International Journal on Applications in Information and Communication Engineering
Volume 8 : Issue 2 : June 2022, pp 12 – 16 www.aetsjournal.com ISSN (Online) : 2394 - 6237

FACIAL EMOTION DETECTION USING DEEP LEARNING

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Abstract — Facial emotion detection is one of the most interesting research areas where many researchers have actively participated in the last few decades. The paper tries to discuss the application of emotion research, which has seven different emotions such as happy, sad, neutral, anger, surprise, fear, disgust are obtained. Humans can produce different emotions in different situations, which have differentmeanings,intensities, and complexities. Using the Convolutional Neural Network (CNN) algorithm, About 89% of the accuracy has been achieved. This is the easy way for everyone. Deep learning and neutral networks have been used for good results. Our proposed Deep Learning Model helps focus on important features of human faces to find emotions using multiple datasets such as FER-2013 and image datasets.

Keywords— Emotion Recognition, Dataset, Types of Emotions, Neural Networks, Facial Expression, CNN

I. INTRODUCTION

We have also been inspired by the benefits of physically handicapped people like the deaf and dumb. But if any ordinary person or automated system can observe the emotions on their faces and understand their needs, it is very easy for them to understand their needs in the co-operative human or automated system.

Figure1:Types of Facial Expressions

Human facial expressions can easily be classified into 7 basic emotions: happy, sad, surprise, fear, anger, disgust, and neutral. The feelings on your face are expressed by the activity of the specific group of nuns on the face. Sometimes subtle in expression , but in signs of complexity, there is often a lot of information about our state of mind. For example, retailers may use these metrics to evaluate the customer's interest. Healthcare providers can provide better service by using additional information about the emotional condition of the patients duringtreatment. Humans are well-trained to read the feelings of others, at the age of 14 months , the difference between happy and sad can already be told to the children. But to answer the question of whether computers can do better than us to enter the emotional state,

we designed a deep learning neural network that gives the machine the ability to predict its emotional state. In other words, we blind them to see what we can see.

II. LITERATURE SURVEY

Facial expressions are a common signal of expressing mood for all human beings. There are many attempts to create expression analysis on automated faces[1] because it is used in many fields such as Robotics, Medicine, Driving assist system and lie detector [2-4]. The 20th century, Ekman et al. [5] he understood the seven basic emotions of culture, in which man grows up with seven expressions (anger, fear, happy, sad, disgust[6] ,and surprise) . In a recent study on the dataset, Sajid et al. discovered the impact on the face as a marker of age estimation[7] .Their findings state that the strangeness of the right face is better than the identity of the right face. The appearance of the face angle is still a major problem for the detection of the face. Ratyal et al. provided solutions for the changing behavior in the appearance of the face pose. They used subject-specific descriptors to use tri-dimensional interpretations[8,9]. There are many problems such

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as excessive makeup[10] poses and expressions[11] which are solved using convolutional networks. Recently, researchers have made an accomplishment in facial emotiondetection [12-14] has been presented,which led to improvements in neuroscience[15] and cognitive sciences[16] that led to the advancement of research in the field of face expressions. As well as computer vision [17] and machine learning [18]

The events in the world made the sense of emotion more accurate and available to the common people. As a result, the expression recognition on the face as a sub-field of the image process is increasing rapidly. Some of the possible applicationsarehuman computer interactions[19], psychiatric observations [20], drunk driver recognition[21], and most importantly, the lie detector [22].

In Existing System, Identifying the human body language is an important issue.To recognize the feeling is to depict the intent in a very ancient style and to establish the unique state of expression fashions involving underlying semantic analysis and point models. Even though this path has been proven to be successful and safe, this illustration is as frequently as possibleTo address this issue, LSA appliesSingular Value Decomposition (SVD) on the dataset to result in a low-position surmise.Every new feeling is a quick mix of each of the different factors to solve the problem of the society. The main idea of the problem model is likely influenced by the way of the file situation . In the dataset, a model of the point of action is created to determine the age of each expression.

- To reduce the rate of accuracy.
- Chances of getting false positives and false negatives is more.
- high price

In the proposed system, we support gaining end-to-end deep knowledge of frameworks based on the communication network that draw attention to categorizing the underlying emotions in facial images. Often, increasing the shell neural community is more than the layers/neurons.The inclusion of neurons depends on making it easier to go to gradient with flow in the network or on better regularization, especially for classification problems which have a large number of classes. However , in order to find the emotion on the face, since there is a low range of classes, we show that the use of such a convolutional network less than 10 hours and targets (which have been trained since the beginning) is able to achieve reassuring results by putting back the state-of-the-art models in many databases. Looking at the image of the face, now all the components of the face are not necessary to find the exact feeling and in many cases, it is necessary to focus only on the region to experience the basic emotions. We connect a health system to our spatial through the local transformer community, so that the focus will be on the areas of the important face.

- high accuracy
- Use of less time
- Less chance for false positives and false negatives.
- Fast Results

III. IMPLENENTATION

To find the face in the act (e.g., the image; this stair is also referred to as face detection), remove the features on the face from the region of the found face (e.g., find the size of the components on the face or describe the skin texture on the face;this step is referred to as the characteristic extraction of the face), analyze the characteristics on the face, and/or find features on the face. Analyze the motion of facial features and the characteristics on the face and to classify this information into some of the facial expressions.

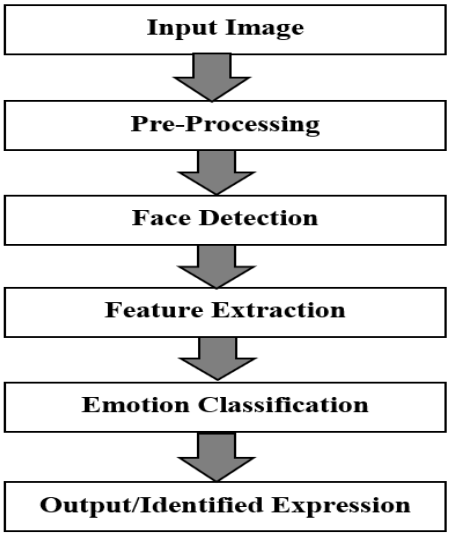


Figure 2. Block Diagram

A. PREPROCESSING

The step is used to remove images that are not like noise images, blur images and images of shadow and to use a Gabor filter to plug the image through video . Therefore, images are used to remove the expression on the face.

B. FACEDETECTION

VJ face detection technology is used to identify the image on the face. There are four stages in the VJ system; That isHaar internal image, AdaBoost and cascades. Figure depicts the characteristics of different types of Haarfeatures.Haar features are applied to input images to check if any of the images on the face are in existence in the captured image.

The unique property can be calculated by adding the entire image pixel and then excluded to get the same value. If the value achieved in that area is high, then the existence of human faces can be seen in the competition.

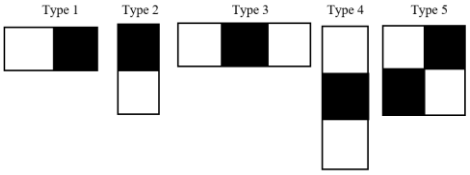


Figure 3 :The different type of Haar features

As shown in Figure 4, integral-image technique is used to evaluate the summation of pixels in addition to the corresponding pixels in a specific rectangle of the image.

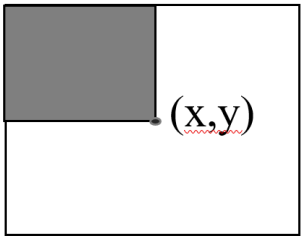


Figure 4 : Integra limage

AdaBoost is used to create stronger classifiers from the Week classifiers. This can reduce the negative detection rate and also reduce unnecessary characteristics.

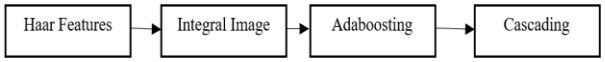


Figure 5 :Stages of VJ face detection

The cascade structure is used to remove a negative image and to check the presence of the face in a particular part of the image.

C. FEATURE EXTRACTION

By improving the accuracy of the images of emotions on the face, the characteristic extraction FER. There are various extraction systems such as Local Binary Patterns (LBP), Grey-Level Co-occurence Matrix (GLCM), Grey Level Weight Matrix (GLWM), Traditional Gabor Filters (TFFs) and DBWP which are used for feel classification .

D. CLASSIFIER

Three different types of classifiers are there: They are KNN, CNN and SVM for classification

The KNN classifier is a method of classifying items based on k,k which shows the number of samples after specification in the space. If k=1, the object is assigned to the neighboring class. Neighbors are protected from the set of accurate classification of known objects. It is taken as a training set for the classifier.

CNN is the most commonly used ANN algorithm in CV. In CNN there is a series of convolutional layers, which are related only to the local regions in the output input. This is done by sliding-filters or weighted-matrix on the input and the convolution output is calculated between the input and filter at each point.

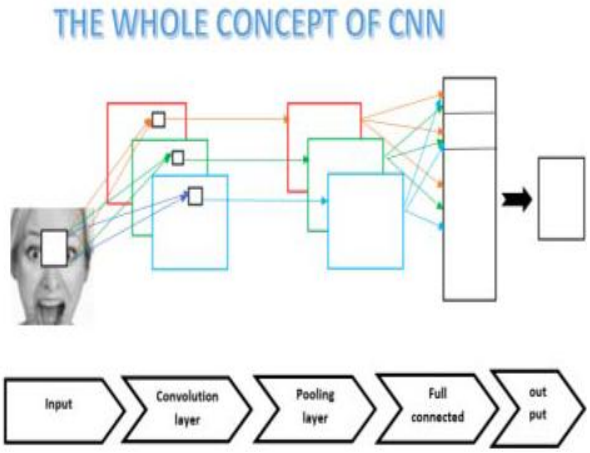


Figure 6:The concept of Convolutional Neural Network(CNN)

After importing the dataset, the first step is pre-processing. In pre-processing we are going to divide pixels i.e., into a row pixel. In try block usage

columns training so we can add pixel values to array and emotion values in an array. The same procedure is being done for testing. For the construction of CNN we are going to convert the values to np.array form.

The second step is to normalize the data. Generally, the normalization is done to scale below 0 to 1 The normalization helps us to train the data faster, after normalization each pixel value will be between 0 and 1. Here we are going to subtract all values from the mean ofthe data, so that the average mean value axis drops from zeroto zero for the entire dataset and find the standard deviation of the dataset. The same procedure is repeated for the test dataset.

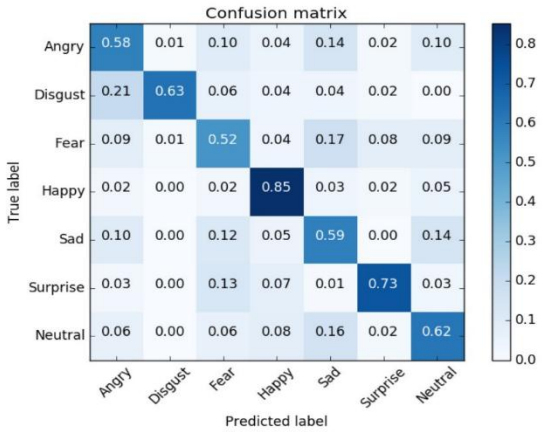
The third step is to reshaping the data. Now our dataset is in the form of array. We have to reshape our data in a format such that each image of the dataset will be of the same size so that, the system can accept the data. Here we are turning our images into 48 x 48 pixels. Now we are going to design neural network models using cnn algorithm with the help of keras. The first step is initializing the sequential model. In this model we have 3 convolutional layers getting, in the first convolutional layer we have 2 Conv2D layers with 64 neurons, kernel size 3,3, the activation function is Relu. The process starts with the start of the model accompanied batch normalization followed by the different convolutional layers with the activationfunction ReLu. The derivative of the ReLu function will be either 0 or 1, therefore, there will be some difference in weight updation, therefore, our gradient descents converge.

IV. EXPERIMENTAL RESULTS

The best modern deep learning model outperforms the best simplified model by about 2% under unconfirmed conditions All measured architectures outweigh the best simplified models, including openings, which contain only half the parameters. These accuracy results tell us that modern deep learning architecture models have the potential to significantly improve FER performance. Our different CNNs already perform competitively for previous works that exploit collaborative voting.

By creating a group of 8 such CNNs, we achieve a FER2013 test accuracy of 89%. Our group of deep learning models achieves state performance without seeking further training data or structures, extensive data elaboration or face registration.

Deprived of any facial registration, our facial emotion recognition process is theoretically minor compared to earlier techniques and not due to registration mistakes. By exploiting the secondary training data and the wide range, FER will additionally advance the fixed data expansion performance.



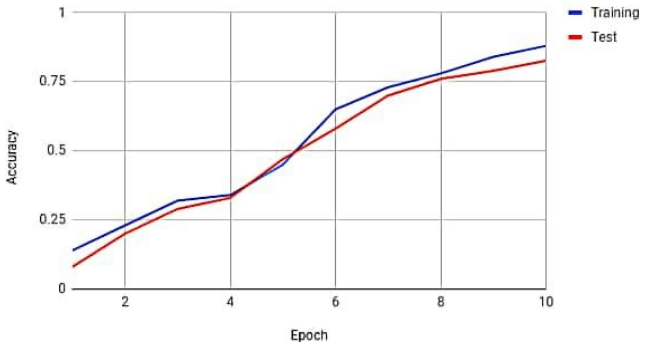


Figure 8 : Accuracy Curve

V. CONCLUSION

The project proposes an approach to identify the range of facial expressions. Our work forms the foundation for a good interaction between humans and machines. In its present situation, the communication between human beings and systems is very common, it is generally speech-to-text transformation. It is possible to create a better response to the desktop by bringing human emotion into the picture.

- The quality of the poor image limits the effectiveness of the face detector .
- The size of the smaller image makes it more difficult to detect the face.
- The face of different facescan take away the

confidence to search for them.

- Data processing and storage can bring limits on the features on the face.

VI. FUTUREWORK

In the future, we want to add the alarm system if it is found in the application that the person's existing emotional country is tired/sleepy. This system is automatic and gives an accurate result to immediate expressions. It can be used in the security system in which they can identify the expression of the person. Doctors can use this system to understand the pain of deaf patients. The use of this system can also be used to find out what is the state of mind of the users, so that they can try to identify the intentions of the customers and change some of their marketing ideas.

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