DEVELOPING AN EMOTION RECOGNITION SYSTEM OF THE FACIAL EXPRESSION BASED ON KEY POINT EXTRACT FEATHERS WITH OPTIMIZED NEURAL NETWORLD

Akshat Khapra

ABSTRACT

Face is the main emphasis of consideration in social dealings, which also plays a more important role in transmission of personality and feelings. Although the capability to infer intellect or character from facial look is dubious, the human skill to identify face is astonishing. We can recognize thousands of faces learnt all through our lifespan and detect acquainted faces at a single glimpse even after so many years of separation. The main issues found that there are three main factors to construct a Facial Expression Recognition system, namely the face identification, facial feature extraction, and reaction or feeling cataloguing. In this paper work we will propose a computational model of face recognition, which is quick, sensibly simple, and accurate in constrained environments such as an office or a household using k-MEAN clustering for divide the data in the cluster form, SIFT and IGA in which feature divide into cluster form with the help of K-mean algorithm, feature extraction is done by SIFT, feature optimization is done by IGA and classification is done using Feed Forward Neural Network. Then finally measure the performance using the following metrics called False Acceptance Rate, False Rejection Rate, and Accuracy.

INTRODUCTION

Most collective work of a thought of feeling could be begun as "a characteristic natural perspective getting from one's circumstances, state of mind, or associations with others". Which misses portraying the main thrust behind all inspiration which may positive, negative or impartial? This is significant data to comprehend feeling as a smart operator. It is exceptionally entangled to identify the feelings and recognize among them. Before a decades or two feeling began to turn into a worry as a significant expansion towards the advanced innovation world. Rises the desire for new day break for knowledge device. Envision a reality where machines do feel what people need or need. With the uncommon sort of figuring then that machine could anticipate the further results and by which humankind could stay away from genuine conditions and parcel more. People are unquestionably progressively solid and savvy because of the expansion of the feeling however less viable than machines. The outward appearance acknowledgment is to recognize human feeling dependent on articulation. Outward appearance acknowledgment pursues the examination structure of plan acknowledgment. This is made out of three stages: recognition of face, highlight (facial) extraction and appearance arrangement. The measure of research completed in every one of these classifications is very sizable and significant. These three classifications are worried about the focal foundation relating to the issue of facial feeling acknowledgment. Together from them, another centre region is improvement of fitting facial database for such studies.

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The Categorizing facial expressions & its features:

Outward appearance introduces a key instrument to portray human feeling. From begin to day's end human changes a lot of feelings, it might be a direct result of their psychological or physical conditions. In spite of the fact that people are loaded up with different feelings, current brain research characterizes six fundamental outward appearances: Happiness, Sadness, Surprise, Fear, Disgust, and Anger as widespread feelings. Facial muscle developments help to recognize human feelings. Fundamental facial highlights are eyebrow, mouth, nose and eyes.

Fig. 1: Basic Facial Expressions

Table -1: Universal Emotion Identification

Emotion	Definition	Motion of facial part
Anger	Anger is one of the most dangerous emotions. This emotion may be harmful so, humans are trying to avoid this emotion. Secondary emotions of anger are irritation, annoyance, frustration, hate and dislike.	Eyebrows pulled down, Open eye, teeth shut and lips tightened, upper and lower lids pulled up.
Fear	Fear is the emotion of danger. It may be because of danger of physical or psychological harm. Secondary emotions of fear are Horror, nervousness, panic, worry and dread.	Outer eyebrow down, inner eyebrow up, mouth open, jaw dropped[13]
Happiness	Happiness is most desired expression by human. Secondary emotions are cheerfulness, pride, relief, hope, pleasure, and thrill.	Open Eyes, mouth edge up, open mouth, lip corner pulled up, cheeks raised, and wrinkles around eyes.
Sadness	Sadness is opposite emotion of Happiness. Secondary emotions are suffering, hurt, despair, pitty and hopelessness.	Outer eyebrow down, inner corner of eyebrows raised, mouth edge down, closed eye, lip corner pulled down.
Surprise	This emotion comes when unexpected things happens. Secondary emotions of surprise are amazement, astonishment.	Eyebrows up, open eye, mouth open, jaw dropped
Disgust	Disgust is a feeling of dislike. Human may feel disgust from any taste, smell, sound or tough.	Lip corner depressor, nose wrinkle ,lower lip depressor, Eyebrows pulled down

A. Emotion recognition The model system for feeling recognition is split into three stages: face detection, feature extraction and feeling classification. Once locating the face with the employment of a face detection rule, the information within the symmetry and formation of the face combined with image process techniques were accustomed method the improved face region to see the feature locations. These feature areas were any processed to extract the feature points needed for the feeling classification stage. From the feature points extracted, distances among the options area unit calculated and given as input to the neural network to classify the feeling contained. The neural network was trained to acknowledge the vi universal emotions.

B. Face Detection The model system offers 2 ways for face detection. Although numerous information based mostly} and example based techniques will be developed for face location determination, we tend to opted for a feature invariant approach supported skin colour because the initial methodology thanks to its flexibility and ease. Once locating the face region with skin colour, many algorithms will be found for various colour areas.

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C. Feature Extraction in the feature extraction stage, the face detected within the previous stage is any processed to spot eye, eyebrows and mouth regions. Initially, the probably Y coordinates of the eyes was known with the employment of the horizontal projection. Then the areas round the y coordinates were processed to spot the precise regions of the options. Finally, a corner purpose detection rule was accustomed get the desired corner points from the feature regions.

D. Feeling classification The extracted feature points area unit processed to get the inputs for the neural network. The neural network has been trained in order that the emotions happiness, sadness, anger, disgust, surprise and concern area unit recognized. 525 pictures from Facial expressions and feeling info area unit taken to coach the network. However, we tend to area unit unable to gift the results of classifications since the network continues to be being tested. Furthermore, we tend to hope to classify emotions with the employment of the naïve bias classifier as Associate in Nursing analysis step. The rest of the paper is organized as follows. connected work (literature survey) is conferred in section II. Methodology is explained in section III. Experimental results area unit conferred in section IV. last remarks area unit given in section V.

LITERATURE SURVEY

Dayana Mathew et al., 2015 has planned a grip feature extraction technique victimisation neural threshold logic models to mechanically recognise the face expressions. The system is simulated at digital system level consisting of reading an image followed up with edge extraction system that may be enforced with hybrid CMOS memristive digital circuits. The results indicate sturdy boundaries of the countenance and it's helpful in development of period feeling recognizing digital chip. Salwa Said, Olfa Jemai et al., 2015 Face feeling recognition is one among the most necessary and apace advanced active analysis areas of computing. a replacement methodology for countenance recognition depends on moving ridge network classifier is planned during this paper. It permits North American nation the detection of six basic feelings nonetheless the neutral one: (Joy, surprise, anger, sadness, concern and disgust) the method consists of 3 principle steps: face discovery, options extraction and classification. The effectiveness of our planned rule is through an experiment incontestable through victimisation well-known check info: the extended cohenkanade database Mounira Hmayda, Ridha Ejbali et al.,2015 This paper presents feeling recognition system supported Beta moving ridge network by the quick moving ridge rework so as to boost the performance of this network. The planned system will be summarized in 2 main steps: coaching stage & classification stage. Comparison with several algorithms that suffer from the low classification rates and also the long playacting time the rates given by our experimental results show the effectiveness of the FWT. Nattawat Chanthaphan et al., 2015 the Facial feeling Recognition supported Facial Motion Stream generated through kindest using 2 sorts of face options. the primary one was simply a straightforward distance price every |of every} pair-wise coordinates packed into 153-dimensional feature vector each frame. The second was derived from the primary one supported Structured Streaming Skeleton technique and it became 765-dimensional feature vector per frame.

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PROPOSED ALGORITHM

This thesis encompasses a set of objectives that is associated with milestone of this process. The objectives are mentioned below.

To study previous techniques based on face recognition system. Collect the database for implementation of proposed method. The implement K-mean for clustering purpose and SIFT algorithm for feature extraction. This algorithm creates features in the form of Key points. Also implement IGA (Improved Genetic Algorithm) Algorithm for feature reduction or optimization. And the implement Feed Forward Neural Network for classification and evaluate the performance parameters and comparison the previous parameters like; false acceptance error, false rejection rate and accuracy.

Feed Forward Neural System

A feed-forward neural system is a naturally motivated characterization calculation. It comprises of a (conceivably enormous) amount of basic neuron-like handling units, sorted out in layers. Every unit in a layer is connected with every one of the units in the past layer. These associations are not all approach: each association may have a different quality or weight. The loads on these associations encode the data of a system. Frequently the by in a neural system are likewise called bunches. Information enters at the sources of info and goes through the net, layer by layer until it lands at the yields. During the ordinary activity, that is the point at which it things as a classifier, there is no criticism in the midst of layers. This is the reason they are called feed-forward neural systems.

Feed-Forward Neural Networks is a collection of neurons linked together in a Network can be represented by a directed graph:
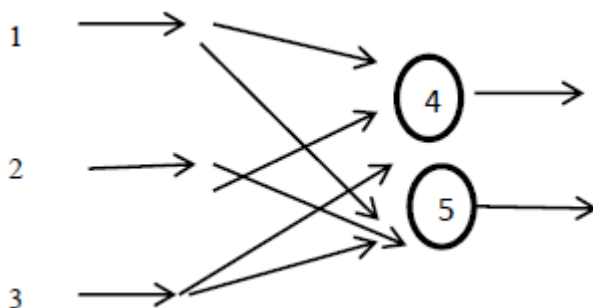

Fig. 2: Nodes represent the neurons, and arrows represent the links amid them.

- Every node has its number, and a link linking two nodes will have a pair of numbers (e.g. connecting nodes 1 and 4).
- Networks without sequences (feedback loops) are called a feed-forward net-works (or perceptron).

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K-Means Clustering Algorithm

Simply speaking it is an algorithm to categorize or to group your objects based on attributes/features into K amount of group. K is positive integer no. The grouping is done by minimizing the sum of squares of distances amid data and the corresponding cluster centroid. Thus, the main purpose of K-mean clustering is to classify the data. K-implies is one of the humblest unaided learning calculations that tackle the outstanding bunching issue. The procedure pursues a straightforward method to order a given informational collection through a specific number of bunches (expect k groups) static apriority. The principle thought is to depict k groups, one for each bunch. These trots ought to be situated in a cleverness path in view of divergent area causes changed the outcome. In this way, the better decision is to put them however much as could reasonably be expected far away from one another.

Genetic Algorithm

Genetic system is computer programs that alike the processes of natural development in order to solve difficulties and to model evolutionary systems.

SIMULATION RESULT EXPLANATION

In this segment, we present the tests and their outcomes alongside their discussion. We perceive and order the articulation for the pictures in the testing dataset and the nature of the equivalent was gotten to utilizing the quality measurements examined beneath. The test set for this assessment try picture arbitrarily chose from the prepared dataset as the pictures to be tried should be prepared first. Matlab 7.0 programming stage is used to play out the analysis. The PC for exploring is furnished with an Intel P4 2.4GHz Personal PC and 2GB memory as talked about above. The plan is tried utilizing usually face feeling recognition. From the reproduction of the investigation results, we can reach to the inference that this strategy is strong to numerous sorts of FER frameworks.

Table no. 1 Performance Parameters False Acceptance rate, false rejection and Accuracy (Proposed Work)

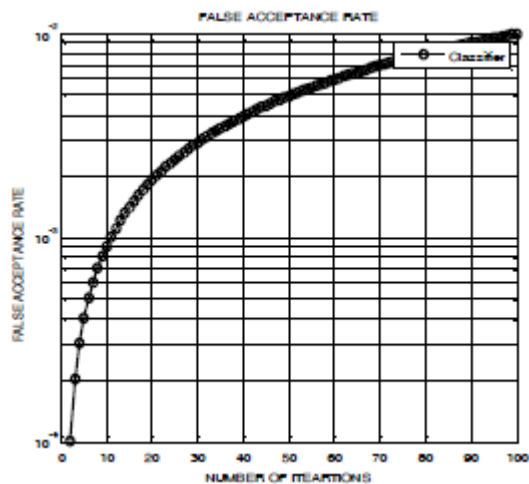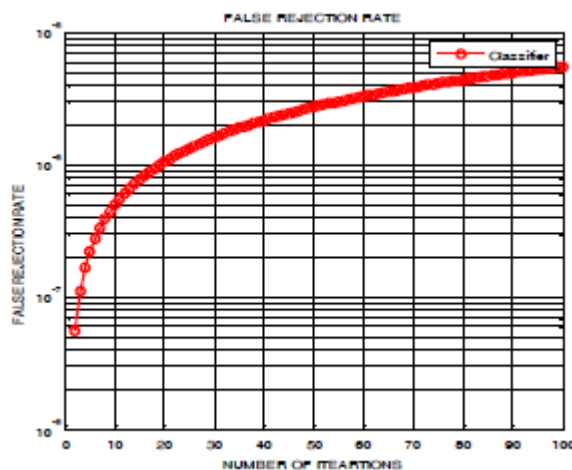| Image Categories	Mean Square Error rate	False Acceptance rate	False rejection Rate	Accuracy
Happy	0.00724	0.0099	5.514	98
Sad	0.0075	0.001	5.623	98.2
Fear	0.0083	0.003	5.781	98.4
Surprise	0.0088	0.005	5.98	98.7
Neutral	0.0091	0.007	6.00	99

Fig. 3 False Acceptance rate (Proposed Work)

Fig. 4: false rejection Rate (Proposed Work)

The above figure represents that the false acceptance rate means which wrong data will accept. The false acceptance rate, (FAR), is the calculate of the likelihood that the biometric safety structure will incorrectly accept an access attempt by an unauthorized user. A system's FAR typically is stated as the ratio of the number of false acceptances divided by the number of identification attempts.

CONCLUSION AND FUTURE SCOPE

In this conclusion, we improve the performance accuracy of the facial emotion detection and security maintained the Industrial area. The 5 emotions HAPPY, SAD, SURPRISE, NEUTRAL & ANGRY based on automatic facial expression recognition systems are over viewed. The neural network, Genetic algorithm approach is based on face acknowledgement, classification and feature extraction. The methodology of facial expression identification technique involves the optimization technique, Scale Invariant Feature Transformation (SIFT), clustering algorithm used to divide the facial emotion categories and neural network method. The methodology does make available a real-world clarification of the problem of facial expression recognition and it can work well in constrained

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environments. In future scope is as human facial expression recognition is a very elementary process, it is useful to evaluate the mood or emotional state of a subject under observation. As such, tremendous potential lies untapped in this domain. The basic idea of a machine being able to comprehend the human emotive state can be put to use in innumerable scenarios, a few of which we have mentioned here.

The capacity to recognize and follow a client's perspective can possibly enable a processing framework to offer significant data when a client needs assistance – not exactly when the client demands help, for example, the adjustment in the Room Ambience by making a decision about the state of mind of the individual entering it. Help individuals in feeling related research to improve the handling of feeling information. Applications in observation and security.