

# Psychopathy Traits from an Image Using Neuro Fuzzy Technique

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## ABSTRACT

Face is a primary focus of attention in social intercourse, playing a major role in conveying identity and emotion. The human ability to recognize faces is remarkable. People can recognize thousands of faces learned throughout their lifetime and identify familiar faces at a glance even after years of separation. We developed a method to extract a facial feature that is most important part of our face. Fuzzy logic variables were used instead of neural network to represent the approximate distance between features extracted. An artificial neural network was used to use fuzzy logic to extract the feature and used to recognize a facial image in the recognition phase. The face recognizer could recognize all learned persons correctly in spite of variations. This method is quite robust, despite large changes in the visual stimulus due to viewing conditions, expression, and aging. In this work, a system recognizes human faces depending on their facial features. In addition, to reveal the outline of the face, eyes and nose, cascade, integral image technique has been used. After normalization, these feature vectors are learned by artificial neural network and fuzzy logic and used to recognize facial image.

**Keywords:-** IES-image expression system, FAR-facial affect recognition, FRM-facial recognition method.

## I. INTRODUCTION

Psychopathy is a person's own personality disorganization having discrete attributes: prolific liar, egocentricity, irresponsibility, criminality and parasitic lifestyle. They are very tough to associate to society because their humour is missing. To find out the changes and better in psychopath people, weakness is developed by operating with other people. The structure of psychopathic and criminal behaviour shows up connected with loss in emotional processing. It is recommended that the impact of different character, faces of psychopathy in facial affect recognition. The latest examined the capability of human being to obtain the characteristic of psychopaths by unique facial affect recognition of emotion and how it affects their antisocial behaviour from other people. Emotional expression remarks regulate the relational presence

[1] [2] [3]. Research determined the correlation between the facial affect recognition and psychopathy disorder deficiency. Find out all the data set regarding to their facial emotions then extract and detect the image. Frequently change in behaviour and anger is become the cause of psychopaths [4].

Emotion represents a psychological state of the human mind. Researchers from different domains have diverse opinions about the developmental process of emotion. Philosophers believe that emotion originates because of substantial (positive or negative) changes in our personal situations or

environment. Biologists, however, consider our nervous and hormonal systems responsible for the development of emotions [5] [6]. Although there are conflicts in the developmental process of emotion, experimental psychologists reveal that a change in our external or cognitive states carried by neuronal signals triggers our hormonal glands. In human body, face is a most important one which identifies the person easily. But rather than there, from many years there are lots of human ability to identify the human and distinguish between the different faces from millions of decades and so many software and technologies are developed today. Computers are just capturing the human face and identify the person within a minute [7] [8] [9]. However, we work on the accuracy and the timing of computing the image in FRM. A facial expression is a gesture executed with the facial muscles, which convey the emotional state of the subject to observers. An expression sends a message about a person's internal feeling [10] [11].

## II. RELATED WORK

[1] S. ben Vacoub, J. Luttin, J. mates, J. kittler (1999) introduced the benefits of classifier combination (fusion) for a multimodal system for personal identity verification. The system uses frontal face images and speech. Show that a sophisticated fusion strategy enables the system to outperform its facial and vocal modules when taken separately. We show that both trained linear weighted schemes and fusion by Support

[2] **Jennifer E. Vitale, Joseph P. Newman and Steven K. Sutton (2002)** in their paper titled “Emotion among Women with Psychopathy during Picture Perception” published in

2002 Journal of no psychopaths exhibited the typical pattern of eye blink reflex magnitude unpleasant neutral pleasant. Psychopaths with high general levels of anxiety also exhibited

this pattern. Psychopaths with lower anxiety exhibited attenuated reflex magnitudes during unpleasant pictures.

[3] **Mairead dolan and rachael fullam (2006)** in their paper titled “Face affect recognition deficits in personality-disordered offenders: association with psychopathy” published in 2006 Cambridge University Press proposed that

“There is a limited literature examining face affect recognition in offenders. In line with the (IES) model, existing studies suggest a psychopathy-related deficit in sad/fear recognition.

[4] **Anthony walsha and huei hsia wubin (2008)** proposed that the separate but overlapping constructs of psychopathy, sociopathy, and antisocial personality disorder from evolutionary, genetic, neurological, and sociological perspectives indicates can be from any segment of society.

[5] **Kevin Wilson, Stephen porter (2011)** proposed that several studies have identified an association between psychopathy and deficits in FAR. Although this finding is widely seen as providing strong evidence for amygdala dysfunction in psychopaths, this interpretation is challenge by studies finding no recognition impairment.

[6] **Pushpaja V. saudagare et al (2012)** proposed that in many face recognition system the important part is face detection. Classification of face detection and token matching can be carry out any neural network for recognizing the facial expression

[7] **Anjela book, Kimberly Costello and joseph a camilleri (2013)** proposed that previous research has shown that victims display characteristic body language, specifically in their walking style. The present study examines the relation between psychopathy and accuracy in assessing victim vulnerability in a sample of inmates from a maximum-security penitentiary in Ontario, Canada.

[8] **Massil ben bouriche, kevin nolet, Dominique trottier, Patrice renaud (2014)** proposed that Violent disgusting characteristic endure is an essential agreement which

connected with mental disorder. To preventing from recession and save society some investment are need to expand tools that implemented improves treatment to the violent characteristics.

[9] **Dianna ribeir da silva, Daniel rijo, randall , salekin (2015)** proposed that Sprouting interest are there in survey of psychopathy traits but there are absence of absolute inspection survey.. Main points are covered the progression of the brain (old brain, new brain and the emotion logically), emotion coordination, aggression, adaptive function and emotion related to anger, shame, dishonour psychopathy.

**Patel mira y, jaymit pandya, nirav m raja (2016)** proposed that, Age development is growing day by day now a days and result seems as differences in looks of human faces extended take thought of computer vision.

Marie-Hélène Cigna, Jean-Pierre Guay, Patrice Renaud (2017) discussed that the limited set of studies available on facial affect recognition in psychopathic individuals not only differ in their findings but also reveal that the stimuli used to portray emotions have little ecological validity.

### III. METHODOLOGY

#### 1. FACIAL RECOGNITION SYSTEM

##### 1.1 Acquisition: -

In this method first digital image is acquire from the camera in which image having their basic image quality and resolution. High quality image is better for identification and verification of the image. The digital image generally a representation of two-dimensional image with a finite set of

value in digital format that is picture elements or pixels. Pixels values are mainly represent the grey scale value level, their colour, heights, opacities, etc.

Common image format are there:-

- a) Sample per point (black and white or grayscale images)
- b) Sample per point (red, green, blue)
- c) Sample per point (red, green, blue & alpha)

##### 1.2 Pre-processing:-

It is a common name of operation where the image at the lowest level of the abstraction both input and output are intensity of images. Main part of pre-processing is that improvement on the image data that suppressed unwanted distortions or enhance some image feature important for

further processing. It is simply the processing of the image storage transmission of image and representation for an autonomous machine perception.

**Different Stages in digital image acquisition and processing**

**FLOW CHART**

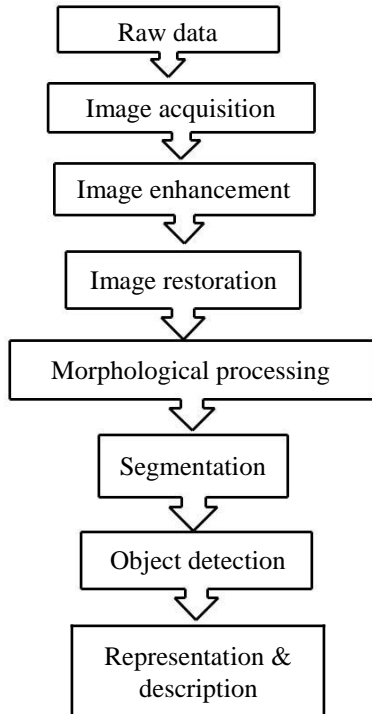


Fig. 1 shows the pre-processing technique.

Face recognition workflow dealing with the large dataset. Real time face recognition is video stream system. It has a database of a facial knowledge and people we want to recognize also known as the face gallery then processing the feature extraction to store the discriminant information about each face in the compact feature vector following learning and modelling basics steps:

**1.3 Object detection: -**

This method recognize & detect the object automatically for their purpose and provide the all qualities of images to the user. The main semantics content of the images is further process to find out the necessary information from the dataset and identification of that datasets is a main purpose. The main part of object detection is representation

- Points: it represent an image with particular point and uses the point to detect or represent an image
- Primitive geometric shape : it shows shape like rectangle, ellipse, can be used to represent object
- Object silhouette & contour: it represent the object boundary & the region inside the contour is call the silhouette of the objects.

Physical or behavioural sample is capture by the system and the detection of the image

**1.4 Face detection:**

It is a technology used in a various application that find human face in digital images to introduce psychological images process which locate the human faces & focus on finding out the frontal human faces that is related to image detection technique where image of a person’s face is matched bit by bit. Algorithm analyse the facial feature extraction or analyse relative position size or cheekbone, smile, shape of the eye etc. These all feature we used to search image with matching feature and any change in the facial feature database will be results in the sense of invalidate the matching process. After detection of feature, there are some key points and interest point. Feature is a piece of information from where we extract the part of interest image. It could be a corner, edges, line, ellipse etc. feature are useful to match two images and to find common points. Machine learning algorithm is use to fit a model of the appearance of the faces in the database. So that we can discriminate between faces of different people in the database. The output of the stage is classifier and model that is use to recognize input images. When we put the input query images then the algorithm is use to find the faces that is located in that image. After that we adjust that image with crop, resize

& normalize the face to match the size of the image used in training faces set of the database.

**1.5 Face recognition: -**

The main important part in our body is our face that play an important role in our environment with our social interaction, finding out the identity of a person though one that use as a security key of a person’s life to recognize. As compared to other system, face recognition having its own different advantages from other systems because of its non-contact process. The image captured by a camera from a distance without touching the person identified and there is no need to identify the person by interacting with them. After the all representation and information of the face then how to recognize the face is main task. If we want that the system automatically find out the face then we build up the completely required database. For each people or person there is different images with their different feature are extract and stored in the database. After that if input images is come as face then the feature extraction and feature detection method is applied on that image and after that comparison is done with each face dataset stored in the database. Then there is our proposed algorithm to deal with further problem with classification. Mainly there are two general application of face recognition

- a) Identification
- b) Verification

Fundamental of pattern recognition:

In general, to operate a system with recognition has to be always need a data set for making a different partition with categories data and compare the similarity between their test data with each category. Generally, the test data called the query when we retrieve the image.

**Flow chart**

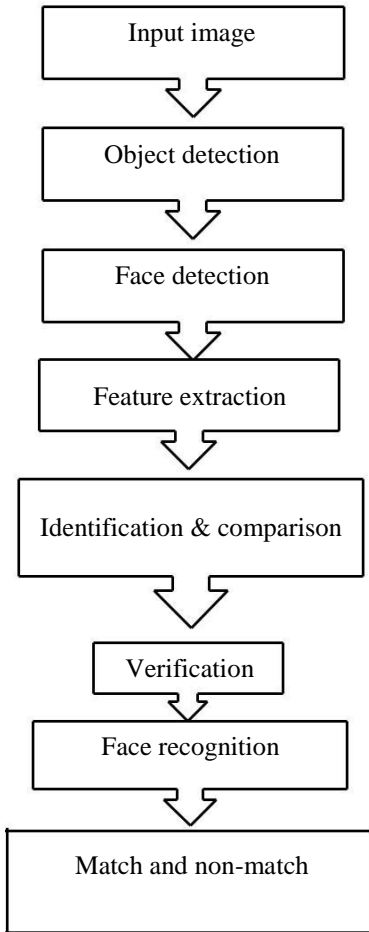


Fig. 2 Flow chart of face recognition.

**2. ALGORITHM:**

**ALGORITHM EMOTION DETECTION**

**Setup**

Initialize required variables  
 Store features like nose, eyes, lips and face of all the images in the dataset to be consider

**Working**

Step1. I ← read image  
 Step2. Loop until all the features are extract  
     Using cascade object detector (Viola Jones Algorithm to detect face) extract  
     Face ← detect face  
     Mouth ← detect mouth  
     Nose ← detect nose  
     Eye ← detect eyes  
 End loop  
 Step3. Loop until features  
     Training ← read all the features stored in training folder End loop  
 Step4. Test ← define extracted features as testing set  
 Step5. Net ← setup neural network with training and testing set  
 Step6. Out ← simulate network  
 Step7. If out match's extracted features then  
     Read fuzzy matrix

Evaluate fuzzy passing output  
 Detect emotion as per the fuzzy rules

End if

**3. Viola Jones Algorithm**

Step1. Haar Feature Selection  
 Step2. Creating an Integral Image  
 Sep3. Ada boost Training Step4. Cascading Classifiers

**4. Fuzzy rules and logic**

1. If (eye is sad) and (mouth is sad) and (nose is sad) and (face is sad) then (emotion is sad) (1)
2. If (eye is sad) and (mouth is neutral) and (nose is neutral) and (face is sad) then (emotion is sad) (1)
3. If (eye is neutral) and (mouth is neutral) and (nose is neutral) and (face is neutral) then (emotion is neutral) (1)
4. If (eye is happy) and (mouth is happy) and (nose is happy) and (face is happy) then (emotion is happy) (1)
5. If (eye is surprised) and (mouth is surprised) and (nose is surprised) and (face is surprised) then (emotion is surprised) (1)
6. If (eye is neutral) and (mouth is happy) and (nose is happy) and (face is neutral) then (emotion is happy) (1)
7. If (eye is surprised) and (mouth is happy) and (nose is happy) and (face is surprised) then (emotion is surprised) (1)
8. If (eye is sad) and (mouth is surprised) and (nose is neutral) and (face is sad) then (emotion is sad) (1)

**IV. RESULTS AND DISCUSSION**

**1. PROPOSED WORK USING FUZZY LOGIC FRAMEWORK**

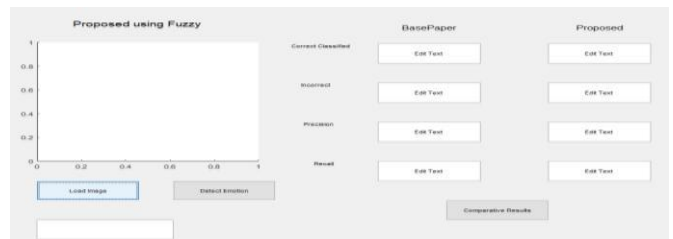


Fig. 3 Proposed Method Framework

**2. DETECTING OF LOADING AN IMAGE**

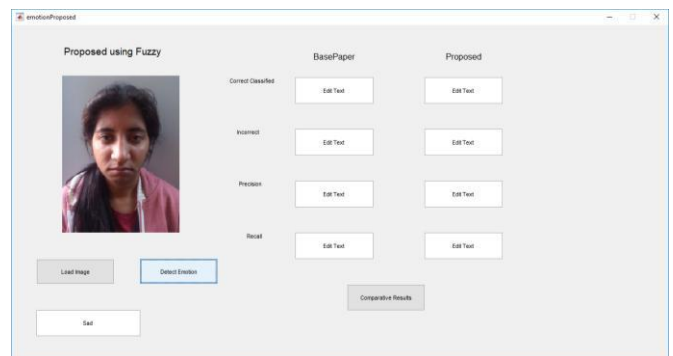


Fig. 4 load an image

3. Extract and detected feature



Table 1. Comparison between base and proposed method

	BASE METHOD	PROPOSED METHOD
CORRECT CLASSIFIED	9	10
INCORRECT CLASSIFIED	1	0
PRECISION	95	99.5
RECALL	75	85

4. COMPARISON BETWEEN PROPOSED AND BASED METHOD

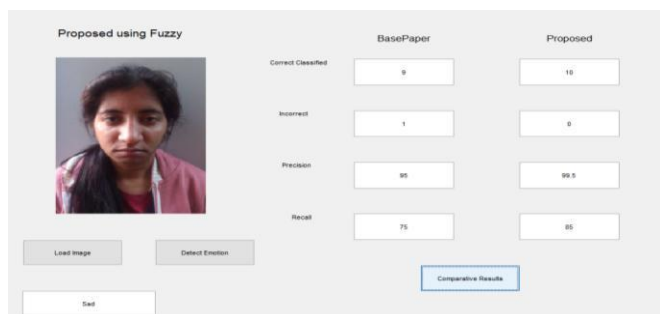


Fig.5 Comparison between proposed and base method

DETECTED EMOTION = Detected emotion is sad for an Image

5. REGRESSION MATRIX

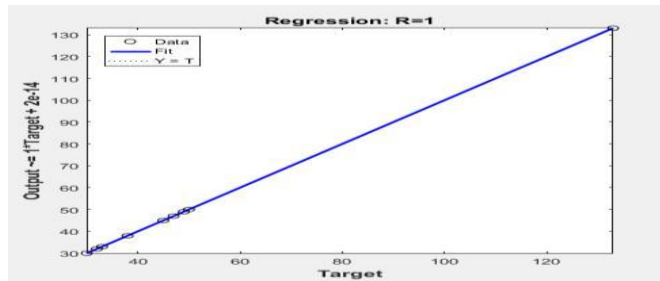


Fig.6 Shows the Regression

6. DEGREE OF MEMBERSHIP

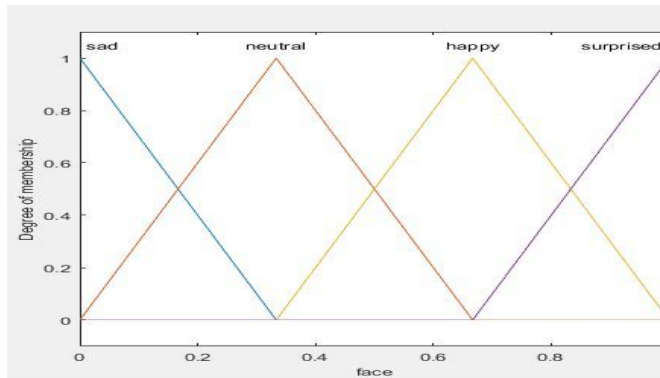


Fig.7 Shows the degree of membership of different emotion.

7. RADIAL BASIS NEURAL NETWORK

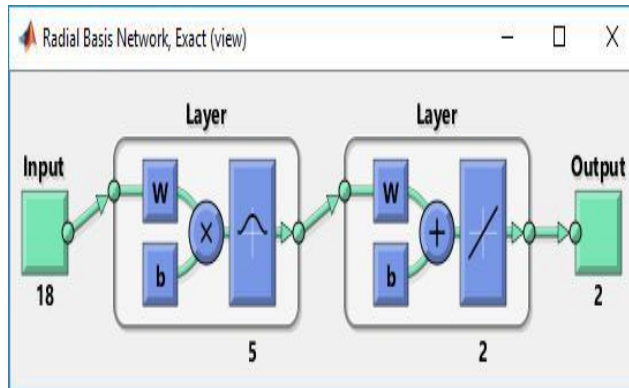


Fig.8 radial basis neural network

8. RESULTS Correct classified

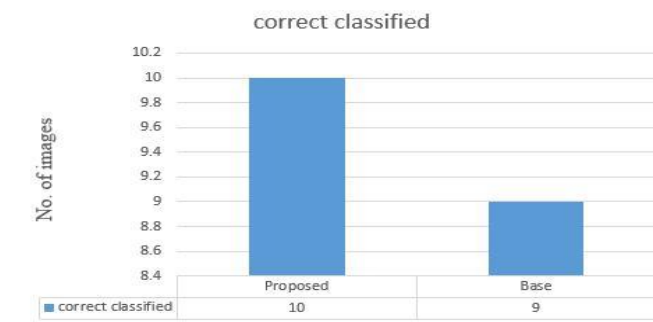


Fig.9 Shows the correct no. of classified.

Incorrect classified

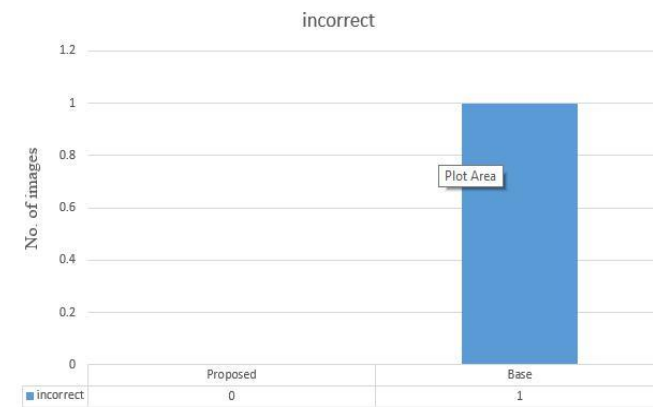


Fig.10 Shows the incorrect no. of classified.



**Recall**

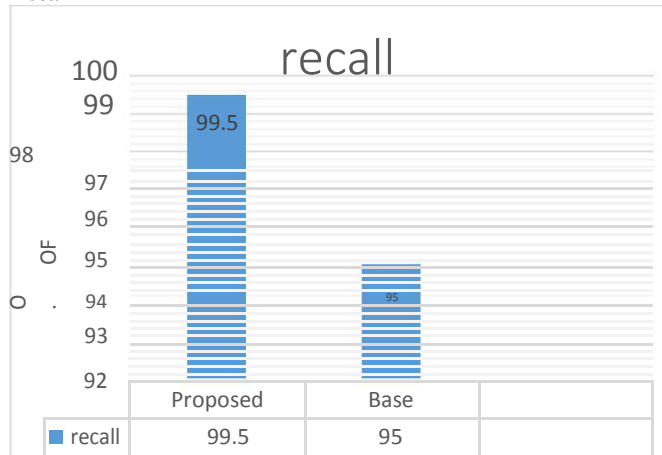


Fig.11 Shows the recall

**Precision**

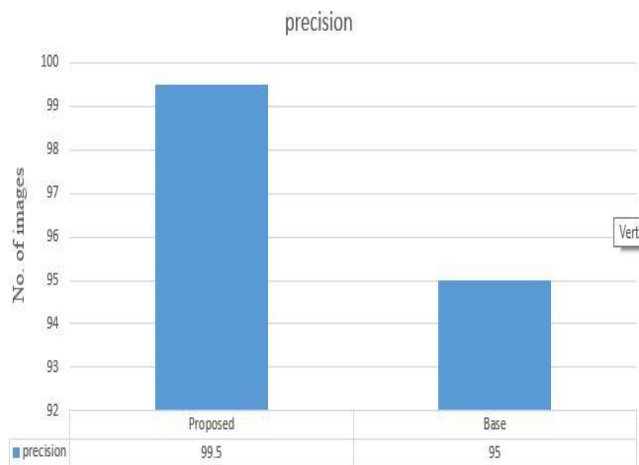


Fig.12 shows the precision

**Confusion matrix**

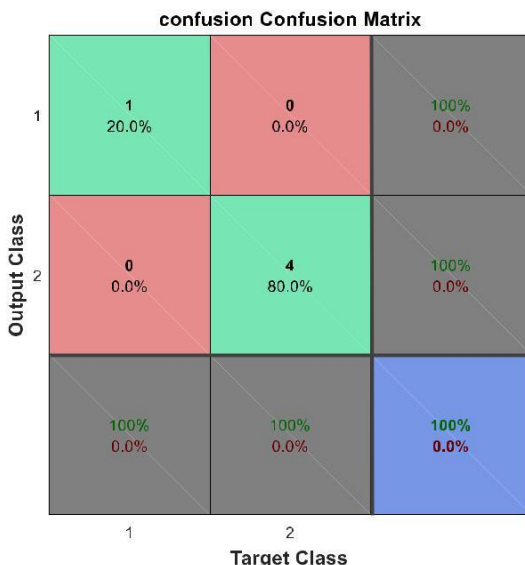
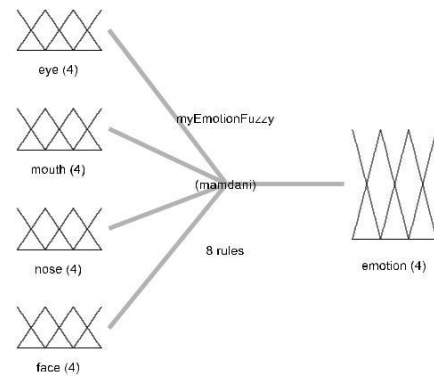


Fig.13 shows the confusion matrix

**Fuzzy logic**



System myEmotionFuzzy: 4 inputs, 1 outputs, 8 rules

Fig.14 Shows the fuzzy logic

**V. CONCLUSION AND FUTURE SCOPE**

Emotion recognition is complex problem with some difficulties. There are various different researches but this work try to evaluate this problem of emotion detection from an image based neural network approach with fuzzy logic where we take expression of face for the recognition of human is emotion. Based on their features neuro fuzzy was train to identify the contained emotion. This work provide better result with their accuracy. In today life, face recognition work very well but system only identify the frontal face image. Somehow, sometimes system fail to recognise actual emotion. In future, we used technology in a smart way where the system can achieve high accuracy rate with minimum help of user to control the system. Deep learning is also be applied for better results and increase accuracy of the system.

**REFERENCES**

- [1] S.ben yacoub, j. luttin, j. mates, j.kittler , “audio-visual person verification” published in IEEE, 1999.
- [2] Jennifer E. Vitale, Joseph P. Newman and Steven K.Sutton , “Emotion among Women with Psychopathy during Picture Perception” published in Journal of no psychopaths, 2002.
- [3] Mairead dolan and rachael fullam, “Face affect recognition deficits in personality-disordered offenders: association with psychopathy” published in Cambridge University Press, 2006.
- [4] Anthony walsha and huei hsia wubin, “Differentiating antisocial personality disorder, psychopathy, and sociopathy: evolutionary, genetic, neurological, and sociological considerations” published in Vol. 21, No. 2, June 2008, 135– 152 Criminal Justice Studies, 2008.
- [5] Kevin Wilson, Stephen porter, “fear and loathing in psychopaths: a meta- analytic investigation of the facial affect recognition deficit” published in journal of International Association for Correctional and Forensic Psychology, 2011.

- [6] Pushpaja V. saudagare et al, “facial expression recognition using neural network” published in International Journal of Soft Computing and Engineering (IJSCE) ISSN: 2231-2307, Volume-2, Issue-1, 2012.
- [7] Anjela book, Kimberly Costello and joseph a camilleri, “Psychopathy victim Selection: The Use of Gait as a Cue to Vulnerability” published in Journal of Interpersonal Violence, 2013.
- [8] Massil ben bouriche, kevin nolet, Dominique trottier, Patrice renaud “Virtual Reality Applications in Forensic Psychiatry”
- [9] Dianna ribeir da silva, Daniel rijo, Randall, salekin “The evolutionary roots of psychopathy” published in United State© Elsevier Ltd, 2015.
- [10] Patel mira y, jaymit pandya, nirav m raja “Effective Aging Approximation for Adult People Using Morphing Technique” published in International Journal of Advanced Research in Computer and Communication Engineering Vol. 5, 2016.
- [11] Marie-Hélène Cigna, Jean-Pierre Guay, Patrice Renaud, “Psychopathic traits and their relation to facial affect recognition” published in Elsevier Ltd, 2017.

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