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## AI FOR MENTAL HEALTH

<sup>1</sup>Mr.Chandan Jaiswal, <sup>2</sup>Ms. Samiksha Shetty, <sup>3</sup>Ms. Janvi Sureja, <sup>4</sup>Mr. Omkar Walunj, <sup>5</sup>Mr. Anas Dange

<sup>1</sup>Student, <sup>2</sup>Student, <sup>3</sup>Student <sup>4</sup>Student, <sup>5</sup>Professor

<sup>1</sup>Computer Engineering,

<sup>1</sup>Universal College of Engineering, City, Country

**Abstract :** Over the last few decades, psychological health issues have become very common in people worldwide. The World Health Organization (WHO) has observed that depression is the most prevalent mental disorder affecting more than 300 million people worldwide, and the severity of the issue has led many health researchers to focus their studies in this area. Differentiating anxiety, depression and stress from one another is problematic for machines; hence an appropriate learning algorithm is required for an accurate diagnosis. According to WHO, a healthy person possesses a healthy brain along with physical wellness. In this project, prediction of the occurrence of psychological problems such as anxiety, depression and stress will be made by applying various machine learning algorithms to data taken from the online Depression, Anxiety and Stress Scale (DASS21) tool. The prediction of stress and other mental illnesses isn't enough. So, we are proposing a system which predicts these factors and also provides relief techniques for different severity levels.

**IndexTerms - Component, formatting, style, styling, insert.**

### LINTRODUCTION

Humans are, by nature, becoming ambitious nowadays and seek every possible opportunity to grow professionally. Modern lifestyles are causing different types of psychological health problems in many people. Psychological problems like anxiety, depression and stress have some overlapping features, for example, a person feels low and lonely in all three. Generally, psychiatrists assess anxiety, depression and stress through questionnaires such as DASS21 because people suffering with anxiety, depression and stress are often not open to sharing their feelings with doctors, relatives or friends. Therefore, in this project we will attempt to assess levels of anxiety, depression and stress by using application without the help of any medical experts or face to face interaction. The standard diagnosis criterion for depression is the Patient Health Questionnaire (PHQ), whilst the Depression, Anxiety and Stress Scale (DASS 21), which has 21 questions, is used for screening the symptoms related to these mental illnesses.

On the daily basis, people are suffering from the stress illness because of many factors which include the social factor, external stimulus or environment factors and internal factors. In healthcare, vast developments have been made with the use of machine learning. Stress is a fatal disease causing a considerable number of fatalities across the world. Machine learning enables the prediction of the possibility of stress prediction for all kinds of users.

#### 1.1 Motivation

The motivation for creating this project are the vast advantages of mental health. Due to the evolution of Machine Learning and people using android applications it is wiser to have a go-to application for analyzing the stress constraint. The main symptoms of depression from a clinical point of view are loss of memory; lack of concentration; an inability to make decisions and loss of interest in recreational activities. The symptoms of GAD (Generalized Anxiety Disorder) are irritability, nervousness, fatigue, insomnia, gastrointestinal problems, panic, and a sense of impending danger, increased heart rate, sweating, rapid breathing and difficulty concentrating. The symptoms of stress are feeling upset or agitated, an inability to relax, low energy levels, chronic headaches, frequent overreaction and persistent colds or infections. Thus, in order to help everyone to fight and overcome such disorders. Therefore, in this current work, we would assess levels of anxiety, depression and stress by using computers without the help of any medical experts or face to face interaction.

1.3Problem Statement Or Objective

#### 1.2 Problem Statement

The basic problem statement of this project is to manage stress in a productive way. It is also evident and people tend to neglect mental health and probably are not serious about mental health as they would rather be about physical health.This is where a personalized android application might help to get an understanding about mental health without worrying about peer pressure.To

design a user-friendly application for the major aim of stress prediction. The questionnaire will be filled by the user and then level of stress is to be predicted. According to the level of stress, various relief techniques are to be given like music, meditation/breathing tips, motivational lectures and therapist consultation suggestions. The dataset for this project is based on DASS-21, the Depression, Anxiety and Stress Scale questionnaire. DASS 21 comprises 21 questions, with 7 questions allocated to each of the scales of Stress, Anxiety and Depression. The possible answers for each question could be given in text or numeric form

### 1.3 Objective

The aim of this project is to create a mobile application which is efficient enough to predict the levels of stress in the users. After assessment of stress levels, stress relief techniques will be shared with the user. He/she can then practice those relief techniques for their betterment of mental health. The relief techniques will be suggested according to the severity of stress. The features included music & sound, meditation tips, breathing exercises, motivational videos and suggesting therapists in the user's nearby location.

- We are proposing a system that will give the best accuracy for the prediction purpose. Machine learning algorithms are tested to train the model.
- To build an interface which captures the user's interest and give the score regarding the user's stress.
- To suggest contacts of a psychiatrist/therapist if the stress level is high.

## II. RESEARCH METHODOLOGY

### 2.1 Survey of Existing or Similar System

In paper [1] smartphone application for mental health proposed an apps for symptom relief are readily available ,however, their usefulness is uncertain; mental health patients should seek and use app which are patient centered evidence-based

In paper [2] machine learning approach for classification of ADHD adults works as discrimination between attention deficit hyperactivity disorder and control groups as well as between ADHD subtypes with machine learning based on power spectra electroencephalography measurements.

In paper [3] the effectiveness of internet based cognitive behavioral therapy in treatment of psychiatric disorders proposed treatment of psychosis and depression through the use of the moderated online social therapy, a program that integrates online peer support and social networking within a clinician moderated site.

In paper [4] a mental health monitoring system using artificial intelligence proposed CBT which is used for monitoring mental health and results are obtained.

In paper [5] dynamic human behavior pattern detection and classification works as well-defined classified emoji-based human behavior patterns to support dynamic behavior classification and detection using machine learning approach.

In paper [6] finding behavioral and imaging biomarkers of major depressive disorder(MDD) Using AI proposed is done in identifying effective imaging and behavioral biomarkers to predict the onset , diagnose and treat depression.

### 2.2 Literature survey conclusion

So, taking everything into consideration we have decided to build our own system/software. We are building an android application which will provide a better experience to use this model rather than a website application. Our project includes characteristics that are different from other surveys. Training a ML model will give us the right direction in terms of accuracy and show the stress, depression and anxiety levels. We then move on to the ways of overcoming stress with some modest techniques.

### 2.3 Limitation Existing/Similar System or Research Gap

By looking at the literature survey we come to a conclusion that we could upgrade the techniques required for our project. Going through the research of the dataset we would not only build the model accordingly but also with the way to deal effectively with stress.

By planning the deployment budget and strategy before buying, organizations can eliminate many potential obstacles they would otherwise encounter.

## III. PROPOSED SYSTEM

To begin with, the user will have a login page to enter his/her personal credentials whereas new users will have to create a new account by clicking on the Register button. This process includes a specific authentication system to verify the details as an extension of the login data.

Once the login is successful, the next page displays a warm introduction and dive straight in to analyze the person's mental condition. The application then floats a dedicated set of questionnaires of the DASS-21 dataset. It contains 21 extremely sensitive questions regarding the daily routine of the user. Based on the responses of the user of all the

questions which are graded from never to almost always, the system tallies the data and gives the verdict. It may suggest whether the user has severe anxiety, mild depression or no mental illness at all. If the user has some anxiety problems, then a message displayed with the degree of the stress and suggest ways to overcome it. It is done by keeping the user motivated and avoiding panicking. Some of the measures will be to listen to music, which will help to stop overthinking and feel enlightened. This will help to keep the mood refreshed and later suggest some motivational videos too. After analyzing the progress over a few days, the application will determine whether the user has had some improvement or not. In extreme cases where the user is still not able to overcome stress, the application will recommend visiting a genuine therapist for further improvement. It will be giving the details of a few therapists nearby to the user's location.

### 3.2 Algorithm and Process Design



Figure 1 –activity login page



Figure 2- profile and sign up page



Figure 3- assessment activity

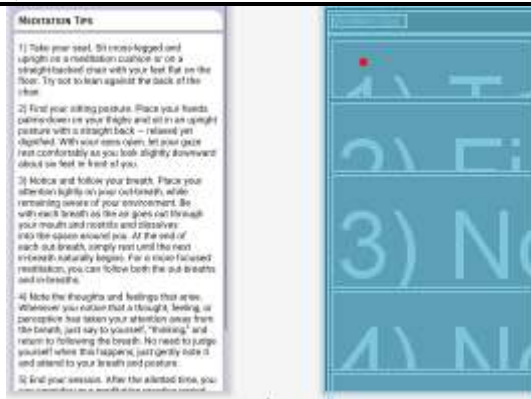


Figure 4- meditation tips



Figure 5- music list for meditation

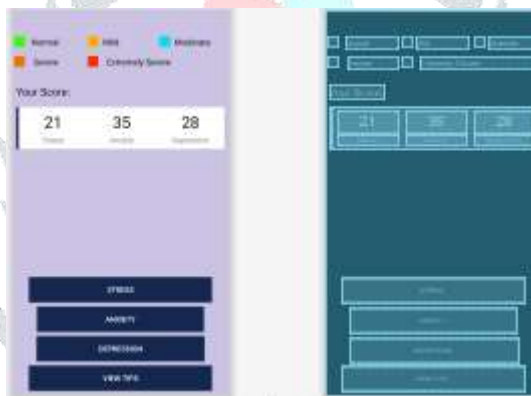


Figure 6- final result and calculations

### 3.3 Analysis

Process model used for the project

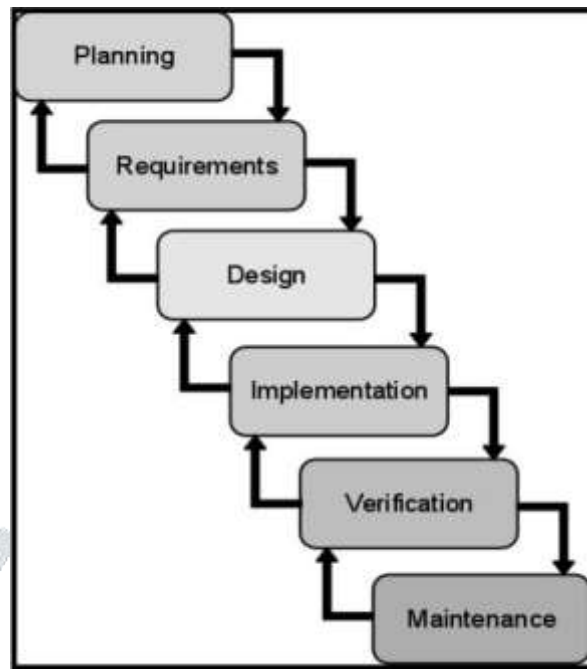


Figure – SDLC PROCESS

We will be using a waterfall model in order to develop our project. The reasons for using waterfall model are as follows:

- It allows for departmentalization and control. A schedule can be set with deadlines for each stage of development and a product can proceed through the development process model phases one by one.
- All the requirements are documented beforehand.
- The waterfall model progresses through easily understandable and explainable phases and thus it is easy to use.
- It is easy to manage due to the rigidity of the model – each phase has specific deliverables and a review process.
- In this model, phases are processed and completed one at a time and they do not overlap.

#### *Feasibility Study*

The aim of the current study was to investigate the feasibility of an application program that promotes behavior change for stress related problems in terms of the program's acceptability, practicability, and any possible effects. In addition, the aim was also to study how appropriate and realistic the study's process and resource management would be for conducting a randomized controlled trial. Questionnaires floated to get the possible results from the users. Both qualitative and quantitative data were collected and analyzed. The program does give the results and determines the anxiety level and therefore it is acceptable and practically feasible.

#### *Technical feasibility:*

Technical feasibility focuses on the technical resources (software and hardware) available to the organization and also helps to determine whether the technical team is capable of converting the ideas into working systems. The software required for our project, Android Studio, Eclipse IDE, is already ready with us. The hardware components such as laptop and mobile phones too are available. The project involves solvable technical issues.

#### *Economic feasibility:*

This assessment typically involves a cost/ benefits analysis of the project. This project is of extremely minimal amount.

**Operational feasibility:**

This assessment involves undertaking a study to analyze and determine whether the user is suffering with mental illness or not. The questionnaire is able to analyse the issues and suggest ways to help overcome them. It will also observe the online activity to get a clearer view of progress of the user. It can suggest techniques at regular or personalized intervals and suggest a genuine therapist if needed. The time saving factor is achieved in this application by using minimal activities in case of stress relief.

**IV. CONCLUSION**

This project focused on the prediction of five severity levels of anxiety, depression and stress using different machine learning models. These methods fall into four different categories: Bayes, neural network, lazy and tree. Last is a hybrid technique of K-star and random forest method. The hybrid approach improved the accuracy of the single algorithm, but it took 30 to 45 minutes to execute, whereas single algorithms were executed in a maximum of five minutes. All the methods were applied to two different databases, DASS42 and DASS21, collected from different sources. After application of all the techniques, the results showed that neural networks performed better than all the others.

The application gives the proper indication of the stress, anxiety and depression levels. With this result it gives the user an idea about where his/her mental health is heading. The application also provides methods to overcome the stress factor by suggesting effective exercises to practice on a day-to-day basis. After following the suggestions, over a period of time it may be possible to encounter that the stress levels have decreased.

The proposed model can be more enhanced by using Deep Learning techniques for stress prediction. Live interactions with a stress management center will reduce the user's problems in a quick manner. If the interactions are paid, then we can assure the app to be more helpful than the proposed model.

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