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DEPRESSION DETECTION USING MACHINE LEARNING

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ABSTRACT: Depression is a common mental disorder and one of the main causes of disability worldwide. Lacking objective depressive disorder assessment methods is the key reason that many depressive patients can't be treated properly. Developments in affective sensing technology with a focus on acoustic features will potentially bring a change due to depressed patient's slow, hesitating, monotonous voice as remarkable characteristics. So, our motivation is to find out a speech feature set to detect, evaluate and even predict depression. For examining the correlation between depression and speech, we extract features as many as possible according to previous research to create a large voice feature set.

In the previous system if the person is detected as depressed then that person was treated using medicines but in our system, we are providing some techniques based on which persons level of depression is being determined. Using BDI technique some questions are to be answered. Facial expressions detect the face, expressions of person. In rare cases the nearby doctor/suggestions/notification are used for depression detection.

INTRODUCTION

Every Human being in day to day life is being diagnosed with depression due to affection of different parameters. It disturbed mental state of the human being. So as consider to technology we have one solution to solve this issue in terms of machine learning. Machine learning is a process which learns from past experience and provide the best result when the same issue or event occurs in the future.[2] It considers different parameters like user emotions. Depression is a leading cause of mental ill health. It is a major cause of suicidal ideation and leads to significant impairment in daily life. Machine Learning can help detection and can generate possible solutions to tackle depression.

Depression is a mental illness that is not taken seriously in some countries that can cause us depression.[1] Depression is a psychiatric disorder that needs to be addressed with medication. According to Our World in Data Website, Depressive disoprders occur with varying severity,The WHO's International Classification of Diseases defines this set of disorders ranging from mild to moderate to severe. The Institue of Health Metrics and Evaluation adopt such definitions by disaggregating to mild, persistent depression (dysthymia) and major depressive order (severe).

PROBLEM STATEMENT

To develop a user centric application program which addresses growing problem of depression in teenagers. Basically to design and develop an application which can be helpful to the normal user , where machine learning is playing a big role to calculate the depression level of the user according to the user Input or face expression detection (parameters like face edges) .

PROJECT OBJECTIVE

Using machine learning techniques, our objective from this project is to identify and tackle the problem which is tremendously affecting todays youth's depression. This project aims at properly identifying depression levels by using two approaches such as facial expression based emotion recognition [8] and calculation of depression level from answers belonging to the questions asked to the user. From questions asked to the answer, we with this software try to recommend movies and tv series with certain genres to target and reduce depression level from users.

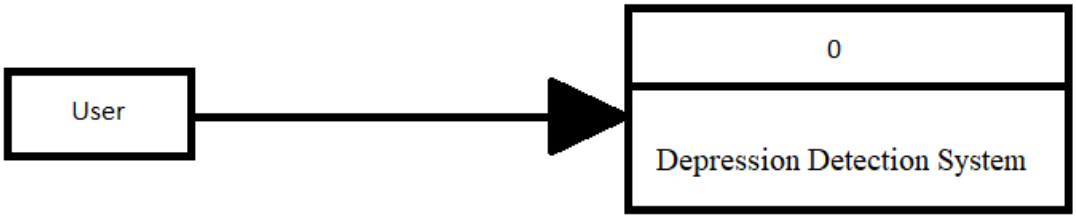

Fig. 1 – Data Flow Diagram 1

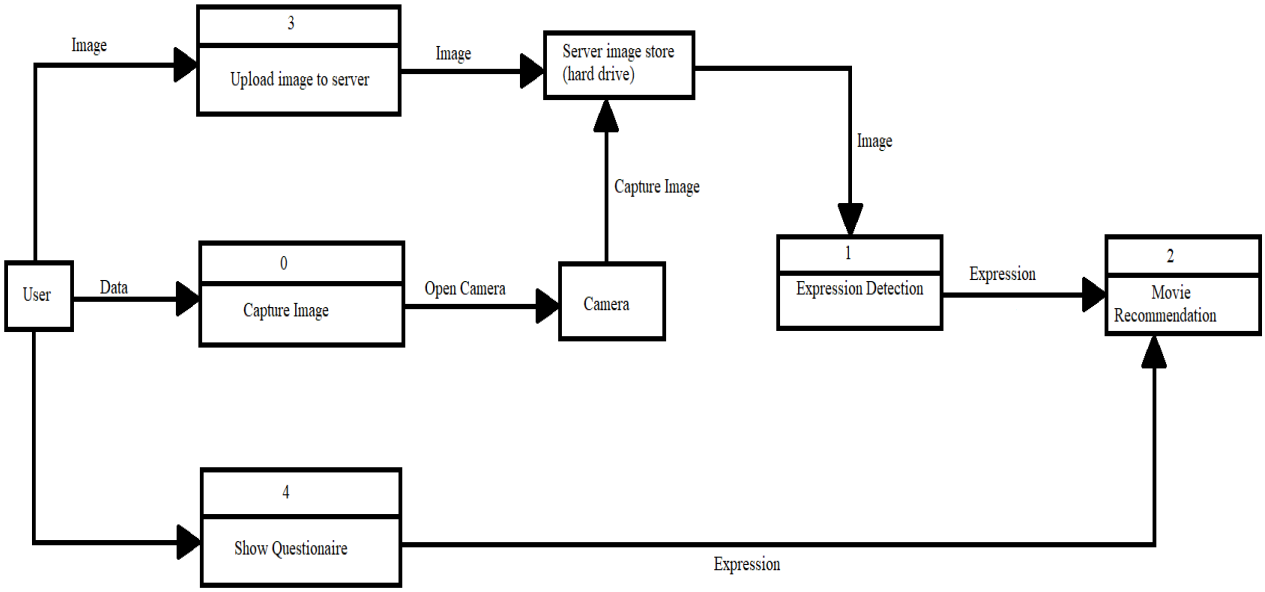

Fig. 2 – Data Flow Diagram 2

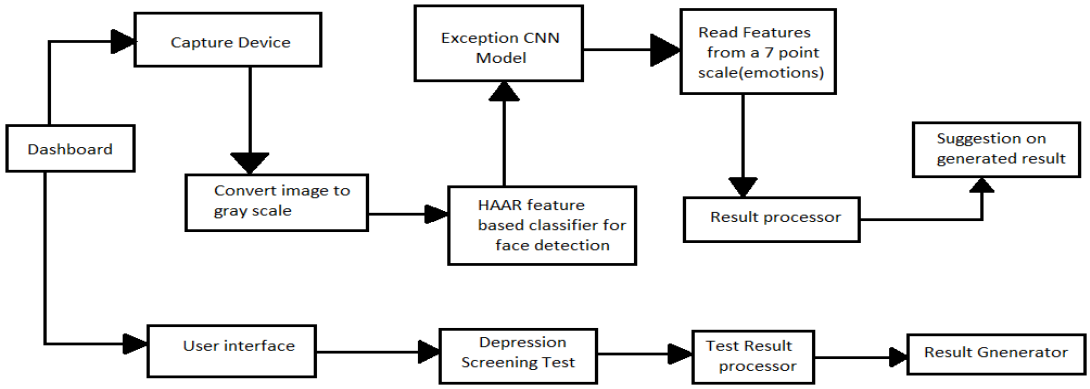

Fig. 3 – System Architecture

METHODOLOGIES

1. Haar cascade Classifier for Face Detection:

In this system we used Haar classifier algorithm for face detection when one of these features is found, the algorithm allows the face candidate to pass to the next stage of detection. A face candidate is a rectangular section of the original image called a sub-window. Generally these sub-windows have a fixed size (typically 24×24 pixels). This Sub-window is often scaled in order to obtain a variety of different size faces. The algorithm scans the entire image with this window and denotes each respective section a face candidate. The algorithm uses an integral image in order to process

Haar features of a face candidate in constant time. It uses a cascade of stages which is used to eliminate non-face candidates quickly. Each stage consists of many different Haar features. Each feature is classified by a Haar feature classifier. The Haar feature classifiers generate an output which can then be provided to the stage comparator. The stage comparator sums the outputs of the Haar feature classifiers and compares this value with a stage threshold to determine if the stage should bepassed. If all stages are passed the face candidate is concluded to be a face.

A) Haar Feature Classifier

A Haar feature classifier uses the rectangle integral to calculate the value of a feature. The Haar feature classifier multiplies the weight of each rectangle by its area and the results are added together. Several Haar feature classifiers compose a stage. A stage comparator sums all the Haar feature classifier results in a stage and compares this summation with a stage threshold. Each stage does not have a set number of Haar features. Depending on the parameters of the training data individual stages can have a varying number of Haar features.

B) Haar Features:

Haar features are composed of either two or three rectangles. Face candidates are scanned and searched for Haar features of the current stage. Each Haar feature has a value that is calculated by taking the area of each rectangle, multiplying each by their respective weights and then summing the results.

2. Goldberg Depression Questionnaire:

Goldberg questionnaire consist of this questionnaire to help determine if you need to see a mental health professional for diagnosis and treatment of depression, or to monitor your mood. This questionnaire consists of a scale which can be used on a weekly basis to track moods. It might be used to show your doctor how your symptoms have changed from one visit to the next. Changes of five or more points are significant. This scale is not designed to make a diagnosis of depression or take the place of a professional diagnosis.

MODULES

1. **Login module**:

This module is responsible for creating account for the user and storing results and suggestions generated by the system.

2. Dashboard module:

Provides the user interface for accessing the depression detection system, which includes feature to capture image using the built-in laptop camera and allows user to select an image used for processing for the other modules. Dashboard module also include questionnaire test which user can give for test analysis.

3. Face Detection module:

This module is responsible for loading of FER dataset and HAAR feature based cascade classifier. It detects frontal face in an image well. It is real time and faster in comparison to other face detector. We use an implementation from OpenCV.

4. Expression Detection module:

This module uses an Xception CNN module (Mini_Xception,2017). We will train a classification CNN model architecture which takes bounded face (48*48 pixels) as input and predicts probabilities of 7 emotions in the output layer.

5. Suggestion module:

Depending on the result of user which is generated from previous module. This module collects movies and teen shows which are similar to the emotions of the current user and also might help to tackle depression related issues and finally we generate and present this list to user.

OUTPUT

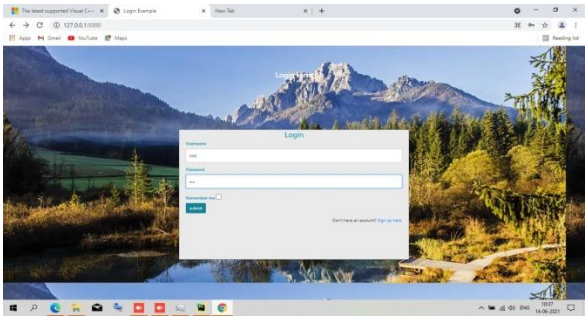

Fig. 4 – Login View

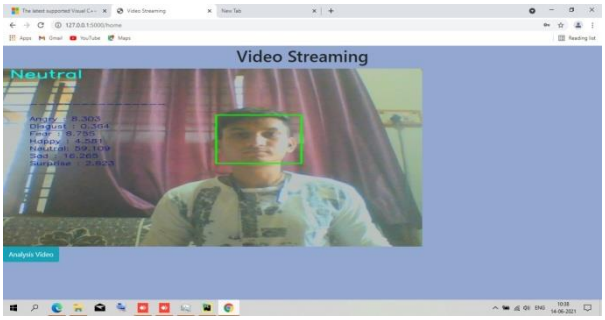

Fig. 5 – Video View

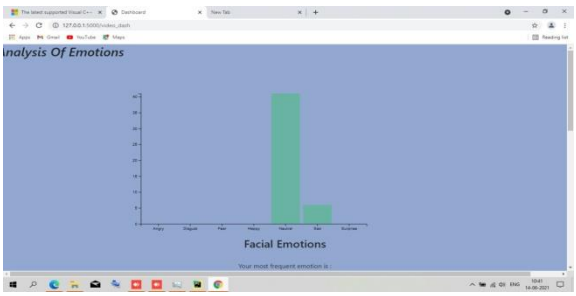

Fig. 7 – Emotion Analysis

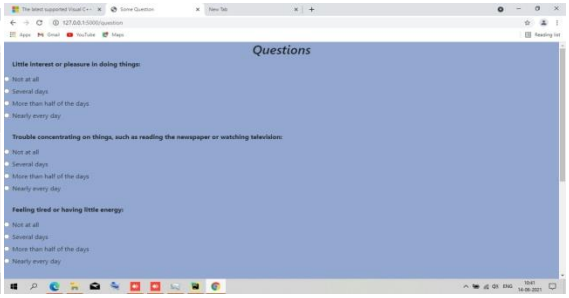

Fig. 8 – Question part 1

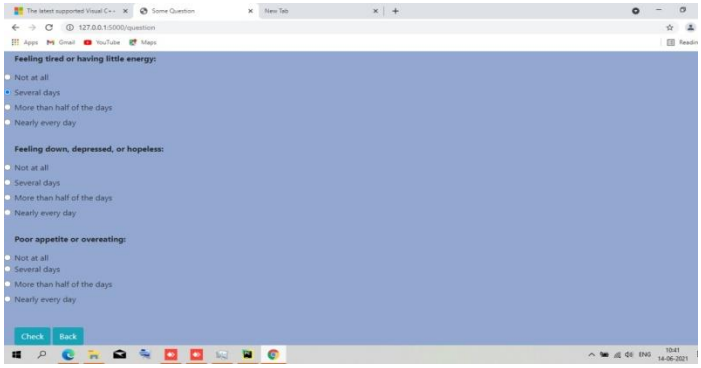

Fig. 9 – Question part 2

Conclusion

Usually in the system if the person faces depression then that person will be treated using medicines but in our system, we are providing some techniques based on which persons level of depression is being determined. Using questionnaire some questions are to be answered and facial expression which detect the face, expressions of person. In rare cases, the nearby doctors or suggestions are used for detecting level of depression.

Future Scope

We want to scale our existing system to various other platform like mobile app's where user can use our system with the no cost. We are thinking to connect an admin panel to system. Where admin can easily add the questions and it can dynamically reflect to our user.

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