Real Time Emotion Detection to Predict Depression Using OpenCV

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Abstract - One of the ways human express emotions through facial expression. Real time depression prediction in the field of emotion recognition has been challenging task over the past decades. Labelling and inference of cognitive affect state from a video capturing the face will possibly help us with the depression detection systems based on facial gestures. Facial expression is triggered when a emotion is experienced, hence depression detection can be achieved by predicting the facial expression. Facial emotions are classified as follows: Happy, Sad, Anger, Fear, Disgust and Surprise. Depression has the potential to be lethal in many cases. To avoid all the above we need to stop people from suicidal act as soon as possible and the victim must be treated appropriately. The aim of this paper is to use real time video analysis of user's emotion. We have used Convolutional Neural Networks[CNN] in order to achieve this state. If angry, sad, disgust is carried out for a long period time then it will be marked as depression. Then a video call will pop up on the screen with nearby psychologist. This may help the user get out of the depressed state.

*Key Words***:**

1.INTRODUCTION

Depression can take control of our daily life. Depression is a global public common illness worldwide. According to the latest data from the World Health Organization (2021), [1] More than 280 million in the world are pretentious by depression and are in depressed state. There are three types of psychological states such as emotions (Happy, Sad, Anger, Fear, Disgust, and Surprise), observation (e.g, understanding a state of memory), perception (e.g., sound). Depression is a serve mental disorder in which a person feels an emotion. It also includes features like worthlessness, guilt, anger, problems in concentration. It is measured by the number of symptoms come duration. Depression includes actions such as yelling at someone when they are out of emotion. [2] Feeling Guilty, Confused state of mind , imbalanced state of income will be triggering health

conditions. Many people due to, COVID-19 lead to mental complications. In unpleasant or stressful scenarios, a loss of this condition may trigger up depression. The global lifetime generality of emotional depression is around 15%.Depressed people face different episodes with a high level of severity. Depression is always compared to silent killers which take life without warning. Reports of depression say that teenagers are more involved while comparing with adults. People with depression may oversleep or sleep for fewer hours by which their pattern of sleep changes and they become unhealthy often. National Institute of Mental health listed some forms of depression disorder such as:

• Dysthymia disorder

• Unclear state of mind - Postpartum depression

• Delusion depression

• Cyclic disorder

2. RELATED WORK:

This section has various technique of our main modules in our system such Depression Emotion Detection. We have done a comparative study for different approaches available for Depression detection.

Costa et al. [3] made use of images. They tried to make use of color diffrences in skin to get the physiological parameters. This approaches did not produce any measuring output.

Verkruysse et al. [4] presented a system that made use of easy, less expensive digital cameras to learn the heart of the individual from his face. It took hardly 30 seconds to produce the output.

Kenneth et al [5] developed a non-contact system for capturing two PPG (Photoplethysmogram) signals that are at different wavelengths at the same time. The experiment was conducted on 10 test subjects. The camera and the PPG sensors were used to collect data.

The subtleties are being utilized for client confirmation reason. When the client signs in, the genuine handling of the information happens on the worker. The information is taken from the client, sent it to the worker for preparing utilizing Recurrent Neural Network (RNN). The engineering is a start to finish instrument and dependent on that a decoder is being constructed. The consideration component is likewise executed where it the fundamental attributes of the sentences are being extracted.[6]

This paper was composed by Aliaa A. A. Youssif, Wesam A. A. Asker which presents a PC vision framework for programmed look acknowledgment (AFER). There are three significant strides in AFER, the initial step being the identification of the face in the scene. The subsequent advance is to remove the facial highlights that showing the look and the third step is to arrange the facial showcase appeared on the face[7]

The creators Enrique Correa, Arnoud Jonker, Michael Ozo and Rob Stolk proposed their paper of feeling acknowledgment utilizing Convolutional Neural Network. This strategy incorporates two or three hundred high goal photographs tomany thousands more modest pictures. To expand the precision of the feelings identified the size of the preparation dataset should be expanded from 9000 pictures to 20000 pictures from FERC. The outcomes acquired are contrasted and different strategies like SVM and LVQ. It creates a precision of 90% happy,80% nonpartisan and 77% amazed. [8]

3. METHODOLOGY

3.1 Convolutional Neural Network:

The design of a ConvNet is analogous thereto of the property pattern of Neurons within the Human Brain and was galvanized by the organization of the cortical area. The Convolutional Layer and also the Pooling Layer along type the i-th layer of a Convolutional Neural Network. looking on the complexities within the pictures, the quantity of such layers is also inflated for capturing low levels details even any, however at the value of a lot of machine power.

3.2. Facial Expression dataset:
There square measure several open accesses countenance dataset in literature. we've used knowledgeset for countenance from Kaggle and also the data has 48x48 element grayscale pictures of faces. The coaching set consists of twenty eight,709 examples with seven emotions (happy, sad, surprised, fearful, angry, disgusted, and neutral).
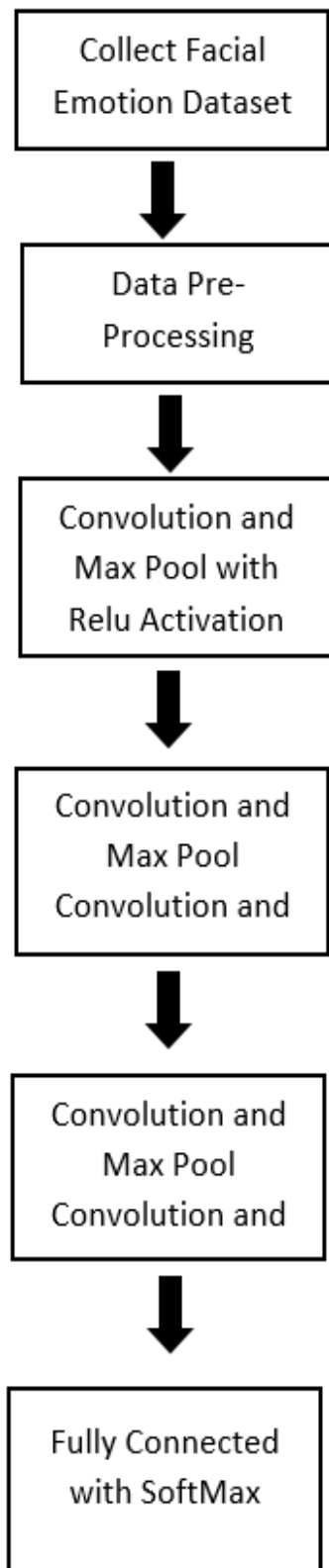
3.3. Image Preprocessing:
The face circumference was detected exploitation the Haar Cascade library from the images. Then, these detected rectangular facial expressions were clipped and recorded. Also, {the pictures|the pictures|the photographs} were reborn to grey images and was placed in neural networks. This method was done to avoid extra density within the neural networks.

3.4. Convolutional neural network design:
The planned CNN architecture is aimed to coach the element values within the rectangular region containing facial expressions. this happens in three stages when that it's fed into the totally connected layers. The CNN structure consists countenance knowledge and includes the three stages every of that has a pair of convolutional layers with 'relu' activation perform followed by max-pooling layers, and three totally connected layers with 'relu' and softmax activation perform. in the end operations of convolutional layers and max-pooling layers, every frame feeds to the totally connected layers and prediction of frames was processed with classifier as seven different facial emotional state.

3.5 Network preparing:
The neural organizations were executed utilizing Keras with a TensorFlow backend running in Python. The model waprepared for 50 ages.

3.6 Real time testing:

After the preparation of proposed CNN engineering, the prepared model was tried continuously. To start with, human appearances were recognized by the PC camera utilizing Haar Cascade library. From that point onward, the recognized pictures were shipped off the model and the classes they have a place with were queried.As a consequence of the forecasts, the chance of having a place with which class the look was appeared on the webcam screen. OpenCV is utilized to draw a rectangular limit around the face distinguished and the feelings perceived is shown on the screen with an emoji pointer on the window with the rate certainty of that feeling.

Collect Facial Emotion Dataset

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Data Pre-Processing

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Convolution and Max Pool with Relu Activation

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Convolution and Max Pool Convolution and

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Convolution and Max Pool Convolution and

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Fully Connected with SoftMax

Table 3.6 - Modules used

Modules used	Functionality
Data Pre-processing	The data required to train and test the model is processed and divided into training and test dataset. The images are reshaped for keras model.
Model definition	The CNN Model code is defined using the required ML Libraries with 3 fully formed layers after the operations of 3 convolutional and 3 max pooling layers
Real time Emotion Recognition	The real time classification of emotion is done with the help of OpenCV to access video with a webcam and the emotion recognition classification is shown on the screen

3.6 VIDEO CHAT APP:

Instant electronic communication and video calls paved the means for higher communication. The users will exchange messages from any location at any time inside a couple of seconds. Of course, the video business app permits US to form the proper paradigm shift to a different level. inside real time audio and video Chat, users are mistreatment the video business app. So ,in this application we are about to integrate Teams call with person.

3.7 Analysis:

The framework distinguishes side effects of misery for a client by depending on a variable, score that is covered up to the client. The worth of the score variable decides the following arrangement of inquiries that should be introduced to the client and subsequently helps in making expectation that tells the feeling of the client which is one among the two classes miserable or discouraged. Every choice related with a specific inquiry is administered by a number that contributes towards the score variable. The primary page of survey comprises of not many fundamental inquiries. A score of 16 leads the

client to take up a downturn test. In the event that the client gets a score of 16 or above in it, sadness is recognized, and proper helpline number is shown for additional assistance. A score lesser than 16 prompts an outcome that says the client is pitiful, and the client is made suggestion to elevate his mind-set. Then again, a score of 4 on the essential poll page prompts a finish of the client being glad.

In conclusion any score between the scope of 4 and 16 takes the client to a bitterness test where the client is additionally coordinated forward into the misery test or taken into the downturn test dependent on his score esteem.

4. RESULTS AND DISCUSSION

We prepared our Convolutional Neural Network model utilizing Kaggle data set which incorporates seven feelings (satisfaction, outrage, misery, disdain, unbiased, dread and shock) The identified face pictures are resized to 48×48 pixels, and changed over to grayscale pictures at that point were utilized for contributions to the CNN model. We accomplished a precision pace of 64% for the feeling acknowledgment.

In this paper, we presented a catch-based work area application to distinguishes if the client is discouraged and this application utilizes a survey which the client should reply. In view of the came about answer the client is recognized on the off chance that he/she is discouraged or not. The investigation of whether an individual is fleeting pity or showing manifestations of melancholies was offered by internals scores granted to the responses of each question when tried with various situations.

5. CONCULUSION:

Facial Expression Recognition System for Depression detection has a wide scope of utilizations in mental examination. In pandemic n number of teenagers are affected by mental Health. This application will help them to get rid of the depressed state. The framework assumes an informative part in relational relations since they can uncover the emotional state, intellectual movement, character, goal, and mental condition of an individual. The framework has 3 modules-face discovery that is executed by Haar Cascade, feeling acknowledgment which is carried out by CNN utilizing Keras that basically centers around identifying feelings that can reflect sadness in a person. At last, the last module, is utilized that is utilized to perceive

discouragement that further assists with separating among pity and wretchedness. In conclusion, this project helps to sight the condition

of a private. The paper provides associate degree analysis of various techniques and algorithms employed in this project to deduce the results. It conjointly demonstrates the connected work on an equivalent topic and their approaches in determination beside the distinctive approach employed in the project. It provides an in depth summary of the proposed answer and design. The paper conjointly describes each every module employed in the psychological science Screening take a look at.

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