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Human Behaviour Detection by Reading Facial Expression

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Abstract: ***There are many way to by which human being communicate with each other verbal, sign language or facial expression are one of them. Here we propose artificial intelligence based facial expression detection system by which we can detect behaviour of human being by computer system.***
Facial expression detection have lot of real life applications including computer to human interaction, Human behaviour reorganisation, cognitive study, emotion analysis, personality development etc. Here we set a study which uses a new technique for facial expressions using single frame uses combination of vector and geometrical feature based classification method
Generally to study human face the image of face is divided into small grid of pixels . In this Study we have divided whole face into sub region of local regions. This technique acquire most important sub regions of the domain and start collecting most important sub regions incrementally which enhance accuracy and speed.
The consequences of looks acknowledgment utilizing highlights from space explicit locations , likewise contrasted and the outcomes acquired utilizing all encompassing portrayal. The presentation of the proposed look acknowledgment framework has been approved on openly accessible expanded Cohn-Kanade (CK+) look informational collections.

I. INTRODUCTION

For last few year the growth in artificial intelligence and Deep learning catching up in the field of image processing. The human behaviour recognition with the help of facial expression recognition in short called FER has emerged as a significant area to study. To understand Automated and real time FER for human behaviour recognition there are many areas where it can be crucial to high growth like computer to human interaction, health industry, transport safety and human behaviour detection etc. Psychologists have developed many technique to understand human behaviour and emotions by studying images of human face expressions. as facial action coding system (FACS) which is recommended and developed by "Ekman and Friesen and Ekman et al". FACS propose human behaviour based on 33 action or expression of human face. Facial expressions can be model by single AU method or by multiple models. After analysing acquired signals by use of effective computing whole analysis is based on six basic expressions namely fear, anger, happiness, disgust, sadness and surprise.
Many classification techniques used to identify emotions of facial expression recognition. Artificial Neural Networks (ANNs) is used to classify facial expressions. Support Vector Machines (SVMs) and Hidden Markov Model for facial expression. SVM is used for single frame. HMM's are used for handling frame from sequential data.

II. RELATED WORK

The important model for element extraction, and the ensuing portrayal, can and has been performed with a large number of techniques. The general methodology of utilizing of Gabor changes combined with brain organizations, like Zhang's methodology is a well known approach. Other extraction strategies like nearby paired designs by Shan, histogram of arranged angles via Carcagni, and facial tourist spots with Active Appearance Modeling by Lucey have been utilized. Characterization is many times performed utilizing learning models, for example, support vector machines.

III. METHODOLOGY

In this study we have used facial point locations to define a set of face regions instead of representing face as a regular grid based on face location alone, or using small patches cantered at facial key point locations. By representing the face in such a way we can obtain better-images as compared to grid based representation. The second contribution this study is the use of geometric features from corresponding local range in combination with appearance features. Since, facial point locations are used to define face local range, geometric features defines the shape of the local range which vary according to face emotion.

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The spatial moments (m_{ji}) are computed as,

$$m_{ji} = \sum_{x,y} \left(I(x,y).x^j.y^i \right) \quad (3)$$

where $I(x,y)$ is the binary image with face local shape represented with 1 and background with 0.

The central moments (mu_{ji}) are computed as,

$$mu_{ji} = \sum_{x,y} \left(I(x,y).(x-\overline{x})^j.(y-\overline{y})^i \right) \quad (4)$$

where $(\overline{x},\overline{y})$ is the mass center.

$$\overline{x} = \frac{m_{10}}{m_{00}}, \quad \overline{y} = \frac{m_{01}}{m_{00}} \quad (5)$$

The normalized central moments (nu_{ji}) are now computed as:

$$nu_{ji} = \frac{mu_{ji}}{m_{00}^{(i+j)/2+1}} \quad (6)$$

Thus obtained geometric descriptors are concatenated with appearance descriptors and FER is performed using SVM classification.

A. Local Binary Pattern

Appearance base different features like HOG, LBP, and Local Gabor Binary Pattern (LGBP) even Scale Invariant Feature Transform (SIFT) etc. are some of the technique used by scholars for study of FER. as region based feature extraction if time consuming because area can be larger in size so we are using LBP feature as appearance feature. The face of human is divided into specific parts based on local regions. The feature descriptors for FER are used only from subset of local regions detected technique.

In LBP, a double code is created for every pixel in a picture by thresholding its near with the worth of the middle pixel. It was initially characterized for 3 x 3 areas giving 8 bit codes in view of the 8 pixels around the middle pixel. The administrator was subsequently reached out to utilize neighborhood of various sizes, picture planes, turn invariant LBP and so on. In our framework we simply utilize the essential LBP administrator. The

administrator names the pixels of a picture by thresholding a 3 x 3 neighborhood of every pixel with the middle worth and thinking about the outcome as a double number. A 256-canister histogram of the LBP names is figured over an area and is utilized as a surface descriptor.

A LBP is 'uniform' assuming it contains all things considered one 0-1 and one 1-0 change when seen as a round piece string. For example, 00000000, 00111100 and 11000001 are uniform example. It is seen that uniform examples represent almost 90% of all examples in the (8, 1) neighborhood in surface pictures.

After labeling an image with LBP operator, a histogram of the labeled image $f_l(x,y)$ can be defined as:

$$H_i = \sum_{x,y} I(f_l(x,y) = i), i = 0,1,\ldots,n-1 \quad (1)$$

where n is the number of different labels produced by the LBP operator and,

$$I(A) = \begin{cases} 1, \text{A is true} \\ 0, \text{A is false} \end{cases}$$

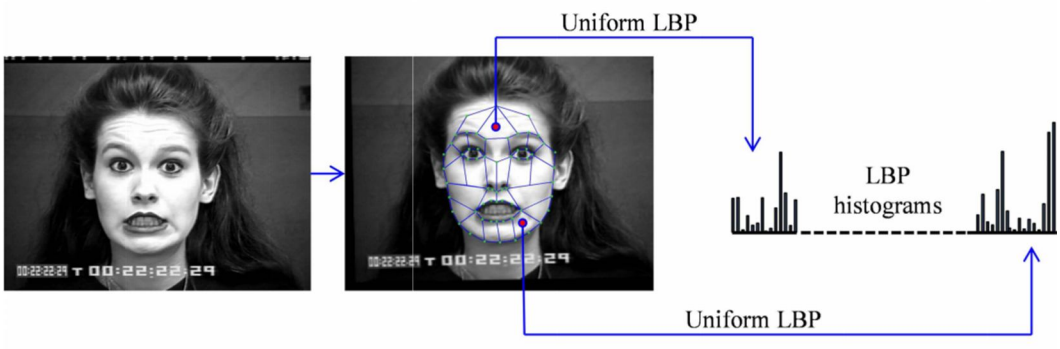


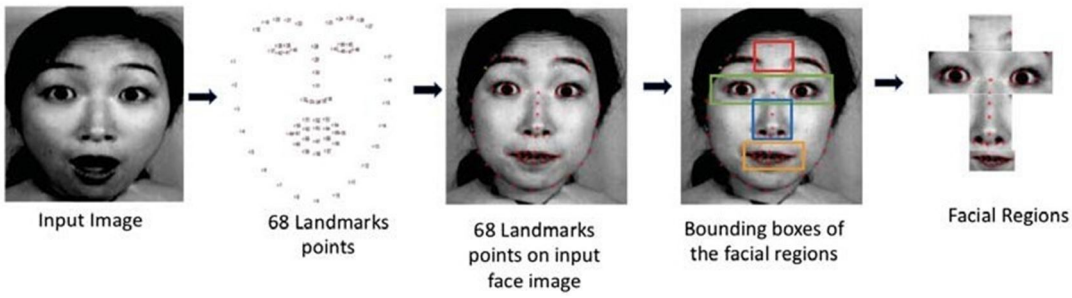
Fig 1-a LBP Features

The LBP highlights are likewise removed utilizing matrix portrayal. The all out face area is isolated into normal networks (Fig. 1-a) and the aftereffect of FER from matrix portrayal is contrasted and the outcome from proposed nearby portrayal.

B. Normalized Central Moments

Development of facial milestones or unique places of facial tourist spots are involved by numerous analysts to remove mathematical data for this specific issue. In our framework, development of facial milestones can't be utilized as it is an edge based framework. The shape and size of nearby areas in our portrayal shifts for various articulations, hence we likewise need to catch shape data as mathematical element descriptor. The standardized focal minutes up to three orders are involved from each chosen nearby areas in our face portrayal which is determined as follows.

IV. RESULTS





From above figures it is clear how normal image can be converted to a frame based on feature extraction like nose, eyes and lips.

V. CONCLUSIONS

From many year of research and computer vision technology have evolved to clone human eyes features like recognizing human behavior based on his face expressions by using limited face locations. locations of face like nose, eyes, and lips play important role to know behavior of human being Our work on recognizing human behavior based on feature extraction from single frame will play significant role in future study in this domain. and the technique can be enhance by using many other techniques in combination like Two Dimensional (2D) Taylor Expansion, HSOG for feature extraction, Euler Principle Component Analysis

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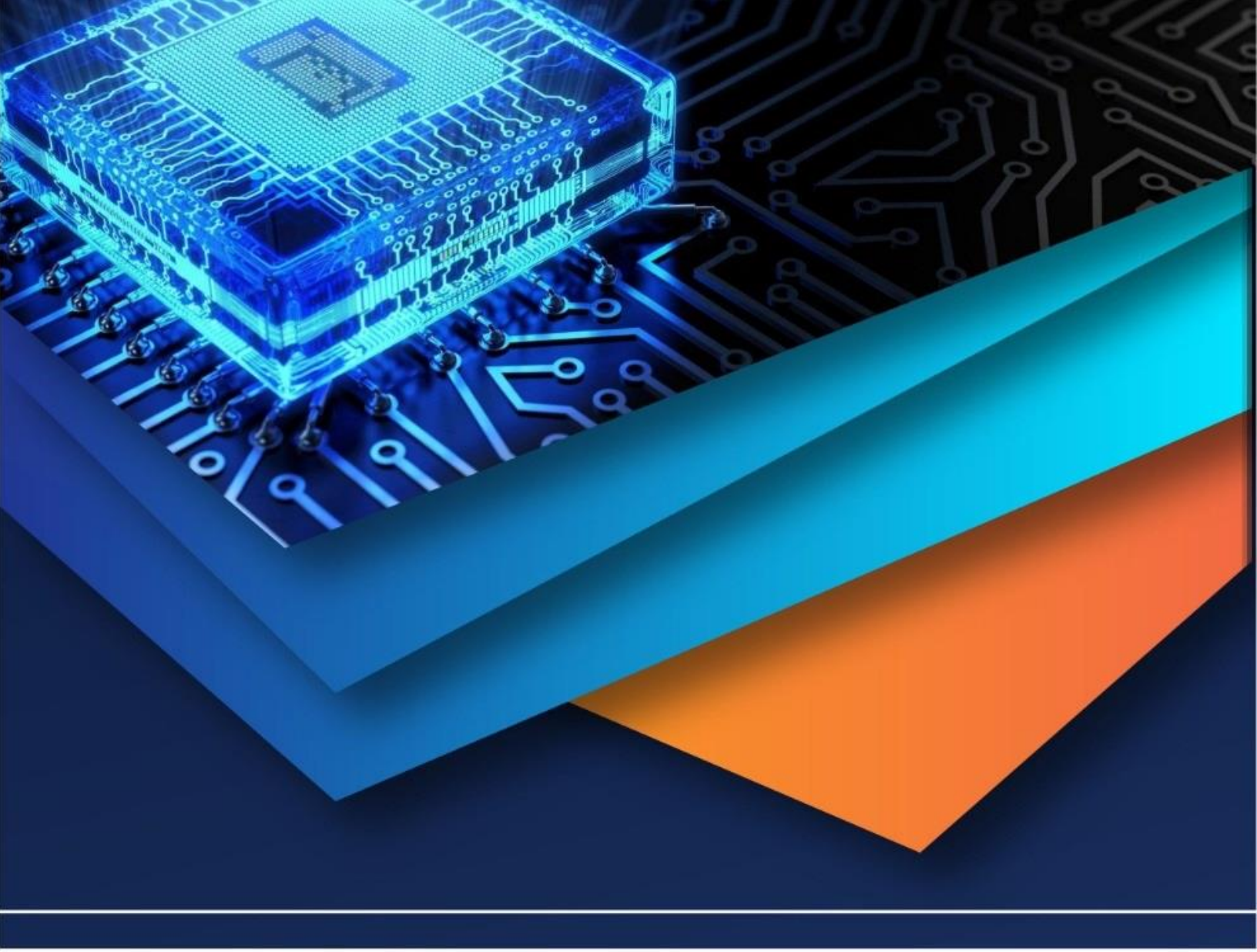
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