

**A
Project Report
on
CRIMINAL FACE DETECTION SYSTEM**

**Submitted in partial fulfillment of the requirements
for the award of the degree of
Bachelor of Technology**

**in
Computer Science and Engineering**

By

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BONAFIDE CERTIFICATE

This is to certify that the project report entitled “**CRIMINAL FACE DETECTION SYSTEM**” submitted by **SHIVA TAMRKAR** (**1613101680 / 16SCSE101563**) to the GALGOTIAS UNIVERSITY, Greater Noida, Utter Pradesh, in partial fulfillment for the award of Degree of Bachelor of Technology in Computer science & Engineering is a bonafide record of the project work carried out by them under my supervision during the year 2019-2020.

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ABSTRACT

Criminal Face Detection project aims to build a automated Criminal Face Detection system by leveraging the human ability to recall minute facial details. Identification of criminals at the scene of a crime can be achieved in many ways like fingerprinting, DNA matching or eye witness accounts. Out of these methods eye witness accounts are preferred because it stands scrutiny in court and it is a cost effective method. It is possible that witnesses to a crime have seen the criminal though in most cases it may not be possible to completely see the face of the perpetrator. The Criminal Face Detection System will be built of an existing criminal database. Input would be provided in the form of sketch or an image and matched against the existing database and results would be provided. Criminal record generally contains personal information about particular person along with photograph. To identify any Criminal we need some identification regarding person, which are given by eyewitness. In most cases the quality and resolution of the recorded image segments is poor and hard to identify a face. To overcome this sort of problem we are developing software. Identification can be done in many ways like finger print, eyes, DNA etc. One of the applications is face identification. The face is our primary focus of attention in social inters course playing a major role in conveying identify and emotion. Although the ability to infer intelligence or character from facial appearance is suspect, the human ability to recognize face is remarkable .The human face is a complicated multidimensional visual model and hence it is very difficult to develop a computational model for recognizing it. The paper presents a methodology for recognizing the human face based on the features derived from the image. The proposed methodology is implemented in two stages. The first stage detects the human face in an image using viola Jones algorithm. In the next stage the detected face in the image is recognized using a fusion of principle .

CHAPTER 1

INTRODUCTION

(i) Overall view--

Over the years, a lot of security approaches have been developed that help in keeping confidential data Secured and limiting the chances of a security breach. Face recognition which is one of the few biometric methods that possess the merits of both high accuracy and low intrusiveness is a computer program that uses a person's face to automatically identify and verify the person from a digital image or a video frame from a video source. It compares selected facial features from the image and a face database or it can also be a hardware which used to authenticate a person.

In developed countries, the law enforcement create face database to be used

with their face recognition system to compare any suspect with the database. In other hand, in india most cases are investigated by using thumbprint identification to identify any suspect for the case. However, because of unlimited knowledge through internet usage, most criminals are aware of thumbprint identification. Therefore, they become more cautious of leaving thumbprint by wearing gloves except for non-premeditated crimes.

(ii) Purpose--

- To improve the current existing criminal face detection system.
- To provide a fast detection of a criminal in a mean time.
- To remove the complexity from the image.
- Easy detection of criminal by using a sketch or getting an image through the cctv camera or difficulty in detection of a criminal or to match the data with the criminal record.

(iii) Motivation and Scope--

There is no dedicated Criminal Face Detection System to assist in facial detection of criminals rather police technicians have to go through to different pictures of criminals and manually slice each picture to generate images, this will usually lead to the generation of low resolution and blurred images. This system is aimed to identify the criminals in any investigation department. Scope of the system is completely identification of the face. Within the allocated time completing the system with the specified user requirements. One system is for the administrator and the other one is for the users. It can be used in many fields there are Bank, Hotel and Police Station. A throughout survey has revealed that various methods and combination of these methods can be applied in development of a new face recognition system. Among the many possible approaches, we have decided to use a combination of knowledge based methods for face detection part and neural network approach for face recognition part. The main reason in this selection is their smooth applicability and reliability issues.

The accuracy of text and face recognition is based upon pose, illumination, emotions, facial components and image quality. Certain features need to be incorporated in the system to process real time images at faster rate with high precision. Another aspect of the research includes, developing a model which if trained on given criminal record dataset can predict the face sketch of a criminal based upon features fed as input by a witness.

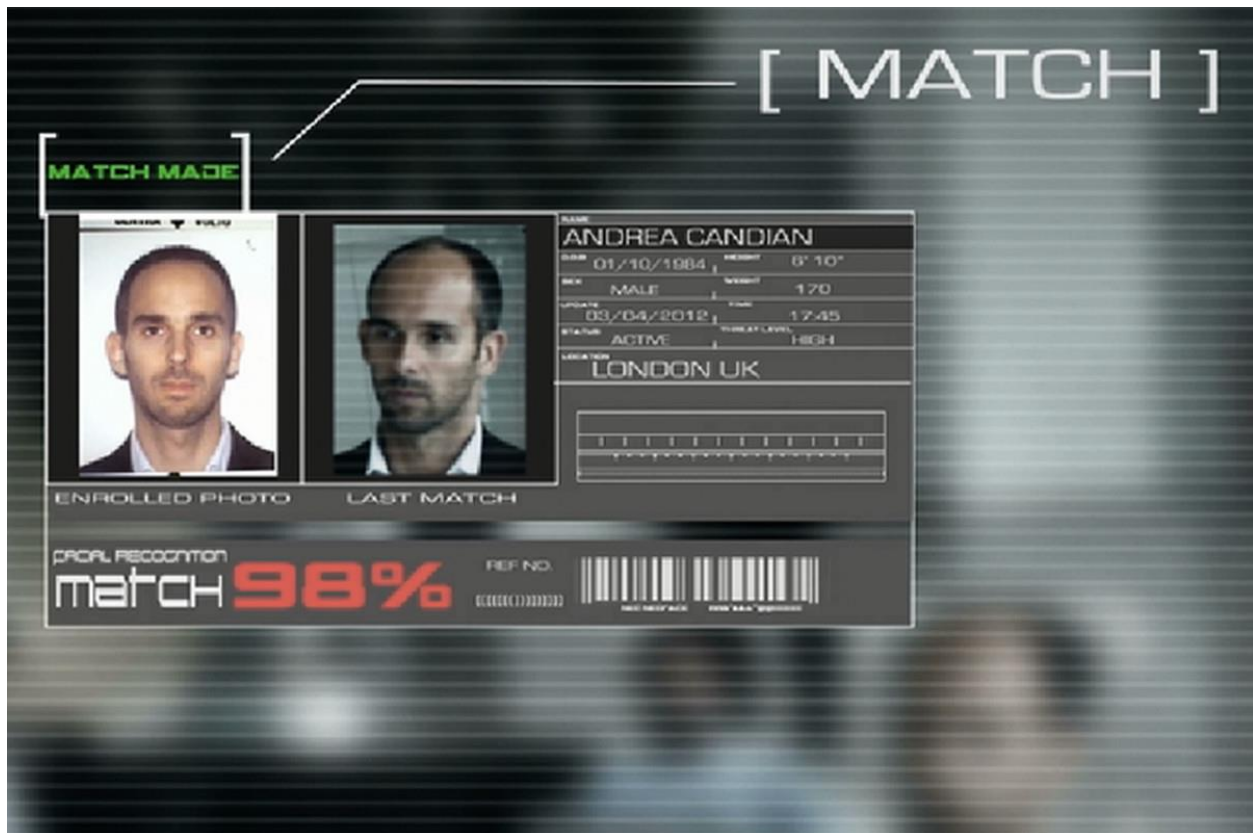


Figure-1

“Here is a demo image by which we can understand that how it works, suppose if i wanted to find this person on our criminal database but the image we got through the cctv camera is not clear enough to find the consult person/victim , so what we do we pick the image and insert in the model and then first removes the complexity of the image and then it matches with the criminal database and then it shows that images is under the criminal database so that we can got the information regarding that victim. “

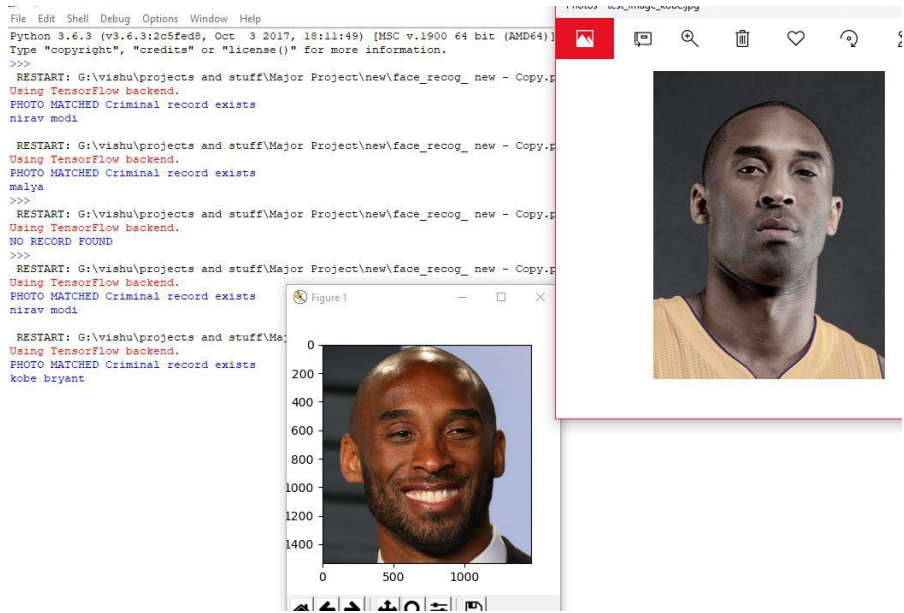


Figure-2

CHAPTER 2

LITERATURE REVIEW

This section reviews the basic concepts of the criminal face detection system. We firstly need to understand the various components of the face detection system under the criminal detection. Or we can say in this we will remove the complexity from the image, which we get to match with the criminal record or data. In the past, we were not able to remove the complexity from the image which we get through the CCTV or any camera.

Technique used--The work based on high order tensor to construct a multi linear structure and model the multiple factors of face variations.

Conclusion-- The paper introduced the new concept that appearance factor, the factor of person's identity modeled by a tensor structure can be used for better recognition system, specially for different types of appearance of same faces.

Project Objective—

This project is intended to identify a person using the images previously taken. The identification will be done according to the previous images of different persons.

Project Scope—

The scope of the project is confined to store the image and store in the database. When a person has to be identified the images stored in the database are compared with the existing details.

Overview of the project—

This project is aimed to identify the criminals in any investigation department. Here the technique is we already store some images of Criminal Face Identification System.

The criminals in our database along with his details and those images are segmented into many slices say eyes, hairs, lips, nose, etc. These images are again stored in another database record so to identify any criminals; eyewitnesses will see the images or slices that appear on the

screen by using it we develop the face, which may or may not be matched with our images. If any image is matched up to 99% then we predict that he is only the criminal. Thus using this project it provides a very friendly environment for both operator and eyewitness to easily design any face can identify criminals very easy.

CHAPTER 3

PROBLEM FORMULATION

PROBLEM IDENTIFICATION—

There is no consult thing regarding criminal face detection in india , although india is a developing country and are working / using these face detection projects by which they are able to find the criminals easily by matching the face in their criminal database by removing the complexity or by matching the victim's face organs like eyes,ears,nose,by which they can easily recognize the face of the criminals in any difficult condition,so this project help the police of our country and help them by matching the imaginary data / sketch or the image with the complexity of photo matching .so we remove the complexity from the image and then matches with the criminal database ,if the data has been matches with the current existing record it will be very beneficial for the department.

CHAPTER4.

Existing System

There is no dedicated Criminal Face Detection System to assist in facial detection of criminals rather police technicians have to go through to different pictures of criminals and manually slice each picture to generate images, this will usually lead to the generation of low resolution and blurred images. Linking of each sliced image to the original image is also a herculean task. The Criminal Face Detection System is ineffective because a witness will not be able to continually peruse the different images rather they will receive a broken stream of images and randomness of the sliced image is not achievable. In the current System the complexity in the photo can't be removed and as we are not able to remove the complexity of any image, we can't clarify the criminal or any person with conviction.

CHAPTER 5

PROPOSED WORK

The proposed method implement an efficient Face Detection and Recognition technique which is independent of variations in features like color, hairstyle, different facial expressions etc using Viola Jones algorithm.

PRE PROCESSING:

A standard image database which is readily available either in color or gray scale is considered. In the Pre-processing stage contrast stretching is performed on the acquired image where the white pixels are made whiter and black pixels are made blacker.

FACE DETECTION:

After contrast stretching viola-Jones algorithm is applied for detecting the face in the image. Viola-Jones detector was chosen as a detection algorithm because of its high detection rate, and its ability to run in real time. Detector is most effective on frontal images of faces and it can cope with 45° face rotation both around the vertical and horizontal axis. The three main concepts which allow it to run in real time are the integral image, Ada Boost and the cascade structure.

CHAPTER 6

IMPLEMENTATION

PRE-REQUISITES

This project requires good knowledge of Deep learning, Python, working on Jupyter notebooks, Keras library, Numpy, and *Natural language processing*.

Make sure you have installed all the following necessary libraries:

- pip install tensorflow
- keras
- pillow
- numpy
- Open CV-python
- matplotlib

Here are some libraries of python used in the project.

- Tensorflow-- used in this project,so what is tensor flow-Tensorflow is a free and open source library for dataflow and differentiable programming across a range of tasks.Tensorflow is an open source and deep learning library developed by google that is used to perform complex numerical operations and several other tasks to model deep learning models.it's architecture allows easy deployment of computations across multiple platforms like cpu,gpu and etc.Tensor flow is a python library for fast numerical computing created and released by google.

Open CV-- OpenCV-Python is a library of python bindings designed to solve computer vision problems .open CV makes use of numpy, which is a highly

optimized library for numerical operations with a matlab style syntax.all the OpenCV array structures are converted to and numpy arrays. **OpenCV** (*Open Source Computer Vision Library*) is a [library of programming functions](#) mainly aimed at real-time [computer vision](#).^[1] Originally developed by [Intel](#), it was later supported by [Willow Garage](#) then Itseez (which was later acquired by Intel^[2]). The library is [cross-platform](#) and free for use under the [open-source BSD license](#).and it's applications are gesture recognition, facial recognition, human interaction and mobile robotics.

- Numpy- **NumPy** is a package in **Python** used for Scientific Computing. **NumPy** package is **used** to perform different operations. The ndarray (**NumPy** Array) is a multidimensional array **used** to store values of same datatype. These arrays are indexed just like Sequences, starts with zero. NumPy targets the [CPython](#) reference [implementation](#) of Python, which is a non-optimizing [bytecode](#) interpreter. Mathematical algorithms written for this version of Python often run much slower than [compiled](#) equivalents. NumPy addresses the slowness problem partly by providing multidimensional arrays and functions and operators that operate efficiently on arrays, requiring rewriting some code, mostly inner loops using NumPy.
- Mplotlib-- **matplotlib.pyplot** is a collection of command style functions that make **matplotlib** work like MATLAB. Each **pyplot** function makes some change to a figure: e.g., creates a figure, creates a plotting area in a figure, plots some lines in a plotting area, decorates the **plot** with labels, etc. **Matplotlib** is a [plotting library](#) for the [Python](#) programming language and its numerical mathematics extension [NumPy](#). It provides an [object-oriented API](#) for embedding plots into applications using general-purpose [GUI toolkits](#) like [Tkinter](#), [wxPython](#), [Qt](#), or [GTK+](#). There is also a [procedural](#) "pylab" interface based on a [state machine](#) (like [OpenGL](#)), designed to closely resemble that of [MATLAB](#), though its use is discouraged.

- Keras-- **Keras** is a powerful and easy-to-use free open source **Python** library for developing and evaluating deep learning models. It wraps the efficient numerical computation libraries Theano and TensorFlow and allows you to define and train neural network models in just a few lines of code. **Keras** is a high-level neural networks API, written in **Python** and capable of running on top of TensorFlow, CNTK, or Theano. ... Use **Keras** if you need a deep learning library that: Allows for easy and fast prototyping (through user friendliness, modularity, and extensibility). Keras contains numerous implementations of commonly used neural-network building blocks such as layers, [objectives](#), [activation functions](#), [optimizers](#), and a host of tools to make working with image and text data easier to simplify the coding necessary for writing deep neural network code.

DRIVER CODE UNDER IMPLEMENTATION--

```
face_recog_new - Copy.py - G:\vishu\projects and stuff\Major Project\new\face_recog_new -
File Edit Format Run Options Window Help

import cv2
from PIL import Image
import numpy as np
import matplotlib.pyplot as plt
from keras.models import load_model
#model=load_model('model i have sent u in drives address')
#model=load_model('modelnew.h5')
model=load_model('f.h5')
c=['kobe bryant','nirav modi','malya','sharukh','ranveer']
d=['a','b','m','s','r']

img='modi london 2.jpg'
#img='neerav blk nd white.jpg'
y=Image.open(img)
y=np.array(y)
#model.save('fe.h5')
y=cv2.resize(y,(300,300))
y=y/255.0
y=np.expand_dims(y,axis=0)
r=model.predict(y)
e=np.argmax(r)
if r[0,e]<0.4 or e==5:
    print("NO RECORD FOUND")
else:
    print("PHOTO MATCHED Criminal record exists")
    q=Image.open(d[e]+'.jpg')
    q=np.array(q)
    plt.imshow(q)
    #plt.imshow(c[e],q)
    print(c[e])
    plt.show()
```

Figure-3

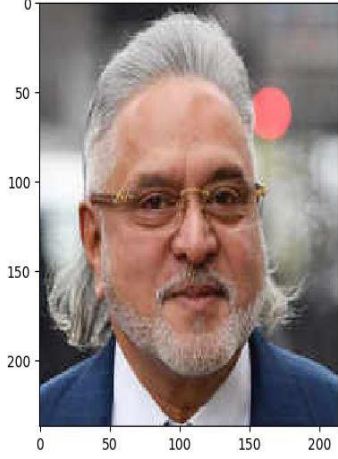
```
File Edit Format Run Options Window Help
import cv2
from PIL import Image
import numpy as np
from keras.models import load_model
#model=load_model('model i have sent u in drives address')
model=load_model('f.h5')
c=['kobe bryant', 'nirav modi', 'malya', 'ranveer', 'sharukh']

img='04mallya.jpg' ← INPUT IMAGE PATH
y=Image.open(img)
y=np.array(y)
#model.save('fe.h5')
y=cv2.resize(y, (300,300))
y=y/255.0
y=np.expand_dims(y,axis=0)
r=model.predict(y)
e=np.argmax(r)
if r[0,e]<0.4 or e==5:
    print("not found")
else:
    print("photo nmatched criminal found")
    q=Image.open(d[e]+' .jpg')
    q=np.array(q)
    plt.imshow(q)
    print(c[e])
```

Figure-4

RESULTS OF DRIVER CODE-

```
y=Image.open('img')
File "C:\Users\Vishwendra\AppData\Local\Programs\Python\
fp = builtins.open(filename, "rb")
FileNotFoundError: [Errno 2] No such file or directory: 'i
>>>
RESTART: G:\vishu\projects and stuff\Major Project\new\fa
Using TensorFlow backend.
photo nmatched criminal found
Traceback (most recent call last):
  File "G:\vishu\projects and stuff\Major Project\new\face
q=Image.open(d[e]+'jpg')
NameError: name 'd' is not defined
>>>
RESTART: G:\vishu\projects and stuff\Major Project\new\fa
Using TensorFlow backend.
photo nmatched criminal found
Traceback (most recent call last):
  File "G:\vishu\projects and stuff\Major Project\new\face
q=Image.open(d[e]+'jpg')
NameError: name 'd' is not defined
>>>
RESTART: G:\vishu\projects and stuff\Major Project\new\fa
Using TensorFlow backend.
photo nmatched criminal found
Traceback (most recent call last):
  File "G:\vishu\projects and stuff\Major Project\new\face
plt.imshow(q)
NameError: name 'plt' is not defined
>>>
RESTART: G:\vishu\projects and stuff\Major Project\new\fa
Using TensorFlow backend.
photo nmatched criminal found
malya
>>> plt.show()
```



RESULT DISPLAYED

```
RESTART: G:\vishu\projects and stuff\Major Project\new\face_recog_new - Copy.py
Using TensorFlow backend.
photo nmatched criminal found
malya
```

Figure-5

```
File Edit Shell Debug Options Window Help
Python 3.6.3 (v3.6.3:2c5fed8, Oct 3 2017, 18:11:49) [MSC v.1900 64 bit (AMD64)]
Type "copyright", "credits" or "license()" for more information.
>>>
RESTART: G:\vishu\projects and stuff\Major Project\new\face_recog_new - Copy.p
Using TensorFlow backend.
PHOTO MATCHED Criminal record exists
nirav modi

RESTART: G:\vishu\projects and stuff\Major Project\new\face_recog_new - Copy.p
Using TensorFlow backend.
PHOTO MATCHED Criminal record exists
malya
>>>
RESTART: G:\vishu\projects and stuff\Major Project\new\face_recog_new - Copy.p
Using TensorFlow backend.
NO RECORD FOUND
>>>
RESTART: G:\vishu\projects and stuff\Major Project\new\face_recog_new - Copy.p
Using TensorFlow backend.
PHOTO MATCHED Criminal record exists
nirav modi

RESTART: G:\vishu\projects and stuff\Ma
Using TensorFlow backend.
PHOTO MATCHED Criminal record exists
kobe bryant
```

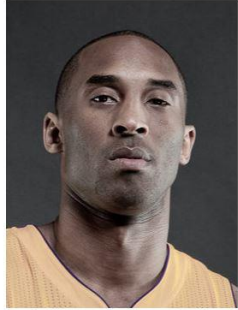
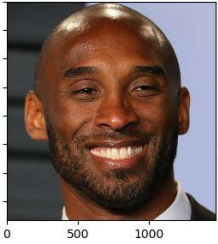


Figure-6

USE CASE DIAGRAM

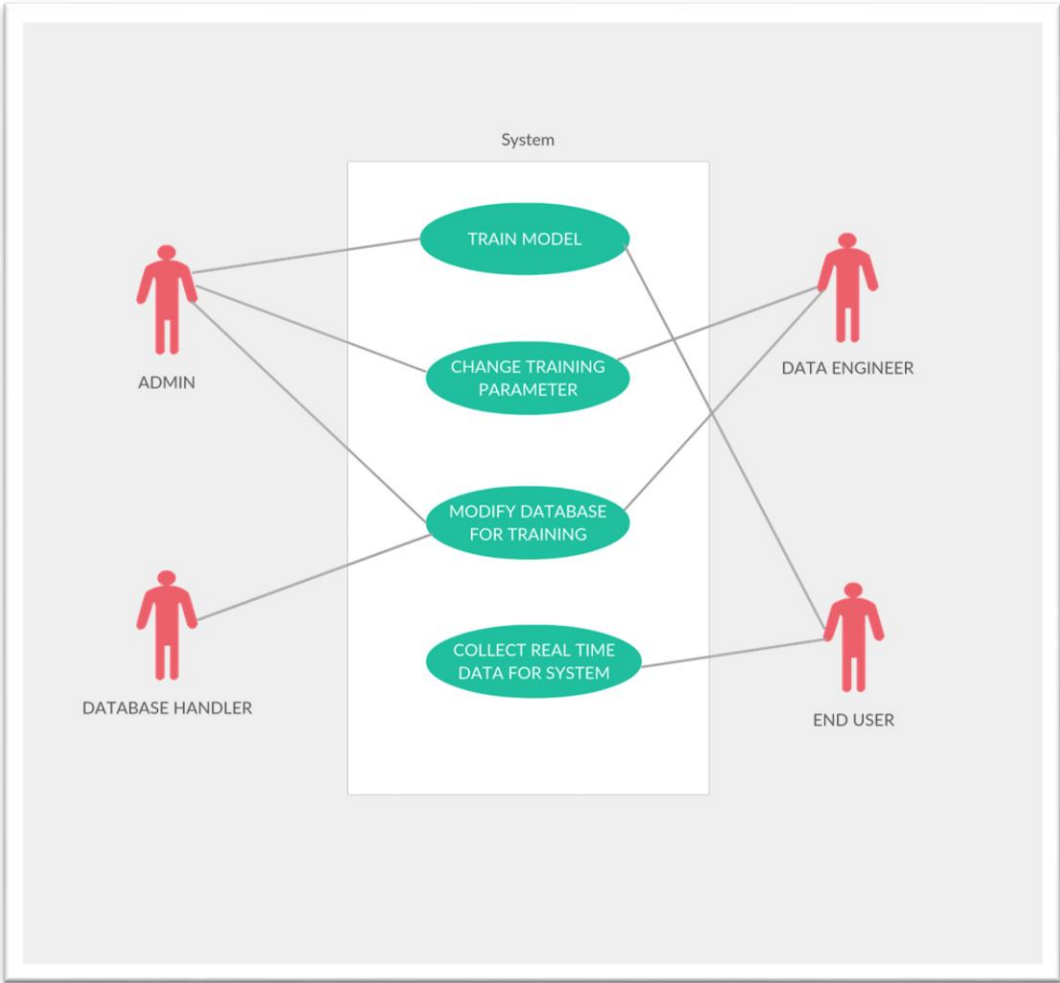


Figure-7

CHAPTER 7

CONCLUSION

- CFD project aims to build a automated Criminal Face Detection system by leveraging the human ability to recall minute facial details.
- dedicated Criminal Face Detection System to assist in facial detection of criminals rather police technicians have to go through to different pictures of criminals and manually slice each picture to generate images, this will usually lead to the generation of low resolution and blurred images. This system is aimed to identify the criminals in any investigation department.

CHAPTER 8.

TOOLS REQUIRED

The various hardware and software requirement are as follows:

Software Requirement:

- Keras
- Tensor Flow
- Python 3.X
- OpenCV
- Sqlite

Hardware Requirement:

- 4 GB RAM
- Intel i3 processor or above
- Windows (on board) graphic unit

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Signature of Project Guide: _____