FACE RECOGNITION USING CNN AND EMOTION DETECTION USING LOCAL BINARY PATTERN

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ABSTRACT

Facial Recognition possess the importance to give biometric authentication that is used in different applications especially in security. A stored database of the subjects is manipulated using image processing techniques to accomplish this task. This paper proposes a frame work of smart glasses that can recognize the faces. Implementing facial recognition using portable smart glasses can aid law enforcement agencies to detect a suspect's face. The advantage over security cameras is their portability and good frontal view capturing. The techniques used for the whole process of face recognition are machine learning based because of their high accuracy as compared with other techniques. Face detection is the pre-step for face recognition that is performed using Haar-like features. Detection rate of this method is 98% using 3099 features. Face recognition is achieved using Deep Learning's sub-field that is Convolutional Neural Network (CNN). It is a multi-layer network trained to perform a specific task using classification. Transfer learning of a trained CNN model that is AlexNet is done for face recognition. It has an accuracy of 98.5% using 2500 variant images in a class. These smart glasses can serve in the security domain for the authentication process.After that emotion is detected using local binary pattern algorithm,Emotion recognition is already widely used by different companies to gauge consumer mood towards their product or brand. The opportunities brought by this technology goes further than market research and digital advertising.

1.INTRODUCTION

DIFFERENT APPROACHES OF FACE RECOGNITION: There are two predominant approaches to the face recognition problem: Geometric (feature based) and photometric (view based). As researcher interest in face recognition continued, many different algorithms were developed, three of which have been well studied in face recognition literature. Recognition algorithms can be divided into two main approaches: 1. Geometric: Is based conditions. The shape of the recovered object is defined by a gradient map, which is made up of an array of surface normals

on geometrical relationship between facial landmarks, or in other words the spatial configuration of facial features. That means that the main geometrical features of the face such as the eyes, nose and mouth are first located and then faces are classified on the basis of various geometrical distances and angles between features. (Figure 1) 2. Photometric stereo: Used to recover the shape of an object from a number of images taken under different lighting

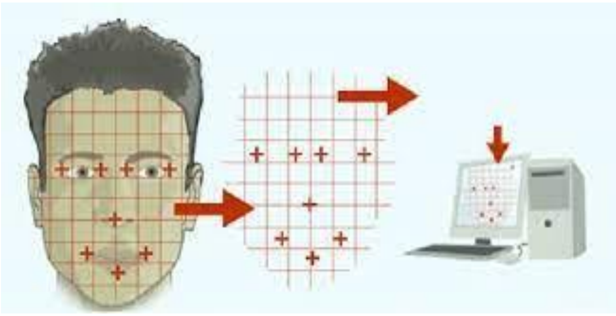

FIG1.GEOMETRIC FACIAL RECOGNITION

Different emotion types are detected through the integration of information from facial expressions, body movement and gestures, and speech. The technology is said to contribute in the emergence of the so-called emotional or emotiveInternet.Emotion recognition provides benefits to many

institutions and aspects of life. It is useful and important for security and healthcare purposes. Also, it is crucial for easy and simple detection of human feelings at a specific moment without actually asking them.we use many algorithms for emotion detection they are HOG,Local Binary Pattern

2. DESIGNING MODELING

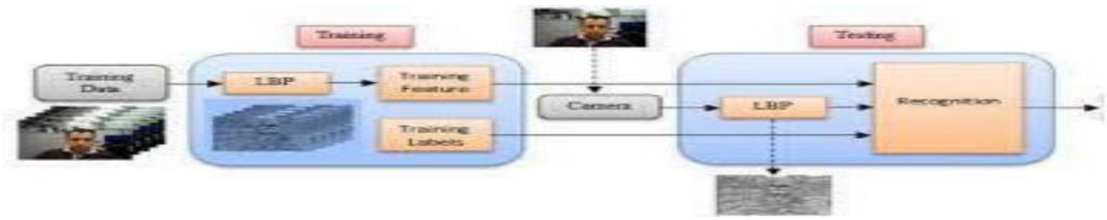

FIG 2 DESIGN MODEING FOR FACE RECOGNITION

Initially many data are trained then on training stage many features are extracted using LBP algorithm after that on testing period using web cam face is detected lively according to our emotion the results are generated.hence it is realtime emotion detection.

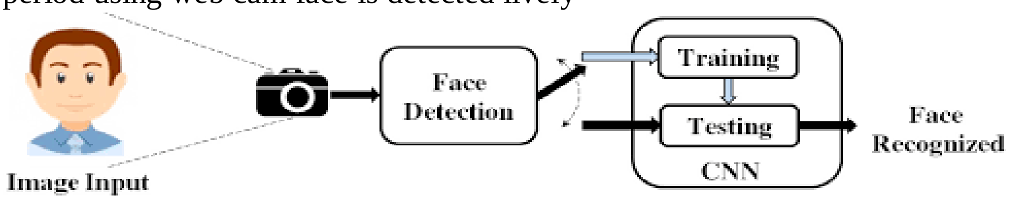

FIG -3 DESIGN MODELING FOR FACE RECOGNITION USING CNN

This is not real time detection so that we have to give input data from that the face is detected after training and testing using CNN algorithm the face is recognized.

3.CNN FOR FACE RECOGNITION

In deep learning, a convolutional neural network (CNN/ConvNet) is a class of deep neural network, most commonly applied to analyze visual imagery. Now when we think of a neural network we think about matrix multiplications but that is not the case with ConvNet. It uses a special technique called Convolution. Now in mathematics convolution isa mathematical operation on two functions that produces a third function that expresses how the shape of one is modified by the other.But we don't really need to go behind the mathematics part to understand what a CNN is or how it works. Bottom line is that the role of the ConvNet is to reduce the images into a form that is easier to process, without losing features that are critical for getting a good prediction A Convolutional NeurralNetwork (ConvNet/CNN) is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other.The pre-processing required in a ConvNet is much lower as compared to other classification algorithms. While in primitive methods filters are hand-engineered, with enough training, ConvNets have the ability to learn these filters/characteristics.

The architecture of a ConvNet is analogous to that of the connectivity pattern of Neurons in the Human Brain and was inspired by the organization of the Visual Cortex. Individual neurons respond to stimuli only in a restricted region of the visual field known as the Receptive Field. A collection of such fields overlap to cover the entire visual area.

4 EMOTION DETECTION USING LBP

The LBP operator is one of the best performing texture descriptors and it has been widely used in various applications. It has proven to be highly discriminative and its key advantages, namely, its invariance to monotonic gray-level changes and computational efficiency, make it suitable for demanding image analysis tasks. The LBP operator was originally designed for texture description.The operator assigns a label to every pixel of an image by thresholding the 3 3neighborhood of each pixel with the center pixel value and considering the result as a binary number. Then,the histogram of the labels can be used as a texture descriptor.To be able to deal with textures at different scales, the LBP operator was later extended to use neighborhoods of different sizes. Defining the local neighborhood as a set of sampling points evenly spaced on a circle centered at the pixel to be labeled allows any radius and number of sampling points. Bilinear interpolation is used when a sampling point does not fall in the center of a pixel.

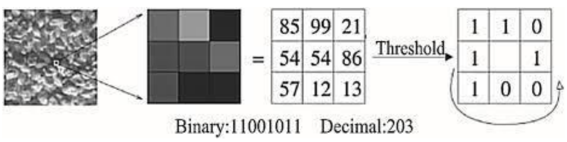

FIG-4 THE BASIC LBP OPERATOR

In the following, the notation ðP;RÞ will be used for pixel neighborhoods which means P sampling points on a circle of radius of R. See Fig.4 for an example of circular neighborhoods.Another extension to the original operator is the definition of so called uniform patterns . A local binary pattern is called uniform if the binary pattern contains at most two bitwise transitions from 0 to 1 or vice versa when the bit pattern is considered circular. For example, the patterns 00000000 (0 transitions), 01110000 (2 transitions) and 11001111 (2 transitions) are uniform whereas the patterns 11001001 (4 transitions) and01010011 (6 transitions) are not. In the computation of the LBP histogram, uniform patterns are used so that the histogram has a separate bin for every uniform pattern and all nonuniform patterns are assigned to a single bin. Ojala et al. noticed that in their experiments with texture images, uniform patterns account for a bit less than 90 percent of all patterns when using the (8,1) neighborhood and for around 70 percent in the (16,2) neighborhood. We have found that 90.6 percent of the patterns in the (8,1) neighborhood and 85.2 percent of the patterns in the (8,2) neighborhood are uniform in case of preprocessed FERET facial images.We use the following notation for the LBP operator: LBPu2 P;R. The subscript represents using the operator in a ðP;RÞ neighborhood. Superscript u2 stands for using only uniform patterns

RESULT

The result of detecting the emotion using LBP on MATLAB.The result of detecting the emotion using LBP on MATLAB, I have trained many emotions like angry,sad,happy etc while testing first i kept my face angrily and its show as angry in fig.5 like wise it shows each emotions according to how i change my face, if i didn't show my face then it show face not detected as in fig.8

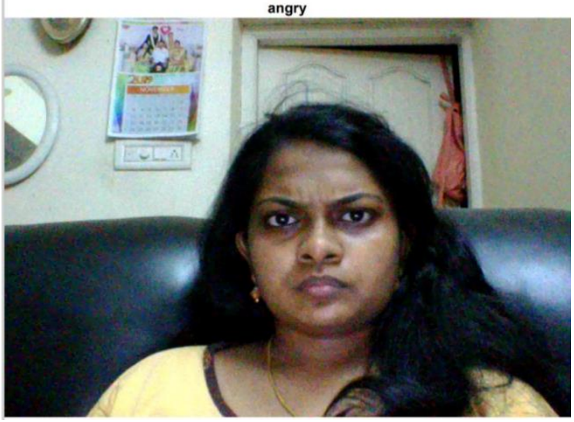

FIG. 5 ANGRY DETECTION

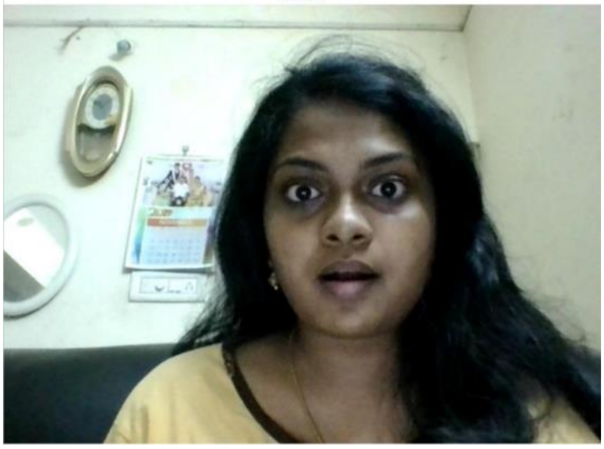

FIG.6 SHOCK DETECTION

FIG.7 HAPPY DETECTION

FIG.8 FACE NOT DETECTED

The face recognition was done by using CNN on fig.9 it shows the graph of loss and accuracy. CNN shows the image with the score on fig.10 it shows the image of elon musk with score .99

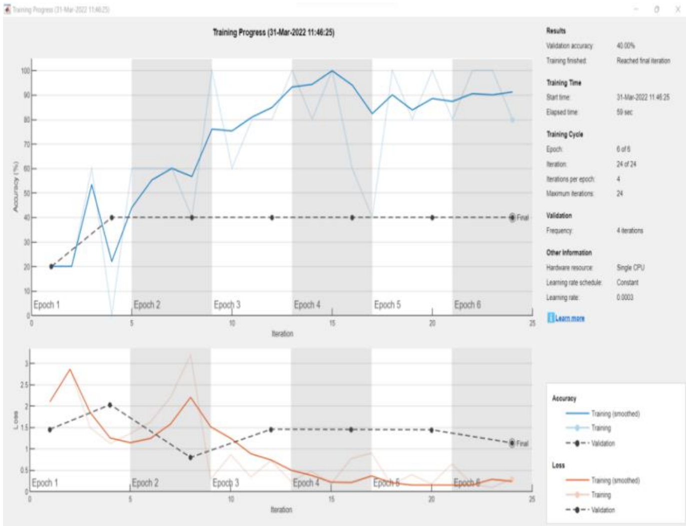

FIG.9 LOSS AND ACCURACY GRAPH OF FACE RECOGNITION

CONCLUSION

Emotion detection is an emerging technology that can provide many benefits. Emotion detection can save resources and time, and even generate new income streams, for companies that implement it right. A face detection and recognition system would certainly speed up the process of checking student attendance in comparison to other bio metrics authentication methods and in the right circumstances it would be able to match their accuracy. Nowadays there are a wide variety of software, whether it is a Face API like Microsoft’s or a library like OpenCV, that makes face detection and recognition accessible and reliable and is constantly improving .hence face attendance purpose in industries,school etc.by using this we can avoid finger marking attendance to make our self safe from pandemic disease

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