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RESEARCH ARTICLE

FACS BASED AUTOMATIC HUMAN EMOTION RECOGNITION

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Abstract— In the field of image processing it is very interesting to recognize the human gesture for general life applications. For example, observing the gesture of a driver when person is driving and alerting the person when in sleepy mood will be quite useful. Human gestures can be identified by observing the different movements of eyes, mouth, nose and hands. In this proposed system it is focusing on the human face for recognizing expression. Many techniques are available to recognize face. This system introduces a simple architecture for human facial expression recognition. The approach is based on a classifier for face detection and simple token finding and matching. This approach can be adapted to real time system very easily. The system briefly describes the schemes of capturing the image from web cam, detecting the face, processing the image to recognize the gestures as well as few results.

Key Terms: - Facial action coding system; Face Recognition; Face Detection; Neural Network

I. INTRODUCTION

Facial expression recognition is an important research problem spanning numerous fields and disciplines. This because Facial expression recognition, in additional to having numerous practical applications such as bankcard identification, access control, Mug shots searching, security monitoring, and surveillance system, is a fundamental human behavior that is essential for effective communications and interactions among people. Facial expressions refer to movements of the mimetic musculature of the face. The vast majority of these muscles are innervated by the cranial nerve, emanating from the brainstem between the pons and medulla .The nerve includes a motor root that supplies somatic muscle fibers to the muscles of the face, scalp, and outer ear, enabling the muscle movements that comprise facial expressions. The sensory part of the nerve enables and augments some aspects of taste and sound.

Facial behaviors are used for various functions, including

Speech illustration: For instance, people often raise their brows when being inquisitive, and lower their brows when they lower their voices.

Conversation regulation: People can cue others that they are either done talking and it's their turn, or not, through their faces.

Emblematic Gestures*:* These are movements that symbolically give verbal meaning that can be conveyed by words, such as the doubtful look produced by raising the upper lip and pushing the lower lip up.

Cognition*:* People often furrow their brows when concentrating or are perplexed. They also purse their lips when conducting mental searches.

Talking and eating. People use the muscles around the mouth area for talking and eating, and especially speech articulation.

Emotion: People use the facial muscles to signal their emotional state.

Expressive regulation: People also use the facial muscles to regulate their emotion signals.

Face feature extraction and emotion recognition is considered to be a key requirement in many applications such as Biometrics, Facial recognition systems, video surveillance, Human computer interface etc. Therefore reliable face detection is required for the success of these applications.

II. RELATED WORK

Two novel methods for facial expression recognition in facial image sequences are presented in [1]. The user has to manually place some of Candid grid nodes to face landmarks depicted at the rest frame of the image sequence under examination. The grid tracking and deformation system used, based on deformable models, tracks the grid in consecutive video frames over time, as the facial expression evolves, until the frame that corresponds to the greatest facial expression intensity. An approach to the problem of automatic facial feature extraction from a still frontal posed image and classification and recognition of facial expression and hence emotion and mood of a person is presented in [2]. Feed forward back propagation neural network is used as a classifier for classifying the expressions of supplied face into seven basic categories like surprise, neutral, sad, disgust, fear, happy and angry.

The recently introduced method for facial expression recognition using spatiotemporal local binary patterns is reviewed and experiments are carried out to investigate the robustness of the approach[3].A two-stage classifier for the elastic bunch graph matching based recognition of facial expressions proposed in[4]. The major purpose is to calculate distinctive similarity between image patterns by applying optimal weights to responses from different Gabor kernels and those from different fiducial points. Two different methods of feature extraction for person-independent facial expression recognition from images [5]. In the [6] paper presents a novel approach to the estimation of user's affective states in Human-Computer Interaction.

III. THE PROPOSED TECHNIQUE

The system divides into 3 modules

A. Preprocessing,
B. Feature Extraction and
C. Classification.

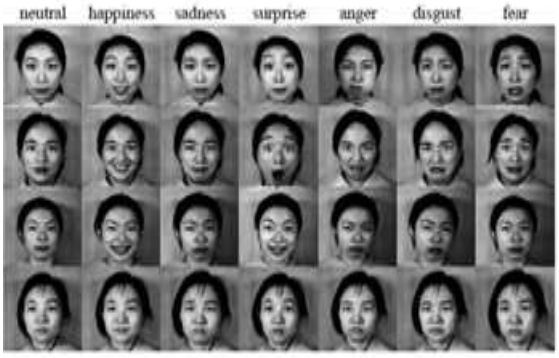

Fig.1- Facial Expression Database: Example

The basis of the representation is a temporal template where the features are used typically based on local spatial position or displacement of specific points and regions of the face.

In this proposed system we have considered five different facial expressions were considered. Extracting the features, firstly logarithmic Gabor filters were applied. Then the Optimal subsets of features were selected for each expression. The classification tasks were performed using the Neural Network. Secondly, this study indicates that the YALE database contains expressers that expressed expressions.

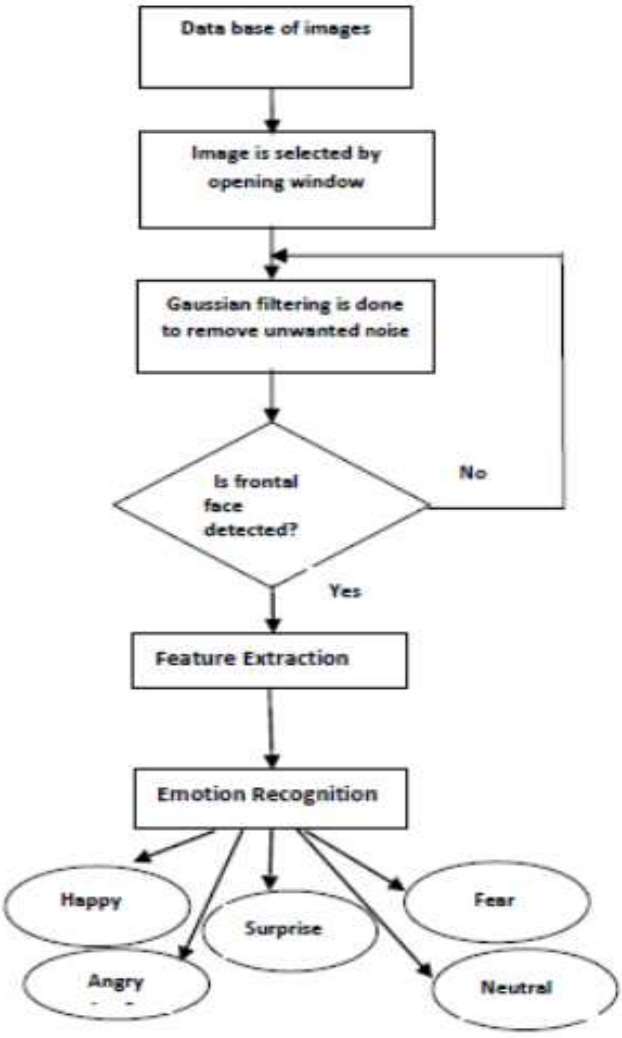

FIG.2 - Proposed System architecture

IV. **FACS**

FACS objectively describes and measures facial expressions and movements. Based on an anatomical analysis of facial action, it offers an advanced method for describing facial movements as they relate to emotions. FACS therefore is an ideal tool for research of the emotional responses to humour since it allows a distinction among different smiles and laughs and to score basic parameters such as frequency, intensity, duration, or symmetry. It has been successfully applied to study the emotional responses to humour before and it is superior to other methods used in humour research **Facial Action Coding System** (**FACS**) is a system to taxonomizes human Facial expression by their appearance on the face. Movements of individual facial muscles are encoded by **FACS** from slight different instant changes in facial appearance. It is a common standard to systematically categorize the physical expression of Emotion and it has proven useful to psychologist and to animator. Due to subjectivity and time consumption issues, FACS has been established as a computed automated system that detects faces in videos, extracts the geometrical features of the faces, and then produces temporal profiles of each facial movement.

FACS can also be modified such that it can be used to compare facial repertoires across similar species, such as humans and chimpanzee. Such considerations enable a comparison of the FACS present in humans and chimpanzees, to show that the facial expressions of both species result from extremely notable appearance changes. A cross-species analysis of facial expressions can help to answer the question of which emotions are uniquely human.

The Facial Action Coding System is shown in figure

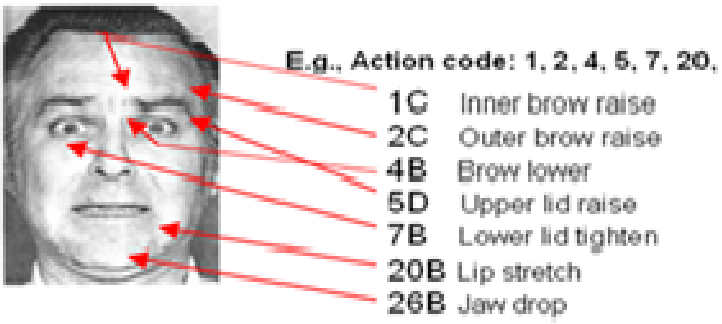

Fig.3

V. RESULT

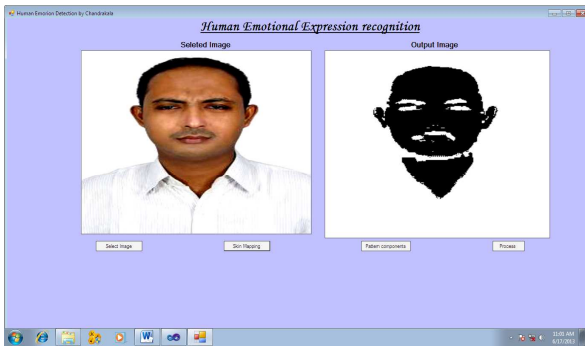

Fig.4 - The above figure extracts the skin part of the given input image

In the Fig.4 we collect the image from the database, and then from the collected image we extract only the skin part which is referred as skin mapping.

Fig.5 - This above figure indicates where we are converting the image to binary image

In this above figure we extract the part which we are interested and the extracted image is converted in to binary image.

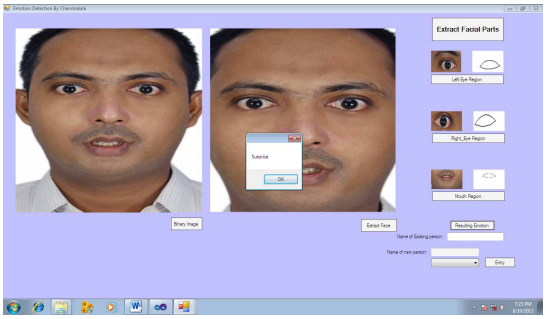

Fig.6 - Finally once we click the button resulting emotion it displays the output as shown above.

In the Fig.6 the extracted image is divided in to right eye, left eye and mouth and further these are converted in to binary image. Finally we will get the expression of the given image.

VI. CONCLUSION AND FUTURE WORK

Facial coding system standard has been used for many years for recognizing and classification of human emotions keeping these standards as base. In the work implemented we used these concepts at better efficiency with aid of skin mapping, pattern matching and local features of the human face to gain the accurate result possible. The system has the capacity to perform accurately with addition of the data base where n number of humans and respective emotions can be recognized.

The future work on the system can be making it a combined human activity based controlling system where all the possible biometrics like face recognition gesture recognition and etc. systems can be used to make it an universal system.

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