

Mental Health Mobile Application with Diagnosis, Sentiment Analysis and Chatbot

Tanvi Gadgil¹, Shailaja Jadhav², Anjali Kumari¹, Mrunali Dasari¹, Chanchal Bhangdia¹

¹Student, Computer Department, MMCOE, Pune, Maharashtra, India

²Assistant Professor, Computer Department, MMCOE, Pune, Maharashtra, India

ABSTRACT

Article Info

Volume 8, Issue 3

Page Number : 94-100

Publication Issue :

May-June-2022

Article History

Accepted: 20 April 2022

Published: 03 May 2022

Mobile phones are probably one of the fastest growing and most rapidly adopted technologies in the world. The various apps and their health features are still relatively new, but their popularity is growing rapidly. The purpose of this study is to explore multiple elements of mental health applications. This study examines many aspects of mental health-related applications available on the Google Play Store between 2016 and 2020. We used a list of keywords such as mental health, mental illness, mental illness remedies, and mental illness remedies to search for apps in the Google Play store. Various applications and programming tools were used to scrape the data.

According to our findings, psychiatric apps primarily address the following symptoms: depression, anxiety, general mental health, stress, post-traumatic stress disorders, bipolar disorders, panic disorders, Sleep disorders, schizophrenia, compulsive disorders, substance abuse (drugs and alcohol), addiction (techniques, etc.). The app, on the other hand, offers different approaches to improving mental health. Relaxation, stress management, symptom tracking, soothing audio, journaling, connecting with mental health resources, interpersonal support, meditation, mood tracking, etc. are one of the approaches. These simple and engaging mental health apps have addressed specific mental health issues. The most common strategy for dealing with these issues is relaxation. It was not possible to predict the reliability of these applications based on their ratings and the number of users rated.

Keywords: Sentiment Analysis, Mental Health Tracker, Chatbot, Apps, Smart-Phone, Depression, common mental disorders, approaches to mental wellbeing.

I. INTRODUCTION

The prevalence of common mental disorders, such as depression, generalised anxiety disorder (GAD), panic disorder, phobias, social anxiety disorder, obsessive-

compulsive disorder (OCD), and post-traumatic stress disorder (PTSD), is increasing globally [1], and has become a global public health concern [2]. Mood disorders (such as depression or bipolar disorder),

anxiety disorders, personality disorders, psychotic disorders (such as schizophrenia), eating disorders, trauma-related disorders (such as post-traumatic stress disorder), drug abuse disorders, and self-harm affect people of all ages [3]. Various societal stigmas are among the major barriers to persons seeking mental health treatment [6] in hospitals and private consultation rooms. Many people suffer silently without seeking therapy and rely on self-care approaches to avoid being stigmatised. According to much research, Smartphone Apps are becoming increasingly popular as a tool for self-care [7]. People are turning to mental health applications as an alternative to seeking treatment because studies show a strong link between mental health and societal taboos and stigmas [8-9]. Another study [10-11] discovered that Smartphone Apps are good tools for promoting mental health and wellness. This study seeks to present a summary of existing mental health applications in order to better understand the main areas of mental illness on which app developers focus. The highly rated apps are investigated here, as rating options are utilised to provide a critical analysis of app quality.

Apps in healthcare are becoming increasingly popular. Apps and their applications in health care are a new phenomenon, as are scholarships associated with them. Scholars from a variety of fields, including medical, public health, psychology, engineering, and communication, are looking into these occurrences from numerous angles. The majority of the scholarships are focused on mobile phone assistance in mental health care. Different elements of mental health-related apps are poorly understood. In such conditions, this article seeks to map out the many dimensions of existing mental health apps.

II. METHODS AND MATERIAL

Grading of Recommendations, Assessment, Development, and Evaluation System

The GRADE system was used to evaluate the evidence's quality. The fine of systematic overview evidence can be judged primarily based on a range of factors, such as pattern length (the larger the higher, preferably over 1000), precision of results, directness of consequences (e.g., impact on mental health signs and symptoms [direct] vs impact on perceived stress [indirect]), homogeneity of effects throughout studies (i.e., consistency of consequences from one study to the next), and study layout (potential studies). The estimated effect length (the greater the value, the better) is used to determine the magnitude of the app's effect. Effect sizes have been supplied one by one from the first-class of evidence for every study. As a result, each characteristic of the GRADE system is assigned a point, with systematic critiques being categorized as very poor, poor to moderate, moderate to high, high, or very high-quality proof. We give both the quality of the evidence and the impact magnitude for every element of the model. We mentioned those who in comparison the applications with a manipulated condition and highlighted the consequences for stand-on my own apps versus apps with guidance, as systematic reviews.

Chatbot

We have used the Rasa framework to create our chatbot. The Rasa Stack is a collection of open source machine learning tools for developers to use in building contextual chatbots and assistants. Entity Extraction-Based Intelligent Chatbot System Anran Jiao examined the performance of RASA NLU stack with Neural Network Classifier and Entity Extractor from scratch in Using RASA NLU and Neural Network [12]. According to this study, the RASA NLU technique is still superior at extracting all entities and classifying user voice intent. It's likewise a fairly comprehensive study, although it relies on a free API for response completeness rather than its own database. Aside from that, the framework is

simple to grasp and utilise, requiring little to no coding. As a result, the Rasa framework proved a better fit for the chatbot.

We have included features such as offering information about mental health, mental health issues, mood journaling, and reminding users to write a note of gratitude or their thoughts on a daily basis; and assisting users in identifying appropriate coping tactics. Users can ask the chatbot questions about symptoms and treatments for various mental health illnesses, and the chatbot will respond with basic facts. The coping strategies evaluation questionnaire (Brief Cope) [13] consists of 28 items that assess effective and inefficient coping methods in the face of a stressful life event. After the user has completed all of the questions, the score is displayed, which is divided into three categories: problem-focused, emotional-focused, and avoidant-coping.

Sentiment Analysis

Sentiment analysis and opinion mining is an area that has experienced considerable growth over the last decade. This area of research attempts to determine the feelings, opinions, emotions, among other things, of people on something or someone. Sentiment analysis is defined as recognition of text to be positive, negative, or neutral. Sentiment analysis It is usually implemented using machine learning. Given the input text 'T', a list of emotion types are given and emotions are determined based on that. Generalization of sentiment analysis pipeline can be divided into five steps:

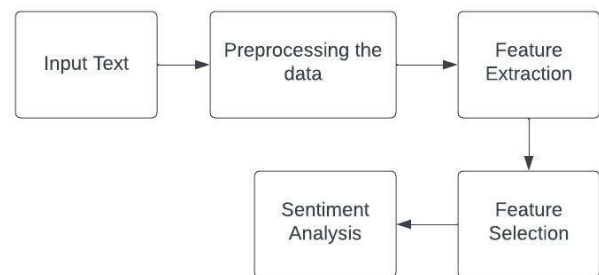
Input text: The Input text could be in the form of Text, PDF, Audio Input and HTML Files.

Pre-Processing: Pre-Processing of input data is necessary in order to make the data in a standard format so that the optimized algorithm could process it and provide the most efficient result. Preprocess consist of process of Stemming, Lemmatization, Tokenization, Stop word removal, Removal of repeated characters and even spell check

Feature Extraction: The process of Feature Extraction is used in the identification of parts of speech in the input text. It helps for proper text formation.

Feature Selection: Feature Selection includes Information gain, selection based on Frequency, Point wise mutual information and gain ratio

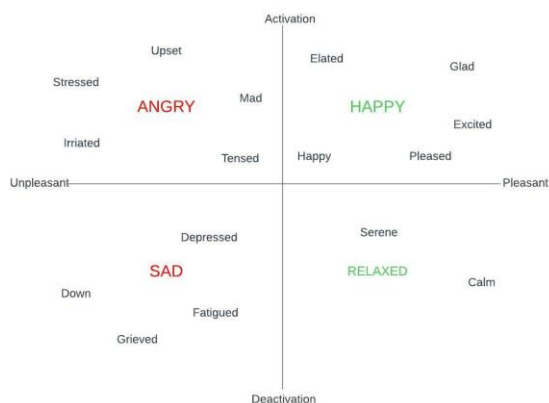
Sentiment Classification: Sentiment Classification can be achieved using multiple methods which include Classification, Regression, Clustering and Association.



Sentiment analysis and sentiment classification is what we have used to understand the state of the user, for analysing we have extracted words from the journal section of our app.

The lexicon-based approach uses a set of words to determine the mood of the text. Emotions are divided into three main types : positive, negative and neutral. There are two main approaches to lexicon-based prediction: the dictionary-based approach and the corpus-based approach. The input text is tokenized after preprocessing and compared to the dictionary value set, which determines the type of text based on this approach, and the entire sentence is given a value and its emotions are calculated.

The corpus-based approach uses an initial list of words to identify more context-specific words and assist them from a variety of semantic techniques. This is an iterative process, starting with a defined word collection, but using multiple sources to expand the search, with alternative synonyms extracted from the opinion seed set, and specific contexts it can be found in famous corpora such as dictionaries and thesauruses.



Diagnosis using Linear Regressions

Linear Regression is a machine learning algorithm based on supervised learning. It performs a regression task. Regression models a target prediction value based on independent variables. It is mostly used for finding out the relationship between variables and forecasting. Different regression models differ based on – the kind of relationship between dependent and independent variables they are considering, and the number of independent variables getting used. Linear regression performs the task to predict a dependent variable value (y) based on a given independent variable (x). So, this regression technique finds out a linear relationship between x (input) and y (output). Hence, the name is Linear Regression.

When users takes any tests - Anxiety, Depression, PTSD the score, age and ID of test is sent as parameter to the regression function and accordingly result is generated whether the user has Low, Moderate, High or Severe mental health issues

III. RESULTS

We looked at the content of mental health-related apps on the Google Play Store. Our findings reveal that the majority of the Apps address common mental diseases like depression, anxiety, and overall mental wellness. Meanwhile, the Apps provide symptom tracking, mood tracking, stress management, relaxing music, meditation, and interpersonal support,

among other behavioural interventions. Despite the fact that these apps are not directly or indirectly recommended by medical professionals, they are helping to alleviate mental illness and promote mental wellbeing. Vázquez et al. (2018), for example, stated that mobile apps have a great potential for delivering mental health therapies, particularly for depression [10- 11].

We have successfully developed a mental health application. We also included generic information regarding various health issues in this app. This application has accomplished its primary goal of diagnosing the user using the GRADE system, and for that purpose, a separate section on diagnosis has been created in which we have different mental health tests such as Anxiety, Depression, PTSD, Addiction, and so on. When users take any of these tests, the score, age, and ID of the test is sent as a parameter to the regression function, and a result is generated indicating whether the user has a Low, Moderate, High, or Severe mental health issues.

This programme also has another use case in which the user can journal his/her ideas, and sentiment analysis assists us in categorising the user's input/text as neutral, positive, or negative. Another important feature of this application is the chatbot, which works like a questionnaire and includes features like providing information about mental health, mental health difficulties, mood journaling, and prompting users to write a message of appreciation or their thoughts on a regular basis; and assisting users in selecting appropriate coping methods. Users may query the chatbot about symptoms and remedies for various mental health issues, and the chatbot will respond with basic information.

IV. DISCUSSION

The purpose of this study was to conduct a content analysis of mental health-related Apps. According to our findings, the majority of the Apps

address common mental ailments such as depression, anxiety, and general mental health. In the meanwhile, the Apps include certain behavioural therapies such as symptom tracking, mood tracking, stress management, relaxing music, meditation, and interpersonal support. Although these applications are not directly or indirectly recommended by medical practitioners, they are attempting to give assistance in alleviating mental disorders and promoting mental wellbeing. Vázquez et al. (2018), for example, stated that mobile applications have a great potential to offer mental health therapies, particularly for depression.[14]

Mobile apps have the potential to significantly improve patients' self-management of mental health conditions. Analyzing user feedback is critical for identifying the strengths and limitations of mental health applications as well as areas for improvement. The reviews help understand overall user experiences with the app as well as individual aspects that people enjoy and dislike. According to the findings of our investigation, the most commonly cited drawbacks of the mental health applications evaluated in this article include poor usability, a lack of diversity and personalisation, trustworthiness and security difficulties, and bad customer support. Surprisingly, these characteristics (usability, diversity of features and options, personalization, social support, user control, customer service, emergency contact, security features) are also the most commonly noted strengths (preferred traits) of programmes that apply them.[16]

Usability testing of mental health apps accessible on the App Store and Google Play is lacking. As a result, the programmes have various design and interface concerns, such as bugs, poor user interface, difficult-to-follow instructions and navigation, and a lack of orientation—all of which, if solved, would likely boost user engagement and lower the high attrition rate.

Furthermore, the evaluations indicate that general mental health applications must be built to

appeal to a broad audience. As a result, allowing users to personalise the app to their own requirements and preferences is an excellent method to increase user happiness and experience, and hence lower the high attrition rate. Users emphasised the necessity to modify the majority of the app's features, such as meditation styles, games, and other activities, in order to attract and meet a wide range of user demands. For example, the app could allow users to customize the length and rate of breathing exercises, as well as the type and duration of meditation.

Furthermore, most mental health apps do not offer users with a privacy policy, which confuses users and undermines app confidence. As a result, mental health applications should give explicit, plain-language information regarding their privacy policies. This reassures users that their data is secure, increasing their faith in the app.[15]

V. CONCLUSION

Mobile devices had been used within the mental health field in recent years as a part of clinical, mental, and preferred health services to aid inside the treatment and monitoring of Mental problems. Mobile technologies now not only enable continuous monitoring of someone's physiological situation, however additionally they assist within the creation of a lifelong file of psychological, mental, and social health. As a result, the use of those technologies in fitness evaluations and interventions can decrease healthcare prices whilst enhancing access to health offerings. We delivered a chatbot software with a tracker that gives conversational mental healthcare offerings based totally on emotion reputation strategies, in addition to a talk assistant platform that consists of a context sensitive advanced natural language-based approach that offers personalized reaction technology in real time even as also allowing the consumer to document and evaluate daily activities. The methods allow for sensitive continuous commentary of the user's emotional fluctuations. As a

result, our strategies will enhance the experience of humans in need of mental healthcare. Other mental illnesses might be used in future studies. We can improve the chatbot's ability to respond emotionally to the user.

This review also adds to the literature by identifying which features of mental health applications are particularly significant to users and should be taken into account when building an app. Our findings from this analysis, in particular, highlight key areas of app design that mental health app developers should consider when building their app to increase user experience, usability, adherence, and hence overall efficacy. First and foremost, developers should concentrate on app usability. Designers of mental health applications should undertake usability tests on both their initial and updated versions. It is critical to provide users with a range of rich material, customization features, and the ability to use the app without many constraints.

VI. REFERENCES

- [1] Institute of Health Metrics and Evaluation. Global Health Data Exchange (GHDx).(Accessed 1 May 2021).
- [2] Artur Rocha, Mario Ricardo Henriques, João Correia Lopes, Rui Camacho, Michel Klein, Gabriele Modena, Pepijn Van de Ven, Elaine McGovern, Eric Tousset, Thibaut Gauthier, and Lisanne Warmerdam. Ict4depression: Service oriented architecture applied to the treatment of depression. In 2012 25th IEEE International Symposium on Computer-Based Medical Systems (CBMS), 2012
- [3] Ariel S. Teles, Francisco J. Silva, Artur Rocha, João Correia Lopes, Donal O'Sullivan, Pepijn Van de Ven, and Markus Endler. Towards situation-aware mobile applications in mental health. In 2016 IEEE 29th International Symposium on Computer-Based Medical Systems (CBMS), pages 349–354, 2016.
- [4] Martha Neary, Stephen M. Schueller, State of the Field of Mental Health Apps, Cognitive and Behavioral Practice, Volume 25, Issue 4, 2018, ISSN 1077-7229
- [5] Monney G, Penzenstadler L, Dupraz O, Etter JF, Khazaal Y. mHealth App for Cannabis Users: Satisfaction and Perceived Usefulness. *Front Psychiatry*. 2015 Aug 27;6:120. doi: 10.3389/fpsyt.2015.00120. PMID: 26379561; PMCID: PMC4550753.
- [6] Firth J, Torous J, Nicholas J, Carney R, Prapat A, Rosenbaum S, Sarris J. The efficacy of smartphone-based mental health interventions for depressive symptoms: a meta-analysis of randomized controlled trials. *World Psychiatry*. 2017 Oct;16(3):287-298. doi: 10.1002/wps.20472. PMID: 28941113; PMCID: PMC5608852.
- [7] Weisel KK, Fuhrmann LM, Berking M, Baumeister H, Cuijpers P, Ebert DD. Standalone smartphone apps for mental health—a systematic review and meta-analysis. *NPJ Digit Med*. 2019 Dec 2;2:118. doi: 10.1038/s41746-019-0188-8. PMID: 31815193; PMCID: PMC6889400.
- [8] Grading quality of evidence and strength of recommendations *BMJ* 2004; 328 :1490 doi:10.1136/bmj.328.7454.1490
- [9] Costello, KL, Floegel, D. “Predictive ads are not doctors”: Mental health tracking and technology companies. *Proc Assoc Inf Sci Technol*. 2020; 57:e250. <https://doi.org/10.1002/pr2.250>
- [10] Vázquez FL, Torres Á, Díaz O, Páramo M, Otero P, Blanco V. Cognitive behavioral intervention via a smartphone app for non-professional caregivers with depressive symptoms: study protocol for a randomized controlled trial. *Trials* 2018;19(1).
- [11] Lui JHL, Marcus DK, Barry CT. Evidence-based apps? A review of mental health mobile applications in a psychotherapy context. *Profess Psychol Res Pract* 2017;48(3):199–210.

- [12] A. Jiao, "An Intelligent Chatbot System Based on Entity Extraction Using RASA NLU and Neural Network," J. Phys. Conf. Ser., vol. 1487, no. 1, 2020, doi: 10.1088/1742-6596/1487/1/012014 pp. 2283-2288, doi: 10.1109/CompComm.2018.8780909.
- [13] Carver CS. You want to measure coping but your protocol's too long: consider the brief COPE. *Int J Behav Med.* 1997;4(1):92-100. doi: 10.1207/s15327558ijbm0401_6. PMID: 16250744.
- [14] Vázquez FL, Torres Á, Díaz O, Páramo M, Otero P, Blanco V. Cognitive behavioral intervention via a smartphone app for non-professional caregivers with depressive symptoms: study protocol for a randomized controlled trial. *Trials* 2018;19(1).
- [15] "Insights from user reviews to improve mental health apps" Felwah Alqahtani, Rita OrjiFirst Published January 10, 2020 Research Article <https://doi.org/10.1177/1460458219896492>
- [16] Islam, Md. Aminul & Choudhury, Naziat. (2020). Original Research Article: Mobile Apps for Mental Health: a content analysis. *Indian Journal of Mental Health.* 7. 222. 10.30877/IJMH.7.3.2020.222-229.
- [17] B. Nandi, M. Ghanti and S. Paul, "Text based sentiment analysis," 2017 International Conference on Inventive Computing and Informatics (ICICI), 2017, pp. 9-13, doi: 10.1109/ICICI.2017.8365326.
- [18] B. Saju, S. Jose and A. Antony, "Comprehensive Study on Sentiment Analysis: Types, Approaches, Recent Applications, Tools and APIs," 2020 Advanced Computing and Communication Technologies for High Performance Applications (ACCTHPA), 2020, pp. 186-193, doi: 10.1109/ACCTHPA49271.2020.9213209.
- [19] R. Hu, L. Rui, P. Zeng, L. Chen and X. Fan, "Text Sentiment Analysis: A Review," 2018 IEEE 4th International Conference on Computer and Communications (ICCC), 2018, pp. 2283-2288, doi: 10.1109/CompComm.2018.8780909.

Cite this article as :

Tanvi Gadgil, Shailaja Jadhav, Anjali Kumari, Mrunali Dasari , Chanchal Bhangdia, "Mental Health Mobile Application with Diagnosis, Sentiment Analysis and Chatbot", *International Journal of Scientific Research in Computer Science, Engineering and Information Technology (IJSRCSEIT)*, ISSN : 2456-3307, Volume 8 Issue 3, pp. 94-100, May-June 2022. Available at doi : <https://doi.org/10.32628/CSEIT228327>
Journal URL : <https://ijsrcseit.com/CSEIT228327>