A

**Project Report**

On

# FACIAL EMOTION DETECTION USING ML

Submitted to

**RAJIV GANDHI UNIVERSITY OF KNOWLEDGE AND TECHNOLOGIES,RK VALLEY**

in partial fulfillment of the requirements for the award of the Degree of

**BACHELOR OF TECHNOLOGY**
**IN**
**ELECTRONICS AND COMMUNICATION ENGINEERING**
**For Fourth year semester II**
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**(Catering the Educational Needs of Gifted Rural Youth of AP)R.K. Valley, Vempalli(M), Kadapa(dist)– 516330**

**2019-2023**

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**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

## CERTIFICATE

This is to certify that the project report entitled **"FACIAL EMOTION DETECTION USING ML"** a bonafide record of the project work done and submitted by

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External Viva-Voce Exam Held on________________________

**INTERNAL EXAMINER** **EXTERNAL EXAMINER**

# DECLARATION

We here by declare that the project report entitled **“ FACIALEMOTION DETECTION USING ML ”** submitted to the Department of **ELECTRONICS AND COMMUNICATION ENGINEERING** in partial fulfillment of requirements for the award of the degree of **BACHELOR OF TECHNOLOGY**. This project is the result of our own effort and that it has not been submitted to any other University or Institution for the award of any degree or diploma other than specified above.

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# ABSTRACT

Face detection has been around for ages. Taking a step forward, human emotion displayed by face and felt by brain, captured in either video, or image form can be approximated. Human emotion detection is the need of the hour so that modern artificial intelligent systems can emulate and gauge reactions from face. This can be helpful to make informed decisions be it regarding identification of intent, promotion of offers or security related threats. Recognizing emotions from images or video is a trivial task for human eye, but proves to be very challenging for machines and requires many image processing techniques for feature extraction. Several machine learning algorithms are suitable for this job. Any detection or recognition by machine learning requires training algorithm and then testing them on a suitable dataset. This paper explores a couple of machine learning algorithms as well as feature extraction techniques which would help us in accurate identification of the human emotion. Automatic emotion recognition based on facial expression is an interesting research field, which has presented and applied in several areas such as safety, health and in human machine interfaces. Researchers in this field are interested in developing techniques to interpret, code facial expressions and extract these features in order to have a better prediction by computer.

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**Chapter-1**

# INTRODUCTION

Emotion recognition is one of the many facial recognition technologies that have developed and grown through the years. Currently, facial emotion recognition software is used to allow a certain program to examine and process the expressions on a human's face. Using advanced image dispensation, this software functions like a human brain that makes it capable of recognizing emotions too.

Human emotion detection is implemented in many areas requiring additional security or information about the person. It can be seen as a second step to face detection where we may be required to set up a second layer of security, where along with the face, the emotion is also detected. This can be useful to verify that the person standing in front of the camera is not just a 2-dimensional representation. Another important domain where we see the importance of emotion detection is for business promotions. Most of the businesses thrive on customer responses to all their products and offers. If an artificial intelligent system can capture and identify real time emotions based on user image or video, they can make a decision on whether the customer liked or disliked the product or offer. We have seen that security is the main reason for identifying any person. It can be based on finger-print matching, voice recognition, passwords, retina detection etc. Identifying the intent of the person can also be important to avert threats. This can be helpful in vulnerable areas like airports, concerts and major public gatherings which have seen many breaches in recent years. Human emotions can be classified as:Anger, Surprise, Sad, Happy, and Neutral.

Fig1.Emotions

Facial muscle contortions are very minimal and detecting these differences can be very challenging as even a small difference results in different expressions . Also, expressions of different or even the same people might vary for the same emotion, as emotions are hugely context dependent . While we can focus on only those areas of the face which display a maximum of emotions like around the mouth and eyes ,how we extract these gestures and categorize them is still an important question. Neural networks and machine learning have been used for these tasks and have obtained good results.Machine learning algorithms have proven to be very useful in pattern recognition and classification. The most important aspects for any machine learning algorithm are the features. In this paper we will see how the features are extracted and modified for algorithms like Harcasscade classifier,Local Binary Pattern Histogram. We will compare algorithms and the feature extraction techniques from different papers. The human emotion dataset can be a very good example to study the robustness and nature of classification algorithms and how they perform for different types of dataset.

## Chapter-2

## Objective

Facial Emotion Recognition is a technology used for analysing sentiments by different sources, such as pictures and videos. It belongs to the family of technologies often referred to as 'affective computing', a multidisciplinary field of research on computer's capabilities to recognise and interpret human emotions and affective states and it often builds on Artificial Intelligence technologies.

Facial expressions are forms of non-verbal communication, providing hints for human emotions. For decades, decoding such emotion expressions has been a research interest in the field of psychology (Ekman and Friesen 2003; Lang et al. 1993) but also to the Human Computer Interaction field (Cowie et al. 2001; Abdat et al. 2011). Recently, the high diffusion of cameras and the technological advances in biometrics analysis, machine learning and pattern recognition have played a prominent role in the development of the FER technology.

## Chapter-3

## Literature Review

In this survey, a systematic literature review of the state-of-the-art on emotion expression recognition from facial images is presented. The paper has as main objective arise the most commonly used strategies employed to interpret and recognize facial emotion expressions, published over the past few years. For this purpose, a total of 51 papers were analyzed over the literature totaling 94 distinct methods, collected from well-established scientific databases (ACM Digital Library, IEEE Xplore, Science Direct and Scopus), whose works were categorized according to its main construction concept. From the analyzed works, it was possible to categorize them into two main trends: classical and those approaches specifically designed by the use of neural networks. The obtained statistical analysis demonstrated a marginally better recognition precision for the classical approaches when faced to neural networks.counterpart, but with a reduced capacity of generalization. Additionally, the present study verified the most popular datasets for facial expression and emotion recognition showing the pros and cons each and, thereby, demonstrating a real demand for reliable data-sources regarding artificial and natural experimental environments.

## Chapter-4

## Existing Method

### 4.1-OpenCV

OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software 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. Being an Apache 2 licensed product, OpenCV makes it easy for businesses to utilize and modify the code.

The library has more than 2500 optimized algorithms, which includes a comprehensive set of both classic and state-of-the-art computer vision and machine learning algorithms. These algorithms can be used to detect and recognize faces, identify objects, classify human actions in videos, track camera movements, track moving objects, extract 3D models of objects, produce 3D point clouds from stereo cameras, stitch images together to produce a high resolution image of an entire scene, find similar images from an image database, remove red eyes from images taken using flash, follow eye movements, recognize scenery and establish markers to overlay it with augmented reality, etc. OpenCV has more than 47 thousand people of user community and estimated number of downloads exceeding 18 million . The library is used extensively in companies, research groups and by governmental bodies.

Along with well-established companies like Google, Yahoo, Microsoft, Intel, IBM, Sony, Honda, Toyota that employ the library, there are many startups such as Applied Minds, VideoSurf, and Zeitera, that make extensive use of OpenCV. OpenCV's deployed uses span the range from stitching streetview images together, detecting intrusions in surveillance video in Israel, monitoring mine equipment in China, helping robots navigate and pick up objects at Willow Garage, detection of swimming pool drowning accidents in Europe, running interactive art in Spain and New York, checking runways for debris in Turkey, inspecting labels on products in factories around the world on to rapid face detection in Japan.

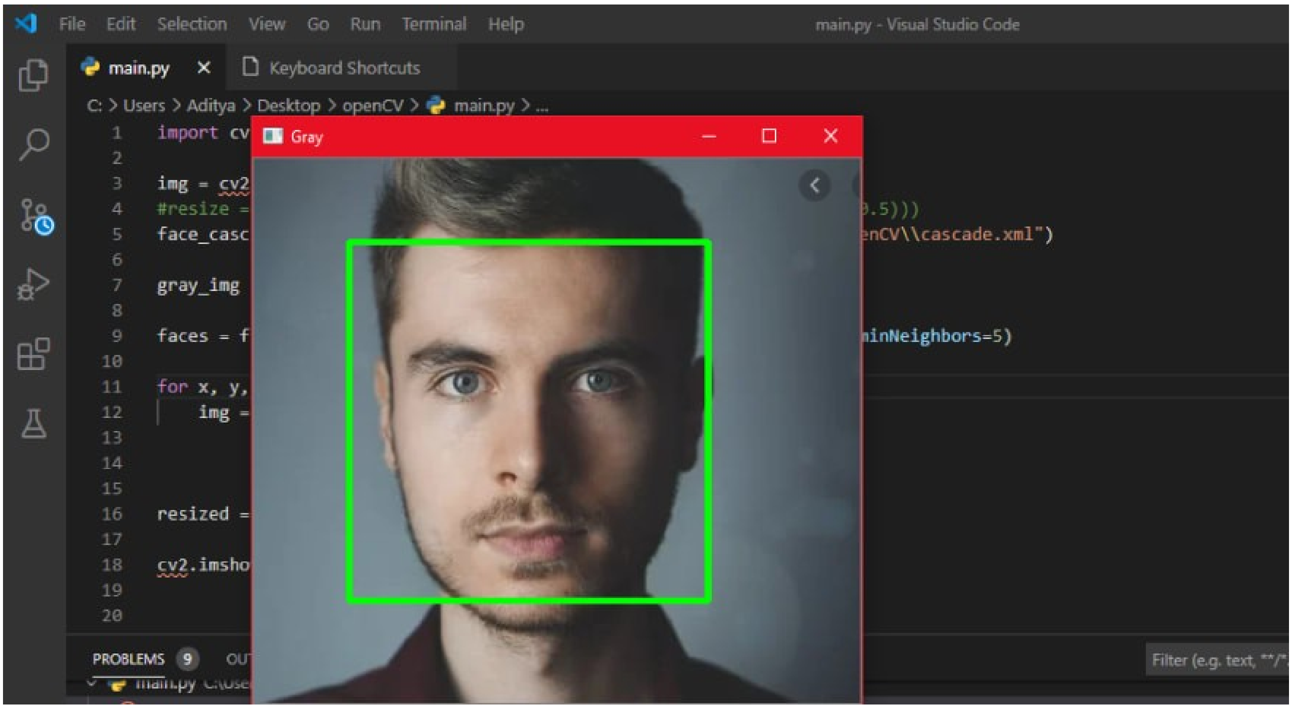



Fig2.Opencv detection

It has C++, Python, Java and MATLAB interfaces and supports Windows, Linux,Android and Mac OS. OpenCV leans mostly towards real-time vision applications and takes advantage of MMX and SSE instructions when available. A full-featured CUDA and OpenCL interfaces are being actively developed right now. There are over 500 algorithms and about 10 times as many functions that compose or support those algorithms. OpenCV is written natively in C++ and has a templated interface that works seamlessly with STL containers.

## 4.2-Harcascade

It is an Object Detection Algorithm used to identify faces in an image or a real time video.The algorithm uses edge or line detection features proposed by Viola and Jones in their research paper “Rapid Object Detection using a Boosted Cascade of Simple Features” published in 2001. The algorithm is given a lot of positive images consisting of faces, and a lot of negative images not consisting of any face to train on them. The model created from the training is available at the OpenCV GitHub repository.The repository has the models stored in XML files, and can be read with the OpenCV methods. These include models for face detection, eye detection, upper body and lower body detection, license plate detection etc.

Haar Cascade Detection is one of the oldest yet powerful face detection algorithms invented. It has been there since long, long before Deep Learning became famous. Haar Features were not only used to detect faces, but also for eyes, lips, license number plates etc. The models are stored on GitHub, and we can access them with OpenCV methods.Haar cascade is an algorithm that can detect objects in images, irrespective of their scale in image and location.This algorithm is not so complex and can run in real-time. We can train a haar-cascade detector to detect various objects like cars, bikes, buildings, fruits, etc.Haar cascade uses the cascading window, and it tries to compute features in every window and classify whether it could be an object.

Sample haar features traverse in window-sized across the picture to compute and match features.

Haar cascade works as a classifier. It classifies positive data points  that are part of our detected object and negative data points that don’t contain our object.

•Haar cascades are fast and can work well in real-time.

•Haar cascade is not as accurate as modern object detection techniques are.

•Haar cascade has a downside. It predicts many false positives.

•Simple to implement, less computing power required.

Haar Cascade classifiers are an effective way for object detection. This method was proposed by Paul Viola and Michael Jones in their paper rapid object detectionusing a boosted cascade of simple features.Haar Cascade is a machine learning-based approach where a lot of positive and negative images are used to train the classifier.

•Positive images –These images contain the images which we want our classifier to identify.

•Negative Images –Images of everything else, which do not contain the object we want to detect.

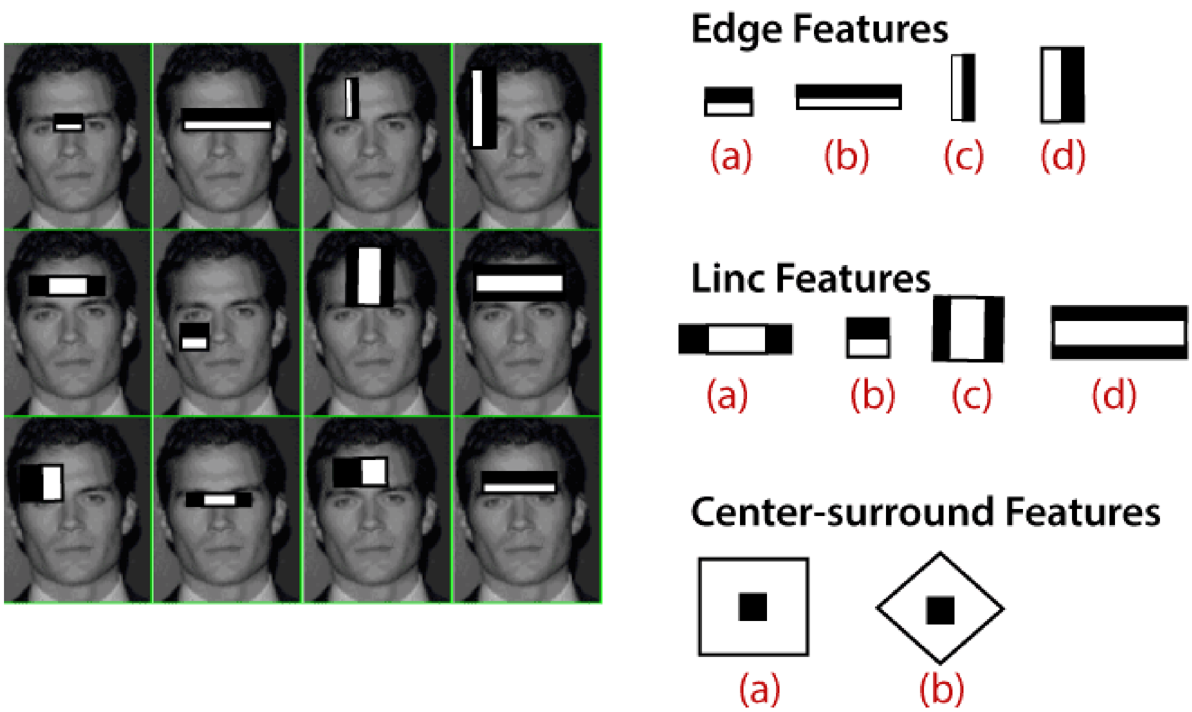



Fig3.Harcascade detection

Facial Recognition is the biometric technique used in face detection. The task for validating or recognizing a face from the multi-media photographs is done using facial recognition technique. With the evolution of advanced society the requirement for face identification has been really important. Detection and identification of faces has been grown worldwide. It owes the demand for security such as authorization, national safety and other vital circumstances. There are number of algorithms for facial detection. This paper aspires to present the comparison of two face recognition techniques Haar Cascade and Local Binary Pattern edified for the classification. As a result the accuracy of Haar Cascade is more than the Local Binary Pattern but the execution time in Haar Cascade is more than Local Binary Pattern.

Facial images and video can be captured anywhere, thanks to the ubiquity and small size of cameras. Surveillance cameras in public spaces or stores are not the only cameras remotely capturing facial images as one's own mobile devices can capture expressions during their use. In these situations, transparency issues arise concerning both the collection and the further processing of personal data. Where the data subjects' facial expressions are captured in a remote manner, it may not be clear to them which system or application will process their data, for which purposes, and who the controllers are. As a result, they would not be in the position to freely give consent or exercise control over the processing of their personal data, including sharing with third-parties. Where data subjects are not provided with accurate information, access and control over the use of FER, they are deprived of their freedom to select which aspects of their life can be used to affect other contexts (e.g. emotions in social interactions could be used in the context of recruitment). Moreover, data subjects need to control which periods of time their captured data will be processed and aggregated to history records of their emotional situation, as emotion inferences may not be valid for them after a period of time. Another consequence of the remote capture of facial expressions and the obscurity of their processing is that data subjects might not be provided with information on which other sources of data these will be aggregated to. Also, advanced AI algorithms add to the complexity of transparency needs, as they may detect slight movements of facial muscle that are unconscious even for the individuals. This would contribute to the unpleasant feeling of vulnerability due to unwanted exposure.

**Chapter-5**

## Proposed Method

### 5.1- Git Clone

Git Clone is primarily used to point to an existing repo and make a clone or copy of that repo at in a new directory, at another location. The original repository can be located on the local filesystem or on remote machine accessible supported protocols. The git clonecommand copies an existing Git repository. This is sort of like SVN checkout, except the “working copy” is a full-fledged Git repository—it has its own history, manages its own files, and is a completely isolated environment from the original repository.As a convenience, cloning automatically creates a remote connection called "origin" pointing back to the original repository. This makes it very easy to interact with central repository.

In Git, cloning is the act of making a copy of any target repository. The target repository can be remote or local. You can clone your repository from the remote repository to create a local copy on your system. Also, you can sync between the two locations.The git clone is a command-line utility which is used to make a local copy of a remote repository. It accesses the repository through a remote URL.Usually, the original repository is located on a remote server, often from a Git service like GitHub, Bitbucket, or GitLab. The remote repository URL is referred to the origin.

The git clone command is used to create a copy of a specific repository or branch within a repository.

Git is a distributed version control system. Maximize the advantages of a full repository on your own machine by cloning.

When you clone a repository, you don't get one file, like you may in other centralized version control systems. By cloning with Git, you get the entire repository - all files, all branches, and all commits.

Cloning a repository is typically only done once, at the beginning of your interaction with a project. Once a repository already exists on a remote, like on GitHub, then you would clone that repository so you could interact with it locally. Once you have cloned a repository, you won't need to clone it again to do regular development.

The ability to work with the entire repository means that all developers can work more freely. Without being limited by which files you can work on, you can work on a feature branch to make changes safely. Then, you can:

- later use git push to share your branch with the remote repository
- open a pull request to compare the changes with your collaborators
- test and deploy as needed from the branch
- merge into the main branch.

Every human has emotions in life at all phases of life's moment or instance. These emotions keep changing ever so often and person to person because of the biological reflexes of human brain produced by the nervous system due to the neurophysiological changes which are closely associated with behavior, mood swings; thoughts, etc. are tending to be reflected as an expression on the human face. The application of study of these emotions of humans using facial expressions became very prominent in the fields of biomedical engineering, neuroscience, product screening, marketing, and advertisement, etc. In early works of emotion recognition is for the most part useful for analyzing product reviews or some methodologies by monitoring videos and images in real time. Imparting artificial intelligence to the future of the world where every industry thrives well. In recent years, progressive growth in artificial intelligence is seen especially in the field of machine learning with the predominant subset called deep learning. Mainly, deep learning algorithms made an overriding burgeon in image classification thereby avoiding the complex process in facial recognition. The framework proposed in this paper describes conceptual and theoretical knowledge for human facial emotion recognition with a labeled model and applying a Haar cascade classifier using CNN classification—a class in deep neural networks used in its implementation.

### 5.2- LBPHFaceRecogniser

Human beings perform face recognition automatically every day and practically with no effort. Although it sounds like a very simple task for us, it has proven to be a complex task for a computer, as it has many variables that can impair the accuracy of the methods, for example: illumination variation, low resolution, occlusion, amongst other. In computer science, face recognition is basically the task of recognizing a person based on its facial image. It has become very popular in the last two decades, mainly because of the new methods developed and the high quality of the current videos/cameras.

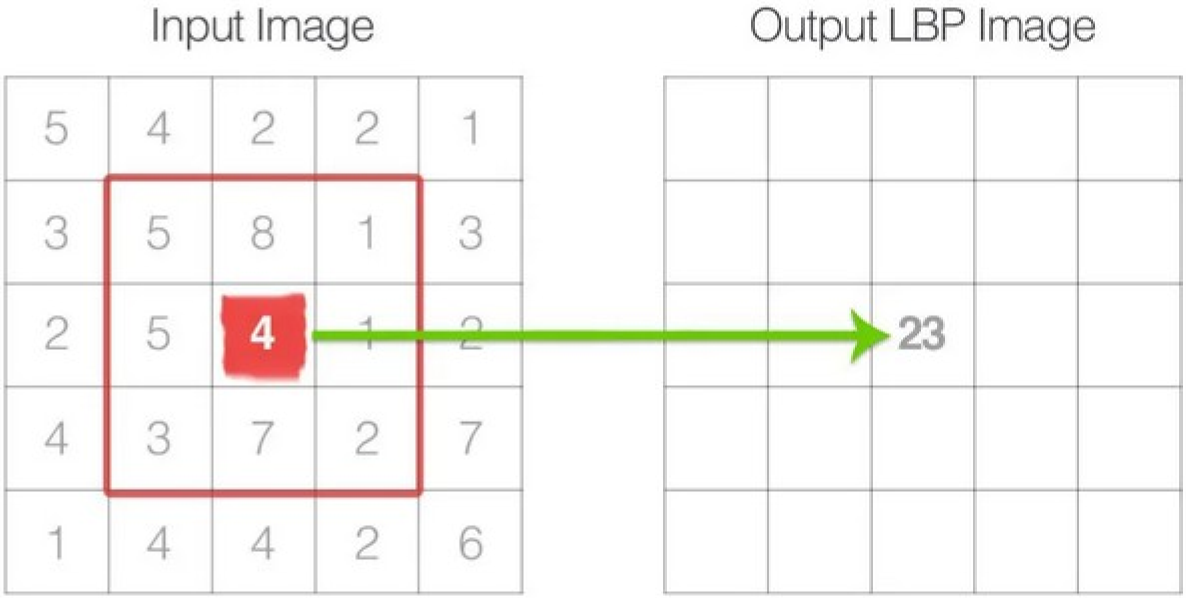



Fig4:LBPHistogram

Note that face recognition is different of face detection:

- **Face Detection**: it has the objective of finding the faces (location and size) in an image and probably extract them to be used by the face recognition algorithm.
- **Face Recognition**: with the facial images already extracted, cropped, resized and usually converted to grayscale, the face recognition algorithm is responsible for finding characteristics which best describe the image.

The face recognition systems can operate basically in two modes:

- **Verification or authentication of a facial image**: it basically compares the input facial image with the facial image related to the user which is requiring the authentication. It is basically a 1x1 comparison.
- **Identification or facial recognition**: it basically compares the input facial image with all facial images from a dataset with the aim to find the user that matches that face. It is basically a 1xN comparison.

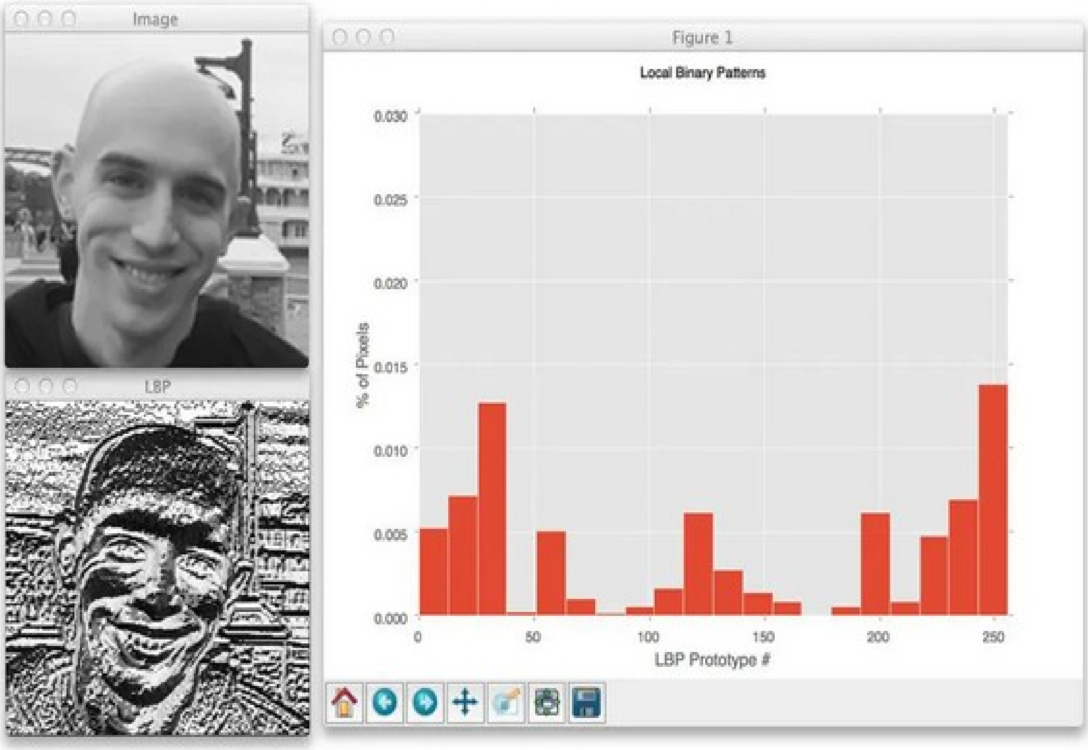



Fig5:LBP Prototype

Local Binary Pattern(LBP) is a simple yet very efficient texture operator which lables the pixles of an mage by thresholding the neighbourhood of each pixel and considers the reuslt as a binary number. It was first described in 1994 (LBP) and has since been found to be a powerful feature for texture classification. It has further been determined that when LBP is combined with histograms of oriented gradients (HOG) descriptor, it improves the detection performance considerably on some datasets. Using the LBP combined with histograms we can represent the face images with a simple data vector.

As LBP is a visual descriptor it can also be used for face recognition tasks, as can be seen in the following step-by-step explanation.

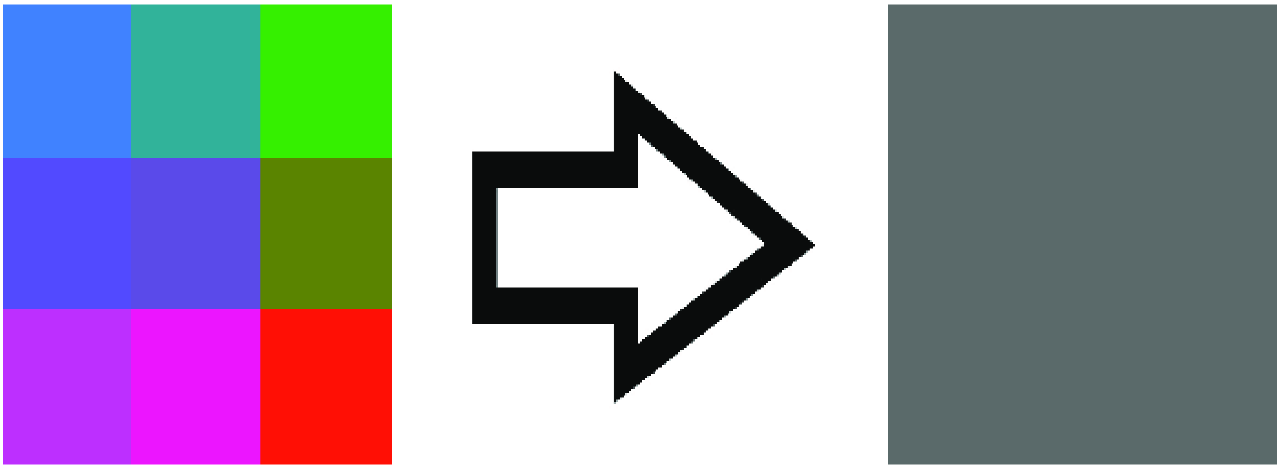
LBPH is one of the easiest face recognition algorithms.

- It can represent local features in the images.
- It is possible to get great results (mainly in a controlled environment).
- It is robust against monotonic gray scale transformations.
- It is provided by the OpenCV library (Open Source Computer Vision Library)

## Chapter-6

### Feature Selection&Extraction

Facial expressions play a significant role in describing the emotions of a person. Due to its applicability to a wide range of applications, such as human-computer interaction, driver status monitoring, etc. Facial Expression Recognition (FER) has received substantial attention among the researchers. According to the earlier studies, a small feature set is used for the extraction of facial features for FER system. To date, a systematic comparison of the facial features does not exist. Therefore, in the current research, we identified 18 different facial features (cardinality of 46,352) by reviewing 25 studies and implemented them on the publicly available Extended-Cohn-Kanade (CK+) dataset. After extracting facial features, we performed Feature Selection (FS) using Joint Mutual Information (JMI), Conditional Mutual Information Maximization (CMIM) and MaxRelevance Min-Redundancy (MRMR) and explain the systematic comparison between them, and for classification, we applied various machine learning techniques. The Bag of Visual Words (BoVW) model approach results in significantly higher classification accuracy over the formal approach. Also, we found that the optimal classification accuracy for FER can be obtained by using only 20% of the total identified features. Grey comatrix and haralick features were explored for the first time for the FER and grey comatrix feature outperformed several most commonly used features Local Binary Pattern (LBP) and Active Appearance Model (AAM). Histogram of Gradients (HOG) turns out to be the most significant feature for FER followed Local Directional Positional Pattern (LDSP) and grey comatrix.



(a) RGB pixels. (b) Grayscale pixels.

Fig6:RGB to Gray conversion

FER technology can detect the existence, changes or total lack of facial expressions, and link this to an emotional state. As a result, in some contexts, algorithms may infer special categories of personal data, such as political opinions or health data. For instance, applying FER technology at political events, political attitudes can be inferred by looking at facial expressions and reactions of the audience. Also, by the lack of facial expressions, algorithms are able to detect signs of alexithymia, a state in which one cannot understand the feelings they experience or lack the words to describe these feelings.

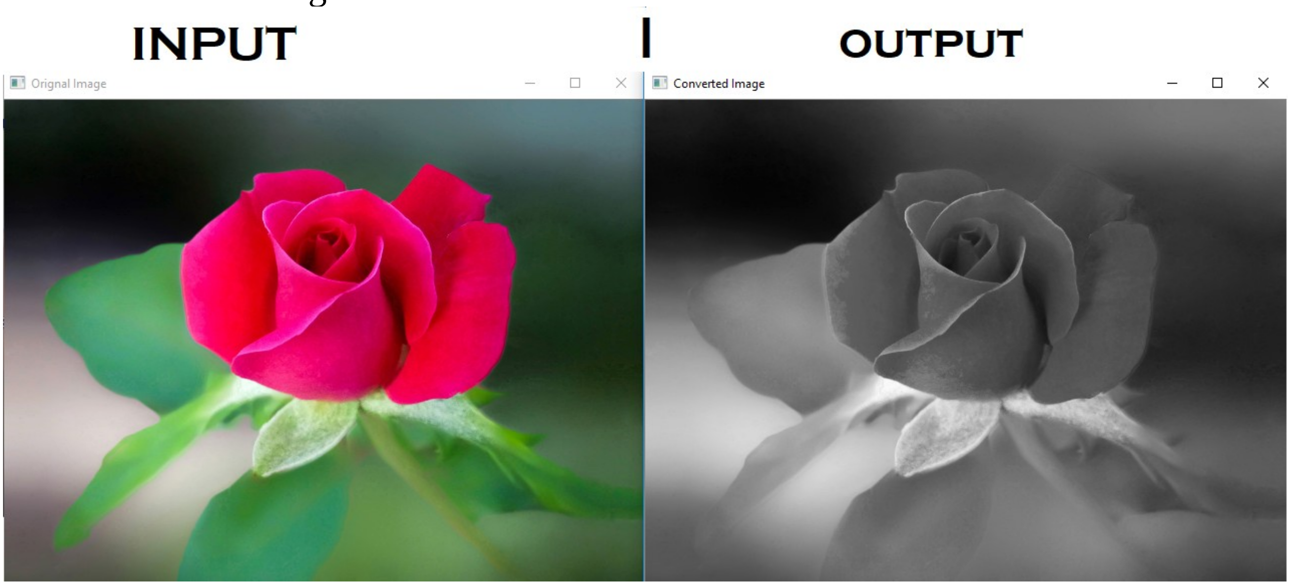



Fig7:RealtimeRGB to Gray conversion

This finding can be linked to severe psychiatric and neurological disorders, such as psychosis. Furthermore, analysis of historical data on one’s emotional state may reveal other health conditions such as depression. Such data, if used in the context of healthcare, could assist in prediction and timely treatment of a patient. However, where data subjects are not able to control the flow of derived information and its use in other contexts, they may face a situation of inference and use of such sensitive personal data by non-authorised entities, such as employers or insurance companies.

### 6.1- Face Detection and Emotion Recognition Using Machine Learning

1.Collecting images with expressions:

This stage refers to collecting the images from various sources to train and test the data.Here we use git clone command to collect images from the github.

2.Feature selection: This stage refers to attribute selection for the training of the machine learning algorithm. The process includes the selection of predictors for construction of the learning system. It helps in improving prediction rate, efficiency, and cost-effectiveness.

3.Feature classification: When it comes to supervised learning algorithms, classification consists of two stages. Training and classification, where training helps in discovering which features are helpful in classification. Classification is where one comes up with new examples and, hence, assigning them to the classes that are already made through training the features.Classifying the images into the folders with respective emotion it exhibits.

3.Training our classifier: Machine learning requires numerical data for learning and training. During feature extraction, processing is done to transform arbitrary data, text or images, to gather the numerical data.The images are trained based on their emotion and written with emotion id. Algorithms used in this step include image processing using local binary pattern recognition,harcasscade classifier,opencv etc.

4.Classifiers: This is the final step in this process. Based on the inference from the features, the algorithm performs data classification. It comprises classifying the emotions into a set of predefined emotion categories or mapping to a continuous space where each point corresponds to an expressive trait. It uses various algorithms such as harcasccade classifier,Local binary pattern histogram .

5.Recognition of expression in new images:Now we use  images with different emotions to detect.According to the training of the images with emotion classification.The computer will detect the emotion and presents its confidence level.

**6.2.OUTPUT:**

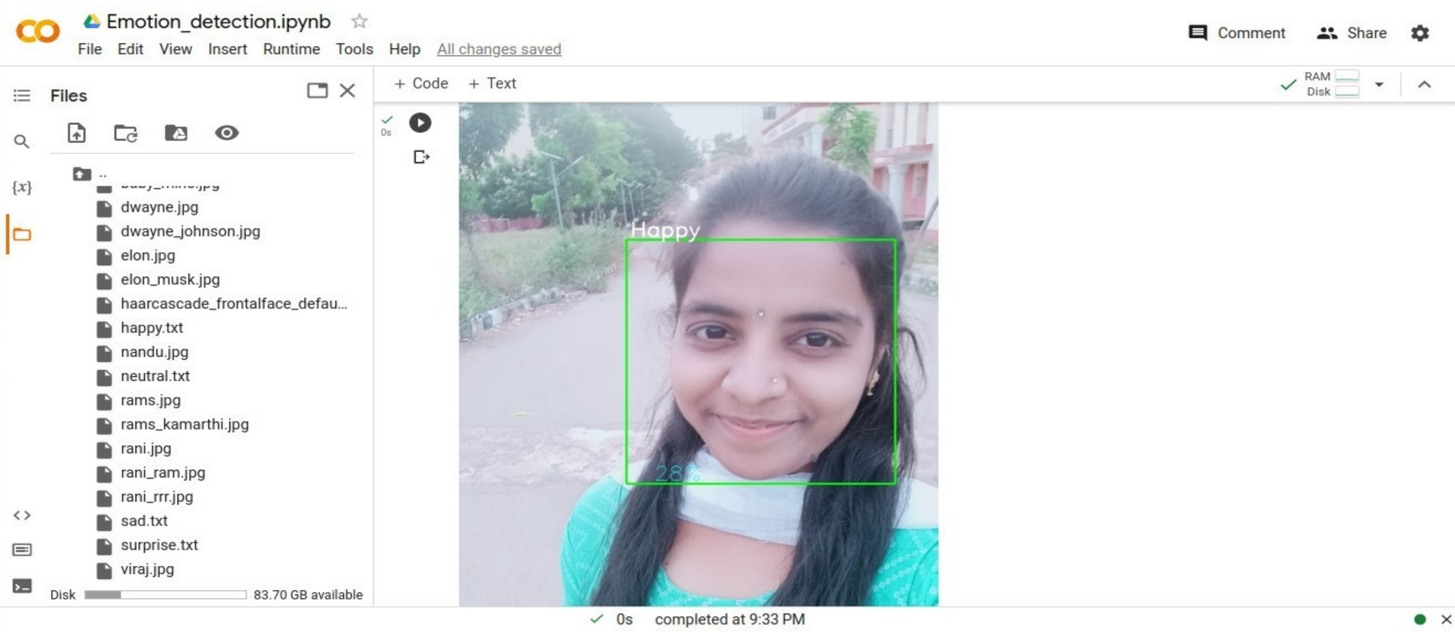



**Fig8:Happy Face**

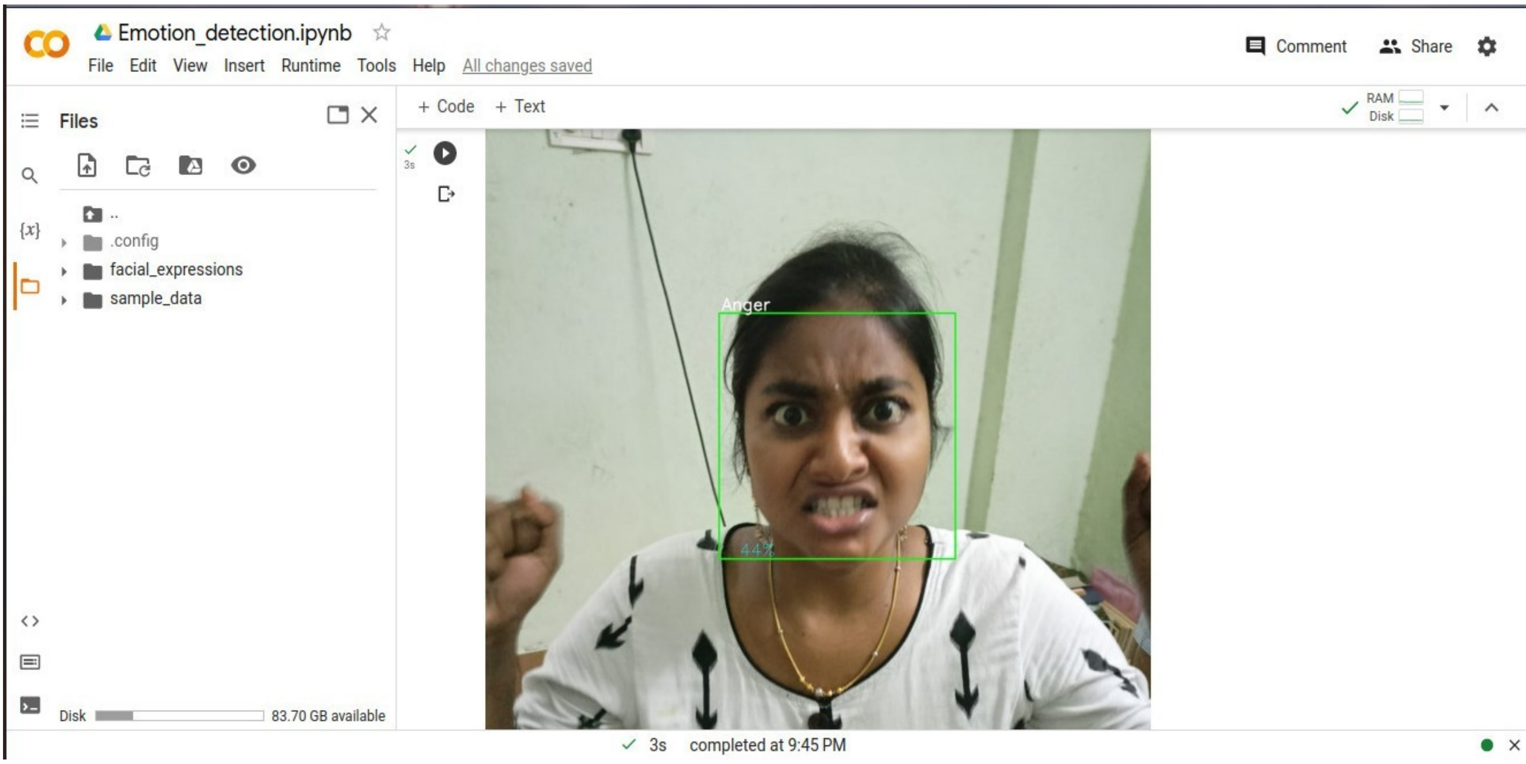



**Fig9:Angry Face**

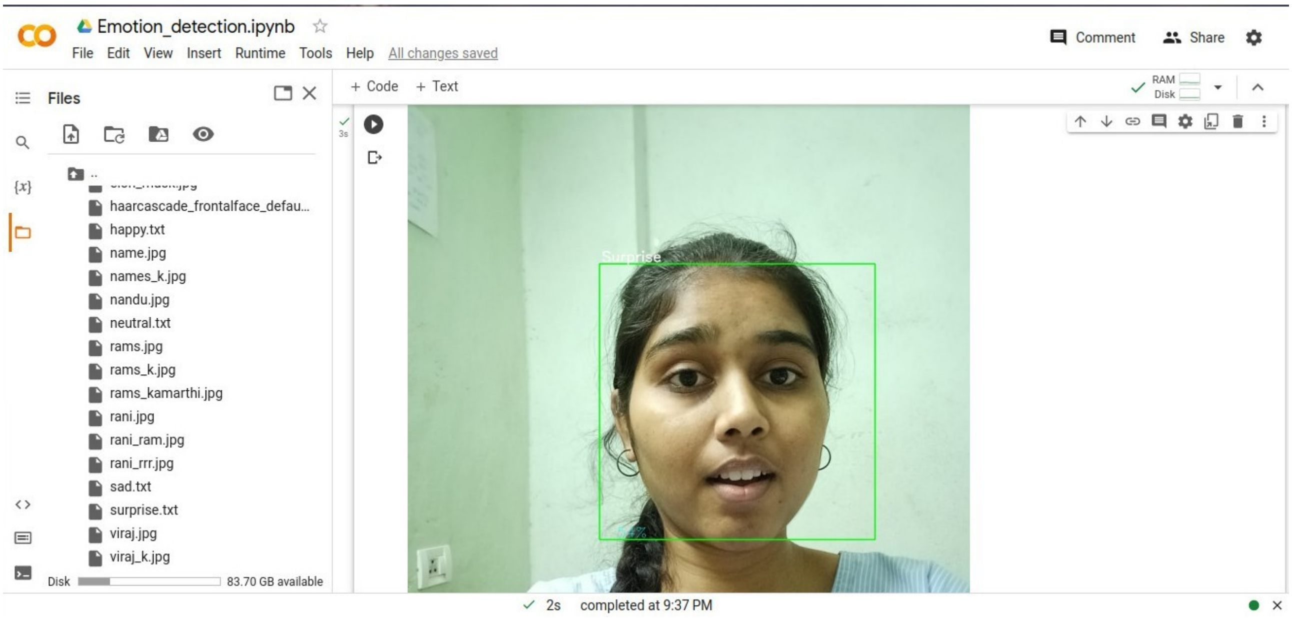



**Fig10:Surprise Face**

**Chapter-7**

## Future Scope

Going forward more research and more information about facial recognition and emotion detection will be looked in to. Now that the facial recognition software and base classifier has been successfully implemented, the next step is to get the program to be able to detect even more emotions. Currently there exists four total databases: happy, sad, surprised, and angry. However, due to an insufficient amount of images for the other three emotions, the classifier is not completely accurate and does detect those emotions well. Getting those classifiers going well should not be too daunting of a tasks sense that is simply a matter of finding even more reliable images. Ideally each database will have approximately 300 images. The happy database is at 155 as of right now and seeing as how it already works pretty well, doubling the size of the database should increase the accuracy even more. Increasing the size of each database is not the only project going forward. The next big step is for the program to display via text what the emotion is instead of just generating a circle around the distinguishing trait of a given emotion. This will be more user friendly and will alleviate any uncertainty as to what the circles represent. Another future task is to change the way the classifier is called within the program. As is stands at the moment, the programmer has to go in and change the classifier based on what emotion is desired. The software would ideally be able to scan the image, find the face, and determine what the emotion is without having to pre-select the classifier.

Chapter-8

# Conclusion

Our implementation can roughly be divided into 3 parts:

1) Face detection
2) Feature extraction
3) Classification using machine learning algorithms

In identification methods face recognition is one amongst them. It is one of the major applications compared to other different identification ways like the fingerprint, iris scanner and RFID. The clear image and correct pose may increase the face recognition accuracy. The current work is based on the face recognition system, where the two algorithms Haar Cascade and Local Binary Pattern Classifiers are compared. In which the conclusion is that the Haar cascade classifier is more accurate than the LBP classifier. This will help the people to choose the best algorithm for their work. The disadvantage of the classifiers is that it doesn't detect the face of the children. This can be the future implementation.

The face detection and emotion recognition are very challenging problems. They require a heavy effort for enhancing the performance measure of face detection and emotion recognition. This area of emotion recognition is gaining attention owing to its applications in various domains such as gaming, software engineering, and education. This paper presented a detailed survey of the various approaches and techniques implemented for those approaches to detect human facial expressions for identification of emotions. Furthermore, a brief discussion on the combination of steps involved in a machine learning based approach and geometric-based approach for face detection and emotion recognition along with classification were described. While reporting this survey, a comparison of accuracies was made for the databases that were used as datasets for training and testing. Different kinds of databases were described in detail to give a brief outline of how the datasets were made, whether they were posed or spontaneous, static or dynamic, experimented in a lab or non-lab conditions and of how diverse the datasets are. A conclusion derived from this survey of databases is that RGB databases lack the intensity labels, making it less convenient for the experiments to be performed and, hence, compromises on the efficiency. The drawbacks of thermal databases are that it does not work with pose variation, variation in temperature, aging and different scaling (e.g., identical twin problem). Disguises cannot be captured if the person has put on glasses. Thermal images have a very low resolution, which affects the database quality. The 3D databases are not available in abundance to perform experiments and improve accuracy. The accuracies of different algorithms with these databases were also mentioned, which showed that there is scope for improvement in the field of emotion recognition regarding accuracy and for detecting subtle micro-expressions.

**Chapter-9**

# Appendix

```
!git clone https://github.com/misbah4064/facial_expressions.git
%cd facial_expressions/
%mkdir -p data_set/{anger,happy,neutral,sad,surprise}
import cv2
with open('happy.txt','r') as f:
img = [line.strip() for line in f]
for image in img:
loadedImage = cv2.imread("images/"+image)
cv2.imwrite("data_set/happy/"+image,loadedImage)
print("done writing")
%mkdir dataset
import cv2

with open('happy.txt','r') as f:
images = [line.strip() for line in f]

face_detector = cv2.CascadeClassifier('haarcascade_frontalface_default.xml')
face_id = input('\n Enter Emotion id end press <return> ==> ')

count = 0

for image in images:
img = cv2.imread("data_set/happy/"+image)
gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)
faces = face_detector.detectMultiScale(gray, 1.3, 5)

for (x,y,w,h) in faces:

cv2.rectangle(img, (x,y), (x+w,y+h), (255,0,0), 2)
count += 1
cv2.imwrite("dataset/User." + str(face_id) + '.' + str(count) + ".jpg",
gray[y:y+h,x:x+w])

print("\n Done creating face data)
import cv2
import numpy as np
from PIL import Image
```

```
import os
path = 'dataset'

recognizer = cv2.face.LBPHFaceRecognizer_create()
detector = cv2.CascadeClassifier("haarcascade_frontalface_default.xml");

def getImagesAndLabels(path):

imagePaths = [os.path.join(path,f) for f in os.listdir(path)]
faceSamples=[]
ids = []

for imagePath in imagePaths:

PIL_img = Image.open(imagePath).convert('L')
img_numpy = np.array(PIL_img,'uint8')

id = int(os.path.split(imagePath)[-1].split(".")[1])
faces = detector.detectMultiScale(img_numpy)

for (x,y,w,h) in faces:
faceSamples.append(img_numpy[y:y+h,x:x+w])
ids.append(id)

return faceSamples,ids

print ("\n [INFO] Training faces....")
faces,ids = getImagesAndLabels(path)
recognizer.train(faces, np.array(ids))

recognizer.write('trainer/trainer.yml')
print("\n [INFO] {0} Emotions trained. Exiting
Program".format(len(np.unique(ids))))
import cv2
import numpy as np
import os


recognizer =cv2.face.LBPHFaceRecognizer_create()
recognizer.read('trainer/trainer.yml')
cascadePath = "haarcascade_frontalface_default.xml"
```

```
faceCascade =cv2.CascadeClassifier(cascadePath)

font = cv2.FONT_HERSHEY_SIMPLEX
id = 0
names = ['Anger', 'Happy', 'Neutral', 'Sad', 'Surprise', 'None']

cam =cv2.VideoCapture(0)
cam.set(3,640) # set video widht
cam.set(4,480) # set video height

minW =0.1*cam.get(3)
minH =0.1*cam.get(4)

img =cv2.imread("sad.ipg")
img =cv2.flip(img, -1)

gray =cv2.cvtColor(img,cv2.COLOR_BGR2GRAY)

faces =faceCascade.detectMultiScale(gray,
    scaleFactor =1.2,
    minNeighbors = 5,
    minSize = (int(minW), int(minH)),)

for(x,y,w,h) in faces:

cv2.rectangle(img, (x,y), (x+w,y+h), (0,255,0), 2)

id, confidence =recognizer.predict(gray[y:y+h,x:x+w])

 if (confidence <100):
 id = names[id]
confidence = " {0}%".format(round(100- confidence))
```

```
else:
id = "unknown"
confidence = " {0}%".format(round(100- confidence))

cv2.putText(img, str(id), (x+5,y-5), font, 1, (255,255,255), 2)
cv2.putText(img, str(confidence), (x+5,y+h-5), font, 1, (255,255,0), 1)

cv2.imwrite("sad e.jpg",img)

print("\n [INFO] Done detecting and Image is saved")
cam.release()
cv2.destroyAllWindows()
import cv2
import matplotlib.pyplot as plt
%matplotlib inline

image = cv2.imread("dwayne_johnson.jpg")
height, width = image.shape[:2]
resized_image = cv2.resize(image,(3*width, 3*height), interpolation =
cv2.INTER_CUBIC)

fig = plt.gcf()
fig.set_size_inches(18, 10)
plt.axis("off")
plt.imshow(cv2.cvtColor(resized_image, cv2.COLOR_BGR2RGB))
plt.show()
```

**Chapter-10**

# References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