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A Comprehensive Review of Deep Learning in Depression Detection with Chatbot Assistance

Pratik D. Dawedar[1], Shivaksha U. Bhore[2], Shreyash A. Mhaisane[3], Pankaj D. Parbat[4], Prof. A. V. Dahat[5]

Department of Computer Science & Engineering, P. R. Pote (Patil) College of Engineering and Management, Sant Gadge Baba Amravati University, Amravati, India

ABSTRACT: Suicide is undeniably one of the most pressing social health issues in modern society. Suicidal ideation, or thoughts of committing suicide, serve as critical indicators of the risk of suicide. India ranks among the top countries globally in terms of annual suicide rates. The objective of the Face Emotion Recognition (FER) system is to identify human emotions to help mitigate the suicide rate. This system involves the extraction of facial features and employs the CNN (Convolutional Neural Network) algorithm for emotion recognition. By classifying emotions as positive or negative, the system aims to detect stress based on predefined threshold values.

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

I. RELATED WORK

Depression Detection using Emotion Artificial Intelligence, proposed by Mandar Deshpande and Vignesh Rao, aims to utilize natural language processing techniques on Twitter feeds to conduct emotion analysis with a specific focus on depression. The paper involves classifying individual tweets as either neutral or negative, using a curated word-list tailored for detecting signs of depression. The prediction process employs a Naive-Bayes classifier.

Facial emotion recognition in real-time and static images, proposed by Shivam Gupta, aims to detect facial expressions, which serve as a crucial form of nonverbal communication. Numerous studies have focused on classifying these facial expressions. Strong evidence supports the existence of universal facial expressions encompassing eight emotions: neutral, happiness, sadness, anger, contempt, disgust, fear, and surprise. Detecting these emotions on the face is of paramount importance due to its extensive applications in the fields 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, aims to devise computational methods for emotion recognition through images. The paper utilizes the Cohn-Kanade database to train a pattern recognition neural network and employs the Viola Jones object detector to extract facial expression information. The resulting neural network demonstrates an impressive overall accuracy of 90.7% in recognizing six basic emotions: 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, introduces software capable of detecting and recognizing faces while providing additional insights into the person being observed. These insights can be utilized to gather feedback from customers or assess whether a person requires motivation. The detection of eye blinking is particularly crucial in scenarios such as vehicle operation or security surveillance to prevent accidents or mishaps.

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

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II. METHODOLOGY

The process begins with capturing the face of the subject using the camera module. Once the face is detected, it undergoes processing to classify emotions as either positive or negative. This involves processing the detected image to identify the subject's face using the Convolutional Neural Network (CNN) algorithm.

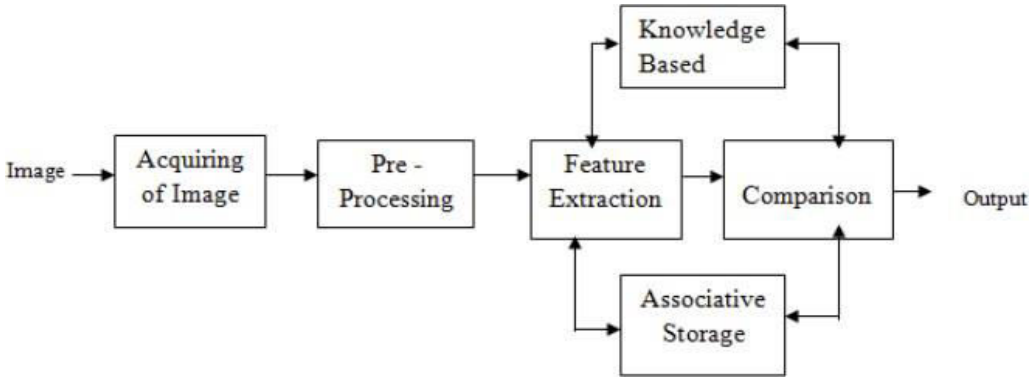

Fig.1 Methodology Of the system

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.

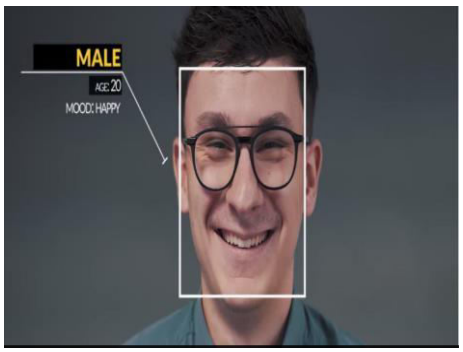

Fig. 2 face detection

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.

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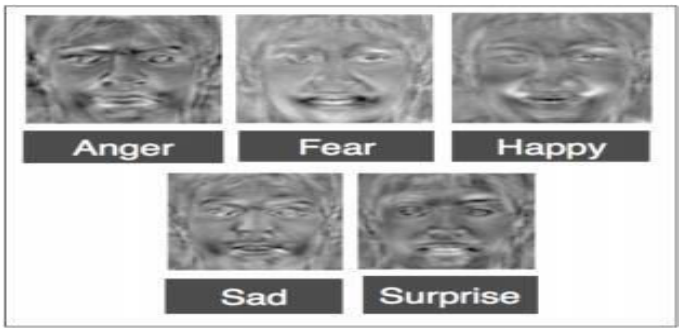

Fig 3 Emotion Detection

- Feature Extraction

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

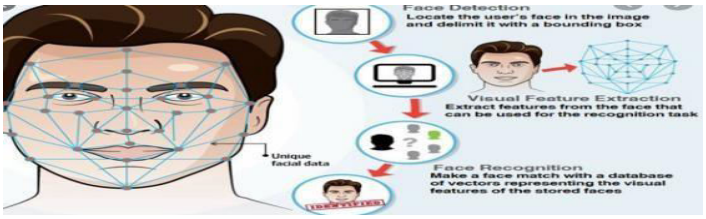

Fig.4 Feature Extraction

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

- Emotion Recognition

Emotions are extracted from the detected face by processing the captured image from the camera module, which contains the facial features. The detected face is pre-processed, involving cropping and resizing. The detectors defined prior can then be utilized to identify and sort the emotions. It's important to note that the Viola-Jones algorithm employs the AdaBoost algorithm with a cascading classifier. This means that a series of weak classifiers' classifications with a satisfactory threshold are combined to produce an acceptable outcome.

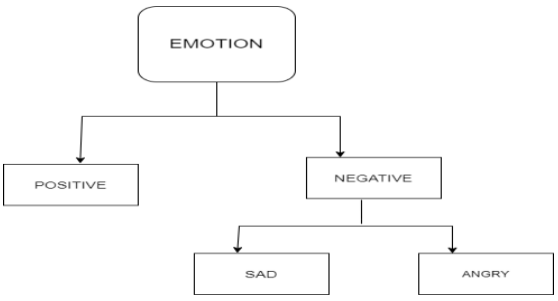

Fig.5 Emotion Recognition

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- 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:

Step 2: Step3:

Confirm the upper limit of the number of faces to be detected. Adjust the scaling of the images according to the

Device's Camera.

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):
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. Extracted

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

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.

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III. SIMULATION RESULTS

- Main GUI Snapshot

Fig. 6 Face Detection

- Discussion

We are developing a real-time depression detection system. The process involves capturing video using the laptop camera and detecting faces within the video stream. In the second module, we utilize a Deep Convolutional Neural Network (DCNN) algorithm along with a previously recorded dataset to analyze the emotions of the person in the video and identify signs of depression on their face. This system aims to provide timely and accurate detection of depression in individuals using readily available technology.

IV. CONCLUSION AND FUTURE WORK

The proposed system demonstrates success in predicting depression both in test data from the dataset and in real-time video of users. In real-world scenarios, when integrated with various web platforms, this system has the potential to raise awareness about depression and provide interfaces for detecting existing or upcoming depression in individuals. Moreover, this model can assist psychologists in detecting depression among individuals and offer insights for future studies related to depression.

REFERENCES

1. Scott J. Social network analysis. Thousand Oaks: Sage; 2017.
2. Serrat O. Social network analysis. In: Knowledge solutions. Singapore: Springer; 2017. p. 39–43.
3. Mikal J, Hurst S, Conway M. Investigating patient attitudes towards the use of social media data to augment depression diagnosis and treatment: a qualitative study. In: Proceedings of the fourth workshop on computational linguistics and clinical psychology from linguistic signal to clinical reality. 2017.
4. Conway M, O'Connor D. Social media, big data, and mental health: current advances and ethical implications. Curr Opin Psychol. 2016;9:77–82.
5. Ofek N, et al. Sentiment analysis in transcribed utterances. In: Pacific-Asia conference on knowledge discovery and data mining. 2015. Cham: Springer.
6. Greenberg LS. Emotion-focused therapy of depression. Per Centered Exp Psychother. 2017;16(1):106–17.
7. Haberler G. Prosperity and depression: a theoretical analysis of cyclical movements. London: Routledge; 2017.
8. Guntuku SC, et al. Detecting depression and mental illness on social media: an integrative review. Curr Opin Behav Sci. 2017;18:43–9.
9. O'Dea B, et al. Detecting suicidality on Twitter. Internet Interv. 2015;2(2):183–8. Islam et al. Health Inf Sci Syst (2018) 6:8 Page 12 of 12

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10. Zhang L, et al. Using linguistic features to estimate suicide probability of Chinese microblog users. In: International conference on human centered computing. Berlin: Springer; 2014.
11. Aldarwish MM, Ahmad HF. Predicting depression levels using social media posts. In: 2017 IEEE 13th international Symposium on Autonomous decentralized system (ISADS). 2017.
12. Zhou J, et al. Measuring emotion bifurcation points for individuals in social media. In: 2016 49th Hawaii international conference on system sciences (HICSS). 2016. Koloa: IEEE.
13. Wee J, et al. The influence of depression and personality on social networking. Comput Hum Behav. 2017;74:45–52.

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