Emotion Detection to Prevent Suicide

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ABSTRACT

Suicide might be considered as one of the most serious social health problems in the modern society. Suicidal ideation or suicidal thoughts are people's thoughts 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 Convolutional Neural Network (CNN) 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.

I. INTRODUCTION

Suicide is an important issue in the Indian context. More than one lakh (one hundred thousand) lives are lost every year to suicide in our country. In the last two decades, the suicide rate has increased from 7.9 to 10.3 per 100,000. There is a wide variation in the suicide rates within the country. The southern states of Kerala, Karnataka, Andhra Pradesh and Tamil Nadu have a suicide rate of > 15 while in the Northern States of Punjab, Uttar Pradesh, Bihar and Jammu and Kashmir, the suicide rate is < 3. This variable pattern has been stable for the last twenty years. Higher literacy, a better reporting system, lower external aggression, higher socioeconomic status and higher expectations are the possible explanations for the higher suicide rates in the southern states.

In 2016 the number of suicides in India had increased to 230,314. Suicide was the most common cause of death in both the age groups of 15-29 years and 15-39 years. About 800,000 people die by suicide worldwide every year, of these **135,000** (17%) are residents of India, a nation with 17.5% of world population.
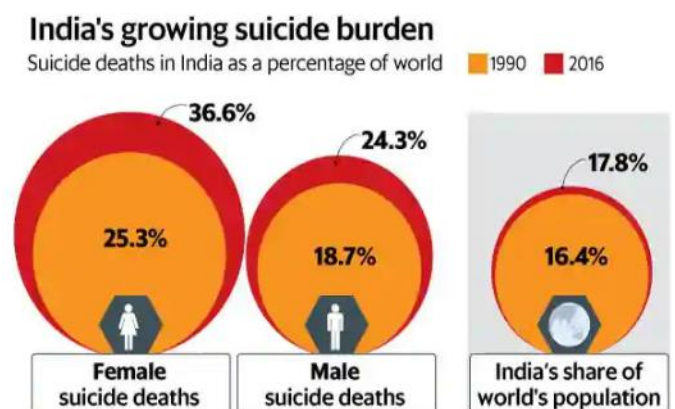
India reported an average 381 deaths by suicide daily in 2019, totalling 1,39,123 fatalities over the year,

according to the latest National Crime Records Bureau (NCRB) data. A 3.4 per cent increase was observed in suicides during 2019 (1,39,123 suicides) as compared to 2018 (1,34,516) and 2017 (1,29,887), the data showed. The rate of suicide (incidents per 1 lakh population) rose by 0.2 per cent in 2019 over 2018, as per the data. According to the statistics by the NCRB, which functions under the Union Home Ministry, the suicide rate in cities (13.9 per cent) was higher as compared to all-India suicide rate (10.4 per cent) in 2019.

Suicide by "hanging" (53.6 per cent), "consuming poison" (25.8 per cent), "drowning" (5.2 per cent) and "self-immolation" (3.8 per cent) were the prominent means of committing suicides during the year, the data showed.

India had the highest suicide rate in the South-East Asian region in 2016, a new report by the World Health Organization (WHO) has revealed. India's own official statistics, which map the number and causes of suicides in the country, have not been made public for the last three years, hindering suicide prevention strategies and efforts to execute the WHO's recommendations in this regard.

India's suicide rate stood at 16.5 suicides per 100,000 people in 2016, according to the WHO report. This was higher than the global suicide rate of 10.5.

The report presented suicide rates for countries and regions using data from the WHO Global Health Estimates for 2016. When classified according to region and income, India is part of the South-East Asia region and the Lower Middle-Income group of countries. India's suicide rate (16.5) was higher than the rate of its geographic region (13.4) and the rate of its income group (11.4).

II. METHODS AND MATERIAL

1. 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.
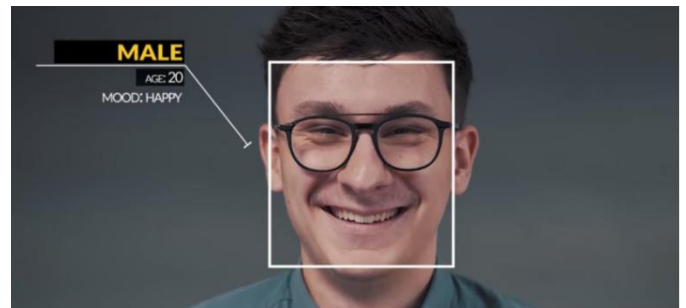
These details, such as distance between the eyes or shape of the chin, are then converted into a mathematical representation and compared to data on other faces collected in a face database.

### 2. Emotion Detection

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

3. 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
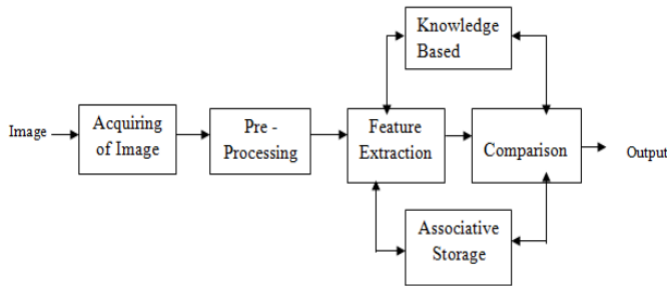
This is plotted and an increase in the negative emotion can be inferred as increase in stress

4. Feature Extraction

Facial feature extraction is the process of **extracting face** component **features** like eyes, nose, mouth, etc from human **face** image.
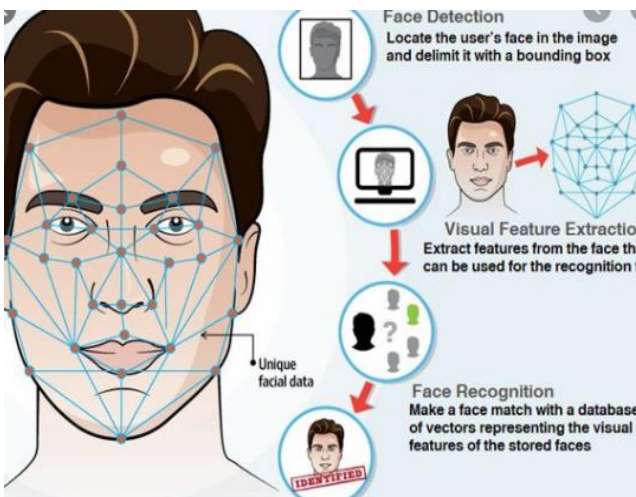
Facial feature extraction is very much important for the initialization of processing techniques like **face** tracking, **facial** expression recognition or **face** recognition.

5. 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.
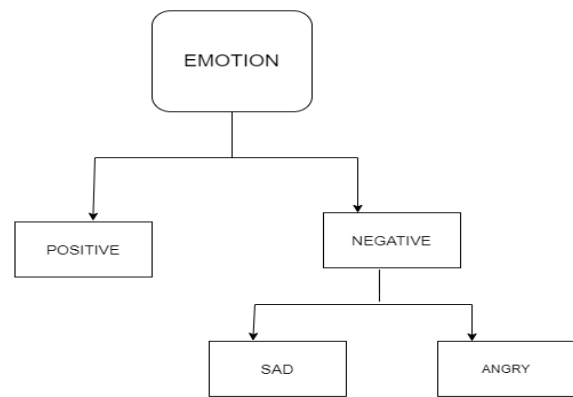
6. Set Stress Threshold:

After the emotion is detected, it is plotted against the time axis. Over a period of time it is observed and if it crosses an estimated threshold value, some action is performed.

III.CONCLUSION

The predictor is relatively successful at predicting test data from the same dataset used to train the classifiers. However, the predictor is consistently poor at detecting the expression associated with contempt. This is likely due to a combination of lacking training and test images that clearly exhibit contempt, poor pre-training labeling of data, and the intrinsic difficulty at identifying contempt. The classifier is also not successful at

predicting emotions for test data that have expressions that do not clearly belong exclusively to one of the seven basic expressions, as it has not been trained for other expressions. Future work should entail improving the robustness of the classifiers by adding more training images from different datasets, investigating more accurate detection methods that still maintain computational efficiency, and considering the classification of more nuanced and sophisticated expressions.

IV. REFERENCES

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