A Project Report on

Baymax- AI Based Depression Detection System

Submitted in partial fulfillment of the requirements for the award of the degree of

Bachelor of Engineering

in

Information Technology

by

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Approval Sheet

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Declaration

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, We have adequately cited and referenced the original sources. We also declare that We have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Abstract

Artificial intelligence (AI) technologies and techniques have useful purposes in every domain of mental health care including clinical decision-making, treatments, assessment, self-care, mental health care management and more. Recent technological innovations are highlighted to demonstrate capabilities and opportunities. This project involves an AI based Expert System which can significantly contribute to improving mental health of an individual to lead a better life without any stress or melancholy. The expert system provides expert advice and therapy to overcome negative thoughts. This project can also help to reduce the number of suicides caused due to extreme depression. This project is about virtual human conversation with the system to support user's interaction within a mental health care context. It provides private online healthcare guidance and support where the app can serve the role of a clinician or a psychotherapist

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Chapter 1

Introduction

As per a survey by WHO in 2016, close to 800,000 people die due to suicide every year and there are many more who attempt suicide. Hence, many millions of people are affected or experience suicide bereavement every year. Suicide occurs throughout the lifespan and is the second leading cause of death among 15-29 year olds globally. Suicide is a global phenomenon in all regions of the world; in fact, 78 percent of global suicide occurred in low- and middle-income countries in 2015. Suicide accounted for 1.4 percent of all deaths worldwide, making it the 17th leading cause of death in 2015. In India, over 5 crore people suffer from depression. Every 3 seconds a person attempts to die in India. A number of people of all age groups suffer from melancholy due to various reasons. As extreme depression may lead to suicidal thoughts, there is a need of an app which will help to reduce the depression and mental stress thereby combating the suicide rate.

Looking at the severity of mental illness, there is a need of some application which can act as your mental health care companion. An application in your mobile phone that can handle whatever life throws at you and helps you live the best life you can. We need an application which will help people to deal with depression, anxiety, social distress, relationship stress, career stress, body image, loneliness.

Various technologies like Artificial Intelligence, Expert System, Fuzzy Logic can be used in making such an application. Artificial intelligence (AI) based tools hold potential to extend the current capabilities of clinicians, to deal with complex problems and ever-expanding information streams that stretch the limits of human ability. The (treatment) choices we make change what we observe (clinically, or otherwise), which changes future choices, which affects future observations, and so forth. As humans (clinicians or otherwise), we leverage this fact every day to act "intelligently" in our environment.

To best assist us, our clinical computing tools should approximate the same process. Such an approach ties to future developments across the broader healthcare space, e.g., cognitive computing.

Expert system is a branch of Artificial Intelligence which offers benefits in many areas of health care. The system allows experts without experience of computers to build and evaluate complex disease models or psychiatric schedules which condense symptoms, pathological factors and social factors into international disease classifications. The knowledge of human expert system in the area of mental ill and disorder is transformed and often encoded into the knowledge base using a fuzzy logic and then provide the severity of any particular disorder.

1.1 Objective

- To develop this android application motive is the detection of depression in an individual and giving them an online help to prevent it or to find a cure for their depression.
- To develop a user friendly android application which enhances better graphical user interface that will help a user to interact in a proper way which will help us to examine their problem.
- To help the user an individual suffering or going through depression to lure him out of it.

1.2 Problem Statement

Depression as we know is the rising problem nowadays amongst all the age groups. The traditional online methods were insufficient in some or the other way, for ex: some of them did not have a chatbot from which a user can precisely communicate with the system so as to convey his problem.
It is to create a user friendly interface so as that the problem could be understood easily and a proper treatment and solution could be provided from system end. It is to create one of the best android app that detects levels of depression and provides good solution.

1.3 Technological Stack

- Android Studio
- Firebase
- Android SDK
- Coding Language: Kotlin
- Rule Engine: DROOLS.

Chapter 2

Literature Review

The papers refered are mentioned below:

[1] Aslina Baharum1, Tan Wei Seong1, Nurul Hidayah Mat Zain2, Nurhafizah Moziyana Mohd Yusop3, Muhammad Omar4, Nordaliela Mohd. Rusli ,Releasing Stress Using Music Mood Application: DeMuse , Universiti Malaysia Sabah, 88400 Kota Kinabalu, Sabah, Malaysia 2017

Findings: A content-based analysis was conducted in order to obtain the features that are valuable enough as the properties usage in the development of prototype. In this content analysis, a number of Music, which are "Relax Lite: Stress Relief", "Calm", "Relax & Rest Guided Meditations", "MindShift", and "Pacifica: Stress & Anxiety".

Advantages: Stress free Music

Disadvantages: Chatbot was not provided and Fuzzy Logic was not provided only music was Introduced

[2] Sami Elzeiny, Marwa Qaraqe ,Workplace Stress Detection Approaches, College of Science and Engineering Hamad Bin Khalifa University Doha, Qatar

Finding: Define the main goal and strategy of the organization.Construct a clear leadership structure and hierarchy.Limit working shifts to 12 hours maximum with overlap between shift to ensure briefing the following staff.Provide training, communication tools such as phones,intranet portals.Rotate employees between high-, mid-, low-stress tasks,and encourage breaks and vacations.Consider flexible working scheme including part time job,distance working, or sharing job

Advantages: Electrocardiography (ECG),Electroencephalography (EEG),Electrodermal activity(EDA).

Disadvantages: Chatbot was not provided and Fuzzy Logic was not provided, for only office people.

[3] Gábor Kiss, Klára Vicsi, Comparison of read and spontaneous speech in case of Automatic Detection of Depression , Department of Telecommunications and Media Informatics Budapest University of Technology and Economics Budapest, Hungary, 2017

Finding: Speech samples were collected from healthy and depressed subjects in quiet environment with head microphone. The recordings were recorded at 44,1 kHz with 16-bit sample rate. Two types of speech sample were recorded from each subject, read speech: a short folk tale "The North Wind and the Sun" and spontaneous speech: dialogue between the examined subject and interviewer, both in Hungarian language. A total of 73 subjects were recorded, 42 females and 31 males. From the 73 subject 48 subjects were diagnosed with depression, 30 females and 18 males, and 25 subjects were healthy, 12 females and 13 males.

Advantages: Psychological Status Monitoring by G. Kiss, K. Vicsi • Comparison of read and spontaneous speech in case of Automatic Detection of Depression Computerized Analysis of Language phenomena (COALA) (AO-11-Concordia).

Disadvantages: Chatbot was not provided and Fuzzy Logic was not provided

[4] ADITYA VIVEK THOTA, A DHARUN, Machine Learning Techniques for Stress Prediction in Working Employees, SRINIVASULU REDDY Assistant Professor, Machine Learning and Data Analytics Lab, Department of Computer Applications, National Institute of Technology, Trichy

Finding: This is highly effective in healthcare as there is enormous amount of data and if this is properly fed to an intelligent system and trained accordingly, the resulting prediction model will be unparalleled and free from human errors and reduce the time required for diagnostics. Hence, the responses of the OSMI 2017 dataset were used to train the following ML models that are previously tested in healthcare based classification problems.

Advantages: Motivational thoughts according to there requirements.

disadvantages: Chatbot was not provided and Fuzzy Logic was not provided, for only office people.

[5] Zhenhai Mu , Lizhen Jiang ,Distributed Grating Sensor Stress Data Acquisition and Management System, Guilin University of Aerospace Technology ,Guilin,541004,China

Finding: As a popular measuring tool, grating sensor should be used.The range of application is more and more extensive. The advantages of high-precision data measured make it a promising development prospect at home and abroad. At the same time, the system design of this subject needs to combine hardware and software.

Advantages:: Detect The level of stress

disadvantages: Chatbot was not provided and Fuzzy Logic was not provided, Only level is shown.

Chapter 3

Project Design

3.1 MODULE DESIGN

Following are the Flow charts.

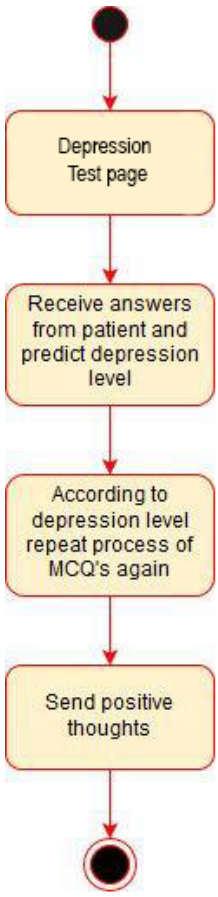

Figure 3.1: Flowchart of Application

User attempts the Depression Test i.e. MCQ based test and results are displayed and further positive video or doctor consultation is recommended.

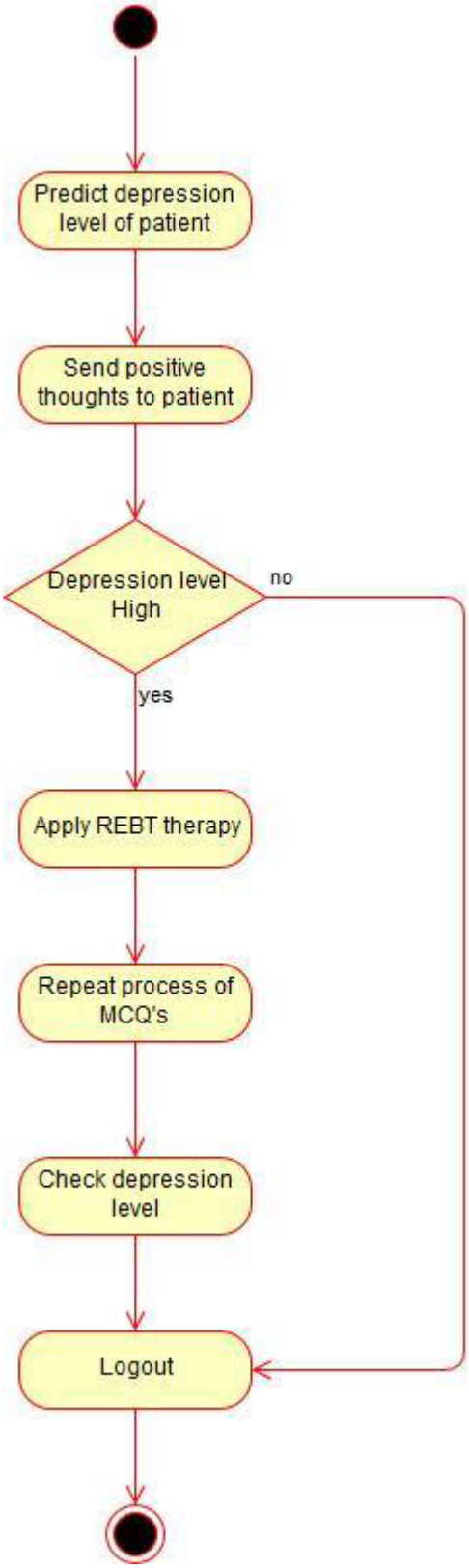

Figure 3.2: Flowchart of Expert

This flow chart refers to action of app where depending on result expert advice is recommended.

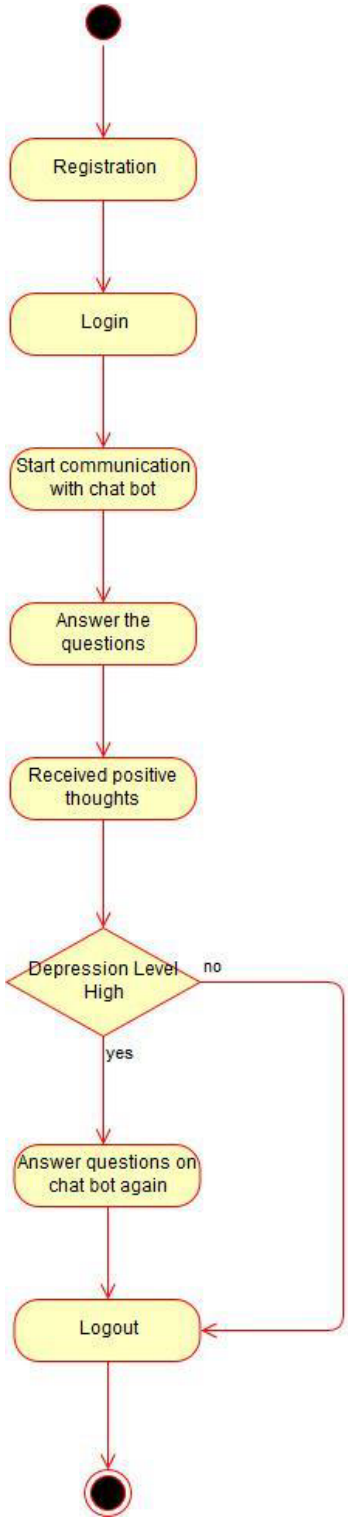

Figure 3.3: Flowchart of Patient

This flow chart refer to second iteration of test. wherein after first test recommendation user repeats test to know about his situation and required action is suggested.

3.2 SYSTEM ARCHITECTURE

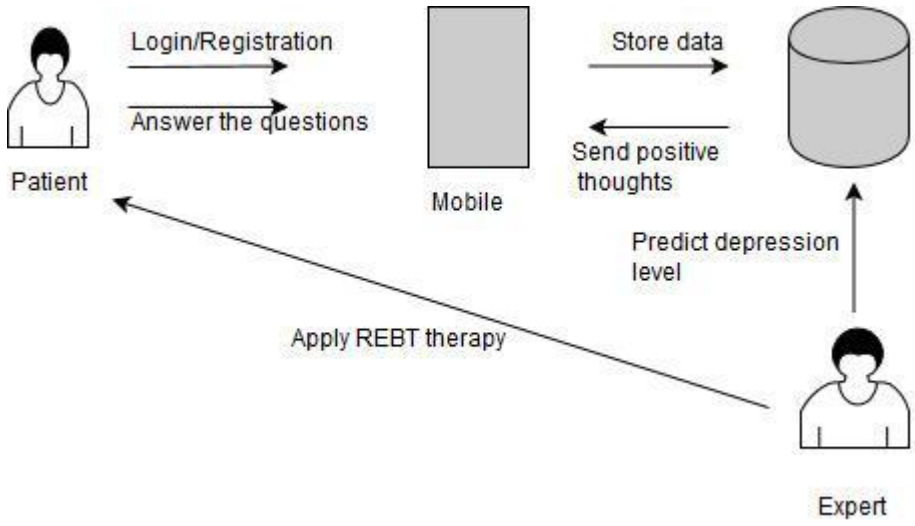

Figure 3.4: System Architecture

- Patient registration and login to android app.
- Patient answer the questions
- Predict depression level of patient from answers
- Depression level is high then apply REBT therapy
- Send positive thoughts to Patient
- Patient start communication with chat bot.
- Repeat process of Questions and answers
- Check again depression level of patient

3.3 SEQUENCE DIAGRAM

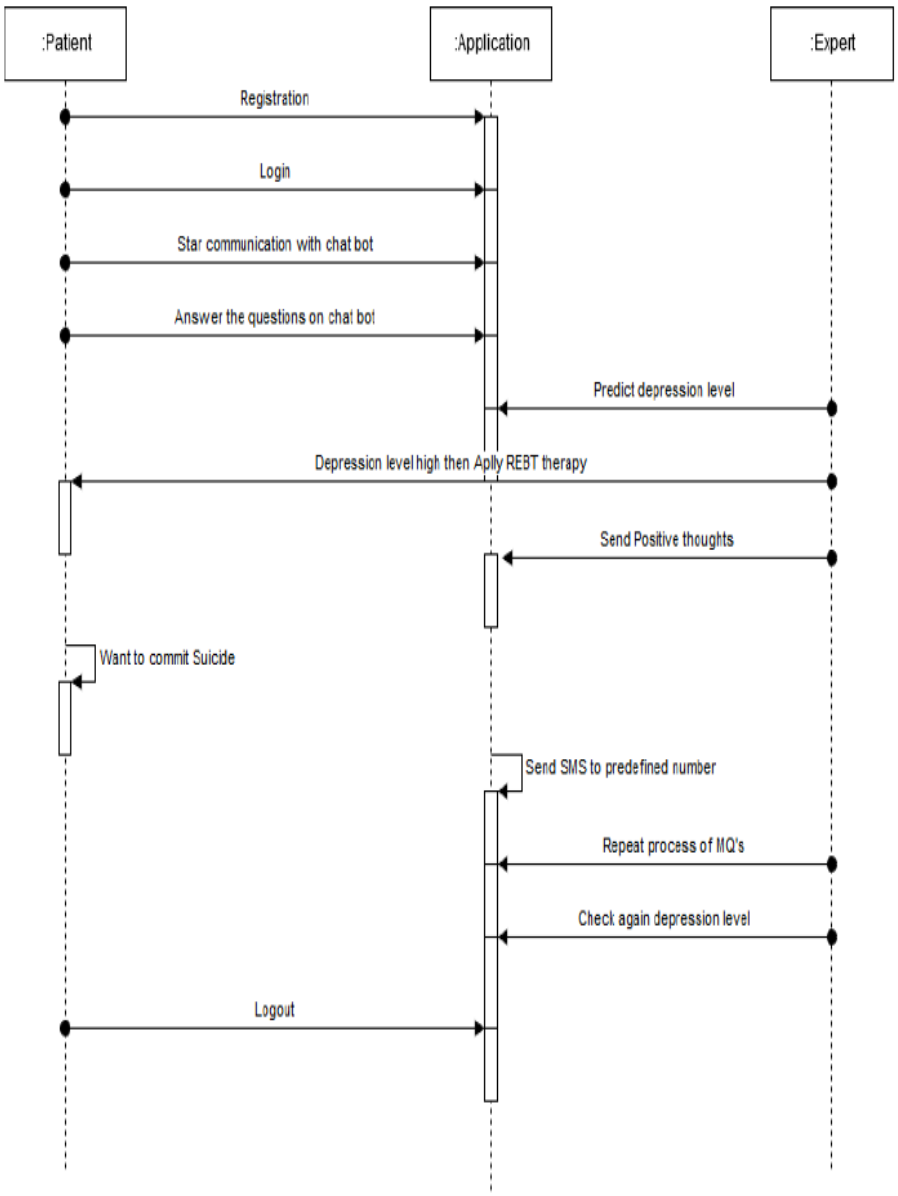

Figure 3.5: Squence Daigram.

A Sequence fragment is represented in a frames with a interaction with objects : Patient, Application, Expert. Patient can register and login to the application and can communicate with chat bot. Expert predict depression level and if high use REBT therapy, send SMS to patient.

3.4 USE CASE DIAGRAM

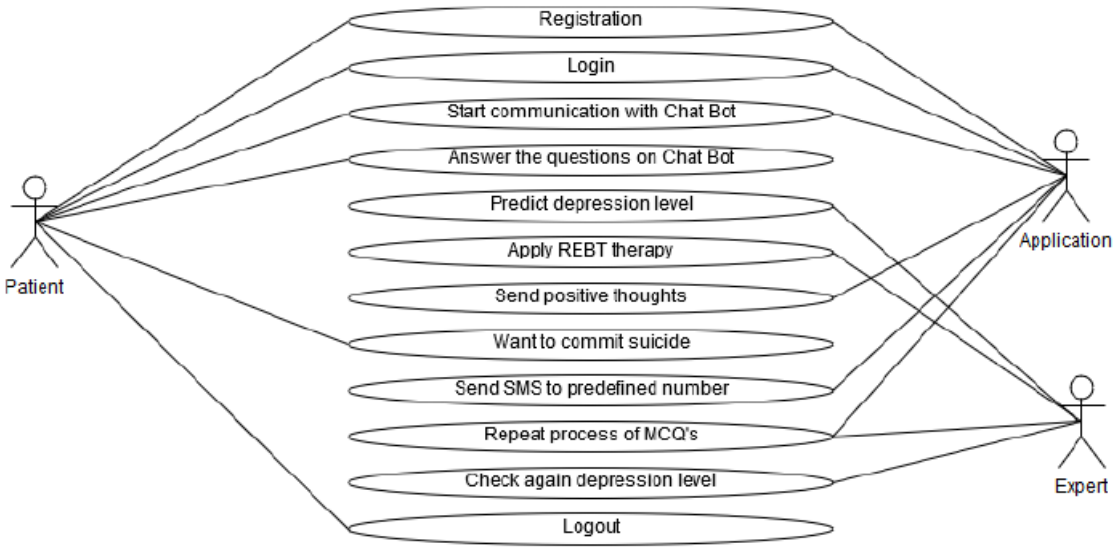

Figure 3.6: Use Case Daigram

As shown in the diagram Patient, Application, Expert acts as an actor. here patient will give input to the application. Patient and Expert will communicate through application

3.5 CLASS DAIGRAM

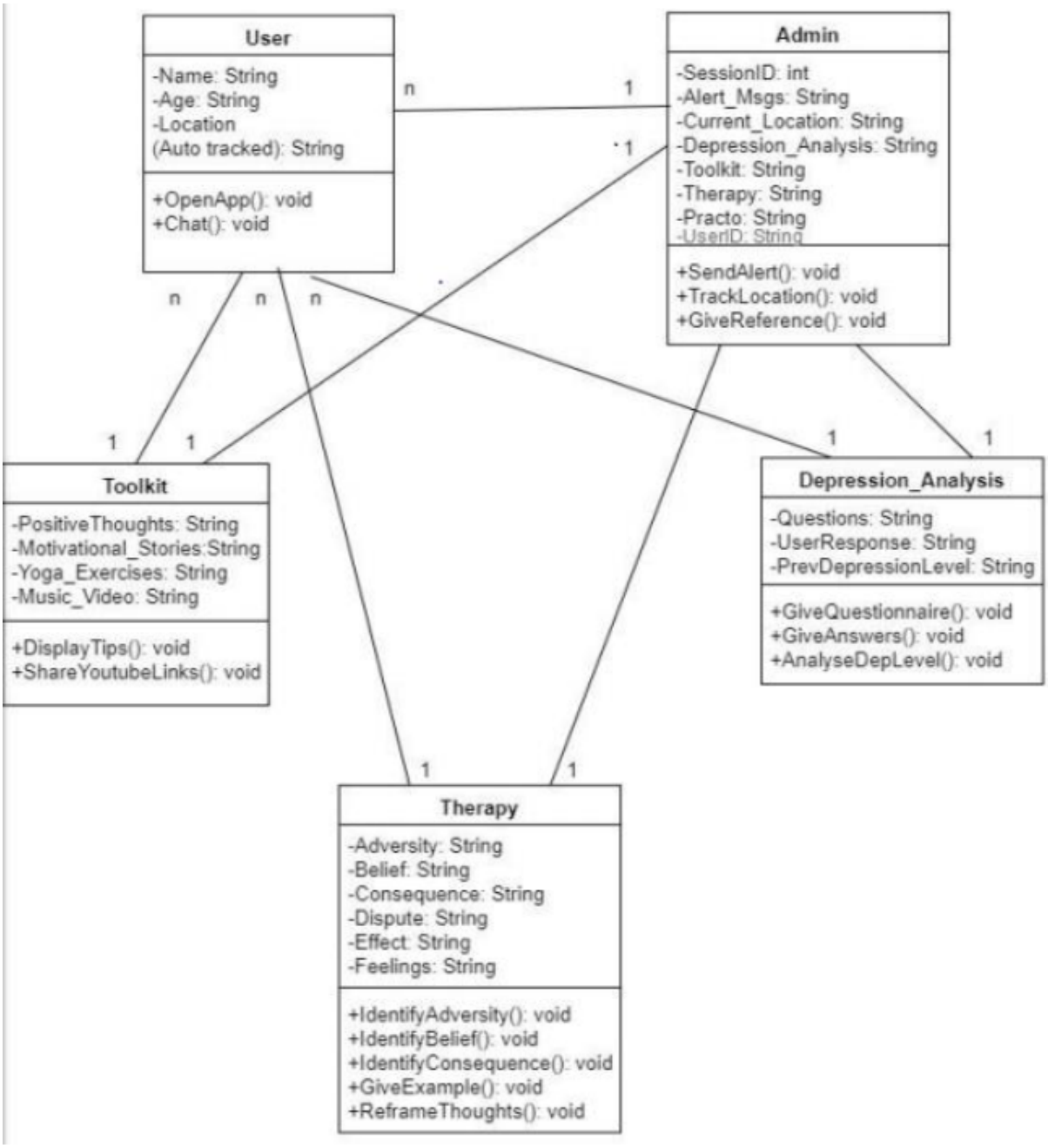

Figure 3.7: Class Daigram

In Software Engineering, a class diagram is a type of static structure diagram that describes the structure of a system. Even their attributes, operations and relationships. Depression analysis will analysis the depression.

Here User class represent the basic information of user. Toolkit class represents positive thoughts, yoga tips etc. Therapy class represents consequences and feelings.

Chapter 4

Project Implementation

4.1 Screenshot of application

4.1.1 Login

Login Page of the App where user can log in to use app. If user is new user than he/she can register by here by clicking.

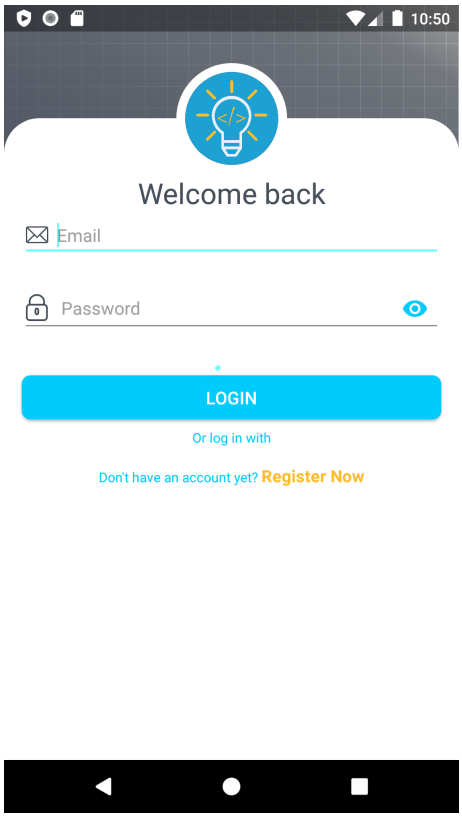

Figure 4.1: Login page

4.1.2 Registration

Following is the registration page, where new user is supposed to fill the form and Sign up.

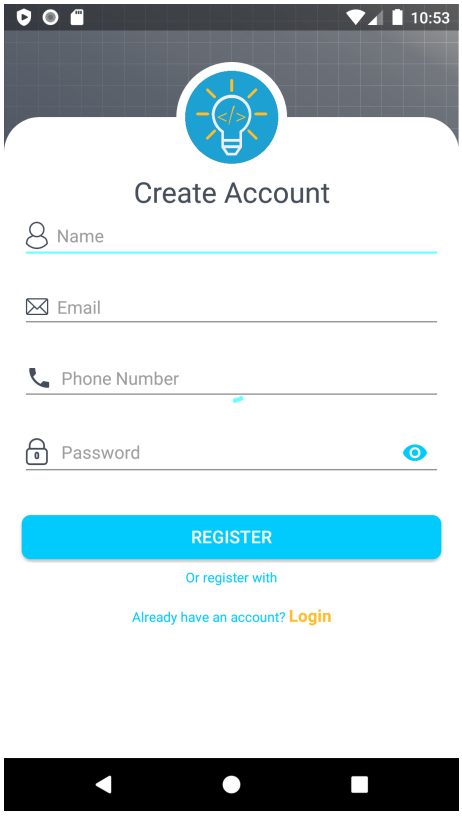

Figure 4.2: Registration page

4.1.3 Home Page

This is Home page after successful login. Here user can navigate to Test Page and Chatbot

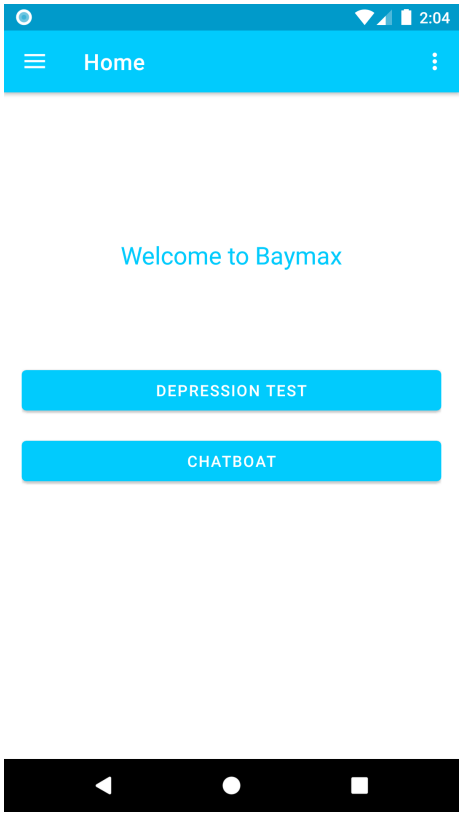

Figure 4.3: Home Page

4.1.4 Depression Test

Below screenshots is the test page where user has to attempt few mcq's to know his/her depression level.

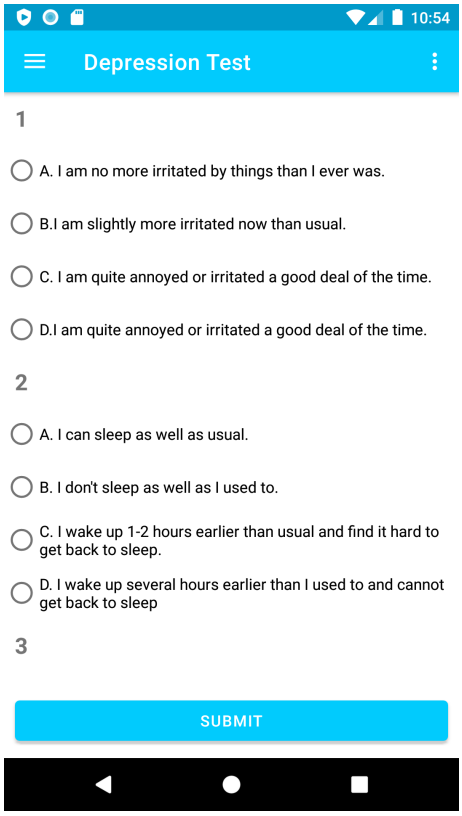

Figure 4.4: Give Depression Test MCQ's

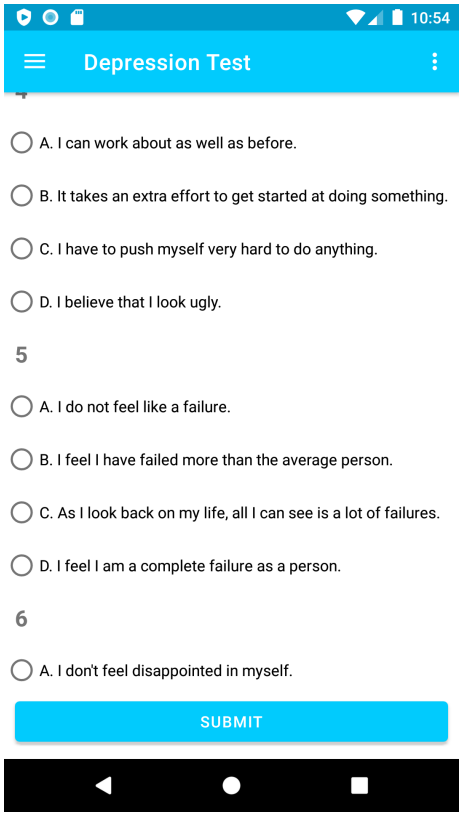

Figure 4.5: Give Depression Test MCQ's

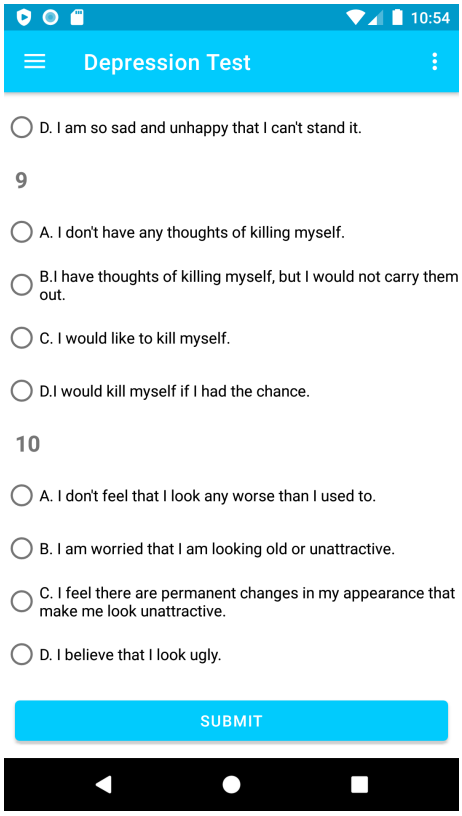

Figure 4.6: Give Depression Test MCQ's

4.1.5 Marks And Depression level

Here after successful completion of test user gets to know his result.

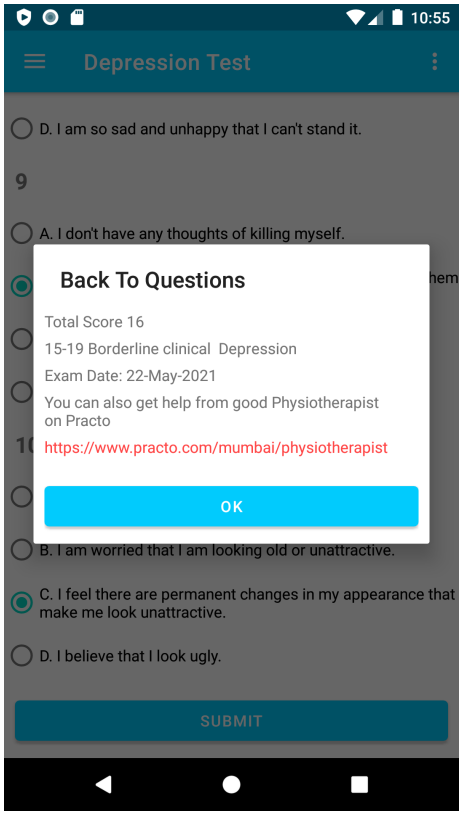

Figure 4.7: Displaying Marks and Depression Level

4.1.6 Constulting on Practo

After result to test, App recommends some tips to user. it the user detects for severe depression than he gets the practo online platform link where he can consult the issue with doctor and get treatment.

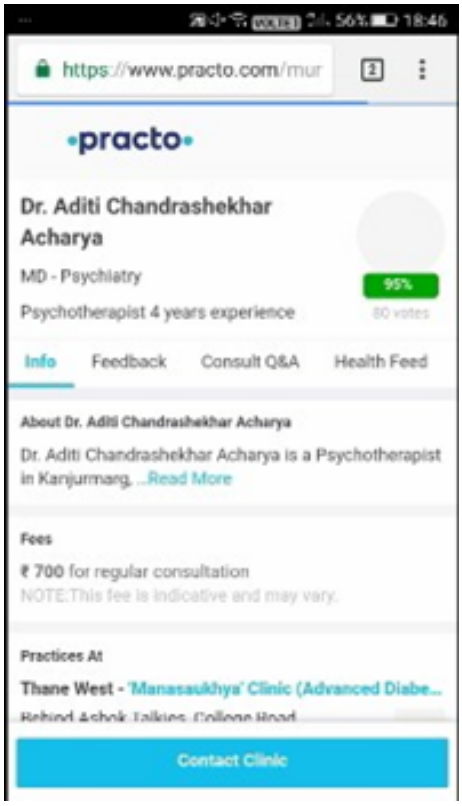

Figure 4.8: Redirecting to Practo

4.1.7 Tips For Recovery

If user Detects mild to moderate symtoms the he is suggested with some tips which can be accessed from Menu. This tips consist of meditation, yoga, chants and bhagvad geeta readings. Below are the screenshots.

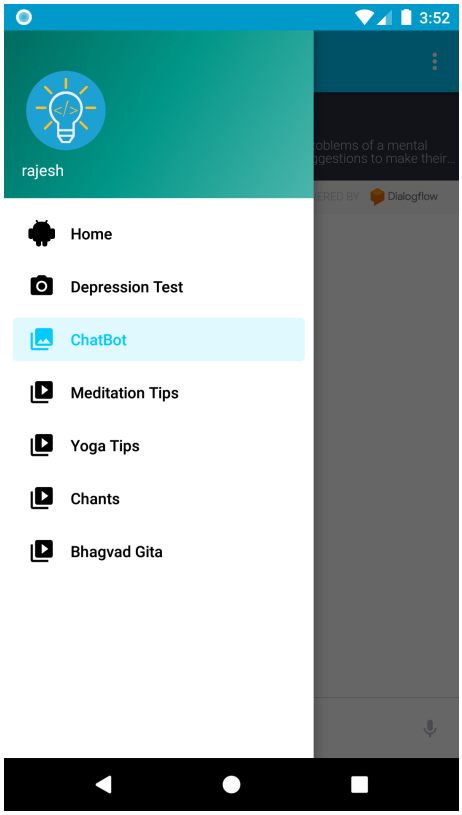

Figure 4.9: Menu Drawer for tips

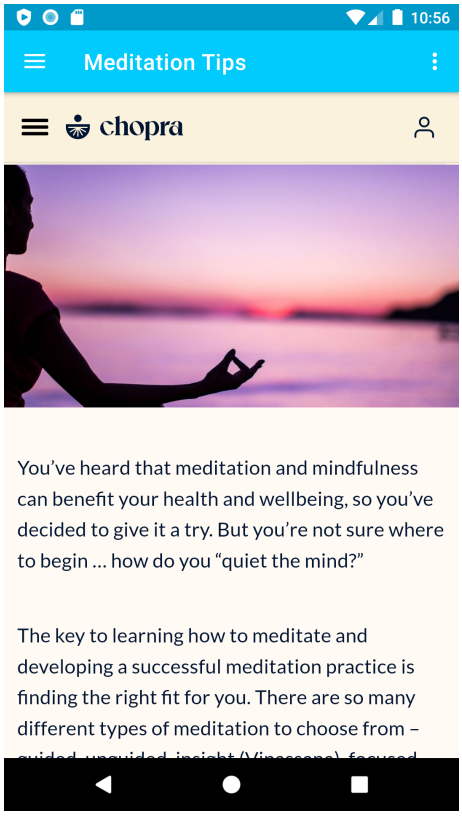

Figure 4.10: Meditation Tips

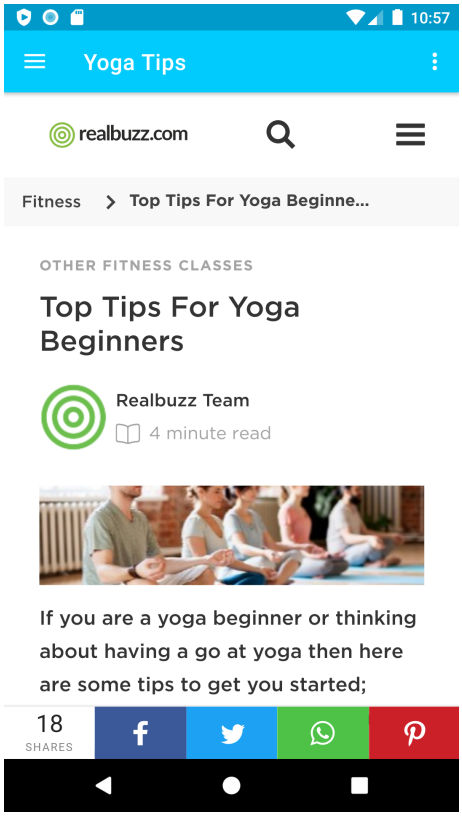

Figure 4.11: Yoga Tips

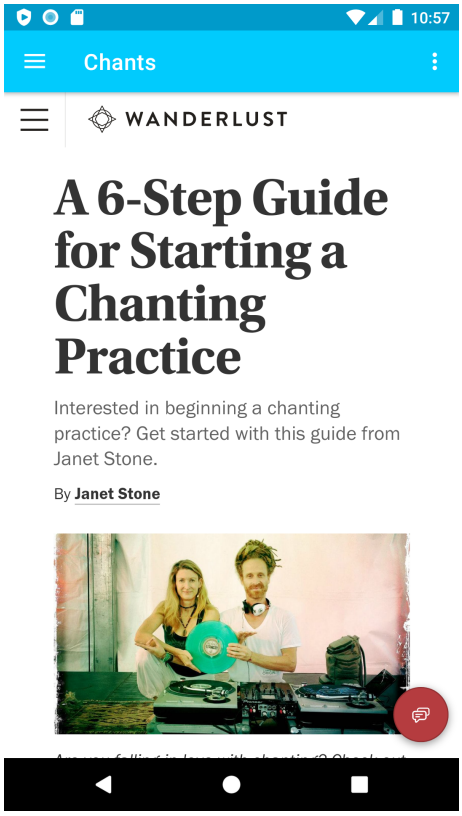

Figure 4.12: Chants Tips

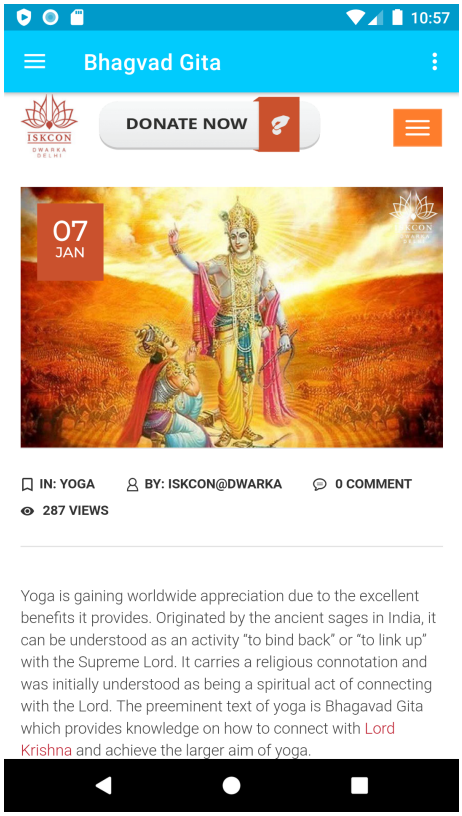

Figure 4.13: Towards Bhagvad Gita

4.2 Chat on chatbot

Following is the chatbox, where user can type his problem and get replies to his questions.

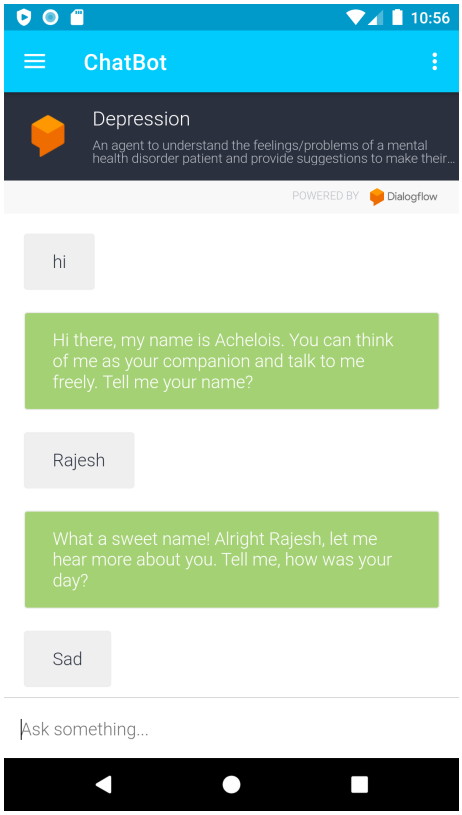

Figure 4.14: Chatbot

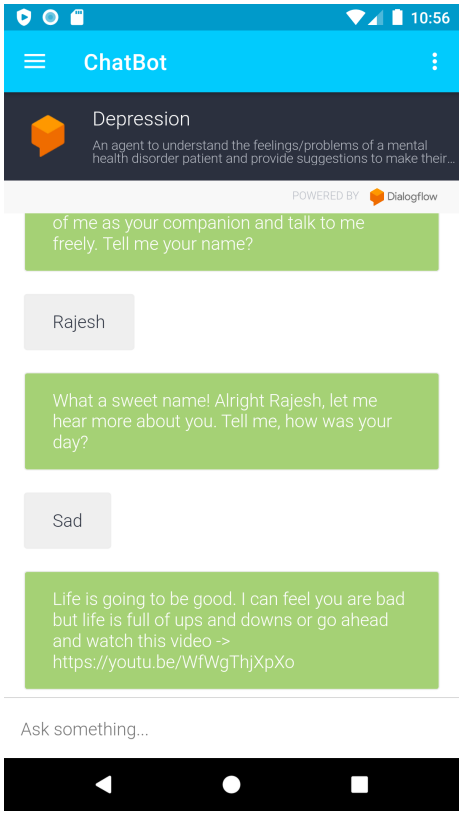

Figure 4.15: Chatbot

Chapter 5

Testing

Later on we carried out the testing part that comprised of testing to check the program for correct results and error freeness. We have Tested login & other functionality like chat bot response, multiple login with same email address.

Chapter 6

Result

By Baymax App have been successfully identify the depression level of user and helped them with motivational thoughts thoughts to poke-up with their mild to moderate depression level. App will drive to consult doctor on practo platform & in future perspective we will implement notification feature were we will sending notification to close contact in serve patient.

Chapter 7

Conclusions and Future Scope

7.1 Conclusions

Depression detection system aims on helping each & every individual to overcome his insecurities regarding the mental stress. This application mainly focus on how the user is feeling by asking some set of questions which would be further estimated in level of stress he is going through. To avail this application user need to install a application in their mobile phones. The application is design in such a way that if the algorithm finds out that person is suffering from severe level of stress then some different kind of help is offered,for mild to moderate mostly in some motivational video or text form. For severe cases app drive patient to online consulting platform practo. This application will overcome the unspoken culture of depression in India.

7.2 Future Scope

The aim at detecting the depression level of a certain age criteria. From the result, it can be clearly stated that people differ from the state of health to do so the person's information is kept in database and each individual is provided with a different level of treatment.

Given the current versatility and variety of development option for mobile application, the key is to determine what platform will best align with your business problems and goals. Mobile application are a powerful tool for connecting with the consumer, businesses and users, and their functionality and value is only increasing as the world continues to more towards mobility.

As the features where compared with some other significance features, and as a result it was stated that few project where dealing only till the depression detection. As this application deals with the detection as well as to help to decreased the level of depression.

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[4] Sami Elzeiny, Marwa Qaraqe, College of Science and Engineering Hamad Bin Khalifa University Doha, Qatar

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