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SYSTEM TO DETECT MENTAL STRESS USING MACHINE LEARNING AND MOBILE DEVELOPMENT

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Abstract: Depression is the most common mood disease in the world, with serious consequences for one's well-being and functionality, as well as substantial personal, familial, and societal consequences. Early and effective diagnosis of depression symptoms could provide numerous advantages for both physicians and those who are affected. The goal of this study was to create and evaluate a methodology that could detect visual symptoms of depression and help clinicians make judgments. The field of automatic depression evaluation based on visual clues is fast expanding. The current comprehensive assessment of existing methodologies focuses on image processing and machine learning algorithms, as documented in over sixty articles over the last ten years. The visual signs of depression, various data collection methodologies, and available datasets are all summarized. The review discusses visual feature extraction methods and algorithms, dimensionality reduction, classification and regression decision methods, and various fusion methodologies. A quantitative meta-analysis of published data is given, based on performance criteria that are robust to chance, to indicate general trends and important unresolved concerns for future investigations of automatic depression evaluation using visual cues alone or in combination with visual cues. The proposed work also used deep learning to forecast the level of depression based on current input of face photos.

Keywords: Convolutional Neural Network, Deep Learning, Dataset, Depression.

I. INTRODUCTION

In many cases, people who are sad are completely unaware of their mental illness. They are unable to pinpoint the source of their unhappiness, and as a result, such students develop suicidal impulses. In some circumstances, students are aware that they are depressed, but they are afraid to seek help from others, owing to a misunderstanding about the 'humiliation' connected with depression. It is preferable to recognize the indicators of depression when it is still in its early stages. If depression is detected early on, a one-hour conversation with a counselor can be quite beneficial to the student. This could completely transform that student's negative mindset into a good one. Such a student can be given sound advice on how to cope with mental stress and led down the appropriate route to success. Facial expressions are the most essential type of nonverbal communication. Many researches have been conducted to determine the facial expressions associated with depression. The current research is mostly focused on determining whether or not college students are depressed by examining their facial traits. For face identification, feature extraction, and classification of these characteristics as depressed or non-depressed, this system primarily employs several image processing algorithms. The technology will be programmed to recognize depression-related characteristics. Then, using a web camera, footage of various students with frontal faces will be collected. The facial traits of these people's faces will then be extracted in order to predict depression. The student will be classed as depressed or non-depressed based on the severity of depression symptoms.

II. LITERATURE SURVEY

Many investigations have been conducted to recognize the exact looks that are connected with sadness. A review has been led for discovering Action Units (AU) connected with various feelings displayed by discouraged patients [1].

The video information for this review was gathered through clinical meetings of discouraged patients just as non-discouraged patients Highlights connected with eye development to comprehend the eye action of the discouraged and elements connected with head present development to comprehend the head development conduct of the discouraged have been done in [2].

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MSE assists with discovering the varieties that happen across a solitary pixel in the video. The entropy levels of exceptionally expressive, non-discouraged patients were high. The entropy level was low for discouraged patients who were less expressive of their emotions.

Another review introduced a procedure which utilizes examination of facial calculation alongside investigation of discourse for melancholy location [3].

The characterization of the elements connected with eye movement showed higher importance in recognizing serious despondency. Location of discouragement from facial highlights should be possible by estimating 'Multi-Scale Entropy' (MSE) on the patient meeting video. [4]

This work says that the articulations related with despondency are viewed as in lower frequencies in more modest term recordings. Accordingly longer time recordings should be caught for successful discouragement discovery. Datasets are likewise made by catching recordings of patients while noting clinical meetings. Interviews recorded were for both for discouraged patients just as non-discouraged patients. Recordings are additionally recorded from the determination of wretchedness till the patient has improved. [1][4].

Studies showed that there is a huge connection between facial highlights and vocal conduct of the discouraged [5].

In specific examinations, patients were given wearable devises to screen their actual wellbeing, enthusiastic conduct and social cooperation for recognizing sorrow [6].

A few scientists have gathered datasets by showing people film-strips to catch the looks of subjects watching them. Information is likewise gathered by giving an undertaking of perceiving negative and positive feelings from various facial pictures [7].

Rather than breaking down a video for discouragement location outline by outline, better outcomes have been got for identification of gloom when the video is considered overall. [8]

The understudies experiencing discouragement would show less mindfulness in homerooms. Assuming the understudies' feelings are planned to the exercises done in homeroom, their passionate state can be seen if they are discouraged or not, and in view of this the instructor can help the understudy by focusing harder on that specific understudy. [9]

If various appearances in a similar scene show a similar positive or negative feeling, it would assist with understanding the entire circumstance of the scene, regardless of whether subjects in the scene are glad or whether something wrong is occurring in the scene [10].

III. OBJECIVES

- The main objective is to find the stress of person easily on basis of post/caption made by him in day-to-day life
- To reduce the mental stress.

IV. PROPOSED SYSTEM

Machine learning (ML) approaches to recognize rising stress levels using a social media application we developed, and to predict stress in advance, perhaps preventing serious damage to their lives. The suggested model takes into account both dataset collection and user posts generated while using the program. We divide the data into two halves, with 80 percentage being utilized for training and 20 precent for testing. The system uses techniques including pre-processing, feature extraction, and machine learning algorithms and categorization

V. IMPLEMENTATION DETAILS OF MODULE

A. **MODULE I**

Users post on GUI:

A user will post what's on their mind on the Graphical user interface. A post will be created in the form of a tweet.

Final Dataset collection:

In this module one process, after user has posted the tweet. Collection of datasets will happen. We will also have a set of predefined datasets.

B. MODULE II

Once the dataset is ready and intact, system runs module II system architecture module II involves Data Pre-processing,

Steps involved in Module II

Data Cleaning

Data cleaning machine learning is the method of identifying the incomplete, wrong, unnecessary, incorrect, or missing part of the data and then changing, replacing, or removing them according to the specific requirement. Data is the most important thing for Machine learning and Analytics.

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Data Normalization

In Machine Learning Normalization is a data preparation technique that is frequently used in machine learning. The process of transforming the columns in a dataset to the same scale is referred to as normalization

C. MODULE III

Once the dataset is cleansed and after the pre-processing and normalization of data, system will start the process of feature extraction. Here we will prioritize and extract relevant features

D. MODULE IV

This module will involve Training of data and further classification of data.

Training of data

Training datasets are fed to machine learning algorithms to teach them how to make predictions or perform a desired task. The observations in the training set form the experience that the algorithm uses to learn. In supervised learning problems, each observation consists of an observed output variable and one or more observed input variables.

Testing Data

Test data is used to see how well the machine can predict new answers based on its training.

VI. RESULT ANALYSIS

A proposed Test data is used to see how well the machine can predict new answers based on its training.

Precision and Recall

Precision is the fraction of retrieved instances that are relevant to our dataset, while recall is the fraction of relevant instances that are retrieved. Precision can be seen as measure of completeness or quality.

Recall is nothing but the true positive rate for the class. In information retrieval, Performance Measures can be calculated with the help of Precision and Recall. These are important for evaluation matrices. Where, Precision is positive predictive value and recall is sensitivity. Precision is a measure of result relevancy and recall is a measure of how many truly relevant results are returned. It measures relevant percentage of results whereas Recall gives percentage of total relevant results which are correctly classified by the algorithm.

Precision (P) is defined as the number of True Positives (TP) over the number of true positives plus the number of False Positives (FP).

$$Precision = True\ Positives / (True\ Positives + False\ Positives)$$

$$Precision = TP / (TP + FP)$$

Recall (R) is defined as the number of True Positives (TP) over the number of true positives plus the number of false negatives (FN).

$$Precision = True\ Positives / (True\ Positives + False\ Negatives)$$

$$Recall = TP / (TP + FN)$$

$$Recall = TP / (TP + FN)$$

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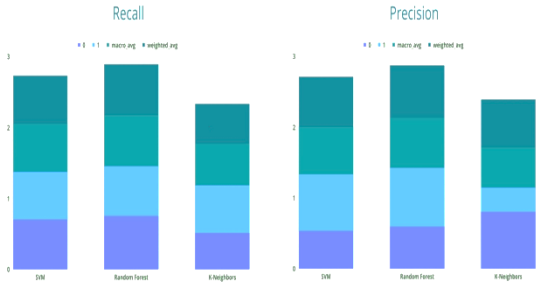

Figure 1 : Precision and recall graph

Accuracy

Machine learning algorithms Support Vector Machine, KNN, and Random Forest with are applied on test data. Posts are classified as Stress, Depression, Normal, Relax, Happy and other i.e. none identified by the system. Results can be expressed with the help of different Test cases. By applying all three SVM, Random Forest and KNN, and analyzing the test files to get accurate results. Graph shown below shows the accuracy from all three algorithms respectively. Random Forest showed maximum accuracy with a percentage of 71.6% following which is 67% by SVM algorithm and KNN gave us the accuracy of 55% overall.

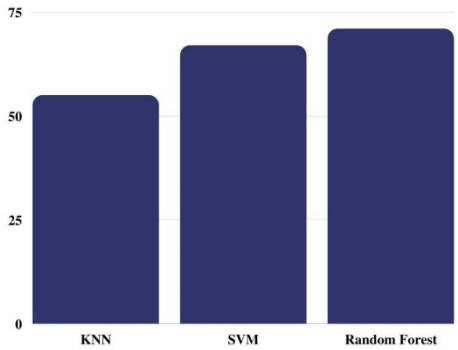

Figure 2 : Accuracy graph

CONCLUSION

A proposed automated stress recognition system is based on a user's social media review/post. In interpersonal relationships, the system plays a communication role. In psychology research and human-computer interaction applications, an automated Depression level recognition system has a wide range of uses. In interpersonal relationships, the system plays a communication role. For response and asking, the suggested system is based on the PHQ dataset (from kaggle). SVM and the Random Forest algorithm were used to create the proposed system. We investigated how the proposed stress detection model can be more precise and cost-effective in comparison in this proposed system

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