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TO ANALYSE EMOTIONS OF USERS USING SENTIMENT ANALYSISAND FACE EMOTION RECOGNITION THROUGH MACHINE LEARNING INFORMATION TECHNOLOGY DEPARTMENT

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ABSTRACT

We humans have a number of different facial expressions that we can understand the feelings of another. In general, facial expressions are a natural and direct way for a person creature to communicate their emotions and intentions. Facial expressions are key aspects of non-verbal communication. However, Human Face expression Recognition is one of the most powerful as well challenging tasks to be performed due to communication ambiguity. Therefore, we need a method that can provide real-time analysis vague feelings. The list of emotions that is viewed around the world is - happiness, sadness, surprise, fear, anger, disgust. Therefore, in this paper we have built a system of pre-processing, extraction and separation emotions based on their facial expressions using machine learning algorithms. This method will also solve the problems of lighting variation, suspension flexibility, light variation, skin tone variation and real user experience analysis time using algorithm to get facial expressions.

Keywords: Emotion, Happy, Haar Cascade,Convolutional Neural Network.

I. INTRODUCTION

The shape of a person's face is very important in social interaction. Communication often involves both speech and non-speech. At least - in words the connection is expressed in the form of a face. Such is the face soft signs of great communication. Non- verbal communication means communication between humans and animals through eye contact, movement, facial expressions, gestures, and language.

Eye contact controls contribution, conversations and creates a link other. Facial expressions include smiles, sadness, anger, disgust, surprise and fear. A smile on a person's face reflects their happiness and reveals a twisted eye. Sad speech is a feeling of relaxation that is often expressed as twisted eyebrows and frowning. Anger on a person's face is related to unpleasant and irritating situations. Annoyed speech is expressed by squeezed eyebrows, small and enlarged eyelids. Disgusting remarks are expressed by pulling down the eyebrows and the broken nose. Surprise or shock reveals when something unexpected happens. This is expressed through eye opening and opening of the mouth and this expression is easily identified. The background feature includes two types and is geometric based as well appearance based. Separation is also one of the important processes in which the above-mentioned expressions such as smile, sadness, anger, disgust, surprise, and fear are separated. The geometric-based element includes the eye, mouth, nose, eyebrow, other facial features and the removal of the facial-based element includes the facial part. The program focuses on a variety of FER three-step strategies respectively pre-processing, element setting and categories. And, it shows the benefits of different FER strategies and performance analysis of different FER methods. In particular FER systems are experiencing problems with light variation, pose variation, light variation, skin tone diversity.

II. RELATED WORK

The problem of distinguishing emotions from facial expressions in photographs is widespread. One of the first papers to install neural nets in this storage is EMPATH paper from 2002. It continues to perform Gabor filters on crude images followed by various modifications and PCA before inserting a 3-layer neural net. Recently, papers have used deep neural and convolutional neural networks for classifying emotions. Most of these papers focus on categorizing emotions in video images or based on audio and visual data (mixing speech attention once video strategies). Many papers want to see and match faces, but most do not use convolutional neural networks to extract emotions from still pictures. The exception to this is the paper by Kahou et al. actually training a deep convolutional neural network in a set of still images, but then use this in video data. Apart from the Kaggle competition, there is another Emotional recognition competition for still images and videos, Emotion Recognition in The Wild Challenge. In particular, the winners in 2013 competition use convolutional neural

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networks to classify.

Some other researchers have expanded the Cannons theory by showing a thalamic emotional expression structure using CNN. This novel theory is included that emotion which attracts emotions simultaneously arouses both emotions, such as fear, and body reactions like sweating. The program contains 3 modules. Face detection module is based on the image classification method where the given image is converted to a binary image and used for face detection.

Ongoing problems from the previous system have been complicated by the neutral network through multiple layers, light contrast problems, pose variations, lighting variations, skin tone variations. The main consequence of such systems is that they fail to scan multiple images in a single frame. Therefore, the literature study shows that many programs have been proposed for the analysis of emotions and emotions but with an accuracy of 75 - 82%.

III. METHODOLOGY

The methods and materials we use to analyze facial recognition are as follows:

We used a data set with a good variety of image that show different emotions such as happiness, anger, sadness, surprise, fear, and disgust. The goal is to use facial features such as eyes, eyebrows, lip movements to determine the percentage of sensations on the user's face.

The study expands the limited research understanding of CNN and machine learning used to analyze facial expressions with good accuracy.

We have developed a way of predicting, extracting and classifying emotions based on the shape of its face using machine learning algorithms. This method will also solve the problems of light variation, pose variation, light variation, skin tone variation. To speak of the uniqueness of the proposed system - a literature review conducted means that many programs have been proposed for the analysis of emotions and emotions but with an interval of 75 - 82% accuracy. But as we used the Histogram Evaluation algorithm to pre-process, the Dimensional Reduction feature extraction algorithm and the Haar Cascade segment algorithm as a separator, the accuracy of the model was increased to 85% in addition to providing very effectiveresults in real time.

Work Flow Diagram:

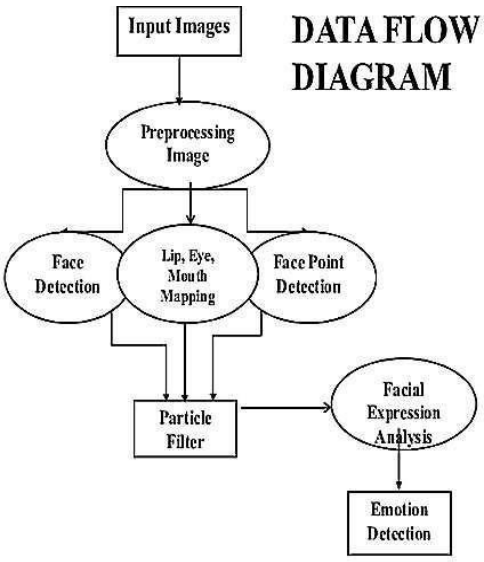

Figure 1: Work Flow Diagram

1) Process in advance and make it normal for raw data collected in real time to plan different attributes that can be used continuously. It includes different types of processes such as image clarity and measurement, contrast adjustments, as well as additional development procedures speech frames.

2) Extract features of processed data and fine- tuning disturbing features within the image for further processing. This is done using two processes such as extracting episodes and pairing episodes.

3) Divide the excluded features into the previously defined classes. In addition, analyze classified data to determine and predict user usage behavior.

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4) Analyzing users' feelings to determine how a someone may respond to a particular type of situation.

5) Eliminate the problem of subtle changes in facial expressions taken from real-time and providing a database that eliminates the problem of diversity in light, variety of pose, variety of lighting, variations of skin tone.

In addition, this method will also solve the problems of pose variation, light variation, skin tone variation due to which we will be able to determine the mood in a normal image, a small pixel image, and cartoon images.

IV. BACKGROUND STUDY

Imane Lasri, Anouar Riad Solh and Mourad El Belkacemi proposed a formal program a way that sees students' feelings on their faces. This program consisted of three phases: facial recognition using Haar Cascades, familiarity and emotional recognition using CNN on the FER 2013 website with seven types of speeches. Findings have shown that facial recognition is possible in education and, as a result, can help teachers adjust their presentations according to students' feelings.

Rohit Pathar, Abhishek Adivarekar, Arti Mishra and Anushree Deshmukh suggest a systematic way of dividing a face image into one of seven the emotions they consider in this study, by forming many categories divides into categories. In this paper they use convolutional neural networks (CNNs) to perform training on gray scale photography. They try at different depths once the maximum number of coating layers to get the best accuracy and finally gain 89.98% accuracy. They also analyze the performance of a different network structures such as a shallow network and a deep network deep in perception human emotion.

Hajar Chouhayebi, Jamal Riffi, Mohamed Adnane Mahraz, Ali Yahyaouy and Hamid Tairi have proposed a systematic approach to compare the results of two proposed ways to represent the acquisition of the landmarks of the Face and Feature Background. The first method is based on image processing (for example, histogram measurement, thresholding, colour modification, morphological works, etc.) and the second used the Dlib library to find faces landmarks. Explored each descriptive feature in two perspectives- Separation methods such as Vector Support Machine (SVM) and Multi-layer Perceptron (MLP) with three-dimensional data (10k US Adult Faces Database, MUG Facial Expression and personal website) to share three different facial expressions: joy, surprise and neutrality. The test results show that the first proposed method shows 91.5% accuracy and accuracy of more than 96% in the second method.

So, in a wide nutshell- The most commonly used feature algorithms are-- Gabor Features, Histogram of Oriented Gradients (HOG) and Local Binary Pattern (LBP), These have been used and compared to five popular information sites. Three popular ML-SVM algorithms, Random Forest (RF), and KNN were used for emotional intelligence detection. When we compare all this, we find that Haar cascade has a high accuracy of 94-96% and is very fast in making computer features like haar due to the use of integral images.

V. RESULT

Since then, we have successfully trained the operating system using different data sets emotions are different from the Japanese database, we used a dataset of different landmarks depicting 4.18MB size of data in comma separated values.

As a result, we were able to,

- Take a real-time user photo using the camera
- Pre-delete the image by using different filters to edit location symbols once manage light and pixel problems.
- Remove the element needed to separate the face with different emotions.
- Edit the extracted feature and align those features with the current database anddetermine user feelings.
- Finally, we were able to successfully plan an emotional graph to be displayed during the period.

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Outputs:

Figure 2: Happy Face

Figure 3: Sad Face

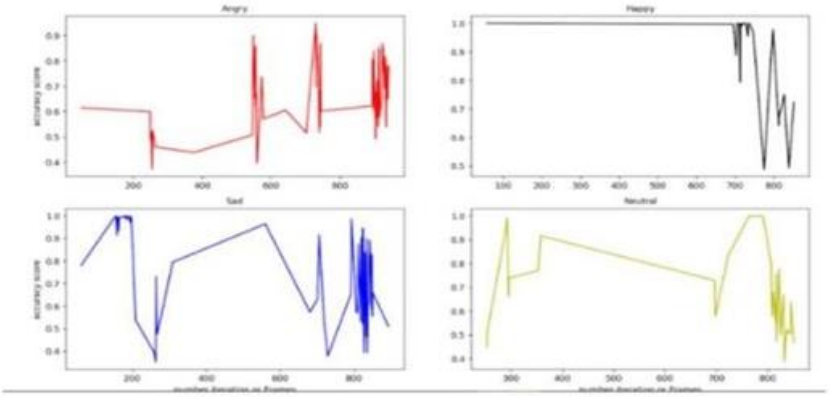

Figure 4: Graphical Representation

The following is a table showing the number of periods and the accuracy of those periods. The epoch number is a hyper parameter that describes the numerical times during which the learning algorithm will work across the training database.

Table 1: Epochs vs Accuracy table

Iterations	No. of epochs	Classification accuracy
1	1000	85.3
2	1000	83.8
3	1000	85.5
4	1000	86.01
5	1000	86.4

Following is the table depicting recognition rate.

Recognition Rate (RR)= (no. of correctly identifiedimages / Total no. of images) *100

Table 2: Recognition rate

Images/epochs	Training time (in sec)	Recognition rate
16/100	2.58	89%
16/500	10.22	86%
16/1000	18.78	83%

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Following is the table depicting false positives forrespective emotions.

False Positives (FP) are positive outcomesthat the model predicted incorrectly.

This is also known as Type I error. An AI false positive is when a user is incorrectlyidentified as a fraudster.

Table 3: False Positives

Emotion	False positive rate
Neutral	5
Angry	3
Happy	0
Sad	3
Disgust	5
Fear	5
Surprise	4

VI. BENEFITS AND SHORTCOMING

After implementing and analyzing the proposed model we came across different benefits and shortcomings of the system by considering different use-cases.

Following are the benefits of the system:

1) Determines the appropriate emotion of user with an accuracy percentage of around 89%.
2) Works for images captured at real time i.e., dynamic and static data.
3) Since, we are using convolutional neural network it ignores the problem of subtle changes in facial expressions captured at real time.
4) Eliminates issues with pixel changes,illumination problems and works with cartonified image.
5) Provides immediate and definitiveclassification.
6) Stores the emotions possessed by user within a course of time in an array which can be used to obtain meaningful data.
7) Determines the emotions of multiple face in a frame (matrix) simultaneously.
8) Implementation and setup are cost effective.

Following are the shortcomings of the system:

1) Since, human expresses their opinion in an ambiguous way, the system sometimes fails to determine amalgam of emotions.
2) Follows complex network structure.
3) Difficult to overcome face occlusion issues.

VII. CONCLUSION

Therefore, after developing a facial recognition model using machine learning, we gained 85% high accuracy and a minimum of 82% and learned to use machine learning algorithms and application in our project while using different classification techniques to achieve the result. As we have seen the result depends on the different emotions described and these feelings are taken from Kaggle. This was our project that we developed for our university.

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