Depression Detection Using Machine Learning

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ABSTRACT

According to the World Health Organization, depression is expected to be the second leading cause of disability by 2030. Depression is a state of mental illness. It is characterized by long-lasting feelings of sadness and despair. Most people with depression do not report that they are depressed. If a person remains grieving for a very long time, the person may be called depressed. Such a person needs the help of a psychiatrist to make the correct diagnosis. You can check the emotions of people by their facial expressions. Facial expressions are very useful for examining a person's emotional state. So this project will help such people check for depression in themselves. To see if this person is sad most of the time, we can assume that he is a depressed person. Once this is confirmed, a correct diagnosis can be made. Depression can be recognized by facial expressions and through texts. Deep learning algorithms can help us understand a person's emotions better by analyzing their facial expressions. In this article, we proposed a CNN model for analyzing human emotions.

Keywords : Depression detection, Facial Expressions, Convolutional Neural Network, Deep Learning.

I. INTRODUCTION

One of the increasing mental health problems affecting many of the younger generation is depression. Depression is caused by work culture, demanding lifestyles, emotional imbalances, family issues, and social life. Depression is becoming a common and serious illness that negatively impacts people's daily lives. Such mental states usually lead to grief, loss of interest in things and work, and can lead to suicide. It interferes with natural functioning both at work and at home. The main symptoms of depression are changes in eating and sleeping habits, low energy, difficulty concentrating, anxiety, hopelessness, thoughts of self-harm, and self-harm. Main results include weight loss, heart disease, and inflammation. This study uses facial recognition models to study user emotions.

Depression is also called a mood disorder. It refers to feelings of sadness, loss, or anger that interfere with a person's daily life. People experience depression in many ways. This affects daily work and can lead to lost time and decreased productivity. It affects the relationships and some chronic health conditions. Depressive people are distracted by sad thoughts and tend to positively negative stimuli. Depressives constantly use words containing negative words with negative expressions that indicate sadness, stress, low motivation, or dissatisfaction.

We have used a CNN model in this project. A CNN is a special type of neural network that differs from other neural networks in its convolutional layers. To classify an image, a CNN analyzes the corners, vectors and dimensions of each pixel matrix. Standard methods for detecting facial emotions consist of three processes: face detection and tracking, feature extraction, and facial expression classification.

II. LITERATURE SURVEY

Title	Author	Publication	Summary
Facial Emotion Detection using Machine Learning	Raut Nitisha	Spring 2018	The main goal of the work discussed in the thesis is to make the detection of depression through speech more feasible in terms of time and resources.
A comprehensive study of facial emotion detection techniques	Renuka Deshmukh, Vandana Jagtap	IJCSIS	In this paper, they recognized facial expressions from images in the JAFFE database.
Facial Emotion Detection using Deep Learning	Akriti Jaiswal, A.Krishnama Raju, Suman Deb	INCET	In this paper, they proposed a method based on deep learning to detect facial emotions from an image.
Real-time acoustic depression detection using machine learning techniques	Bhanushree Yalamanchili, Nikhil Sai Kota, Maruthi Saketh Abbaraju, Venkata Sai Sathwik Nadella, Sandeep Varma Alluri	Ic-ETITE	The main goal of this article is to make the detection of depression through speech more feasible in terms of time and resources.
A Machine Learning based Depression Analysis and Suicidal Ideation system using Questionnaires and Twitter.	Swati Jain, Prakash Narayan, Rupesh Kumar Dewang, Utkarsh Bhartiya, Nalini Meena, Varun Kumar	SCES	In this paper, they proposed a depression analysis and suicidal ideation detection system to predict suicidal acts based on the level of depression.

			They collected real-time data from students and parents by having them fill out questionnaires such as the PHQ-9.

III. PROPOSED SYSTEM

Proposed System is based on CNN Model. A CNN or Convolutional Neural Network (ConvNet) is a deep learning algorithm that takes input as images and assigns weights to the input values to help classify the output images. CNNs are not only used for image classification, but also for data analysis, pattern recognition, computer vision, and solving NLP tasks. CNNs are algorithms inspired by the design of neurons in the human brain. The architecture of CNN algorithms deals with the number of convolutional layers, max pooling layers, and fully connected layers. The proposed study uses ReLU as the activation function. CNN works well with image recognition and pattern recognition.

The dataset for this study consists of hundreds of images with both male and female faces expressing different emotions. The methodology of this project focuses on creating a CNN model that filters unnecessary information from the input and expresses facial expressions through the output. We have also use natural language processing (NLP) technique that analyzes textual content uploaded to social media. Help develop approaches to detect depression. This study analyzes a number of previous studies that have used research methods to identify depression.

3.1 CNN:

CNN uses spatial correlations between the input data and itself.

A number of input neurons are connected between each simultaneous layer of the neural network. Hidden neurons are the focus of the local receptive field. CNN is a type of network architecture for deep learning algorithms used for image recognition and other tasks that require pixel data processing. There are other neural networks in deep learning, but CNNs are the main network architecture for object detection and recognition.

3.2 ReLU Activation Function:

ReLU stands for "Rectified Linear Activate Unit" and is considered one of the few milestones in the deep learning revolution. Simple, but much better than previous activation features such as Sigmoid and Tanh.

3.3 Softmax Activation Function:

The softmax function is a function that converts K real-valued vectors to K real-valued vectors that sum to 1. Input values can be positive, negative, zero, or greater than one, but softmax converts them to values between 0 and 1 so that they can be interpreted as probabilities. If one of the inputs is small or negative, softmax will change it with a low probability, and if the input is large, with a high probability, but it will always be between 0 and 1.

3.4 Sentiment Analysis:

Sentiment analysis, also called sentiment mining, is an approach to natural language processing (NLP) that detects the underlying emotional tone of a text. Sentiment analysis is the process of analyzing digital text to determine whether the emotional tone of a message is positive, negative, or neutral.
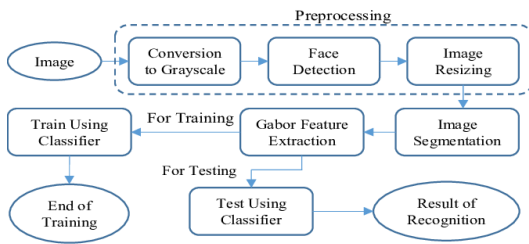
3.4 Model Architecture:

Fig. Model Architecture
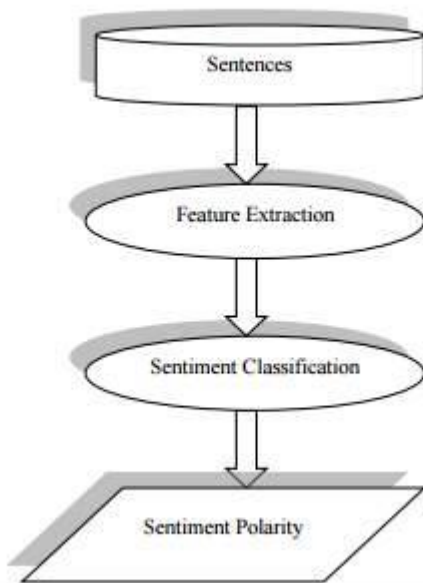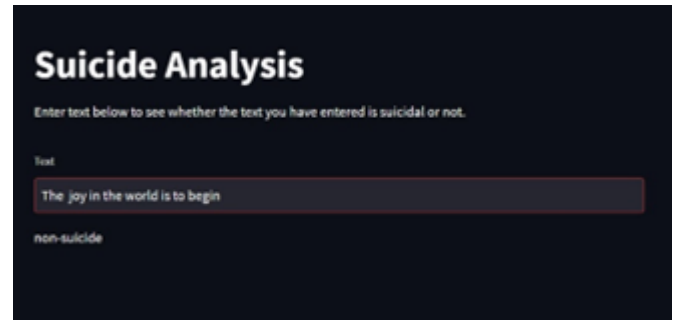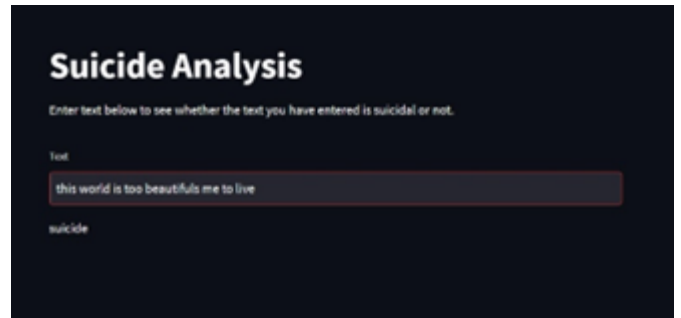
3.5 Sentiment Analysis Architecture:

Fig. Sentiment Analysis Architecture

IV. RESULT AND DISCUSSION

We applied CNN model to detect facial expressions and some NLP techniques for text analysis.

V. CONCLUSION

We analyze our proposed model using trained and tested sample images and evaluate their performance against the previous existing model. The experimental results will show that the proposed model is better than the models described in the previous literature in emotion recognition results. The experiment shows that the proposed model produces high-level effects on the datasets.

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