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A Survey on: Facial Emotion Recognition.

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Abstract: ***Facial Emotion Recognition is an advanced area of research in the field of Human-Machine Interaction and Image Processing. Facial expression checks the multiple varieties of human faces like it color, shape, expressions and texture etc. are considered. To detect a facial emotions or expressions of the human with variations in the facial movements including mouth, eyes, and nose are to be checked or determined and after that consider those features by a very good classifier to recognize the human emotions.***

Keywords:

I. INTRODUCTION

Facial recognition is the process of verifying or identifying a person by the digital images. The term emotion is derived from Latin term "emovere" Facial expressions are the facial changes in response to a person's internal emotional states, intentions or social communications.which means to stir, to agitate, to move. As when we feel agitated or excited when we experience anger, fear, joy, grief, disgust, etc.

Fig 1: Expression for the Six Basic Emotion.

These expressions are produced as a result of distortions of facial features due to the contraction of facial muscles. Facial expression recognition is not an easy task because of circumstances like illumination, facial occlusions, face colour/ shape etc. These expressions can vary between individuals. Face recognition systems have many problems pertaining to pose, light, facial expression and quality of picture. It can be solved by applying some sort of image preprocessing before they are applied for further analysis purpose [3].

"Face Unlock" is already introduced in the smart phones that by looking to the camera the user can be able to open his/her device,it uses the facial and as well as emotion recognition for unlocking the device.

A. The overall process comprises of following stages

1) It allows Creation of training set and read in images.
2) It apply pre-processing techniques.
3) It checks Format data and calculate the face space.
4) It apply same preprocessing tests to the test images.
5) It run test images against the face space.
6) Rank techniques based on number of correct matches and false matches and time to calculate data.

The different methods to test includes smoothing, blurring, sharpen, edge detection, image size and combination. The results obtained will be based on ranking system based on correct matching, speed and incorrect matching .The face biometric comprises of micro elements and macro elements. Fig. 2 a, b, c are showing Components of facial recognition system. Macro elements include nose, mouth, eyes, cheek bone, chin, lips, forehead and ears. Micro elements verify the distance between the macro features or reference features and their size. The applications of facial recognition include Criminal Identification, Missing Children Identification, Passports/Driver's License, Voter identification, Welfare fraud, Logging on to computer, Accessing files, Surveillance, Access to Building etc.

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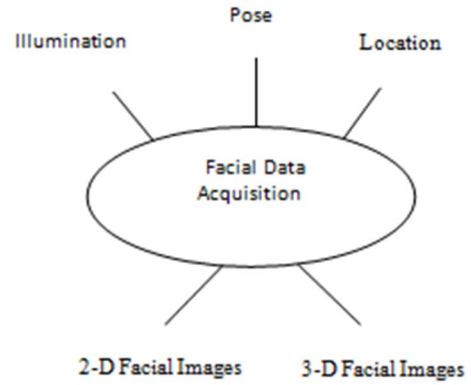
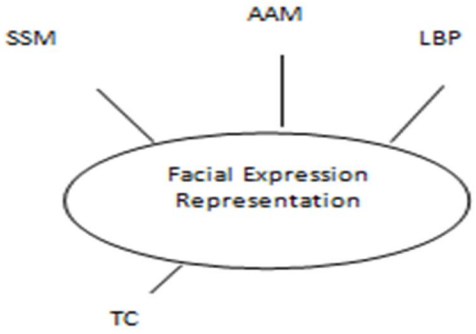


(a)



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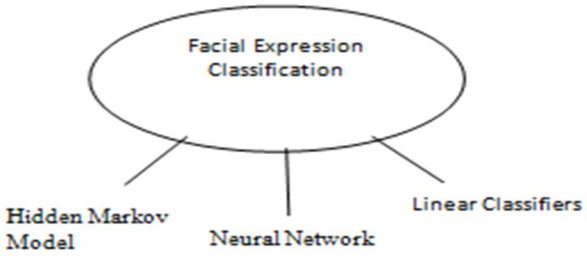

(c)

Fig. 2: a, b, c are showing Components of facial recognition system.

The facial expression recognition system is divided into four major steps:

a) Face detection
b) Normalization
c) Feature extraction
d) Classification

II. LITERATURE SURVEY

A. Feature Based Approach

A feature-based approach to face recognition in which the features are derived from the intensity data without assuming any information of the face structure is presented. Then these features are segmented & then it can be used as the input data for structural classifier. The techniques like dynamic link architecture, pure geometry & hidden Markov model (HMM) are put under this category. During the survey it have been studied that eyes, mouth, and nose are the prominent features for face recognition.

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B. Holistic Approach

In this approach the statistical methods are used to elaborate the statistical characterization from the entire training sample images. There are the techniques like eigenfaces, probabilistic eigenfaces, fisherface, support vector machines (SVM), nearest feature lines (NFL) and independent-component analysis which can be used in the holistic approach.

Fig.3 Examples of six basic emotions (anger, disgust, fear,happiness, sadness and surprise) uses includes tracking facial features, recognition of activation of facial muscles (Facial Action Units)

C. Hybrid Approach

Hybrid approach is a combination of above two mentioned approaches. The idea of this method comes from how human vision system perceives both local features and whole face. The methods like modular eigenface, hybrid local feature, shape normalized, and component based methods are used in hybrid approach. These Human facial features have the great significance in the face recognition process. The facial features have the distinguishing characteristics which are not present in other facial components such as forehead, cheeks and chin.

1) Advantages of Facial Recognition

a) As a biometric identifier like in case of driver license and passport.

b) It is a good biometric identifier for quick and small-scale verification applications.

2) Disadvantages of Facial Recognition

a) Controlled source is needed for better results.

b) Disguised person is not identified.

Sr. No	Emotions	Description of Facial expression
1.	Happy	The eyebrows are relaxed, and lowering of mouth corners.
2.	Sad	lowering of mouth corners raise inner portion of brows.
3.	Fear	brows raised eyes open mouth opens slightly.
4.	Anger	brows lowered lips pressed firmly eyes bulging.
5.	Surprise	brows arch eyes open wide to expose more white jaw drops slightly.
6.	Disgust	upper lip is raised nose bridge is wrinkled cheeks raised.

Table 1: Facial Expression Description Of Six Basic Emotions

III. FACIAL EMOTION RECOGNITION SYSTEM

The facial Emotion recognition is the process of identifying human emotion. It helps to check the various mood and expressions of the person whether he/she is sad, anger, happy or fear etc.
There are the most common approach to facial emotion recognition that consists of three steps:

A. Face detection and tracking
B. Feature extraction and
C. Expression classification.

The Face detection process the facial images by without human intervention that leads to find the facial region from the input images .After that the face is positioned and then the next step is to extract discriminative information caused by facial expressions. As we know Facial muscles movements helps in identifying human emotions. The facial expressions features are the parameters that can be considered for recognizing emotions. The facial emotions or expressions include eyebrow, mouth, nose, eyes and cheeks.

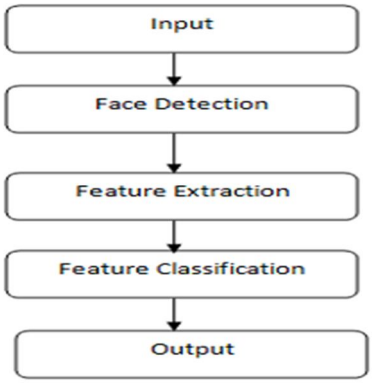

Fig. 4: Facial Emotion Recognition System Flow

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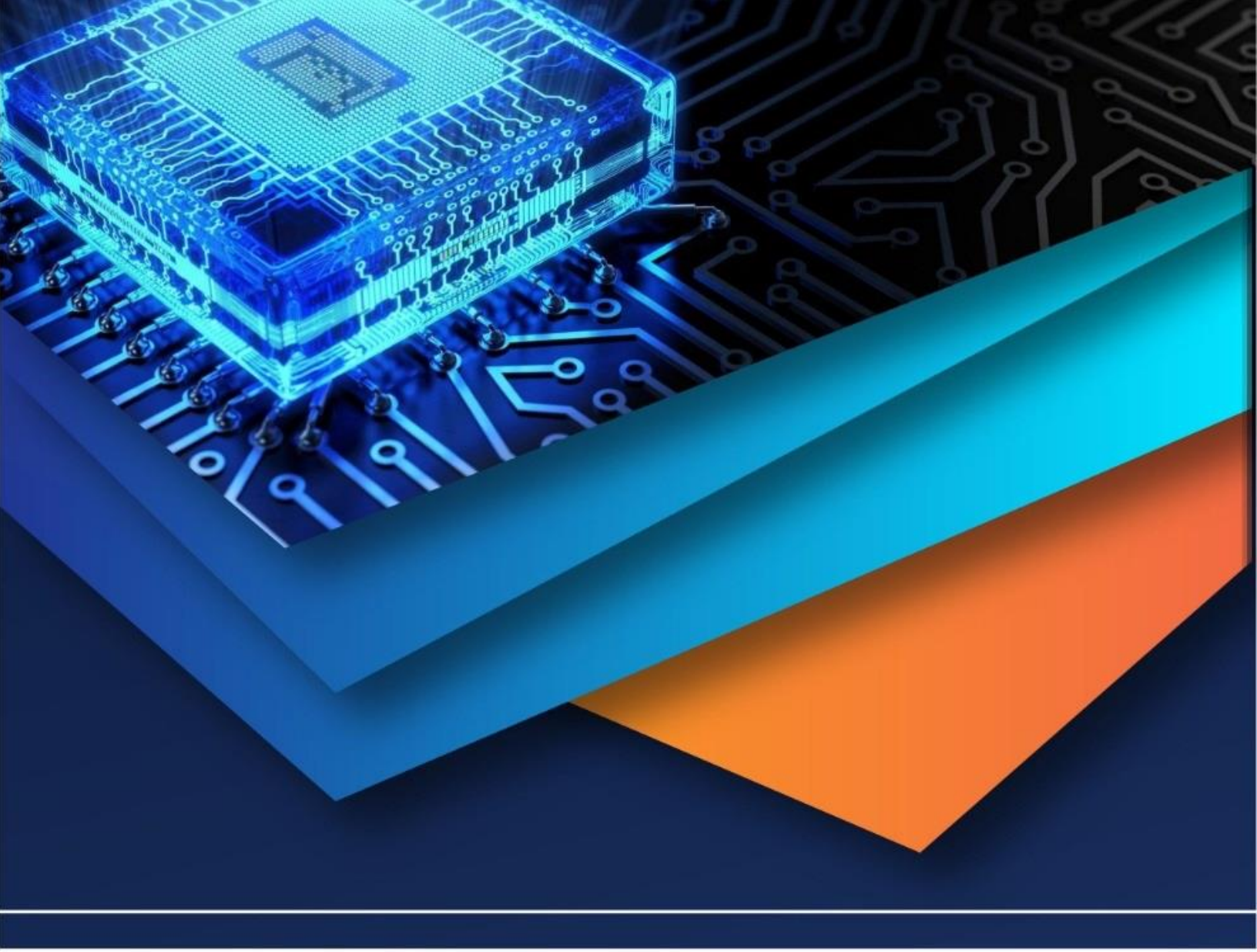

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