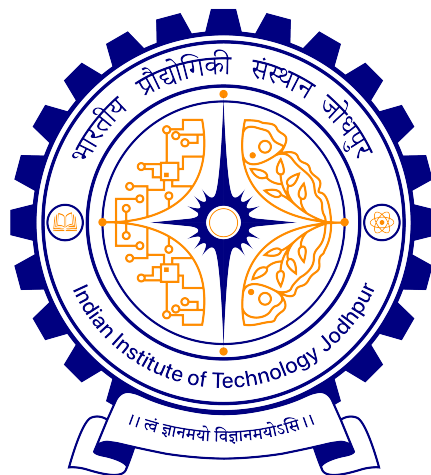


EEL 7170 : Introduction to IoT

Lab Report



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Program: **B.Tech in ES**

Lab 7: Facial Detection Using OpenCV

16 November, 2024

1 Assignment

1.1 Objective

The objective of this lab is to set up and run OpenCV on a Raspberry Pi for image processing tasks, including facial detection using the Dlib library.

1.2 Components Used

- Raspberry Pi (with camera module)
- Raspberry Pi Camera
- OpenCV
- Dlib
- Python

1.3 Procedure

Part 1: Setting Up OpenCV on Raspberry Pi

- **Step 1: Attach the Raspberry Pi camera**
 - Insert the Raspberry Pi camera into the camera port.
 - Power on the Raspberry Pi.

- **Step 2: Verify camera setup**

```
rpivid --test
```

If the preview window appears, proceed. Otherwise, check connections or replace the camera and reboot.

- **Step 3: Install OpenCV**

```
sudo apt install python3-opencv
```

- **Step 4: Install Dlib for facial detection**

```
wget https://github.com/prepkg/dlib-raspberrypi/releases/latest/download/dlib_64.deb
```

```
sudo apt install -y ./dlib_64.deb
sudo apt install -y g++
```

Part 2: Facial Detection Using Python Script

- Run the provided Python script to perform face detection.
- Ensure the virtual environment is activated before running the script.

1.4 Code

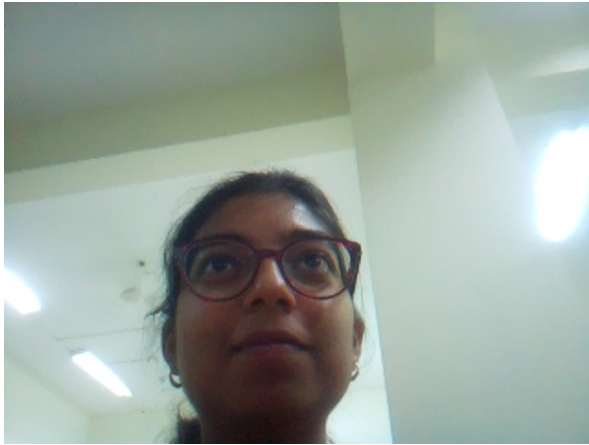
1.4.1 opencv.py

```
1 import dlib
2 import cv2
3 from picamera2 import Picamera2, Preview
4 import time
5 picam2 = Picamera2()
6 camera_config = picam2.create_preview_configuration()
7 picam2.configure(camera_config)
8 picam2.start_preview(Preview.QTGL)
9 picam2.start()
10 picam2.capture_file("test.jpg")
11 img = dlib.load_rgb_image('test.jpg')
12
13 detector = dlib.get_frontal_face_detector()
14 bboxes = detector(img, 1)
15
16 for b in bboxes:
17     cv2.rectangle(img, (b.left(), b.top()), (b.right(), b.bottom()), (0, 255, 0),
18                     2)
19
20 dlib.save_image(img, 'result.jpg')
```

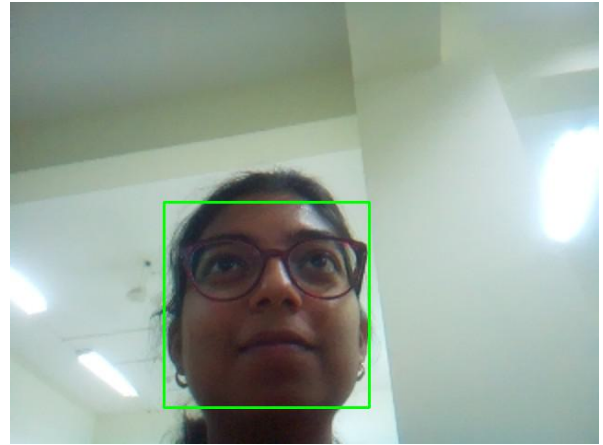
Listing 1: Python script for facial detection using OpenCV and Dlib

1.5 Observations & Results

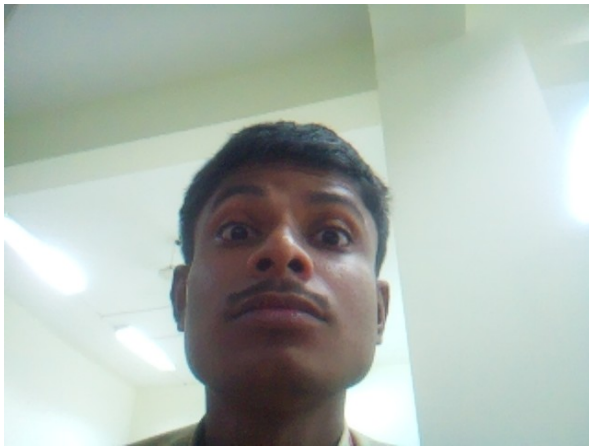
- Successfully installed OpenCV and Dlib on the Raspberry Pi.
- Verified camera functionality using `rpicas-still`.
- Ran the Python script and detected faces in the captured frames.



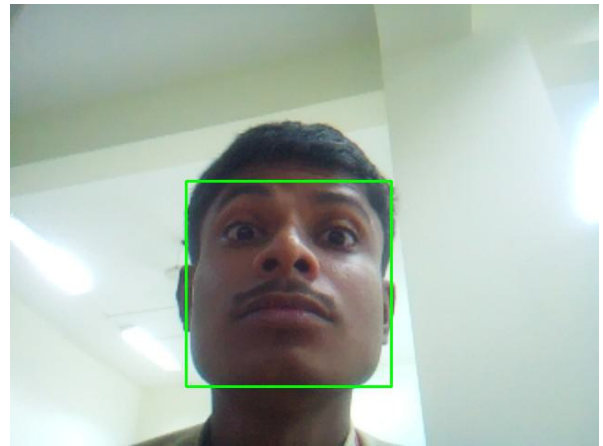
(a) Test 1



(b) Result 1



(a) Test 2



(b) Result 2