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Enhancing Mental Health with Philoi: A Comprehensive Analysis of Mood Music and Chatbot Module

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Abstract

The aim of our project was to develop an app that would enable recording and monitoring of behavior related to specific aspects of wellness, as well as support those aspects of wellness that are also entertainment-related. Our main goal was to envision and develop an app with the wellbeing of users in mind. People's mood scan either be improved upon or changed by music. Music and mental health are tightly intertwined. "We frequently use music to complement or change our mood. While there are advantages to mood-appropriate music, it may cause us to remain in a depressed, angry, or nervous state". This system shows survey regarding the same after doing a lot of research and interviews we found out that 68% of the people listen to music according to their mood or to change their mood. This inspired us to build an application that not only plays music but also recommends the user songs according to the music in order to avoid the daily nuisance of wasting time on selecting the right music. Why quit at this point? Because mental stability is a crucial component of a healthy existence in today's hectic world, we thought of a way to make our app more practical by including an AI chatbot that not only converses with you but also provides you with suitable advice on your concerns. This was our icing on the cake.

Keywords: Mood Music, Chatbot, Artificial Intelligence, Android Application, Face Detection

Introduction

The nexus of mental health and digital innovation has emerged as a crucial route for offering accessible and efficient support to those dealing with emotional and psychological issues in a time of fast technology growth. 'Philoi' distinguishes out among the plethora of mental health applications as a light of hope, fusing cutting-edge technology with sympathetic design to meet the various requirements of its users. The two main components of the mental health counseling app Philoi that are extensively examined in this study report are Chatbot and Mood Music. One cannot overestimate the importance of mental health as it is a crucial component of total wellbeing. The urgent need for accessible and efficient interventions is highlighted by the prevalence of mental health illnesses around the world, which is compounded by a number of socio-cultural and environmental factors. With its cutting-edge methodology, Philoi aims to close the gap between conventional therapeutic techniques and modern technology, providing people seeking direction, comfort, and empowerment in their mental health journeys with a vibrant platform. The deep influence of music on emotional well-being is encapsulated in the Mood Music module, a crucial part of Philoi. Utilising the healing power of sound, Philoi uses carefully chosen collection of songs that are designed to suit a range of moods and emotional states.

Based on empirical study on the psychological impacts of music, this module offers users a customized auditory experience that aims to research on the psychological effects of music, providing users with a personalized auditory experience designed to alleviate stress, anxiety, and depression. The Chatbot function complements the Mood Music module and enhances the user experience by offering a private and easily accessible channel for communication. The Chatbot uses natural language processing algorithms to recognise and address variety of emotions and worries. It is intended to engage users in compassionate dialogues. Thechatbot provides direction, coping mechanisms, andresources through an easy interface, establishing a sense of connection and support for people navigating the complexity of mental health. The goal of this study article is to thoroughly examine Philoiin order to clarify the effectiveness of its Mood Music and Chatbot modules in enhancing mental health outcomes. We want to present a nuanced perspective of the app's potential as a revolutionarytool in the field of mental health intervention biosynthesizing empirical studies, user feedback, and expert evaluations. The theoretical foundations of the mood music module will be covered in more detail in later sections when we look at the psychological processes by which music has a therapeutic effect. Additionally, we will carefully examine the Chatbotfeature's operation and efficacy, gauging its ability to offer sympathetic and fact-based support. In conclusion, Philoi is a prime example of how innovation and compassion can coexist, and the incorporation of technology into mental health care signifies a fundamental paradigm change. We want to present a nuanced perspective of the app'spotential as a revolutionary tool in the field of mental health intervention by synthesising empirical studies, user feedback, and expert evaluations. The theoretical foundations of the mood music module will be covered in more detail in later sections when we look at the psychological processes by which music has a therapeutic effect. Additionally, we will carefully examine the Chatbot feature's operation and efficacy, gauging its ability to offer sympathetic and fact-based support. In conclusion, Philoi is a prime example of how innovation and compassion can coexist, and the incorporation of technology into mental health care signifies a fundamental paradigm change.

Literature Survey

AI chat bots are increasingly being used to give consumers with mental health help. The use of mood music by chat bots to aid users in managing stress and enhancing their mental health is one area where they are demonstrating promise [1].

A increasing corpus of studies suggests that music may benefit mental health. Music has been shown to alleviate stress, anxiety, and depression, as well as improve mood and emotional well-being [2].

While research on the effectiveness of Archabbots for mood music is limited, preliminary findings suggest that they can be effective in improving mood and reducing stress. According tone study, users who listened to mood music suggested by an AI Chatbot reported a significant reduction in stress and anxiety.[3]

A promising and creative strategy for mental health care is the employment of Chatbot therapists. They provide convenient, accessible, and cost-effective support for those suffering from mental illness. However, further research is needed to explore their effectiveness in comparison to traditional therapy methods and to improve their design and implementation.[4]

The study examined the prevalence of mental health problems, use of mental health services, and the global burden of illness to assess the Region of the Americas' lack of mental health care. Mental and substance use disorders accounted for 10.5% of the global illness burden in the Americas, with a 65.7%treatment gap for moderate to severe disorders. More than half of children and adolescents with serious mental illnesses were not receiving treatment, and a sizable proportion of indigenous peoples in the Americas were not either. The study emphasizes the need for improved access to mental health services in the area. [5]

To manage employee mental health, a VR-based mental healthcare training program has been developed that reduces stress. A new version of the course employing chat bots and cell phones is being considered to make the course more convenient and to keep users motivated. In an experiment, chat bots were employed in the self-guided mental healthcare course to increase user motivation and reduce stress. In addition to the study's limited sample size, there was no assessment of long-term use. Additional research is needed to address these restrictions. [6]

In underprivileged regions where people might not have access to conventional mental health therapy, mind-body practices have been shown to be helpful in treating mental health problems. Racial/ethnic minorities also use supplementary health practices, such as prayer and herbal medicines, to cure their illnesses. Evidence shows that mind-body therapies can enhance mental and physical health symptoms, self-care, functioning, and general quality of life in disadvantaged groups. However, larger studies are needed to investigate the efficacy of mind-body interventions in this population. [7]

According to research, analysing social media material might help increase the success rate of mental health diagnosis, with an algorithm intended to identify depression from Integra postings outperforming clinicians. Chatbots may eventually utilize user data to notify mental health professionals to more effective treatments. Furthermore, by offering users coping mechanisms and even warning specialists of suicidal inclinations, Chatbot might help to alleviate the difficulty in receiving mental health care in remote places where there is a scarcity of mental health practitioners. To better detect people’s emotions, future Chatbot may employ advanced sentiment analysis algorithms. [8]

The study proposes a typology for Chatbot based on the duration of the user's interaction with the Chatbot and the locus of control for user involvement. The typology is used to assess high-level interface design for four sample Chatbot usage. The typology was demonstrated to be thorough and to contain just certain types, and the categorization dimensions were determined to be generic and pertinent. This work is considered a step toward improving the utility and user experience of Chatbot. [9]

The study highlights the increasing use of motivational interviewing (MI) for mental health concerns, in addition to addiction and substance abuse. It also emphasizes the importance of incorporating both technical and relational components of MI in designing conversational sequences. The presented case study suggests that such sequences can facilitate stress management conversations and encourage self-reflection. However, more diverse sequences and contextualized feedback are needed to improve conversational experiences and confirm empirical effects. [10]

The article discusses the use of machine learning algorithms for detecting human emotions from facial expressions captured in videos, EEG signals, or images. The implementation is divided into three parts, including face detection, feature extraction, and classification using machine learning algorithms. The study explores various machine learning algorithms and feature extraction techniques to achieve accurate emotion identification. The results show promising accuracy rates for the proposed method, outperforming previous studies that used ORB feature descriptors.[11]

The research offers a Chatbot typology based on the length of the user's relationship with the Chatbot and the placement of the user's control. Four sample Chatbot purposes are examined using the typology to examine high-level interaction design. Typologies were revealed to be comprehensive and to include exclusive types, while categorization dimensions were universal and pertinent. As a result of the work presented, Chatbot are expected to become more useful and enjoyable to use. [12]

The article proposes an emotion-aware personalised music recommendation system (EPMRS) that can identify the association between user data and music using a deep convolution neural network (DCNN) and weighted feature extraction (WFE) technique. The system uses implicit user ratings generated by the term-frequency and inverse document frequency (TF-IDF) approach to provide music suggestions to the user in accordance with how they are feeling at the moment. Based on electroencephalography input, the EPMRSperforms better than the PMRSE and the content similarity music recommendation system (CSMRS).The automatic extraction of the user's current emotion from social media data will be combined with the user's data from other sources, such as YouTube, Face book, and Twitter, in future work.[13]Recent years have seen a rise in interest in the study of emotion identification from facial expressions, with many studies concentrating on increasing the precision of existing models. Several studies have looked into deep learning techniques to increase accuracy, including convolution neural networks (CNNs). However, one challenge that has-been identified is the age bias problem in the training data, which can affect the accuracy of emotion recognition, particularly for children. Several studies have investigated the impact of age bias on emotion recognition, and proposed various solutions to address this issue. Overall, there is a need for further research to improve emotion recognition accuracy and address the age bias problem in training data.[14]

According to the literature review, there has been significant recent study on face recognition, with applications in security, surveillance, identity verification, and more. The suggested method uses computer vision and deep learning algorithms to simplify the process of facial identification. The three objectives of the study are face detection, identification, and emotion classification. The suggested system's performance metrics are verified with an accuracy of 88%, and it is intended to detect, recognise, and categories human faces in real time. To classify and identify faces, the VGG 16 and KDEF dataset are utilised. According to the study, this application may be extensively employed in the fields of education, business, medicine, and electronics. [15]

The experimental results presented in this study showcase several key findings. Firstly, the proposed approach achieves a high Correct Recognition Rate (CRR), indicating its effectiveness in recognizing facial expressions. Secondly, the consideration of facial element and muscle movements leads to significant performance improvements, highlighting the

importance of incorporating dynamic features. Additionally, the approach demonstrates promising results even in the presence of face registration errors, which enhances its practical utility. Lastly, a comparison with state-of-the-art methods validates its superiority by achieving the highest CRR on the JAFFE database and ranking among the top performers on the Cohn-Kanade (CK) database.[16]

Firstly, it presents the "Integral Image "representation, enabling rapid feature computation. Secondly, it employs a simple yet effective classifier using the Gadabouts algorithm for feature selection. Lastly, it introduces a cascading technique to swiftly discard non-promising regions, enhancing overall computational efficiency. The approach achieves face detection results comparable to previous state-of-the-art systems, running at an impressive 15 frames per second on a standard desktop. Importantly, this work has broader implications for computer vision and image processing, offering potential applications in diverse domains beyond face detection. The utilization of the Integral Image for feature extraction holds promise for tasks requiring scale invariance, and Haar-like features may find applications in various other domains. The paper's second contribution, an efficient classifier, is expected to benefit object detection tasks like automobile or pedestrian detection. Furthermore, its feature selection approach with Ada Boost has broader implications for improving efficiency in various machine learning applications. The third contribution, the cascade of classifiers, stands out for its simplicity and homogeneity in structure, making it both comprehensible and adaptable. Unlike other approaches proposing more complex and heterogeneous mechanisms, this system offers straightforward trade-offs between processing time and detection accuracy.[17]

Recent advancements in facial expression recognition (FER) have primarily revolved around deep neural network (DNN)-based approaches, showcasing their potential in overcoming limitations of traditional machine learning-based FER methods. However, the high memory requirements and processing costs of DNNs restrict their practical applications, particularly in low-specification devices like those found in vehicles. This paper introduces a fast FER algorithm tailored for monitoring a driver's emotions in resource-constrained environments. It employs a hierarchical weighted random forest (WRF) classifier trained based on sample data similarity, enhancing accuracy. Geometric features extracted from facial landmarks are input into the hierarchical WRFclassifier, yielding competitive performance with deep learning-based FER methods while drastically reducing processing costs. The study not only presents an innovative FER method based on geometric features and hierarchical WRF but also addresses the need for real-world driving datasets with varying illumination conditions. The newly created KMU-FED dataset serves this purpose and validates the proposed method's effectiveness. Additionally, the research highlights the adaptability of this FER method in embedded systems for intelligent vehicles and envisions its broader applications in fields like entertainment, education, virtual reality, and gaming.[18]

Facial expression recognition in videos is a complex challenge in computer vision and human-computer interaction. Texture features have been a popular choice for capturing skin deformation-related intensity changes. However, they often struggle with issues related to alb do and lighting variations. To address these challenges, this paper introduces novel texture feature known as "image ratio features." Image ratio features outperform traditional texture features such as

high gradient component features in terms of robustness to albedo and lighting variations. Furthermore, the study combines these image ratio features with facial animation parameters (FAPs), which describe the geometric movements of facial feature points, to improve facial expression recognition accuracy. The evaluation, which was carried out on multiple databases, including the Cohn-Kanade dataset, reveals that image ratio features outperform albedoand lighting variations. Furthermore, the combination of image ratio features and FAPs is powerful approach, outperforming either feature set alone. The study also looks into asymmetric facial expressions, demonstrating the effectiveness of the combined recognition system on their own facial expression database. [19]Facial expression recognition plays a crucial role in nonverbal communication and has applications in diverse fields like gaming, criminal interrogations, psychiatry, and animations. Existing techniques for facial expression recognition primarily rely on either appearance features, which capture texture changes in the face, or geometric features, which analyze facial shape and components. In this context, the paper proposes an efficient and faster approach for facial expression recognition using deep convolution neural networks (DCNN) with the Caffe framework on CUDA-enabled GPU systems. The method achieves state-of-the-art results on publicly available datasets, benefiting from the computational power of GPUs for feature extraction. The proposed model offers a versatile solution applicable to various facial expression recognition datasets without the need for retraining or extensivepre-processing. Future work involves exploring other pre-trained DCNN models like GoogLeNet for further advancements in this field.[20]

System Overview

The suggested solution combines the Chat Bot and Mood Music modules to create an AI-enabled assistance system. Each module has a specific function, and together they provide a complete user experience.

1. Mood Music Module: Based on the user's emotional state, the Mood Music module recommends music based on advanced facial recognition and mood categorization algorithms.

The following are the main elements and features:

Component for facial recognition: A live video feed or a photograph of the user's face taken with a camera serves as the input. Processing: uses cutting-edge facial recognition algorithms (like OpenCV and Dlib) to find and examine facial characteristics, expressions, and landmarks. Identifies and extracts important facetraits, such as brow position, mouth curve, and eye movement.

2. Component of mood categorization:

The user's emotional state is represented by the retrieved facial features as input. Processing: the classification of the user's mood into predefined emotional states (such as happy, sad, or amorous) using machine learning models (e.g.,

SVM, Neural Networks) trained on labelled facial expression data.

3. Component for music recommendations:

The mood label from the Mood Categorization Component as an input.

Processing: accesses a collection of well-crafted music playlists that have been mood-tagged. Chooses a playlist that is suited for the user's recognised emotional state. A suggested playlist for the user's listening is the output.

The Chat Bot module:

Acts as a conversational agent that is clever and capable of comprehending and resolving user issues in a variety of contexts. For efficient communication, it makes use of cutting-edge

Natural Language Processing (NLP) algorithms. The following are the main elements and features: A component of natural language processing (NLP). Text or spoken user input is referred to as input. Processing: uses NLP models to analyse and comprehend user questions and statements, such as Transformer-based models like BERT or GPT.

From the input, extracts pertinent data, intents, and entities. The parsed user query and related intentsare output.

b. Component of issue categorization:

Input: The NLP Component's parsed user query and related intents.

Processing: Categorises user issues into distinct domains using established rules or machine learning models (such as educational, economical, and interpersonal concerns).

Contextual Guidance Component:

The issue domain from the issue categorization component as input.

Processing: Accesses a knowledge base or database with information on recommendations and solutions for the selected problem domain. Depending on the user's unique problem, offers recommendations and solutions that are contextually relevant.

Output: Customised solutions and suggestions for the user.

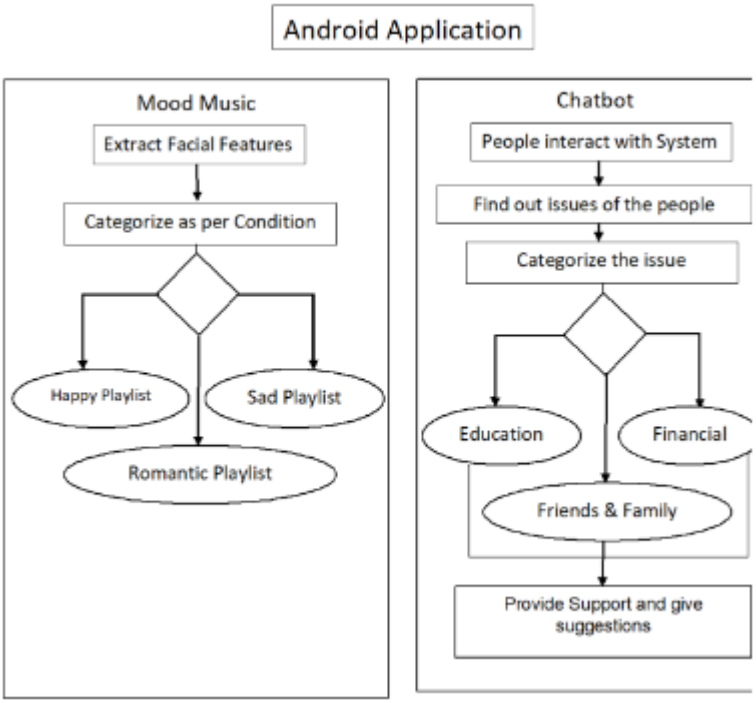

Fig. 1: System Overview

Methodology

The main goal of the application known as the mood-based music recommendation system is real- time mood recognition. It's a product prototype with two main modules: music suggestion and facial expression recognition/mood detection. A. Mood Recognition Software This Module is divided into two sections: • Face Detection: The ability to locate a face in any input frame or image. The output is the bounding box coordinates of the discovered faces. For this assignment, the Open CV Python Library was initially considered. However, because integrating it with an Android app would be difficult, the Java Face Detector class was considered.

This library counts the number of faces in a Bitmap visual object by identifying the people's faces within it. • Detecting mood: classifying facial expressions as joyful, furious, depressed, neutral, surprised, afraid, or disgusted. The traditional Python Keras package was used for this assignment, but the survey revealed that this method works slowly when connected to Android apps and takes a long time to train and validate. As a result, Mobile Net was used, which is a CNN architecture model for mobile vision and image classification. While other models exist, Mobile Net is distinguished by its extremely low processing power requirements for operation and transfer learning applications. As a result, it can be used with mobile devices, embedded systems, and PCs that have low computing efficiency or no GPU without sacrificing accuracy.

It constructs lightweight deep neural networks from depth-wise separable convolutions. The training dataset was created by combining Kaggle's MMA Facial Expression Recognition dataset [7] and FER 2013 dataset [6]. The grayscale photos with 48x48 pixels in the FER 2013 collection. The MMA Facial Expression Recognition dataset contained images with a variety of characteristics. In order to create an even larger dataset with 40,045 training photos and 11,924 testing images, all of these images were converted in accordance with the images in the FER 2013 dataset and combined. Our model was trained and tested for seven classes using Mobile Net and Keras: happy, furious, neutral, sad, surprised, afraid, and disgusted.

After 25 epochs of training, we were able to get an accuracy of about 75%. B. The Module for Recommending Music You could find the Hindi and English versions of the mood-categorized music dataset on Kaggle. In order to store, retrieve, and query this song data upon user request, research was done to find a reliable cloud storage platform.

Although alternatives such as AWS, Google Cloud, and so on were discovered, they were turned down because of their high cost and meager free storage offerings. Next, look into free and open-source streaming services such as Ampache, Restream.io, etc. .. To hold the labels.txt and. tflite files, an assets folder was made in Android Studio.

The model's class labels are contained in the labels.txt file. For loading the model, executing the interpreter, and getting the results, all the necessary methods were developed. MP3 tracks were uploaded to the storage part of the Firebase project. These songs are arranged in the real-time database section based on language and mood. The Firebase database was then connected to Android Studio. The tflite model techniques were integrated with the Firebase music, and a suitable user interface was developed for the Android application. Ultimately, the programme was tested to ensure that any errors were fixed.

Hardware Requirements

The physical computer resources, also known as hardware, are the most common set of requirements defined by any operating system or software application. The following hardware is required for this project: • A minimum of 4 Gigabytes (GB) of RAM (for processing) • Webcam (for laptop/desktop testing) • Camera with a minimum resolution of 16 Megapixels (MP) (for testing on Android devices) • 30 MB (approximate) memory space.

Software Requirements

Software Requirements are concerned with defining the software resource requirements and prerequisites that must be installed on a computer in order for an application to function properly. These prerequisites or requirements are typically not included in the software installation package and must be installed separately before the software can be installed. The following software requirements are required for this project:

• Python 3.6 mood music module, the moods are categorized into various mood like happy, sad, and romantic. The mood will be recognized according to the facial expressions and then it will match with the appropriate mood and the music will be suggested accordingly. In the second module chatbot, is based on the interaction with the system.

The user will communicate with the system. The user will discuss their issues with the chatbot and then the issues will be categorized in various sectors like educational, financial or friends and family. The issues will be analysed and appropriate advice will be suggested to the user sad, and romantic. The mood will be recognized according to the facial expressions and then it will match with the appropriate mood and the music will be suggested accordingly. In the second module chatbot, is based on the interaction with the system. The user will communicate with the system. The user will discuss their issues with the chatbot and then the issues will be categorized in various sectors like educational, financial or friends and family. The issues will be analysed and appropriate advice will be suggested to the user.

Results and Discussion

The Philoi app features a simple, clear, and user- focused interface created to encourage an easy and sympathetic user experience. The interface is distinguished by its serene colour scheme, with subtle, gentle blues and greens that evoke a sense of peace and tranquility.

The home page

When users start the app for the first time, they are welcomed by a welcoming home screen. Customers are presented with two noteworthy options in this case: the two primary Philoi modules, "Mood Music" and "Chatbot."

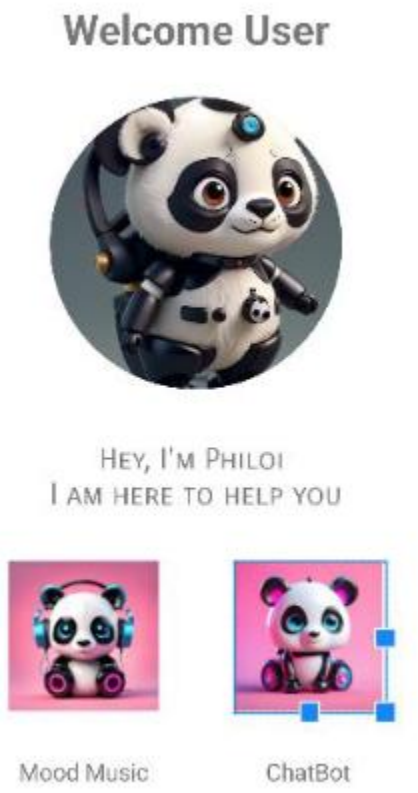

Fig. 2; Home screen

The Philoi app boasts a clean, intuitive, and user- centric interface designed to promote a seamless and empathetic user experience. The interface is characterized by its calming color palette, with soft, muted tones of blues and greens, evoking a sense of tranquility and serenity.

Home Screen

Upon launching the app, users are greeted by a welcoming home screen. Here, they are presented with two prominent options: 'Mood Music' and 'Chatbot', the core modules of Philoi.

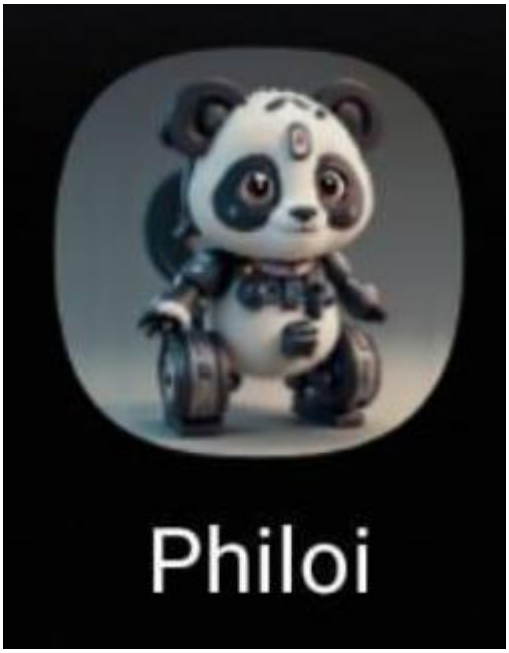

Fig. 3: UI of the application

Conclusion

With its seamless fusion of technology and compassion, the Philoi app represents a significant turning point in the evolution of mental health assistance. It offers a comprehensive and accessible platform for people navigating the complexity of their emotional well-being. The revolutionary potential of Philoi to improve mental health outcomes has been revealed through a careful analysis of its Mood Music and Chatbot modules.

The Mood Music module, which was inspired by actual studies on the psychological impacts of music, is evidence of the healing potential of sound. Users of Philoi are given the ability to tap into the therapeutic potential of music, providing comfort and relief during trying times by providing expertly produced playlists catered to a range of emotional states. Additionally, the Chatbot module acts as a guiding light by offering a private and understanding environment for communication. The chatbot, which is based on cutting-edge natural language processing, engages users in deep dialogue while providing advice, coping mechanisms, and resources with a degree of understanding that extends beyond the boundaries of the digital world.

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