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Trauma Sensing using Machine Learning &Vocal Data Mining

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ABSTRACT: Trauma might be considered as one of the most serious social health problems in the modern society. Mentally ill or Stressed people thought of committing suicide. It can be regarded as a risk indicator of suicide. India is among the top countries among in the world to have annual suicide rate. Objective of Face Emotion Recognition (FER) is identifying emotions of a human for reduce the suicide rate. This system involves extraction of facial features, and threshold detection of stress using emotions expressed through face using the (CNN, 2.17)algorithm. This system is basically used to classify positive and negative emotions and detects the stress based on usual threshold value.

KEYWORDS: Suicide rate,Emotions,Convolutional Neural Network. Introduction

I. RELATED WORK

Trauma sensing using Emotion Artificial Intelligence proposed by Mandar Deshpande and Vignesh Rao. This paper aims to apply natural language processing on Twitter feeds for conducting emotion analysis focusing on depression. Individual tweets are classified as neutral or negative, based on a curated word-list to detect depression tendencies. In the process of prediction Naive-Bayes classifier have been used.

Facial emotion recognition in real-time and static images proposed by Shivam Gupta This paper aims to detect facial expressions are a form of nonverbal communication. Various studies have been done for the classification of these facial expressions. There is strong evidence for the universal facial expressions of eight emotions which include: neutral happy, sadness, anger, contempt, disgust, fear, and surprise. So it is very important to detect these emotions on the face as it has wide applications in the field of Computer Vision and Artificial Intelligence.

Short Research Advanced Project: Development of Strategies for Automatic Facial Feature Extraction and Emotion Recognition proposed by David Restrepo and Alejandro Gomez. This paper aims to develop a computational way for emotion recognition though images using the Cohn-Kanade database to train a pattern recognition neural network and Viola Jones object detector to extract the information of the facial expression. The resulting neural network showed an overall accuracy of 90.7% in recognizing between 6 basic emotions such a surprise, fear, happiness, sadness, disgust and anger.

Emotion recognition and drowsiness detection using Python proposed by Anmol Uppal, Shweta Tyagi, Rishi Kumar and Seema Sharma. This present the software which detects and recognizes faces as well as tells a lot more about that person which could be used to get feedback from customers or to know if a person needs motivation. Detection of eye blinking is important in certain scenarios where to avoid any accident or mishappening like in vehicles or in security vigilance

II. METHODOLOGY

Face of the subject is captured using the camera module. This detected face is processed and the emotions are classified as either positive or negative emotions. The detected image is processed to identify the face of the subject using Convolutional Neural Network (CNN) algorithm.

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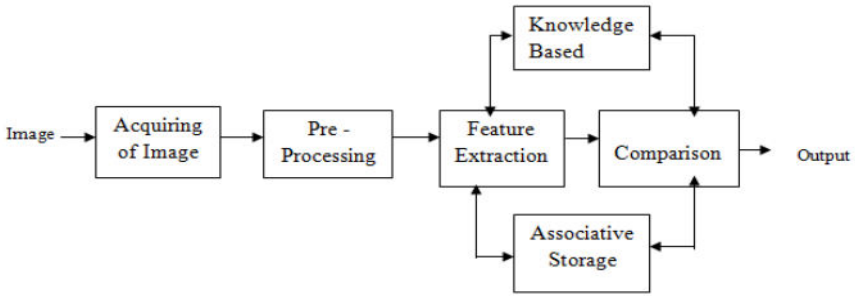

Fig.1 Methodology Of the system

This is plotted and an increase in the negative emotion can be inferred as increase in stress.

- Face Detection

Face Detection is the first and essential step for processing, and it is used to detect faces in the images. A facial detection system uses biometrics to map facial features from a photograph or video. It compares the information with a database of known faces to find a match. Face detection systems use computer algorithms to pick out specific, distinctive details about a person's face.

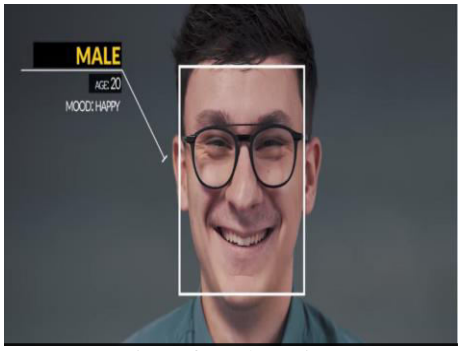

Fig. 2 face detection

These details, such as distance between the eyes or shape of the chin, are then converted into a mathematical representation and compared to data on other faces collected in a face database.

- Emotion Detection

Emotion detection is used to analyze basic facial expression of human. Emotion recognition system is constructed, including face detection, feature extraction and facial expression classification.

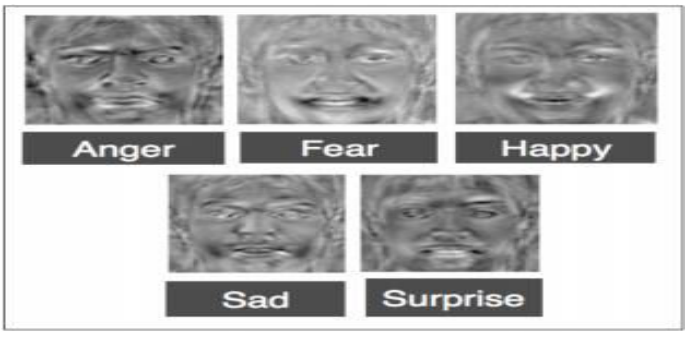

Fig 3 Emotion Detection

- Feature Extraction

Facial feature extraction is the process of extracting face component features like eyes, nose, mouth, etc. from human face image.

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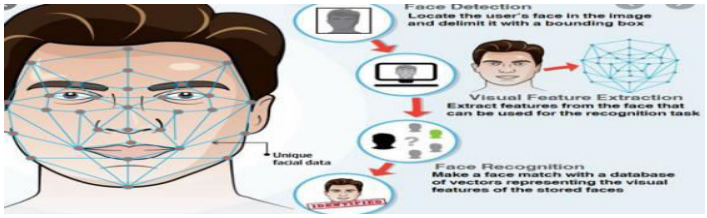

Fig. 4. Feature Extraction

Facial feature extraction is very much important for the initialization of processing techniques like face tracking, facial expression recognition or face recognition.

- Emotion Recognition

The emotions are to be extracted from the detected face. The image that is captured from the camera module, contains the facial features. The detected face is pre-processed (i.e.) cropped and resized. The detectors defined prior can be utilized to identify the emotion and sort them. It must be noted that viola-jones algorithm uses adaboost algorithm with cascading classifier, wherein a series of weak classifier's classification with a satisfactory threshold is combined to give an acceptable outcome.

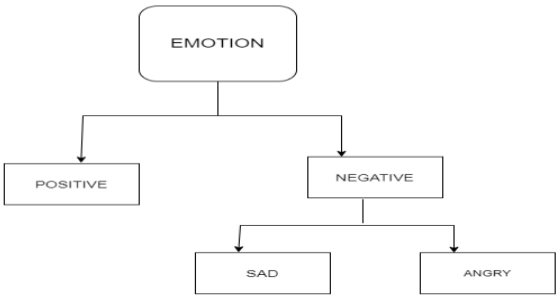

Fig.5 Emotion Recognition

- **Mathematical Model**

Receive input data, process the information, and generate output
Step 1: Load the input images in a variable (say X)
Step 2: Define (randomly initialize) a filter matrix. Images are convolved with the filter
Z1 = X * f
Step 3: Apply the Relu activation function on the result
A = Relu(Z1)nf
Step 4: Define (randomly initialize) weight and bias matrix. Apply linear transformation on the values
Z2 = WT.A + b
Step 5: Apply the Relu function on the data. This will be the final output
O = Relu(Z2)

- Algorithm Details

1) Algorithm 1/Pseudo Code

- Image Processing:

In computer science, image processing is the use of computer algorithms to perform image processing on digital images. We used image processing for detecting the faces from camera and to capture emotions on the detected images.
Steps for Image Detection :
Step 1:
Confirm the upper limit of the number of faces to be detected.
Step 2:
Adjust the scaling of the images according to the Device's Camera.
Step3:
Give access of the device's camera (to on and off) and pass the camera port as input to OpenCV library's VideoCapture method.
Step4 : Confirm the frequency of frames needed from the video and capture them within adjusted intervals.

2) Algorithm 2/Pseudo Code

Deep Convolutional Neural Network (DCNN):

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Input: Test Dataset which contains various test instances TestDBLits [], Train dataset which is build by training phase TrainDBLits[] , Threshold Th.
Output: HashMap ≤class label, SimilarityWeight ≥all instances which weight violates the threshold score.
Step 1: For each read each test instances using below equation

$$testFeature(m) = \sum_{m=1}^{n} (.\ featureSet[A[i] \dots \dots .A[n] \leftarrow \text{TestDBLits})$$

Step 2 : extract each feature as a hot vector or input neuron from testFeature(m) using below equation.

$$\text{Extracted\_FeatureSetx[t.....n]} = \sum_{x=1}^{n}(\text{t}) \leftarrow testFeature\ (\text{m})$$

Extracted FeatureSetx[t] contains the feature vector of respective domain.

Step 3: create the number of Convolutional
For each read each train instances using below equation.

$$trainFeature(m) = \sum_{m=1}^{n} (.\ featureSet[A[i] \dots \dots .A[n] \leftarrow \text{TrainDBList})$$

Step 4 : extract each feature as a hot vector or input neuron from testFeature(m) using below equation.

$$\text{Extracted\_FeatureSetx[t.....n]} = \sum_{x=1}^{n}(\text{t}) \leftarrow testFeature\ (\text{m})$$

Extracted FeatureSetx[t] contains the feature vector of respective domain.

Step 5 : Now map each test feature set to all respective training feature set GAPS

$$weight = calcSim\ (\text{FeatureSetx} \,||\, \sum_{i=1}^{n} \text{FeatureSety[y]})$$

Unable to classify sentiment for heterogeneous images like nature images, animal face images etc.
Traditional CNN is takes more time to train each object and testing respectively. Good accuracy for human face images only not others. Only localize features has consider for sentiment classification is existing research it affect on overall accuracy of error rate.

- **Data mining:**

Text mining (also referred to as text analytics) is an artificial intelligence (AI) technology that uses natural language processing (NLP) to transform the free (unstructured) text in documents and databases into normalized, structured data suitable for analysis or to drive machine learning (ML) algorithms.

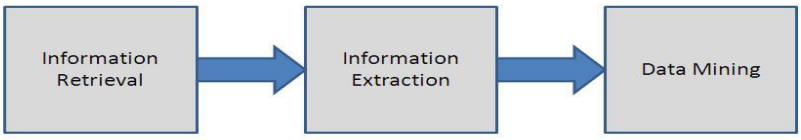

Fig:data mining stages

STAGE 1: information retrieval
The first stage of text or data mining is to retrieve information. This might require using a search engine to identify a corpus of texts that are already digitised or it might necessitate digitisation of physical texts in publications or manuscripts.
STAGE 2: information extraction
The second stage is the mark-up of text to identify meaning. In most cases this will involve adding **metadata** about the text into a database (i.e., author, title, date, edition etc.), while in others it might involve keying in all person names or locations mentioned in the text (for example)..

STAGE 3: data mining
The final stage is to text mine the text(s) using various tools. The purpose is to find associations among pieces of information that draw out meaning and enable researchers to discover new information which might otherwise be difficult to discover.

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III. SIMULATION RESULTS

- **Main GUI Snapshot**
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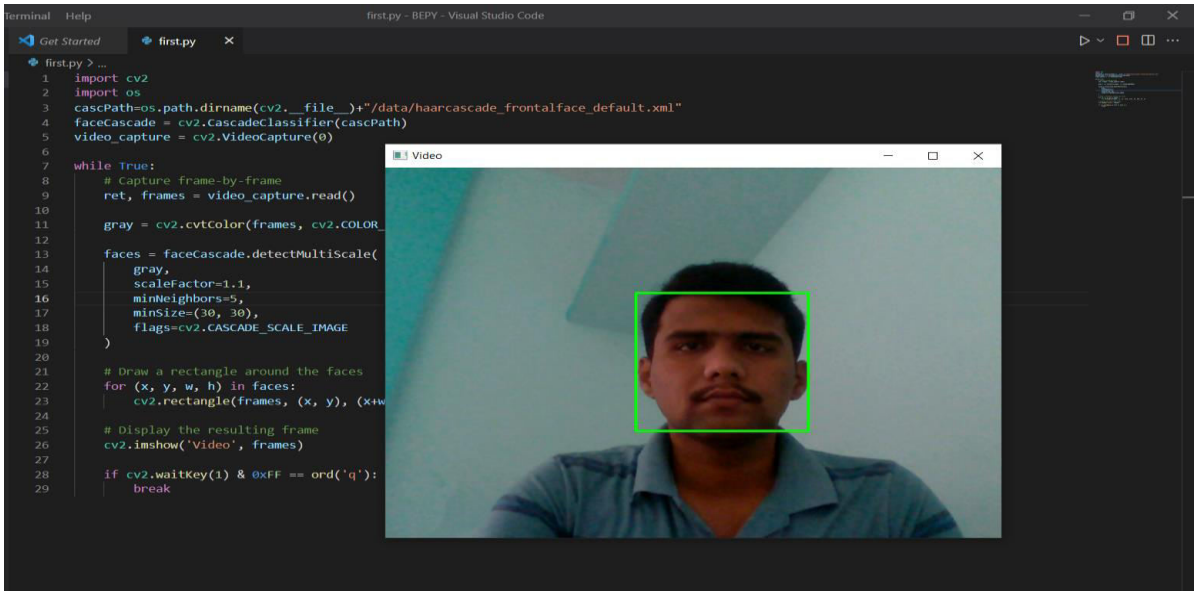

Fig. 6 Face Detection

- **Discussion**

We are designing a real-time detection system for depression detection. We capture a video using laptop camera and detect a face. In second module using DCNN algorithm and previously recorded dataset find emotions of person and detecting depressed face.

IV. CONCLUSION AND FUTURE WORK

The proposed system is successful at predicting depression in the test data from the dataset and also from real time video of user. In real world scenario when integrated with various web platforms, this system can create awareness about depression and also provide interface to detect their existing/upcoming depression. This model can help psychologists to detect depression of individuals and can suggest directions for future depression-related studies.

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