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Depression Detection using Speech Recognition, BDI and Image Processing

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Abstract: While we all feel sad, moody or low from time to time, some people experience these feelings intensely, for long periods of time (weeks, months or even years) and sometimes without any apparent reason. Depression is more than just a low mood – it's a serious condition that can be treated as a mental health issue.

For the detection of depression, some techniques are used. Sentiment analysis is used to classify text whether it is positive or negative. BDI scores are then calculated and found what is the type of mood. Facial expressions are detected by using Image Processing. Then depending on the result doctors or the experts examine the type of mood whether happy, depressed or sad and give suggestions.

Keywords: BDI

I. INTRODUCTION

Mood of human beings is something that defines the inherent emotions of a person. Detection of mood is very important in such cases. For the detection, some android applications are being designed so that using the speech signals mood of a person is determined. Texts, speech inputs, facial expressions are considered.

Then depending on the result doctors or the experts examine the type of mood whether happy, depressed or sad. Some work is previously done related to this project as discussed in literature survey but different techniques are used in different aspects which overall did not make any progress in implementing different modules in one system.

The main aim of system is to automatically identify user's mood and according to that determine whether a person is depressed/smiling. Texts, speech inputs, facial expressions are considered.

In first module Sentiment analysis is used to classify text whether it is positive or negative. In second module BDI scores are then calculated and found what is the type of mood. In third module Facial expressions are detected by using Image Processing. Then depending on the result doctors or the experts examine the type of mood whether happy, depressed or sad and give suggestions.

II. LITERATURE SURVEY

- 1) *Paper 1:* A Robust Method for Face Recognition and Face Emotion Detection System using Support Vector Machine. (Rajesh K M, Naveenkumar M) IEEE 2016. This paper presents framework for real time face recognition and face emotion detection system based on facial features and their actions. The key elements of Face are considered for prediction of face emotions and the user. The variations in each facial feature are used to determine the different emotions of face. Machine learning algorithms are used for recognition and classification of different classes of face emotions by training of different set of images. In this context, by implementing herein algorithms would contribute in several areas of identification, psychological researches and many real world problems. The proposed algorithm is implemented using open source computer vision (OpenCV) and Machine learning with python.
- 2) *Paper 2:* Feature selection to simplify BDI for efficient depression identification. (Jiayue Cai, Z.JeneWang) IEEE 2016. The Beck Depression Inventory (BDI), a self-report questionnaire consisting of 21 question items, has been the most extensively used for depression assessment. The problem of interest here is to identify a subset of questions in the BDI that are most predictive of depression and can reveal gender differences between expression profiles. We investigate feature selection techniques to select a subset of items in the BDI for depression identification and suggest a new simple decision-making rule that yields high classification accuracy. Distinct features in the BDI are identified for depression assessment in men and women. For males, the most useful features include mood, loss of libido, work inhibition, self-accusation, social withdrawal while indecisiveness, mood, work inhibition, distortion of body image, crying are most useful for depression identification in females.

- 3) *Paper 3: Sentiment Analysis in an Affective Intelligent Tutoring System.*(Ramón Zatarain- Cabada, 2Raúl Oramas-Bustillos)IEEE 2017. This paper presents a Sentiment Analysis module that works inside Java Sensei, an Affective Intelligent Tutoring System (AITS) to find out student's opinions about the course contents. The module keeps track the student's opinions(feedbacks) and by using sentiment analysis techniques it finds their positive or negative feelings that they have towards the current material teaching. With this feedback, the course administrators of Java Sensei can find out if the course contents need improvements.

III. PROPOSED SYSTEM ARCHITECTURE

A. Representation Of Used Components And Setup

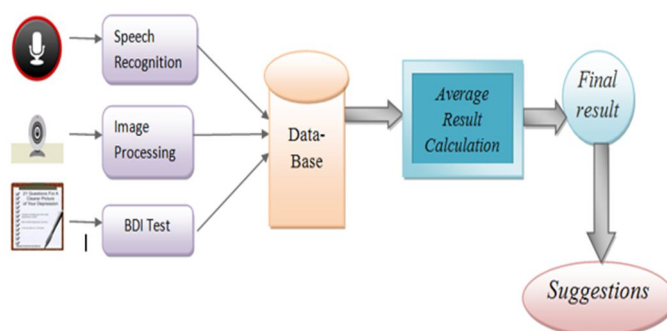


Fig 3.1: System Architecture

B. System Overview and Implementation Details

Speech signals are captured using microphone.

These signals are converted into sequence of words or other linguistic symbol. The speech signals is first recognized and decoded into series of words that might be meaningful according to the syntax or semantics of the given task. The complexity of recognition is reduced by limiting the search for only valid input sentences from the user. Case folding is used to convert uppercase to lower case or vice versa. Stemming process is used to reduce words, for example couches is reduced to couch. At the end result is generated in the form of positive or negative string and store in database. The BDI is a 21 question multiple-choice self -report inventory. Each question had a set of at least four possible responses, ranging in intensity. When the test is scored, a value of 0-3 is assigned for each answer and then the total score is compared to a key to determine the depression's severity. Severity of depression is decided on the basis of standard cut-off values. The final result is stored in database in the form of positive or negative string. Image processing techniques are used to recognize facial expressions. Elements such as lips, eyes, nose etc co-ordinates are recognized using openCV techniques. Lips co-ordinates are used to classify images in different classes. Accordingly, images are classified in positive and negative classes. Results are stored in the form of positive and negative strings.

The majority result is considered after integration.

IV. CONCLUSION

To detect the mood of person and to give suggestion to decrease depression of a person technological support can be used in efficient way. Integrating traditional methods of Image processing, Sentimental analysis, IOT and Data mining will benefit the field of human's good health. Hence the Depression Detection system has been proposed. It will help the users to provide check-up anytime and anywhere. This will in turn increase efficiency and energy of the user.

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