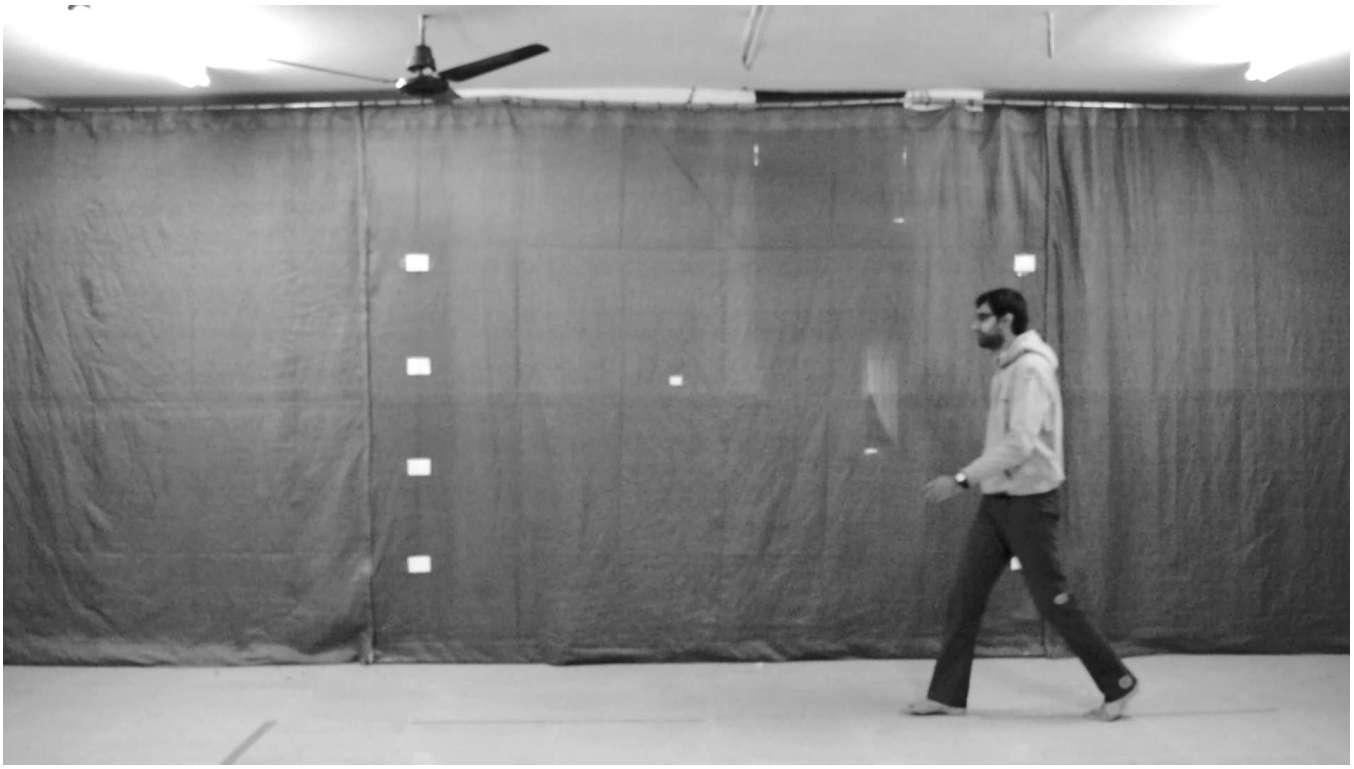
```
#cropping the image
left = 400
top = 150
right = 1900
bottom = 1000

img = image.crop((left, top, right, bottom))


img
```

Task 3.

(a) Convert the image to grayscale

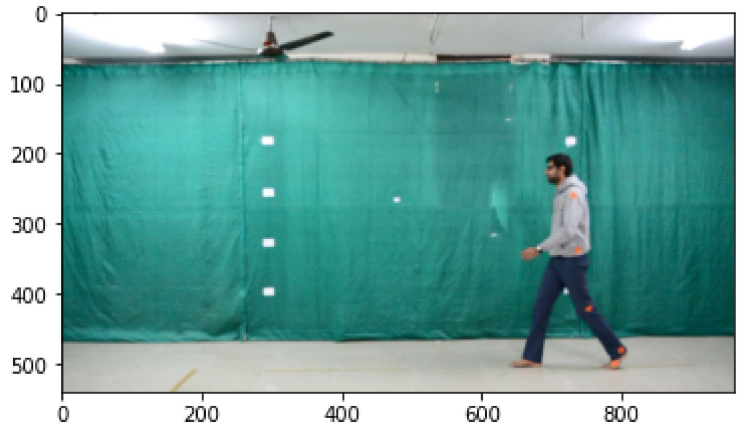
(b) Resize image using PIL and maintain the aspect ratio

```
#converting to grayscale
img1 =  img.convert('L')
img1
```



```
#To resize the image
h, w = img.size
new_h = int(h/2)
new_w = int(w/2)
img2 = img.resize((new_h, new_w), Image.ANTIALIAS)
plt.imshow(img2)
```

```
<matplotlib.image.AxesImage at 0x7fd6375717f0>
```



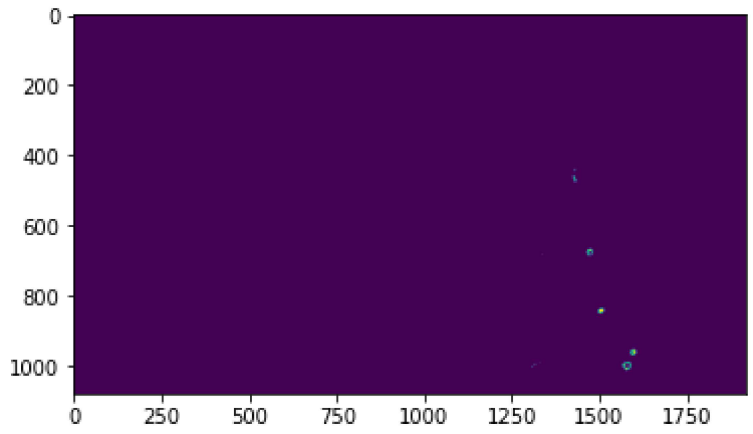
Task 4. From the image to extract the red components in the image.

- Doing it in my own method

```
%matplotlib inline
```

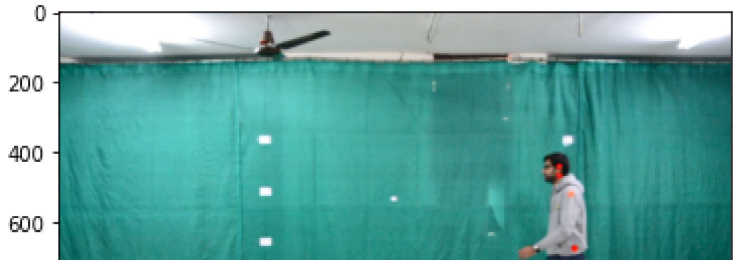
```
# Extracting only the red dots from the image and converting to bonary image
import cv2
import numpy as np

img = cv2.imread("s1_1.png")
#Converting image type to HSV format using cvtColor()
hsv = cv2.cvtColor((img) , cv2.COLOR_BGR2HSV)
mask = cv2.inRange(hsv, (4, 110, 170), (15, 210, 240))
plt.imshow(mask)
```

```
<matplotlib.image.AxesImage at 0x7fd636cce5c0>
```




```
import imutils


#Finding the contours in the image
cnts = cv2.findContours(mask.copy(), cv2.RETR_EXTERNAL,cv2.CHAIN_APPROX_SIMPLE)
cnts = imutils.grab_contours(cnts)


#The centroids of the contour are being evaluated
centroid = []
for c in cnts:
    M = cv2.moments(c)
    cX = int(M["m10"] / (M["m00"] + 1e-7))
    cY = int(M["m01"] / (M["m00"] + 1e-7))
    centroid.append((cX,cY))
    #radius = 6, colour = red(0, 0, 255, thickness = 3
    img = cv2.circle(img, (cX, cY), 6, (0, 0, 255), 3)
    plt.imshow(cv2.cvtColor(img, cv2.COLOR_BGR2RGB))
    cv2.waitKey(0)
centroid
```

```
[(0, 0),
 (0, 0),
 (1316, 995),
 (0, 0),
 (1580, 999),
 (1597, 961),
 (1505, 843),
 (0, 0),
 (0, 0),
 (0, 0),
 (1473, 674),
 (0, 0),
 (1430, 467),
 (0, 0),
 (0, 0),
 (1430, 441)]
```



Task 5. Label all the connected components in the image.

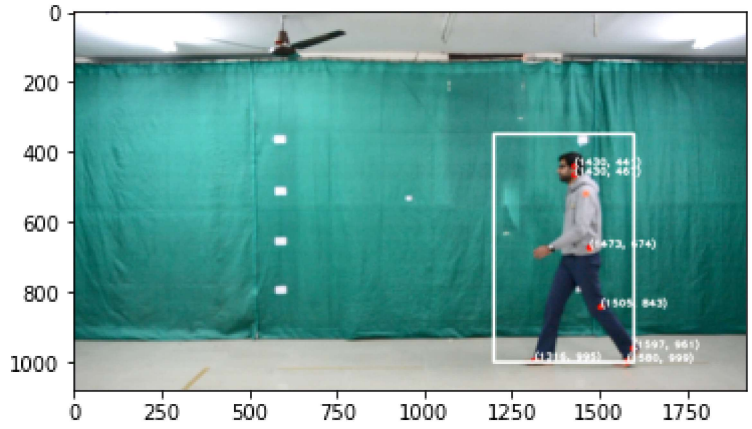
```
# Labelling the dots with the coordinates on the image
for c in centroid:
    img = cv2.putText(img, str(c), (c[0], c[1]),cv2.FONT_HERSHEY_PLAIN, 2, (255, 255, 255), 4
    plt.imshow(cv2.cvtColor(img, cv2.COLOR_BGR2RGB))
centroid
```

```
[(0, 0),
 (0, 0),
 (1316, 995),
 (0, 0),
 (1580, 999),
 (1597, 961),
 (1505, 843),
 (0, 0),
 (0, 0),
```

Task 6. Loop to bound the red objects in a rectangular box.

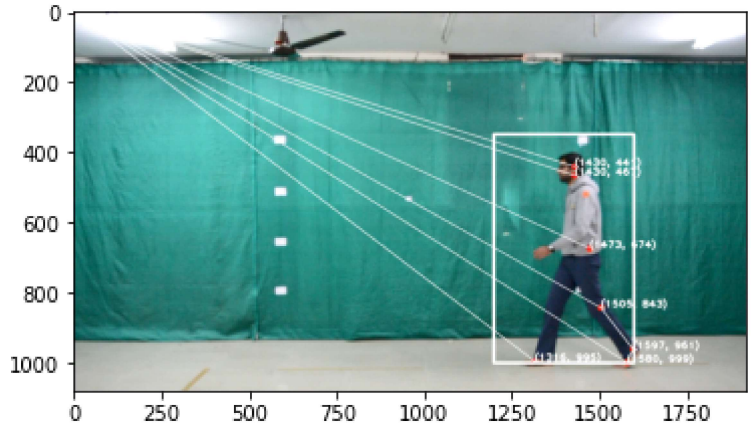
```
#A box is applied around all the dots
img = cv2.rectangle(img, (1200, 350), (1600, 1000), (255, 255, 255), 7)
plt.imshow(cv2.cvtColor(img, cv2.COLOR_BGR2RGB))
```

```
<matplotlib.image.AxesImage at 0x7fd636b45940>
```



Task 7. To draw line between points

```
#A line is drawn between the points
for i in range(1,len(centroid)):
    img = cv2.line(img, centroid[i-1], centroid[i], (255, 255, 255) , 2)
    plt.imshow(cv2.cvtColor(img, cv2.COLOR_BGR2RGB))
```



Your Learning :

Learnt the use of OpenCV for colour scheme of an image.

OpenCV can be used for reshaping the objects.

The experience was rather gruelsome as found it extremely tough and a lot had to be searched on stackoverflow for completing it.