

MINOR PROJECT REPORT FACE DETECTION

A

Report

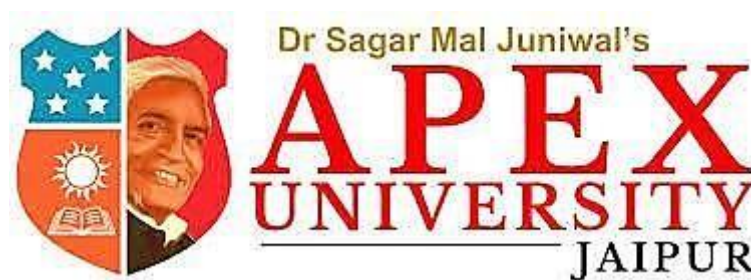
Submitted

In partial fulfillment

For the award of the degree of

Bachelors in Computer Application

(With specialization in Data Science)



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COURSECODE – CA121523 MINOR PROJECT

DECLARATION

I,MEGHA KOTHARI affirm that the Minor Project report titled “FACE DETECTION ” being submitted in partial fulfillment of the requirements for the award of the Degree of BACHELOR OF COMPUTER APPLICATIONS IN

.....is

The original work carried out by me. It has not formed the part of any other project work submitted for award of any degree or diploma, either in this or any other Institution.

(Signature)

Name of the Student: MEGHA KOTHARI
Enrollment No.: 19CA121F50T007

I certify that the declaration made above by the candidate is true

(Signature)

Name of the Internship Coordinator
Department of

ACKNOWLEDGEMENT

The successful completion of this project mark the beginning of an ever – going learning experience of converting ideas & concepts into real life, practical system. This project was a quite a learning experience for me at each & every step. At the same time, it has given me confidence to work in professional setup. I feel the experience gained during the project will lead me to gain the bright prospect in the future. First, I would like to express my sincere thanks to **Mr. Rishank Sharma**, for his active support & continuous guidance without which it would have been difficult for me to complete this project. I will also like to thank my comates for taking keen interest in my project & giving valuable suggestions & helping me directly or indirectly to complete this project.

MEGHA KOTHARI
BCA (GLOBAL)

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ABSTRACT

The report presents the experience & skills gained during the completion of this minor project.

During the period, I acquired practical knowledge & skills about Machine Learning using ML techniques, Python programming Language and some other Tools and Libraries and Computer Vision.

I was able to make a Face Detection model using OpenCV.

The report discusses the skills gained & experience gathered during the completion period.

CHAPTER 1

INTRODUCTION

Introduction

In the process of attaining the award of diploma by students, the least 1 month is required to be spent on an unexceptional industrial training program regarding their specific field or course taken.

Defining the term Minor Project

Minor Project means a project for expansion of a permanent center to strengthen the understanding of your fundamentals through effective application of theoretical concepts. A minor project can help one to boost their skills and widen their horizon of thinking.

Description of Minor Project Objectives

Objectives of Minor Project

The objective of this minor project is to let the students apply the programming knowledge into a real-world situation/ problem and exposed the students how programming skills helps in developing a good programmer.

Objectives of Final Report

The objective of the report enables the students to:

- Provide a work document effectively.
- Produce students that is responsible for their work by providing enough evidential documents that related to work.
- Expose the students on how to provide a proper document.
- Build self-confidence in the students while providing the document.

CHAPTER 2

THE MINOR PROJECT

2.1 INTRODUCTION OF MY DOMAIN

The Domain of my minor project is Machine Learning.

2.1.1 DATA SCIENCE OVERVIEW

Data Science is the study of data using Statistics, Algorithms & Technology.

Data Science is the study of data. It is a process of using data to understand too many different things, to understand the world.

It is the skill of unfolding the insights & trends that are hiding (or abstract) behind data. With insights, you can make strategic choices for a company or an institution.

We can also define data science as a field which is about processes & systems to extract data of various forms & form various resources whether the data is structured or unstructured.

2.2 TECHNOLOGY LEARNT

2.2.1 INTRODUCTION TO MACHINE LEARNING (ML)

ML is the field of study that gives computers the ability to learn from the given data without being explicitly programmed.

Techniques of ML are –

1. Supervised Learning
2. Unsupervised Learning
3. Reinforcement Learning

❖ Features of ML

- ✓ ML is computing-intensive & generally requires a large amount of training data.
- ✓ It involves repetitive training to improve the learning & decision making of algorithms.
- ✓ As more data gets added, ML training can be automated for learning new data patterns & adapting its algorithm.

2.3 LANGUAGES, LIBRARIES & TOOL USED

To complete the given task I have used Python language & tool used is Jupyter Notebook & libraries are NumPy, OpenCV.

2.2.1 Introduction to Python

Python is a high level, general-purpose & very popular programming language.

Python programming language is used in Web Development, ML applications, along with all cutting edge technology in Software Industry. This language is very well suited for Beginners, also for experienced programmers with other programming languages like C++ & Java.

One of the main advantages of using Python is the ability to interact directly with the code, using a terminal or other tools like the Jupyter Notebook.

2.3.2 Introduction to Tool

2.3.2.1 Jupyter Notebook

The Jupyter Notebook is an interactive environment for running code in the browser.

It is a great tool for exploratory data analysis & is widely used by data scientists & for making ML Models.

While the Jupyter Notebook supports many programming languages, we only need the Python support. The Jupyter Notebook makes it easy to incorporate code, text, & images.

2.3.3 Introduction to Libraries

2.3.3.1 NumPy

NumPy is one of the fundamental packages for scientific computing in Python. It contains functionality for multidimensional arrays, high-level mathematical functions such as linear algebra operations & the Fourier transform, & pseudorandom number generators.

2.3.3.2 OpenCV

OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products.

CHAPTER 3

DETAILS OF PROJECT

```
In [1]: import cv2  
import numpy as np
```

Fig 3.1: Importing Libraries

- ✓ Imported the essential libraries used for processing the model.

Loading image using OpenCV

```
In [*]: img=cv2.imread('messy2.jpg')  
cv2.imshow("Messy",img)  
cv2.waitKey(0)  
cv2.destroyAllWindows()
```

Fig 3.2: Loading image

- ✓ Loading the image using OpenCV.
- ✓ imread() function is used to read the given image.
- ✓ imshow() function is used to give the output of the image read using imread() function



Image 3.1: Output of image loaded

FACE DETECTION

```
In [*]: face_cascade=cv2.CascadeClassifier('face.xml')
        faces=face_cascade.detectMultiScale(img)
        for (x,y,w,h) in faces:
            cv2.rectangle(img,(x,y),(x+w,y+h),(50,50,250),2)
        cv2.imshow("Messy",img)
        cv2.waitKey(0)
        cv2.destroyAllWindows()
```

Fig 3.3: Face Detection

- ✓ face.xml is the haarcascade file which contains the face detection algorithm to identify faces in a image or in a real time video.



Image 3.2: Output of Detected Face Image

EYE DETECTION

```
In [*]: img=cv2.imread('img.png')
face_cascade=cv2.CascadeClassifier('face.xml')
eye_cascade=cv2.CascadeClassifier('eye.xml')
faces=face_cascade.detectMultiScale(img)
for (x,y,w,h) in faces:
    single_face=img[y:y+h,x:x+w]
    eyes=eye_cascade.detectMultiScale(single_face,1.40)
    for (ex,ey,ew,eh) in eyes:
        e=cv2.rectangle(single_face,(ex,ey),(ex+ew,ey+eh),(50,250,50),2)
cv2.imshow("Image",img)
cv2.waitKey(0)
cv2.destroyAllWindows()
```

Fig 3.4: Eye Detection

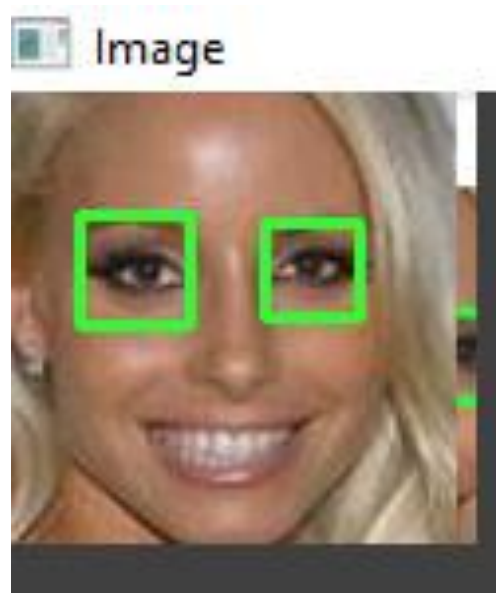


Image 3.3: Output of Detected Eyes in image

SMILE DETECTION

```
In [*]: img=cv2.imread('img.jpg')
face_cascade=cv2.CascadeClassifier('face.xml')
smile_cascade=cv2.CascadeClassifier('smile.xml')
eye_cascade=cv2.CascadeClassifier('eye.xml')
faces=face_cascade.detectMultiScale(img,1.3,5)
for (x,y,w,h) in faces:
    # cv2.rectangle(img,(x,y),(x+w,y+h),(50,50,250),2)
    single_face=img[y:y+h,x:x+w]
    eyes=eye_cascade.detectMultiScale(single_face,1.34)
    smiles=smile_cascade.detectMultiScale(single_face,1.35,25)
    #for (ex,ey,ew,eh) in eyes:
    #    # cv2.rectangle(single_face,(ex,ey),(ex+ew,ey+eh),(50,250,50),2)
    for (sx,sy,sw,sh) in smiles:
        cv2.rectangle(single_face,(sx,sy),(sx+sw,sy+sh),(250,50,50),2)
cv2.imshow("Image",img)
cv2.waitKey(0)
cv2.destroyAllWindows()
```

Fig 3.5: Smile Detection

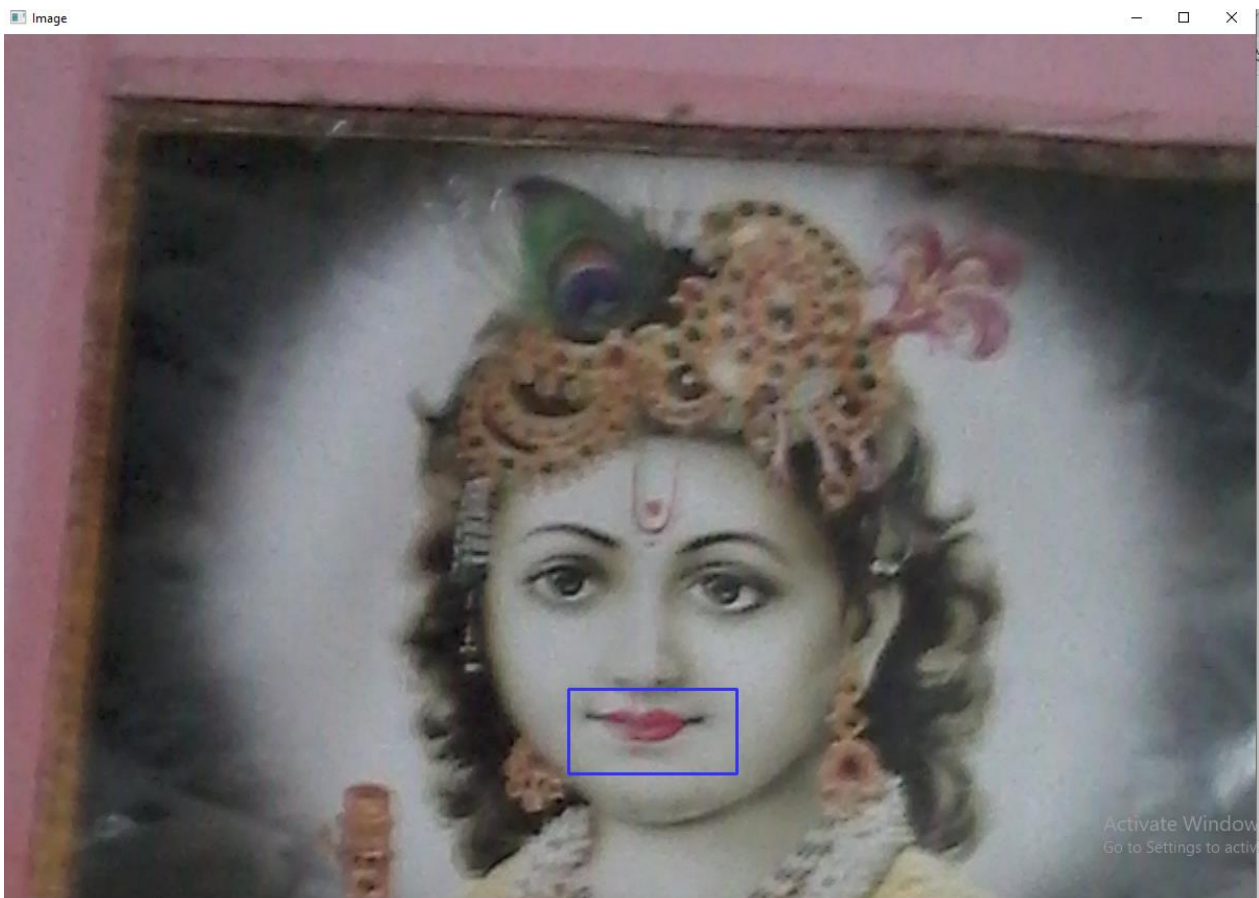


Image 3.4: Output of Detected Smile in image

FACE, EYES, SMILE DETECTION IN ONE IMAGE

```
In [*]: img=cv2.imread('img.jpg')
face_cascade=cv2.CascadeClassifier('face.xml')
smile_cascade=cv2.CascadeClassifier('smile.xml')
eye_cascade=cv2.CascadeClassifier('eye.xml')
faces=face_cascade.detectMultiScale(img,1.3,5)
for (x,y,w,h) in faces:
    cv2.rectangle(img,(x,y),(x+w,y+h),(50,50,250),2)
    single_face=img[y:y+h,x:x+w]
    eyes=eye_cascade.detectMultiScale(single_face,1.35)
    smiles=smile_cascade.detectMultiScale(single_face,1.35,25)
    for (ex,ey,ew,eh) in eyes:
        cv2.rectangle(single_face,(ex,ey),(ex+ew,ey+eh),(50,250,50),2)
    for (sx,sy,sw,sh) in smiles:
        cv2.rectangle(single_face,(sx,sy),(sx+sw,sy+sh),(250,50,50),2)
cv2.imshow("Image",img)
cv2.waitKey(0)
cv2.destroyAllWindows()
```

Fig 3.6: Face, Eyes and Smile detection in one image

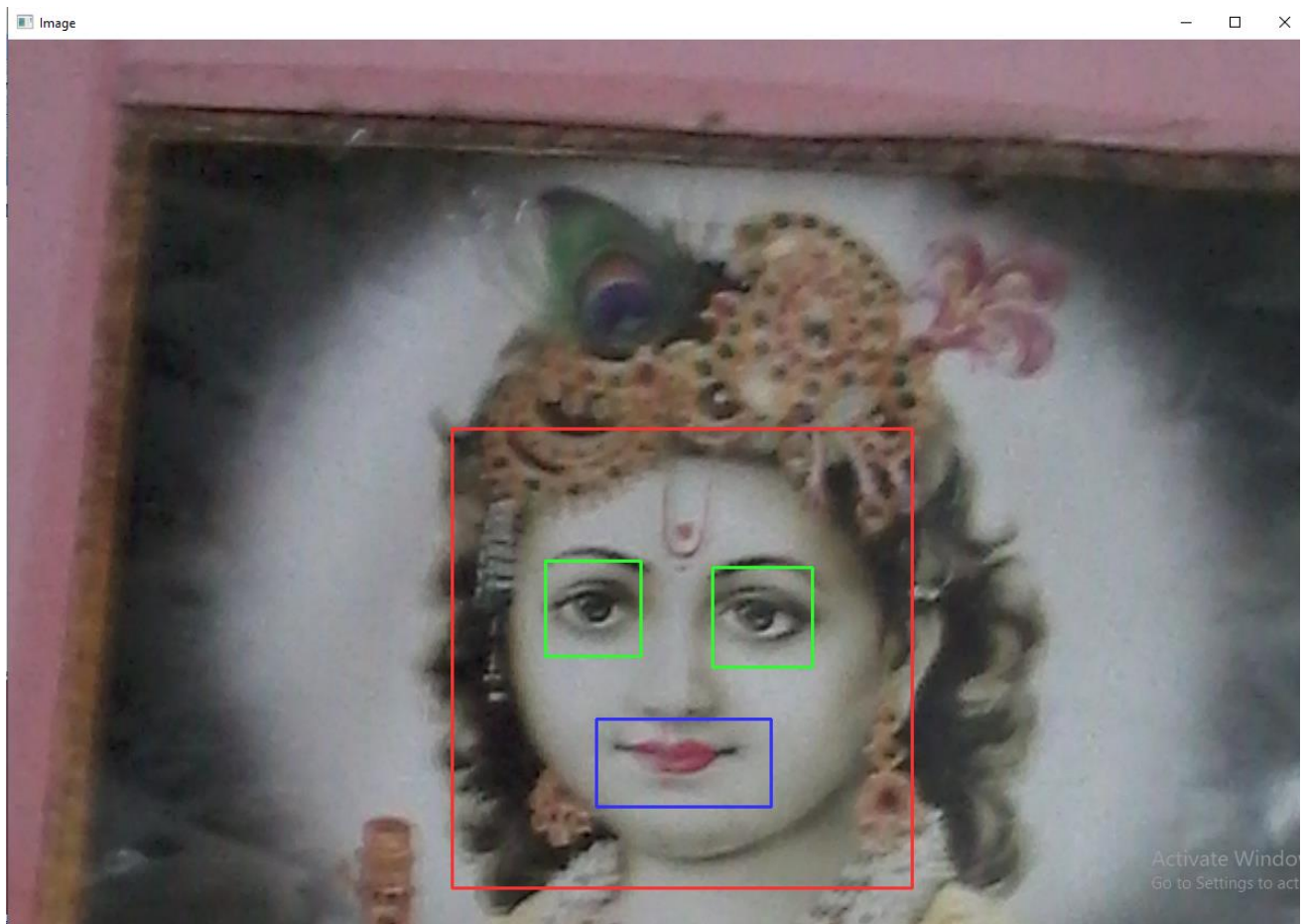


Image 3.5: Output of Detected Face, Eyes and Smile in one image

```

In [*]: ### detecting face in live webcam

import cv2
cam=cv2.VideoCapture(0)
face_cascade=cv2.CascadeClassifier('face.xml')
while True:
    a,img = cam.read()
    img=cv2.flip(img,1)
    faces=face_cascade.detectMultiScale(img)
    for (x,y,w,h) in faces:
        cv2.rectangle(img,(x,y),(x+w,y+h),(255,0,0),2)
    cv2.imshow("webcam",img)
    if cv2.waitKey(1)==13:
        break
cam.release()
cv2.destroyAllWindows()

```

Fig 3.7: Face Detection live in web camera

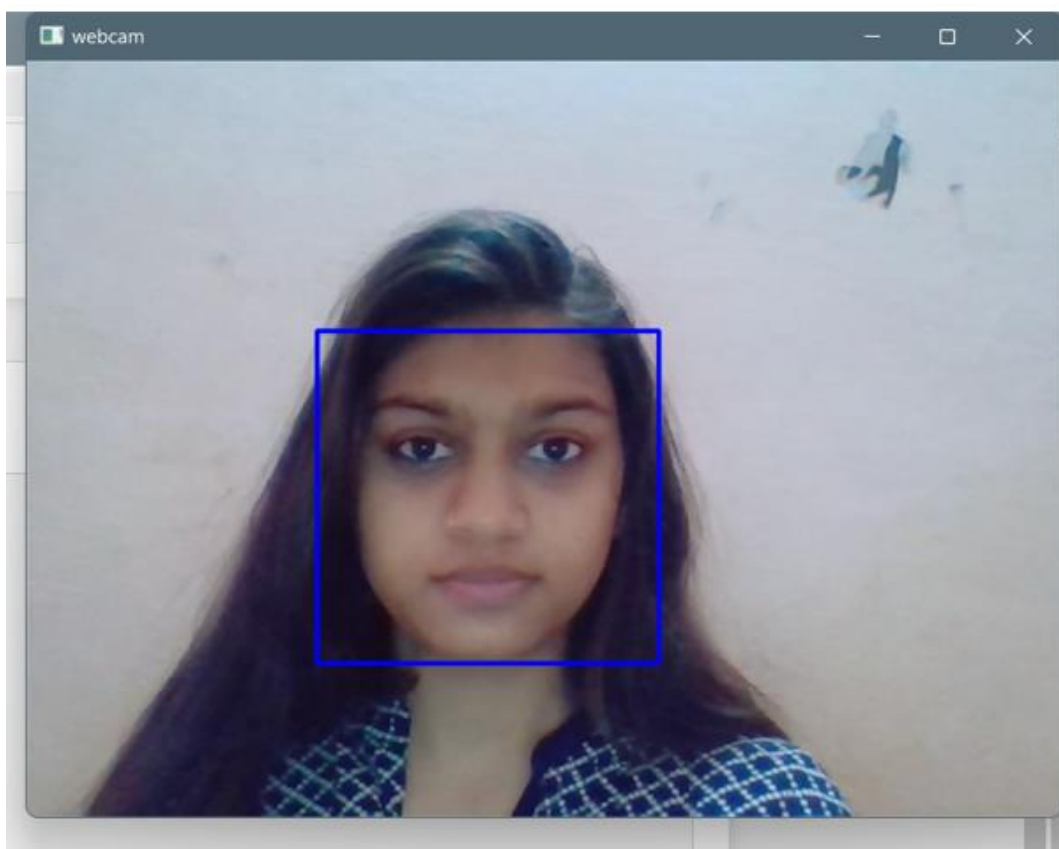


Image 3.6: Live Face Detection

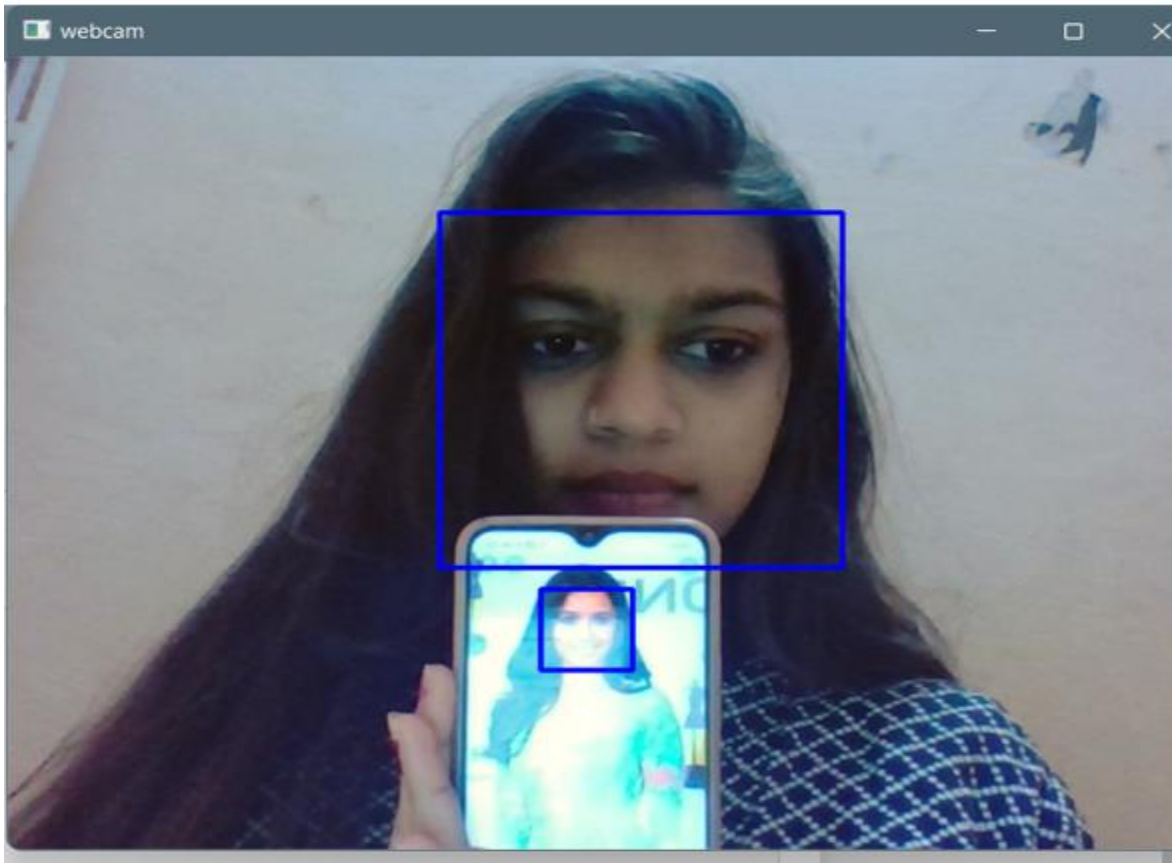


Image 3.7: Live Face Detection (2)

samples for face

```
In [1]: import cv2
cam=cv2.VideoCapture(0)
face_cascade=cv2.CascadeClassifier('face.xml')
path="F:\megha's\screen"
while True:
    a,img = cam.read()
    img=cv2.flip(img,1)
    faces=face_cascade.detectMultiScale(img)
    for (x,y,w,h) in faces:
        cv2.rectangle(img,(x,y),(x+w,y+h),(255,0,0),2)
    for i in range(51):
        img_name=path+'img'+str(i)+'.jpg'
        cv2.imwrite(img_name,img[y:y+h,x:x+w])
        time.sleep(0.5)
    cv2.imshow("webcam",img)
    if cv2.waitKey(1)==13:
        break
cam.release()
cv2.destroyAllWindows()
```

Fig 3.8: Face sample collection

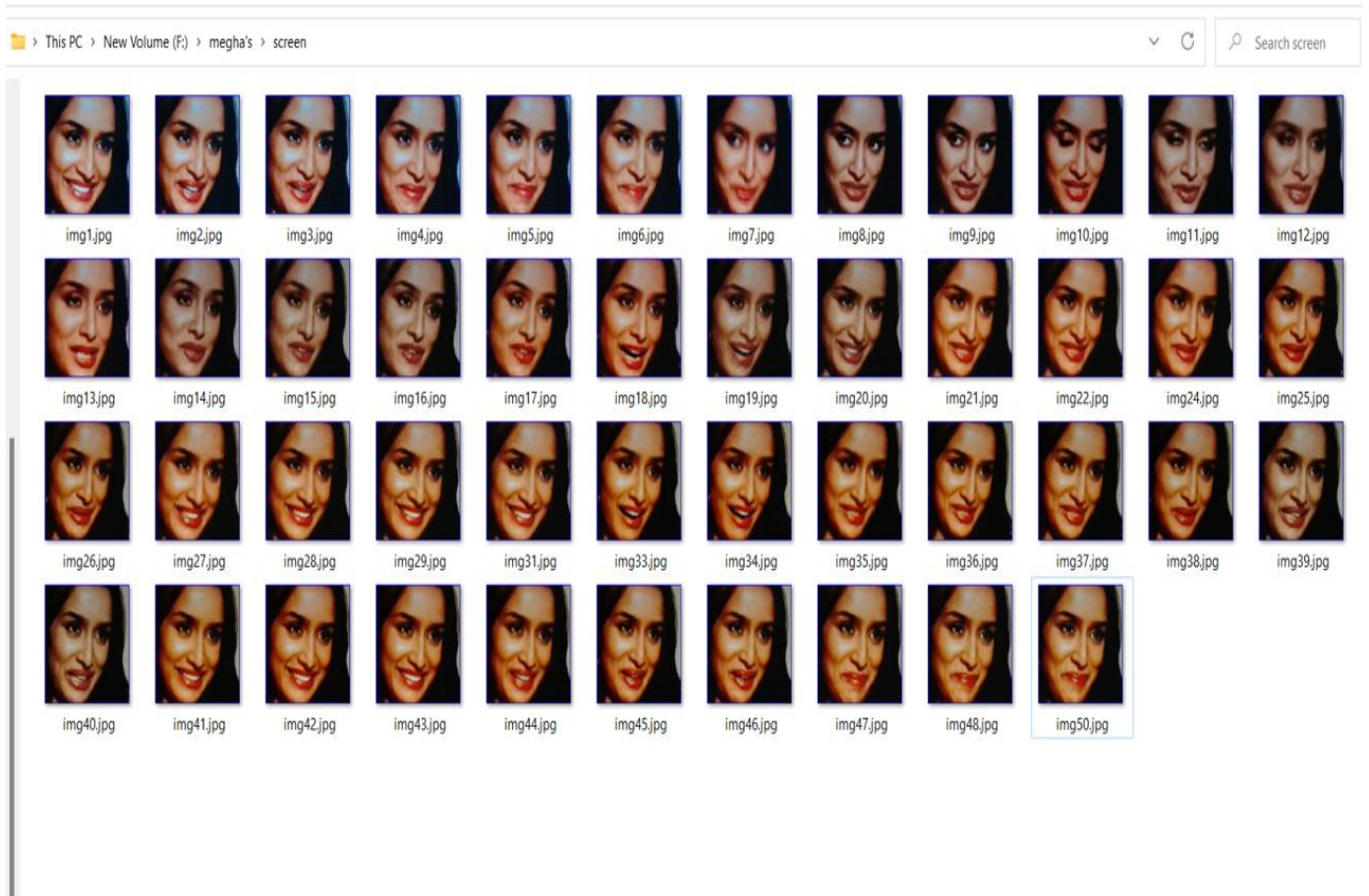


Image 3.6: Sample collections file

CHAPTER 4

CONCLUSION

CONCLUSION

Creating minor project was a success & a great time of acquisition of knowledge & skills. Through this minor project I was able to appreciate my chosen course of study even more, because I had the opportunity to blend the theoretical knowledge acquired from college with the practical hands-on application of knowledge gained here to perform very important tasks that contributed in a way to my productivity of my skills. My minor project here has given me a broader view to the importance & relevance of ML & Data Science in the immediate society & the world as a whole, as I now look forward to impacting it positively after graduation. I have also been able to appreciate the connection b/w my course of study & other disciplines in producing a successful result.

CHALLENGES FACED DURING THE PERIOD OF TRAINING

Some challenges I faced during this training period:

- Learning new algorithm - as learning new things will always be a challenge faced by every individual at first to like to understand, implement the algorithm.
- Wrong predicted values - in every prediction ML model the main challenge is the final predicted values by the model. If the predicted values are wrong then the model may not be the best model for further using/implementing for different purposes or in different fields.
- Error during the execution of model/program - if an error occurred during the execution of model/program it may or may not be easy to identify/detect the error & fix the error

Table of Abbreviation

Abbreviations	Definition/ Full Form
&	AND
b/w	BETWEEN
ML	MACHINE LEARNING
v/s	VERSUS
No.	NUMBER
Fig	Figure

REFERENCES

All Content used in this report is from:

✚ Book I referred are:

Python & Data Science Handbook by Jake VanderPlas.

Introduction to Machine Learning with Python by Andreas C. Müller & Sarah Guido

✚ Websites:

https://www.tutorialspoint.com/scikit_learn/scikit_learn_introduction.htm

https://www.w3schools.com/python/pandas/pandas_intro.asp

<https://en.wikipedia.org/wiki/Matplotlib>

<https://www.google.com/>