A

FINAL PROJECT REPORT

ON

Youth YANA (You Are Not Alone) Mental Health Consulting Web App

SUBMITTED TO THE SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE AWARD OF THE DEGREE OF

BACHELOR OF ENGINEERING
INFORMATION TECHNOLOGY

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2023-2024

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C E R T I F I C A T E

This is to certify that the final project report entitled
Youth YANA (You Are Not Alone) Mental Health Consulting Web App
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is a bonafide work carried out by them under the supervision of **Mrs.Kirti Digholkar** and it is approved for the partial fulfillment of the requirement of Savitribai Phule Pune University for the award of the Degree of Bachelor of Engineering (Information Technology).

This project report has not been earlier submitted to any other Institute or University for the award of any degree or diploma.

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Acknowledgement

We extend our gratitude to Pune Institute of Computer Technology for giving us an opportunity to enhance our knowledge through this project report. We are extremely grateful to Dr. P. T. Kulkarni, Director and Dr. S. T. Gandhe, Principal, PICT and Dr. A. S. Ghotkar, Head of the Department (Information Technology), for providing all the required resources for the successful completion of our project report.We are deeply thankful to Mrs. Sumitra Jakhete, for their invaluable guidance throughout this journey.Our heartfelt gratitude to our project guide Mrs.Kirti Digholkar and project reviewers Mrs. Prajakta Shinde and Mr. Sachin Pande, for their valuable suggestions and guidance during the process. Their expertise, patience, and constructive feedback were instrumental in shaping this project and enhancing our knowledge. We express our thanks to the authors of the references and other works of literature referred to in this report.

In conclusion, We are extremely grateful to everyone who played a part in this project,directly or indirectly.

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Abstract

To tackle mental health issues, a new "Youth YANA (You Are Not Alone) - Consulting Web App" was developed with a focus on innovation. The software evaluates students' wellbeing and mood through substitute measures instead of traditional surveys. It offers a unique user experience and evaluates an individual's state using modern technologies and machine learning methods. By utilizing responses from the questionnaire, the application pairs users with appropriate levels of consulting. It gives guidance on self-improvement and meditation, helping users achieve improved mental health. The goal of the user interface and design is to create a warm and inviting atmosphere.

"YANA" is an online platform created to offer easily accessible and convenient therapy services for mental health. It provides round-the-clock access to licensed professionals, personalized treatment plans, secure and confidential communication, interactive resources, and community support. The platform strives to provide affordable and inclusive mental health support, eliminating geographical and time limitations to ensure accessibility for all. This marks a big milestone in creating a mental health environment that is more inclusive and without judgment, encouraging people to manage their own well-being. By utilizing technology, empathy, and knowledge, the app aims to empower young adults to tackle their mental health challenges with confidence.

Keywords: Consulting Web App, College Students, User experience, Therapy services, Confidentiality, Mental health challenges.

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Abbreviations

YANA	:	You Are Not Alone
Web App	:	Web Application
ML	:	Machine Learning
UI	:	User Interface
UX	:	User Experience
24/7	:	24 hours a day, 7 days a week
GDPR	:	General Data Protection Regulation
HIPAA	:	Health Insurance Portability and Accountability Act

1. Introduction

1.1 Introduction

The "Youth YANA (You Are Not Alone) - Consulting Web App" stands out as a source of empowerment and support in a time when young people' mental health is frequently negatively impacted by the rigors and difficulties of college life. Through the integration of technology, knowledge, and compassion, this ground-breaking effort aims to address the widespread problem of mental health among college students. An inventive method of mental health examination is used to kick off the "Youth YANA" trip. With the use of proxy surveys, the online application assesses and measures college students' depression levels. Beyond evaluation, the app is a doorway to a world of assistance, communication, and direction.

By using machine learning algorithms, the project takes use of the strength of contemporary technology and goes one step further. These algorithms anticipate user behavior in addition to analyzing it, which makes it possible to provide tailored advice based on unique reactions. As a result, the online application turns into a reliable travel companion for mental health. "Youth YANA" is a comprehensive method to recovery that goes beyond evaluation. The software not only helps users understand their mental health but also offers helpful meditation suggestions. Meditation is a wonderful tool for self-improvement and healing. In order to create a calm, friendly, and relaxing environment, the user interface and design have been carefully considered. This helps users feel at ease and comfortable while they engage with the platform.

The project makes use of a technology stack that includes Bun.js, Elysia.js, React.js (Next.js), and MongoDB to make sure it is both technologically sound and user-friendly. "Youth YANA - Consulting Web App" seeks to reassure people and especially college students that they are not alone in their pursuit of mental well-being in a time when mental health is of utmost importance. Our initiative aims to enhance mental well-being by promoting mental health and assisting in navigating the challenges of college life through a combination of technology, skill, and steadfast devotion.

Employing machine learning algorithms, the project harnesses the power of contemporary technology to a greater extent. These algorithms not only analyze but also anticipate user behavior, enabling the provision of personalized advice based on individual responses. Consequently, the online application transforms into a dependable companion

in the journey towards mental well-being. "Youth YANA" represents a holistic approach to recovery that extends beyond assessment, offering valuable meditation suggestions. Recognizing meditation as a powerful tool for self-improvement and healing, the software incorporates these suggestions to aid users in their mental health journey. Furthermore, meticulous attention has been given to the user interface and design to create a serene, inviting atmosphere, fostering a sense of comfort and relaxation for users engaging with the platform.

At the core of its innovative approach lies a sophisticated method of mental health assessment, utilizing proxy surveys within its online platform to gauge the levels of depression among college attendees. However, its impact transcends mere evaluation, as the app acts as a portal to a realm of support, communication, and guidance. Leveraging machine learning algorithms, the project not only analyzes user behavior but also anticipates it, thereby offering tailored advice and personalized interventions based on individual responses. In doing so, the app transforms into a trusted ally on the journey towards mental wellness.

1.2 Motivation

Now, people face many different difficulties and needs as they navigate the difficult transition from youth to adulthood or, in other words, the demanding academic and personal development requirements. core. Unfortunately, their mental health is at risk as they endure many of these difficulties. This project was started because we really care about the happiness of young people. While college can be life-changing, it can also cause stress, anxiety, and depression. Many students silently struggle with mental health issues because they don't know where to turn or because they fear being stigmatized when seeking treatment.

This common understanding of the challenges people face serves as the driving force behind "YANA Youth". We believe that every young person should have access to the tools and resources needed to face and overcome mental health obstacles. Our motivation comes from the belief that no one should face these challenges alone. We see "Youth YANA" as an online hand reaching out to people, letting them know they are not alone in their mental health journey. This initiative aims to remove barriers to seeking help, promote a sense of community and provide support and resources to meet the challenges of university life.

The transition from youth to adulthood poses numerous challenges and demands, both academically and personally, which can significantly impact individuals' mental health. This project, initiated out of genuine concern for the well-being of young people, recog-

nizes the inherent risks to mental health amidst the transformative journey of college life. While higher education holds the potential for profound growth and development, it also presents stressors such as academic pressure, social expectations, and the uncertainties of the future. Unfortunately, many individuals grapple with mental health issues in silence, either due to a lack of awareness about available support or the fear of being stigmatized for seeking help.

Driven by a shared understanding of these challenges, "Youth YANA" emerges as a beacon of support and empowerment. Central to its mission is the belief that every young person deserves access to the necessary tools and resources to confront and overcome mental health obstacles. Motivated by the conviction that no one should navigate these challenges alone, the initiative extends a virtual hand to individuals, assuring them that they are not solitary travelers on their mental health journey. By fostering a culture of openness, inclusivity, and community, "Youth YANA" seeks to dismantle barriers to seeking help, cultivate a sense of solidarity, and provide comprehensive support and resources to navigate the complexities of university life effectively.

1.3 Objectives

- **Enhanced Mental Health and Well-Being:**
  - The "Youth YANA - Consulting Web App" focuses on enhancing mental health and well-being by providing accessible and convenient mental health counseling.
  - It utilizes contemporary technologies and machine learning techniques to assess users' mental health conditions accurately.
  - Through personalized treatment plans and instructions for self-improvement and meditation, it supports users in improving their mental health.
- **Reduced Fear and Improved Accessibility:**
  - The app aims to reduce the fear associated with seeking mental health support by providing a cozy and welcoming environment through its user interface and design.
  - It offers 24/7 access to licensed professionals, ensuring users can seek help whenever they need it, thereby improving accessibility to mental health services.
- **Enhanced User Empowerment and Self-Management:**
  - Users are empowered to take control of their mental health as the app matches them with suitable consulting levels based on questionnaire results.

  - Through personalized treatment plans and interactive resources, users are equipped with the tools to manage their mental health effectively on their own.

- **Multi-language Support:**
  - The app provides support in multiple languages, ensuring that individuals from diverse linguistic backgrounds can access mental health counseling and resources.

- **Real-Time Crisis Support:**
  - The platform offers real-time crisis support, ensuring immediate assistance for individuals experiencing acute mental health crises.
  - This feature enhances the effectiveness of the app in addressing urgent mental health needs and providing timely intervention.

1.4 Scope

The project aims to address the important problem of mental health among people by developing and implementing a complete and user-centric online application. The following describes the scope of the "Youth YANA - Consulting Web App" project:

- **Mental State Evaluation:** The project aims to develop a robust method for evaluating individuals' mental health, specifically targeting students' levels of depression. Through the web application, users will have access to alternative surveys meticulously designed to assess various facets of mental well-being. These surveys will employ advanced data collection methods, including detailed questionnaires and psychological assessments, to offer users a comprehensive understanding of their mental health status. By offering a diverse array of assessment tools, the application seeks to accommodate the unique needs and preferences of its users, ensuring accuracy and reliability in mental health evaluation.

- **Machine Learning Integration:** In pursuit of enhanced precision and efficiency in mental health assessments, the project integrates machine learning techniques into its framework. These sophisticated algorithms will analyze users' interactions with the application, including survey responses and browsing behavior, to gain deep insights into their current mental states. Moreover, the algorithms will be trained to anticipate users' future behaviors based on historical data, enabling the provision of tailored advice and recommendations. By leveraging the capabilities of machine learning, the application aims to deliver personalized interventions that address individual needs, thereby maximizing the efficacy of mental health support.

- **Guided Self-Improvement and Meditation:**A cornerstone of the project involves equipping users with tools and guidance for personal development and meditation. Through the application's interface, users will gain access to a rich array of resources, such as guided meditation sessions, self-help articles, and interactive exercises, all meticulously curated to foster mental well-being. These resources aim to tackle prevalent mental health challenges, including stress, anxiety, and depression, empowering users to take proactive steps towards improving their mental health. By instilling resilience and self-management skills, the application endeavors to facilitate lasting positive changes in users' lives.

- **User Engagement:** Recognizing the critical role of continuous user interaction, the project prioritizes active engagement and feedback gathering mechanisms. Through various channels, including surveys, user reviews, and direct communication, the application solicits input from users to identify areas for improvement and address user concerns effectively. Additionally, interactive features such as forums, chat support, and community events are integrated into the application to foster a sense of belonging and encourage participation. By actively involving users in the development and refinement process, the application strives to remain relevant, responsive, and adaptable to the evolving needs of its user community.

2. Literature Survey

Discussions about mental health are increasingly important, especially in the areas of technical education and employment. This topic is also attracting attention in the media and academia. Many environmental factors, such as academic pressure, interpersonal conflicts, financial stress, and career anxiety, can contribute to the development of mental health disorders. This problem is further complicated by the demanding nature of the engineering profession.

One significant issue is the lack of information and awareness about the experiences of individuals with diagnosed mental health disorders within the engineering community. It is crucial to identify and understand these difficulties to address them effectively. In conclusion, the first step towards enhancing engineering education to better support individuals with mental health disorders in their pursuit of professional goals is the recognition of these challenges.[11]

A study involving 450 students from Malaysian technical universities found that both engineering and non-engineering students face mental health challenges. They also use similar methods to deal with these challenges. This means that students, regardless of their field of study, often experience similar mental health issues and try to cope with them in similar ways.

This highlights the need for schools and institutions to take proactive steps in helping students who are struggling with mental health problems. It's essential to support students in both engineering and non-engineering programs. This research has given us a better understanding of how students in these fields deal with mental health, which can help us provide better support and care for all students.[7]

Mobile health (mHealth) applications are those that are designed to be utilized for mental health. These programs have a great chance to start a revolution in mental health. mHealth apps are taught using deep learning (DL) models using vast amounts of data.[5]

Many students in college and university with mental health concerns often don't seek help. To change this, there's a web-based program. It helps students assess their mental health and encourages them to get support.

The program asks students questions about things like eating habits, alcohol use, attention issues, anxiety, and depression. If it suggests a student might have a mental

health concern, it advises them to see a doctor for further help.

In a nutshell, this tool is meant to make it easier for students to connect with mental health services. It helps them become more aware of their mental health and guides them to the right support when needed.[6]

Researchers looked at 104 mental health apps from places like Google Play and the App Store. They read a massive 88,125 user reviews to see what people thought about these apps. They used computer programs to figure out if the comments were positive or negative.

They found that some of the bad stuff people mentioned in reviews included problems with how easy the apps were to use, issues with what the apps contained, and concerns about ethics, customer service, and billing. On the other hand, people liked the apps when they looked nice, worked well, had good content, and kept their information private.

The point of all this was to help design better mental health apps by understanding what users like and don't like. It's about making these apps more helpful and easy to use.[9]

Want to make sure kids have a good life and avoid problems. To do that, need to find and treat mental health issues early. One way to do this is by using computers to analyze medical information.

In a recent study, scientists tested eight different computer methods to find five important mental health issues in kids. They used data from sixty cases and picked twenty-five important clues for diagnosis. Then, they used special techniques to make things simpler and tested these computer methods.

The good news is that some of these computer methods, like Multilayer Perceptron and Multiclass Classifier, worked really well in finding issues. They performed almost as good with simplified information. So, this research shows that using computers can help us find and treat mental health issues in kids, which is important for their well-being.[13]

Looking at the current state of e-mental health research, and it's quite interesting. This research explores the possibilities and challenges in the field. They're using technology in mental health care, which is a big deal. One key point is the early prediction of how well treatments will work, and they're also working on keeping patients engaged in therapy.

What's even more fascinating is the use of advanced techniques like sentiment analysis, tracking what people do, and using data mining to better understand and help people. It's like using technology to make mental health support smarter.[2]

2.1 Existing Methodologies

The narrative analysis, a qualitative method within the broader definition of narrative inquiry [11] technique, which focuses on comprehending the experiences and narratives of people with a mental illness in the engineering sector, is narrative inquiry. Participants were interviewed in semi-structured interviews, and the data was processed after many readings of the transcripts.It will involve increasing the sample size and examining the experiences of people who have various forms of mental diseases.

A collection of self-developed questionnaires and the DASS-21 inventory [7] used to determine the degree of mental health and strategies for dealing with mental health problems among engineering and non-engineering students.The samples were chosen using a stratified random sampling approach.

Mobile device-based mental health analysis, encompassing multitasking, continuous learning, reinforcement learning, and zero-/few-shot learning, is the methodology of [5]. This highlights the importance of looking at mental health from different angles and gathering detailed information about specific aspects of it.

The Methodology of [6] is a web-based self-screening and referral system created to assist college students in evaluating their mental health and seeking treatment. It serves four primary purposes: sending mental health center referrals through the internet; storing and transmitting Personal Health Information (PHI) and enabling secure messaging with medical personnel. The system seeks to overcome the difficulties that prevent students from obtaining mental health care, including lack of issue detection, delayed appointments, lack of time, financial limitations, and privacy concerns. The benefit of the suggested method is that it gives students an easier way to test themselves for mental health issues and get in touch with treatment providers. By offering a secure messaging system and encrypting data, it also solves concerns about privacy and security.

The extreme learning machine (ELM) algorithm and other techniques are used in [15], The model simulation and testing process to construct and evaluate the proposed mental health education system architecture. Improved classifier performance is achieved by automatically removing hidden layer nodes that are detrimental to lowering network output errors using the ELM method. A data set experiment is also used to evaluate the proposed system, and the results demonstrate that it is superior to existing algorithms

in terms of balancing the degree of privacy protection and classification accuracy.

The Critical Appraisal Skills Program (CASP) is used in [1],Certainly, The systematic review includes support vector machines, decision trees, and neural networks among the machine learning techniques utilized in mental health detection.

In [12] Interviews were transcribed verbatim using Otter.ai, a secure online transcribing software, Semi-structured interviews with psychiatrists and general practitioners are used to gather data using a qualitative method. The interviews were done using the video conferencing software Microsoft Teams, and they were audio-recorded, anonymised, and securely archived.

The Clustering Analysis Algorithm are used in [10], To help college students avoid mental health problems, they're improving how they manage psychological data. They use a technology called data mining, which is like searching for important information. This technology is tested to see if it can stop mental health crises. To make this technology work even better at preventing issues, they've built a special part called the "psychological data mining kernel" using a computer program called MATLAB 2014a. This part is then added to the system that takes care of students' mental well-being. Basically, it's about using technology to make sure students stay mentally healthy and avoid problems.

The application of artificial intelligence (AI) are used in [3] , Mental health problems are becoming more common worldwide, and our healthcare systems are feeling the strain. To tackle this, people are exploring how technology can help. They're using artificial intelligence (AI) to assess and treat mental health issues, which they call "digital psychiatry." This is about how digital psychiatry is not just for therapy. It's being used in education, work, money matters, social media, and the broader digital wellness field. In simple terms, it's about using technology to support mental health in different parts of our lives.

The utilization of plasma to feel the surface of its propagation medium is key to the operation of surface plasmon resonance sensing. The surface plasmon is valuable for sensing applications since it is extremely sensitive to any little disturbance close to the penetration depth.[8]

The methodology in [13] is a research on the use of machine learning techniques to

predict mental health issues. It required selecting crucial characteristics for diagnosis, creating a model with machine learning methods, and assessing the model's precision. It has comparative study of (AODEsr, Multi Layer Perceptron (MLP), RBF Network, IB1, KStar, Multi-Class Classifier (MCC), FT, LADTree) all these algorithms.

The Bags of Words and ML models are used in [9] , The systematic and theoretical analysis of the procedures used in a field of research is referred to as methodology. It includes the guidelines, processes, and regulations followed when conducting research and gathering data. The study topic, the kind of data being gathered, and the research design all influence the approach chosen.

It uses Naive Bayes Algorithm as well as CNN (Convolutional Neural Network) with OpenCV [14] , It is a thorough analysis of how machine learning techniques are used to identify mental health issues. It addresses several machine learning methods, including support vector machines, decision trees, and neural networks.

The methodology of [2] is a method for educating college students about their mental health that is based on the Internet of Things and privacy security is presented in it. To guarantee the confidentiality and security of student mental health data, it makes use of encryption methods and IoT protocols. Additionally, the system uses machine learning and differential privacy techniques to enhance the data's accuracy and privacy.

The system is an affective computing intelligent signal processing system that uses deep learning to create user-centered mobile mental health applications. Data collection, feature extraction, model training, and model deployment are among the system's components [4].

2.2 Research Gap Analysis

- **Personalized Mental Health Assessment:** While the existing technologies mention the utilization of machine learning and various algorithms for mental health assessment, there is a gap in personalized assessment methodologies tailored specifically for college students. The abstract emphasizes the use of proxies for surveys to assess mental health, but there's potential for further research in developing personalized assessment tools that consider the unique challenges and stressors faced by college students.

- **Integration of IoT and Privacy Security:** The methodology mentioned in one of the existing technologies focuses on educating college students about mental health while ensuring privacy and security. However, there's a gap in understanding how such IoT-based approaches can be integrated into existing mental health support platforms like the "Youth YANA - Consulting Web App" to enhance accessibility and effectiveness while maintaining user privacy and security.

- **Community Engagement and Support:** While the abstract highlights the importance of community support in mental health, there's limited mention of specific features or mechanisms within the "Youth YANA" app to foster community engagement and support. Further research could explore innovative ways to leverage technology to create supportive communities within the app, facilitating peer-to-peer support, group activities, or forums for discussion and sharing experiences.

- **Evaluation of User Experience:** The abstract mentions providing a cozy and welcoming environment through the user interface and design of the app. However, there's a gap in understanding the effectiveness of these design elements in enhancing the overall user experience and engagement with the platform. Research could focus on evaluating user satisfaction, usability, and the impact of design features on user engagement and mental health outcomes.

- **Long-term Effectiveness and Sustainability:** While the abstract outlines the features and benefits of the "Youth YANA" app, there's a gap in understanding its long-term effectiveness and sustainability in addressing mental health challenges among college students.Identify strategies for ensuring its sustainability and scalability in the long run.

No.	Title	Authors	Year	Results
[11]	Engineering students and professionals living with a mental illness: an exploration of their experiences and challenges	Matilde and Xu, Xinrui Rose and Ramirez, Nichole and Sambamurthy, Nikitha	2019	Jack's experiences as a mentally ill engineer highlight challenges faced by those with mental health disorders in engineering industry, emphasizing need for stigma reduction and increased support for these individuals.
[7]	A comparison study of methods to solve the mental health problem between the engineering and non-engineering students	Lee, MF and Adam, WMH Wan	2016	It demonstrates that students' mental health is typical, with normal levels of stress, anxiety & sadness. While cognitive approaches predominate, spiritual approaches incorporate problem-solving, counseling & motivation. However, there are not many differences in terms of general mental health amongst professions.
[5]	Deep learning for mobile mental health: Challenges and recent advances	Han, Jing and Zhang, Zixing and Mascolo, Cecilia and André, Elisabeth and Tao, Jianhua and Zhao, Ziping and Schuller	2021	It examines the state of deep learning (DL) methods and signal processing today with an emphasis on mobile mental health analysis. It talks about difficulties like verification and replication as well as possible negative effects like inequality and gaming disorders.such as researchers, politicians, and medical professionals. The essay calls on researchers to improve in-depth analyses of mental health and provide useful mobile applications.
[6]	Addressing mental health epidemic among university students via web-based, self-screening, and referral system: a preliminary study	Kim, Eung-Hun and Coumar, Anil and Lober, William B and Kim, Yongmin	2011	It lowers the need to identify student issues, saves time, and provides health information without the need for appointments. By putting student data in a database, it keeps things secure and private. Users may interact with specialists regardless of their financial situation, and the system supports mail contact. Surveys only include those who are expected to attend.
[15]	Analysis of the architecture of the mental health education system for college students based on the IoT and privacy security	Xiao, Ruijian and Liu, Xingeng	2021	The rise in internet users and computer networks has negatively impacted college students' mental health, leading to Internet mental illness and low self-esteem. The IoT has revolutionized communication, requiring the integrity and confidentiality of sensor data.

[1]	Application of machine learning methods in mental health detection: a systematic review	Abd Rahman, Rohizah and Omar, Khairuddin and Noah, Shahrul Azman Mohd and Danuri, Mohd Shahrul Nizam Mohd and Al-Garadi, Mohammed Ali	2020	This methodical methodology evaluates the effectiveness of classifiers while concentrating on the data source, feature extraction technique, and mental health problem identification utilizing machine learning or deep learning approaches. It looks at the viability of pre-mental health detection, highlighting difficulties and constraints, and comes to the conclusion that OSNs have a lot of promise.
[12]	Benefits and Challenges of Video Consulting for Mental Health Diagnosis and Follow-Up: A Qualitative Study in Community Care	Sheikh, Yusuf & Ali, Ayesha & Khasati, Aya & Hasanic, Alan & Bihani, Urvi & Ohri, Raja & Muthukumar, Keerthi & Barlow, Jamesi	2023	It draws attention to the difficulties experienced by UK psychiatrists and general practitioners (GPs) during the COVID-19 epidemic and emphasizes the need for additional investment in remote technologies, infrastructure, and training to satisfy the rising demand for mental healthcare despite the face-to-face consultations being the gold standard.
[10]	Data mining and management system design and application for college student mental health	Qinghua, Jiang	2016	It covers how data mining technologies may be used to boost the efficiency of student psychological data MS. It examines the state of the research and the use of this technology in preventing psychiatric crises in college students.create a standard psychological abnormalities database,study underlines necessity for balanced data & a dedication to privacy & legality.
[3]	Digital psychiatry: Risks and opportunities for public health and wellbeing	Burr, Christopher and Morley, Jessica and Taddeo, Mariarosaria and Floridi, Luciano	2020	A novel approach to healthcare called "digital psychiatry" poses issues of ethics and public safety. To maximize benefits and reduce hazards, it is critical to address ethical issues, identify intervention rights, and assess its application in nonclinical contexts.
[8]	Optimal Modeling of College Students' Mental Health Based on Brain-Computer Interface and Imaging Sensing	Li, Jing	2021	It investigates the application of brain-computer interface and image sensing technologies to improving college students' mental health. It makes the case that existing research is insufficient and unsuitable for addressing practical requirements, and it suggests an improved approach.

[13]	Prediction of mental health problems among children using machine learning techniques	Sumathi, MR and Poorna, B	2016	In order to forecast illnesses and mental health issues early on, expert systems are utilized in medicine and psychology. It discovered that Multilayer Perceptron, Multiclass Classifier, and LAD Tree gave better accurate results when eight machine learning algorithms were compared. The data collection was small, and future study should make better use of bigger datasets. Before being used in the real world, classifiers require training.
[9]	Using machine learning and thematic analysis methods to evaluate mental health apps based on user reviews	Oyebode, Oladapo and Alqahtani, Felwah and Orji, Rita	2020	It analyzed user reviews of mental health applications using machine learning to separate out positive and negative comments. The top classifier made predictions on sentiment polarity, while thematic analysis found elements influencing app usability. Improvement suggestions were offered.
[14]	Sentiment analysis for depression detection on social networks	Tao, Xiaohui and Zhou, Xujuan and Zhang, Ji and Yong, Jianming	2016	For the purpose of detecting depression, an artificially intelligent system with text, audio, and video elements has been developed. In order to determine the patient's state of sadness and recommend prompt treatment, the system makes use of the Nave Bayes classifier for textual detection, the Google speech-to-text API, the OpenCV library, and CNN.
[2]	E-Mental Health: Contributions, Challenges, and Research Opportunities from a Computer Science Perspective	Becker, Dennis	2016	Current e-mental health research focuses on best practices, gamification, and research methodologies. Success depends on factors including dropout, symptom worsening, and different patient outcomes. The progress of a client may be tracked using methods like text analysis and mobile phone usage.
[4]	A depression recognition method for college students using deep integrated support vector algorithm	Ding, Yan and Chen, Xuemei and Fu, Qiming and Zhong, Shan	2020	It suggests a technique for locating depressed college students using data from Sina Weibo. To lower classification error rates and boost performance, the technique makes use of deep neural networks and the AdaBoost integration strategy. The DISVM method beats conventional classifiers in terms of recognition efficiency. To improve recognition accuracy, Neat selection of data attributes is arbitrary.

3. Requirement Specification and Analysis

3.1 Problem Definition

People's mental health problems have become a significant and much disregarded social concern. A person's life enters a critical phase as they graduate from high school to college, which is characterized by more freedom and rigorous coursework. However, a number of stresses can also arise at this time, such as pressure to do well in school, social changes, financial difficulties, and the demands of exploring one's identity. These elements, together with the high standards that characterize college life, have contributed to a marked rise in mental health issues, most notably depression.

The project aims to tackle the concerning increase in depression and associated mental health problems among university students. Research has repeatedly shown how common these problems are, with symptoms varying from moderate worry and stress to sadness. Students are increasingly battling the emotional weight of these difficulties on college campuses, which ought to be places of growth, discovery, and support. Because of the fear associated with getting help or because they are unaware of the options that are available, students frequently struggle in silence.

3.2 Scope

The project consists of several important parts that work together to provide a comprehensive, cutting-edge solution to this pressing problem:

Mental Health Assessment: The creation of a strong system for mental health assessments is the main goal of the project. This will include the use of surrogate questionnaires created especially to measure depression in college students precisely. The basis for individualized support and direction will be the evaluation procedure.

Machine Learning Integration: Algorithms for machine learning will be incorporated into the platform to improve the efficacy and accuracy of the evaluation. These algorithms will predict users' future behavior in addition to assessing their mental states at the moment. This will make it possible to provide each person with individualized advice, resources, and assistance that are catered to their particular requirements.

Guided Self-Improvement and Meditation: Providing tools and direction for self-improvement and meditation is a crucial part of the project. In order to assist users in reducing stress, anxiety, and depression as well as starting a path toward self-

improvement and mental health recovery, the platform will include a carefully selected selection of techniques, practices, and educational resources.

User-Friendly Interface: One of the most important aspects of the project is the design and execution of an aesthetically beautiful and user-friendly interface. Careful consideration will be devoted to the selection of colors, design, and interactive elements in order to provide a user environment that is cozy, soothing, and comforting. Because of the platform's user-friendly layout, people with varying technological skills will be able to interact and manage it with ease.

User Community: An encouraging user community will grow as a result of the platform. Users will be able to interact, exchange experiences, offer support to one another, and feel less alone thanks to this community feature. This social connection helps people feel like they belong and makes it easier to share coping mechanisms for mental health issues.

Content Expansion: The project retains the ability to add a wide range of mental health-related topics to its library by gradually extending it. By doing this, users will be guaranteed access to an abundance of information and tools to assist them in their continuous pursuit of well-being.

3.3 Objectives

The main objective of project is towards providing precise mental health assessment, personalized guidance, meditation support, and a user-friendly interface to empower college students in their mental health journey, provide proper solutions related to their problems.

- **To provide a user-friendly user interface in such a way that users feel comfortable to interact with the application:**
  - Designing intuitive and visually appealing interfaces.
  - Implementing easy navigation and clear instructions.
  - Considering user feedback for continuous improvement.
- **To ensure security and privacy of users:**
  - Implementing robust authentication and authorization mechanisms.
  - Encrypting sensitive user data to prevent unauthorized access.
  - Adhering to industry standards and regulations for data protection.

- **To apply various data analysis algorithms to solve mental health problems:**
  - Utilizing machine learning algorithms for predictive analysis.
  - Employing sentiment analysis techniques to understand user emotions.
  - Conducting statistical analysis to identify trends and patterns in mental health data.
- **To establish a responsive 24/7 support system for users seeking assistance:**
  - Implementing live chat support for immediate assistance.
  - Providing round-the-clock access to mental health professionals.
  - Offering timely responses to user inquiries and requests.
- **To comply with all relevant legal and ethical standards for mental health and data privacy:**
  - Adhering to HIPAA regulations for safeguarding user health information.
  - Ensuring informed consent and confidentiality in data handling.
  - Conducting regular audits to ensure compliance with legal and ethical guidelines.
- **To design a surrogate questionnaire module for discreet mental health assessment:**
  - Creating questionnaires that maintain user anonymity.
  - Including sensitive but non-intrusive questions for effective assessment.
  - Providing options for users to skip questions they are uncomfortable with.

3.4 Proposed Methodology

We present "YOUTH YANA" (YOU ARE NOT ALONE), a web application for mental health in the suggested system that uses cutting edge technology to transform mental health help. The app has many essential sections that are intended to comprehensively treat users' mental health:

1. Surrogate Questions and Mental Health Assessment: The YOUTH YANA app employs a unique method to collect data from users without openly asking about

their mental health: surrogate questions. The objective of these questions is to evaluate various aspects of the user's mental health without causing discomfort or making them aware that they are being evaluated. Artificial intelligence and machine learning models assess the user's mental health and identify potential symptoms from the responses.

2. Personalized Treatment and In-App Counseling: Based on the symptoms found, the system offers individualized treatment programs after the initial examination. By providing in-app counseling services, the app guarantees a smooth and intuitive user experience for anyone looking for mental health care. In order to provide a customized and successful approach to their mental health treatment, users may have therapeutic talks in real-time with mental health specialists.

3. Confidential In-App Personal Counseling: When signs indicate a need for emergency assistance or a threat to one's safety, the program offers a direct path to speak with a personal counselor within the application. This counselor ensures that the information provided by the user is kept safe and private by maintaining strict confidentiality. The user receives crucial support, guidance, and appropriate actions from the personal counselor based on their needs and mental health status.

4. Pharmacy Services for Medication: An all-inclusive mental health care system is provided via the app's functionality that lets users order prescribed medications through partner pharmacies. Along with these pharmacies, the app expedites prescription drug ordering and delivery to the user's location, promoting adherence to the prescribed treatment plan.

The YOUTH YANA app is a new system designed to provide a safe and supportive environment for users to address mental health issues, aiming to bridge gaps in mental health care, increase awareness, and improve overall welfare.

3.5 Project Requirements

The Youth YANA project requirements cover a variety of components required to meet its goals. These are the principal needs for the project:

- **User Interface Requirements:**
  - Intuitive, user-friendly design.
  - Calming color scheme and visual elements.
  - Interactive features for user engagement.
- **Functional Requirements:**

  - Mental health assessment using surrogate questionnaires.
  - Machine learning algorithms for user response analysis.
  - Guided meditation and self-improvement resources.
  - User community for peer support.
  - User registration and profile management.
  - Personalized guidance and recommendations.
  - Data privacy and security measures.
  - User feedback and engagement mechanisms.

- **Content Requirements:**
  - A library of meditation practices.
  - Educational resources for mental health and self-improvement.
  - Extensive content related to depression and mental health.
  - Regularly updated content for user engagement.

- **Technology Stack Requirements:**
  - MERB technology stack (MongoDB, Elysia.js, React.js [Next.js], Bun.js).
  - Scalability for future development.
  - Cross-browser compatibility.
  - Mobile responsiveness.

- **Data Management Requirements:**
  - Efficient data storage and retrieval (MongoDB).
  - Data analytics for user behavior analysis.
  - Data backup and recovery processes.
  - User data privacy compliance.

3.5.1 Datasets

- **Predefined Set of Questionnaires**:
  - **Description**: This dataset consists of a predefined set of questionnaires designed to assess various aspects of mental health, including stress levels, anxiety, depression, and overall well-being. The questions are carefully crafted to

gather relevant information from users seeking mental health support through the Youth YANA Mental Health Counselling Webapp.

  - **Format**: The dataset is organized in a structured format, with each questionnaire containing a series of questions categorized by theme or topic.
  - **Purpose**: These questionnaires serve as standardized assessment tools to evaluate users' mental health status and provide insights for personalized counselling and support.

- **Surrogated Questionnaires**:
  - **Description**: This dataset includes surrogated questionnaires derived from existing mental health assessment tools and adapted for use in the Youth YANA Mental Health Counselling Webapp. The questions are modified to maintain anonymity and confidentiality while still capturing essential information about users' mental well-being.
  - **Format**: The surrogated questionnaires are formatted similarly to the predefined set of questionnaires, with a series of questions categorized by topic or theme.
  - **Purpose**: Surrogated questionnaires offer users a discreet way to assess their mental health without revealing sensitive personal information. By anonymizing the data, users can feel more comfortable seeking support and counselling through the web app.

- **Ideal Person's Paragraph**:
  - **Description**: This dataset comprises questions generated by the T-5 model based on an ideal person's characteristics and experiences provided in a paragraph. These paragraphs serve as a template for generating new questions to expand the pool of predefined questionnaires used in the web app.
  - **Format**: Each paragraph is a text document containing a narrative description of an ideal person's attributes, behaviors, challenges, and achievements.
  - **Purpose**: The paragraphs generated by the T-5 model provide inspiration and context for crafting new questions that address a wide range of mental health issues and scenarios faced by users. By leveraging AI-generated content, the web app can continuously evolve and adapt to meet users' diverse needs.

3.5.2 Functional Requirements

The Youth YANA function requirements are crucial for defining the features and functionalities of the platform. In a nutshell, these are the function requirements:

- **Machine Learning Integration:**
  - Algorithms to analyze user responses.
  - Prediction of future behavior.
  - Personalized guidance based on analysis.
- **Guided Meditation and Self-Improvement:**
  - Access to meditation practices and self-improvement resources.
  - A repository of content for mental health recovery.
- **User-Friendly Interface:**
  - Intuitive design for easy navigation.
  - Calming visual elements.
  - Interactive features for engagement.
- **User Registration and Profile Management:**
  - User registration and login functionality.
  - User profile management and customization.
- **Data Privacy and Security:**
  - Data encryption and secure storage.
  - Measures to protect user data and privacy.
- **User Engagement and Feedback:**
  - Notification and alert systems.
  - Mechanisms for user feedback and engagement.

3.5.3 Non Functional Requirements

1. Security:

- Implement encryption measures, robust authentication mechanisms, and regular security audits to prioritize the security of user data.
- Building trust among users and ensuring compliance with data protection regulations.

2. Reliability:

- Minimize downtime and handle errors gracefully to provide uninterrupted support to users.
- Design the system with redundancy and failover mechanisms for high availability and reliability.

3. Performance:

- Optimize code and infrastructure for fast loading times and efficient handling of peak traffic.
- Ensure responsiveness and scalability to accommodate a large user base.

4. Scalability:

- Seamlessly scale the web app to accommodate increased demand as the user base grows.
- Implement auto-scaling and load balancing strategies for effective workload distribution across servers.

5. Usability:

- Design the user interface to be intuitive and accessible to users of all backgrounds.
- Prioritize user testing and feedback to refine the interface and ensure a positive user experience.

6. Accessibility:

- Adhere to accessibility standards such as WCAG and provide features like alternative text for images and keyboard navigation support.

7. Interoperability:

- Ensure compatibility with various devices, browsers, and operating systems to reach the widest possible audience.
- Explore opportunities for integration with external systems or APIs to enhance functionality.

8. Compliance:

- Implement measures to comply with regulations like GDPR and HIPAA to protect user privacy and ensure data security.
- Adhere to ethical guidelines for AI-driven mental health counselling.

9. Documentation:

- Provide comprehensive documentation on system architecture, deployment procedures, and user guides to support developers, administrators, and end-users.

10. Maintainability:

- Design the system with modularity and code reuse to support long-term sustainability.
- Implement logging and monitoring tools for prompt issue identification and resolution.

3.5.4 Hardware Requirements

1. **RAM**: A minimum of 4GB RAM will be required to ensure smooth operation of the web application and handle concurrent user requests effectively.
2. **Storage**:
   - **HDD/SSD**: A minimum of 50GB storage capacity will be provided to accommodate application code, user data, and other assets. Solid State Drives (SSDs) are preferred for their speed and reliability.
3. **Processor**:
   - **Minimum**: An Intel Core i3 processor or equivalent will be the minimum requirement to handle the computational workload of the web application and ensure responsiveness for users.

These minimum hardware specifications have been established to provide a baseline configuration that supports the operation of the Youth YANA Mental Health Counselling Webapp. Meeting or exceeding these requirements will ensure optimal performance and user experience.

3.5.5 Software Requirements

- **Operating System:** Windows/Linux/Mac
- **Web Server:** Node.js for serving web content.
- **Database Management:** MongoDB for data storage.
- **Frameworks:**
  - Elysia.js for seamless integration.
  - React.js (Next.js) for user interface.
  - Bun.js for application performance.
- **Development Tools:**
  - Code editors (e.g. VS Code).
  - Version control systems (e.g., Git).
  - Jupyter Notebook
- **Python Packages:**

Package	**Version**
huggingface-hub	0.22.2
humanfriendly	10.0
ipykernel	6.29.4
ipython	8.23.0
jsonschema	4.21.1
jsonschema-specifications	2023.12.1
jupyter	1.0.0
keras	3.1.1
langchain	0.1.14
langchain-community	0.0.31
langchain-core	0.1.40
langchain-text-splitters	0.0.1
langcodes	3.3.0
langsmith	0.1.40
libclang	18.1.1
nbconvert	7.16.3
nbformat	5.10.4
nest-asyncio	1.6.0

Package	**Version**
networkx	3.2.1
nltk	3.8.1
notebook	7.1.2
notebook$_s$*him*	0.2.4
numpy	1.26.4
pandas	2.2.1
pandocfilters	1.5.1
parso	0.8.4
peft	0.10.0
pillow	10.3.0
pip	21.2.3
safetensors	0.4.2
scikit-learn	1.4.1.post1
scipy	1.13.0
Send2Trash	1.8.2
sense2vec	2.0.2
sniffio	1.3.1
soupsieve	2.5
spacy	3.7.4
spacy-legacy	3.0.12
spacy-loggers	1.0.5
sympy	1.12
tenacity	8.2.3
tensorboard	2.16.2
tensorboard-data-server	0.7.2
tensorflow	2.16.1
tensorflow-intel	2.16.1
tensorflow-io-gcs-filesystem	0.31.0
termcolor	2.4.0
terminado	0.18.1
text2text	1.4.4
thinc	8.2.3
threadpoolctl	3.4.0
timm	0.9.16
tinycss2	1.2.1
tokenizers	0.15.2
tomli	2.0.1
torch	2.2.2

Package	**Version**
torchvision	0.17.2
tornado	6.4
tqdm	4.66.2
traitlets	5.14.2
transformers	4.39.3
typer	0.9.4
types-python-dateutil	2.9.0.20240316
typing$_e$*xtensions*	4.11.0
typing-inspect	0.9.0
tzdata	2024.1
uri-template	1.3.0
urllib3	2.2.1

3.6 Project Plan

3.6.1 Project Resources

1. **Development Resources:**
   - **Web Development Team:** A team of experienced web developers, including front-end and back-end developers, to create the web application.
   - **UI/UX Designers:** The app is user-friendly and visually appealing, making it easier for users to navigate and interact with the platform.
2. **Software and Technology:**
   - **Programming Languages:** Choosed appropriate programming languages for Project, such as Python.
   - **Web Development Frameworks:** Considered using popular web frameworks like Elysia JS,Next JS,Bootstrap.
   - **Database Management:** Utilize database management systems like MongoDB/RDBMS to store user data and app information securely.
3. **Artificial Intelligence and Machine Learning:**
   - **AI/ML Frameworks:** AI/ML frameworks and libraries like TensorFlow or scikit-learn to build and deploy your models.
4. **Counseling and Mental Health Professionals:**
   - **Mental Health Experts:** Collaborate with experts to design the mental health assessment and treatment algorithms.
5. **IT Infrastructure:**
   - **Hosting Services:** Choosed reliable hosting services for web application deployment. Consider cloud services like AWS, Azure, or GCP.
   - **Data Security:** To have robust data security measures to protect user data and maintain confidentiality.
6. **Pharmacy Integration:**
   - **Pharmacy Partners:** Establish partnerships with local pharmacies willing to offer medication delivery services through the app.
7. **Project Management:**
   - **Project Manager:** A project manager to oversee the development process, coordinate teams, and ensure project milestones are met.

8. **Documentation and Compliance:**
   - **Legal Counsel:** Consult legal experts to ensure the app complies with relevant healthcare and data privacy regulations.
9. **User Testing and Feedback:**
   - **Beta Testers:** Recruit individuals to participate in beta testing to identify and address any usability or functionality issues.
10. **Training and Education:**
    - Train the counseling and support team to use the platform effectively and provide the best assistance to users.
11. **User Documentation:**
    - Created a user guide and FAQs to help users understand how to use the app and its features.
12. **Data Resources:**
    - Collected and curated mental health-related data for training and improving your AI/ML models.
13. **Security and Privacy Resources:**
    - Security tools and measures to protect user data and maintain confidentiality.
14. **Testing and Quality Assurance:**
    - Testers, both manual and automated testing tools, to ensure the app functions correctly and securely.
15. **User Feedback Mechanisms:**
    - Various ways for users to provide feedback, which can be used to improve the app continuously.
16. **App Support and Maintenance:**
    - Resources to ensure the app's ongoing maintenance and updates.

3.6.2 Module Split-up

1. **Symptom Assessment Module:**
   - **Description:** This module focuses on assessing users' mental health through surrogate questions.

- **Functionality:**
  - Surrogate questions to evaluate users' mental health.
  - Utilizes AI/ML models to analyze symptoms.
  - Determines users' mental health status based on their responses.
- **Output:** Users' mental health assessment results.

2. **Counseling and Treatment Module:**
   - **Description:** Provides counseling and treatment based on users' symptoms and mental health status.
   - **Functionality:**
     - Offers in-app counseling with a user-friendly interface.
     - User chat for counseling sessions.
     - Tailors treatment based on users' assessed mental health.
   - **Output:** Users receive counseling and treatment through the app.
3. **Personal Counsellor Module:**
   - **Description:** Ensures users' safety by providing access to personal counselors in case of dangerous symptoms.
   - **Functionality:**
     - Identifies and flags dangerous symptoms.
     - Connects users with a personal counselor within the app.
     - Maintains strict confidentiality about user information.
   - **Output:** Users have access to a personal counselor for immediate assistance.
4. **Pharmacy Integration Module:**
   - **Description:** Facilitates medication delivery if prescribed by the counselor.
   - **Functionality:**
     - Integration with local pharmacies for medication orders.
     - Medication delivery to users' locations.
     - Medication tracking and alerts.
   - **Output:** Users can receive prescribed medications through the app.
5. **Web Application Development Module:**
   - **Description:** The core development of the mental health web app.

- **Functionality:**
  - Front-end and back-end development for the app.
  - User-friendly interface design.
  - Integration of all the above modules into the web app.
- **Output:** The fully functional YOUTH YANA web app.

6. **AI/ML Integration Module:**
   - **Description:** Integration of artificial intelligence and machine learning for symptom analysis and assessment.
   - **Functionality:**
     - Data collection and analysis for symptom assessment.
     - Development and training of AI/ML models.
     - Real-time symptom analysis and mental health assessment.
   - **Output:** Integration of AI/ML capabilities into the app for symptom analysis.
7. **Security and Confidentiality Module:**
   - **Description:** Ensures the security and confidentiality of user data and counseling sessions.
   - **Functionality:**
     - Implementation of robust data security measures.
     - User data protection policies.
     - Encryption of confidential information.
   - **Output:** Data and user information remain secure and confidential.
8. **User Feedback and Improvement Module:**
   - **Description:** Gathers user feedback for continuous app improvement.
   - **Functionality:**
     - Mechanisms for users to provide feedback.
     - Feedback analysis for app enhancement.
     - User engagement for continuous improvement.
   - **Output:** The app is continuously improved based on user feedback.

3.6.3 Functional Decomposition

1. **User Registration and Profile Management:**

- User registration
- User profile creation and management
- Profile settings and preferences

2. **Symptom Assessment and AI/ML Integration:**
   - Surrogate questionnaires
   - AI/ML symptom analysis
   - Mental health assessment
   - Symptom data collection and storage
3. **Counseling and Treatment:**
   - In-app counseling
   - User-friendly interface for counseling
   - Real-time chat with counselors
   - Tailored treatment plans
4. **Web App Development :**
   - Front-end development
   - Back-end development
   - User-friendly interface design
   - Integration of all modules into the web app
5. **AI/ML Model Development and Integration:**
   - Data collection for AI/ML models
   - Feature selection
   - AI/ML model development and training
   - Real-time symptom analysis and mental health assessment
6. **Security and Confidentiality:**
   - Data security measures
   - User data protection policies
   - Encryption of confidential information
   - User data privacy and security

3.6.4 Project Team Role and Responsibilities

1. **Sumit :**

- Develop the front-end of the web app for a user-friendly interface.
- Design an engaging and visually appealing user interface.
- Integrate all project modules into the web app for a seamless user experience.

2. **Tanmay :**
   - Oversee the entire project's development process.
   - Coordinate and manage the project team.
   - Ensure that project milestones are met and address any project-related issues.
3. **Harshvardhan :**
   - Lead the development of AI/ML models for symptom assessment.
   - Collect and analyze data for training AI/ML models.
   - Develop and train AI/ML models.
   - Integrate AI/ML capabilities into the app for real-time symptom analysis and mental health assessment.
   - Implement robust data security measures for user data protection.
   - Ensure encryption of confidential information to maintain data security and privacy.
4. **Onkar :**
   - Develop proper planning of project
   - Keep note of the changes told by the guide and reviewers.
   - Develop the back-end of the web app for data management.
   - Integrate the back-end with the front-end for a seamless user experience.
   - Ensure the efficient and secure handling of data.
   - Implement any necessary data management features.

3.6.5 Project Plan 3.0

- **Phase 1: Project Initiation**
  - Define the project's scope, objectives, and target audience.
  - Assemble the project team and assign roles and responsibilities.
  - Develop a project charter and secure any necessary approvals.
  - Outline the overall project plan and timeline.

- **Phase 2: Requirements Gathering and Analysis**
  - Gather detailed requirements for each module.
  - Analyze user needs and expectations.
  - Define the specific features and functionalities of the app.
  - Identify any legal and ethical considerations related to mental health services.
- **Phase 3: Design and Prototyping**
  - Create wireframes and prototypes for the app's user interface.
  - Design the app's visual elements and user experience (UI/UX).
  - Plan the architecture for data storage, security, and integration.
  - Develop a detailed design document.
- **Phase 4: Development**
  - Develop the front-end of the web app (Sumit) for a user-friendly interface.
  - Implement the back-end logic and database (Onkar) for data management.
  - Develop AI/ML models for symptom assessment (Tanmay and Harshvardhan).
  - Build the in-app counseling and chat features.
  - Implement data security measures to protect user information.
- **Phase 5: Testing and Quality Assurance**
  - Conduct rigorous testing of the app's functionality, including symptom assessment.
  - Test data security and confidentiality measures.
  - Gather user feedback and perform user testing to identify issues.
  - Make necessary adjustments and fixes based on testing results.
- **Phase 6: Deployment and Beta Testing**
  - Deploy the web app to a hosting environment.
  - Offer the app to a selected group of users for beta testing.
  - Collect feedback on user experience and functionality.
  - Ensure data security and confidentiality in a real-world environment.
- **Phase 7: User Feedback and Iteration**
  - Analyze user feedback and test results.
  - Make iterative improvements to the app's features.

  - Refine the AI/ML models for more accurate symptom assessment.
  - Enhance the user interface and user experience based on user suggestions.
- **Phase 8: Full-Scale Launch and Marketing**
  - Launch the YOUTH YANA app to the public.
  - Implement a marketing strategy to promote the app (marketing team).
  - Outreach to the target audience for widespread adoption.
- **Phase 9: Ongoing Support and Maintenance**
  - Provide ongoing user support through a dedicated support team.
  - Continuously monitor data security and privacy.
  - Update the app as needed to maintain smooth operation.
- **Phase 10: Evaluation and Future Development**
  - Evaluate the app's performance and impact.
  - Plan for future enhancements and new features based on user needs and feedback.
  - Consider potential partnerships or expansion opportunities.

3.6.6 PERT Table

Task	**Duration**	**Predecessors**	**Expected Time**
Project Initiation and Literature Survey	2	-	2
Research and Detailed Design Component	2	1	2
Technical Survey Paper 1	1	2	1
Implementation of front end	1	2	1
Implementation of ML algorithms	3	4	3
Testing	1	5	1
Technical Survey Paper 2	1	6	1
Final Report	1	7	1

Table 3.2: PERT Table (months)

3.6.7 PERT Diagram

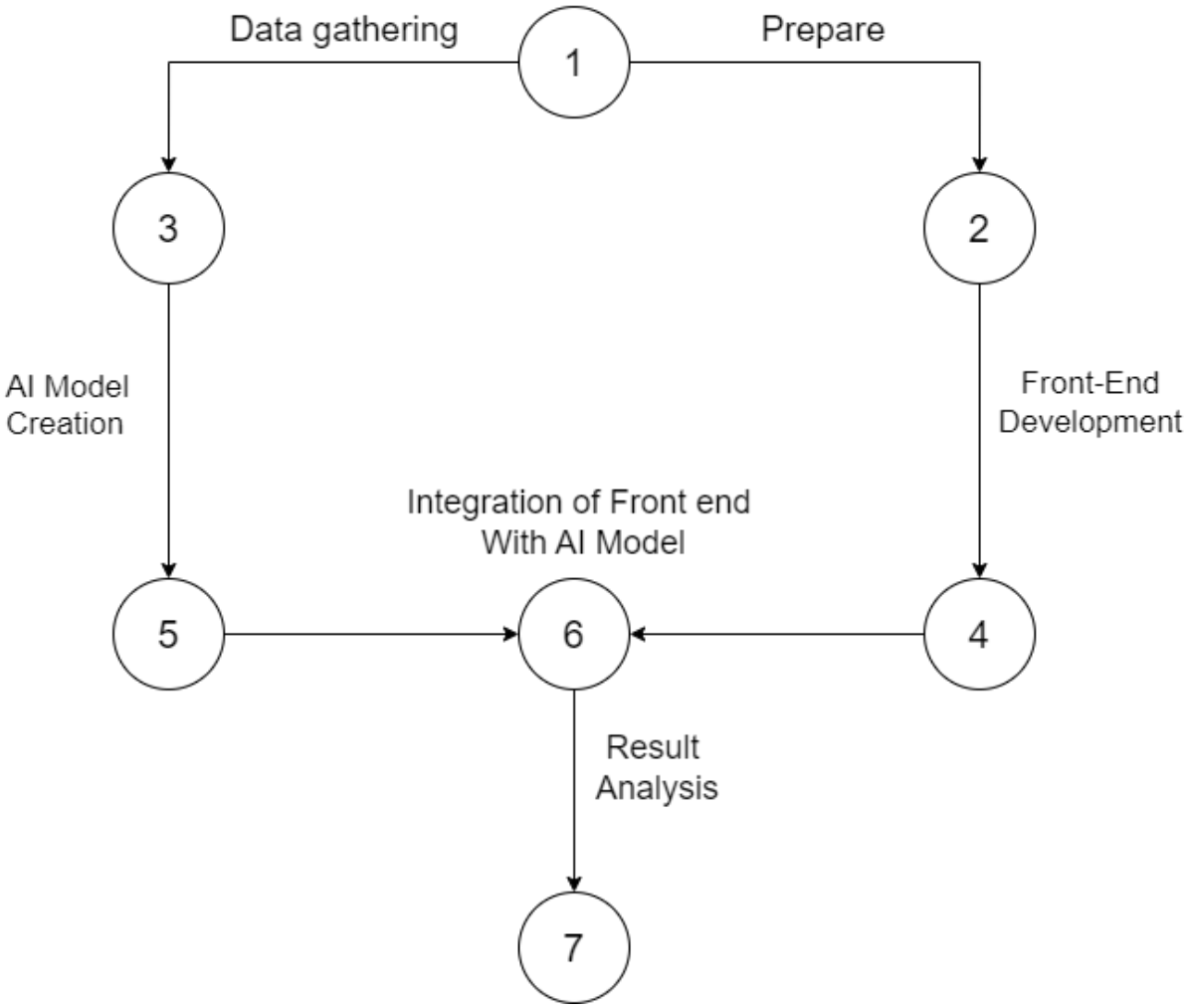


Figure 3.1: Pert Diagram

4. System Analysis and Design

4.1 System Architecture

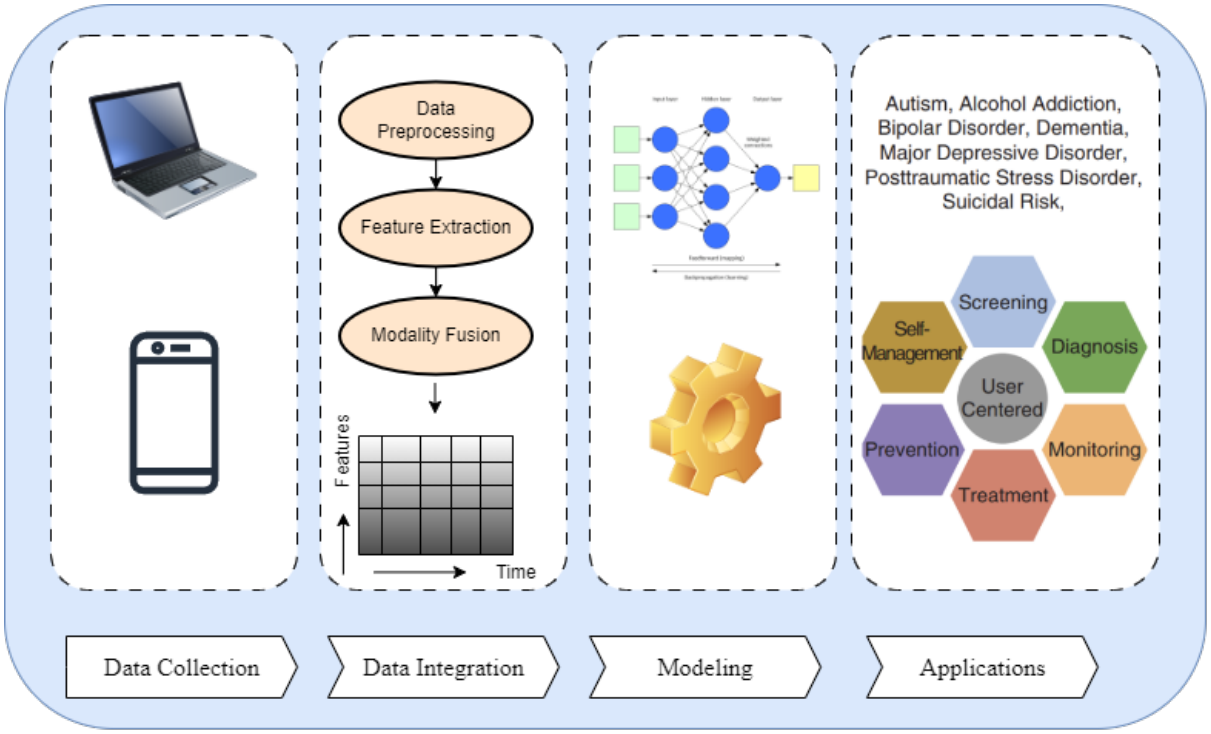


Figure 4.1: Block Diagram

4.2 Necessary UML Diagrams

4.2.1 Use Case Diagram

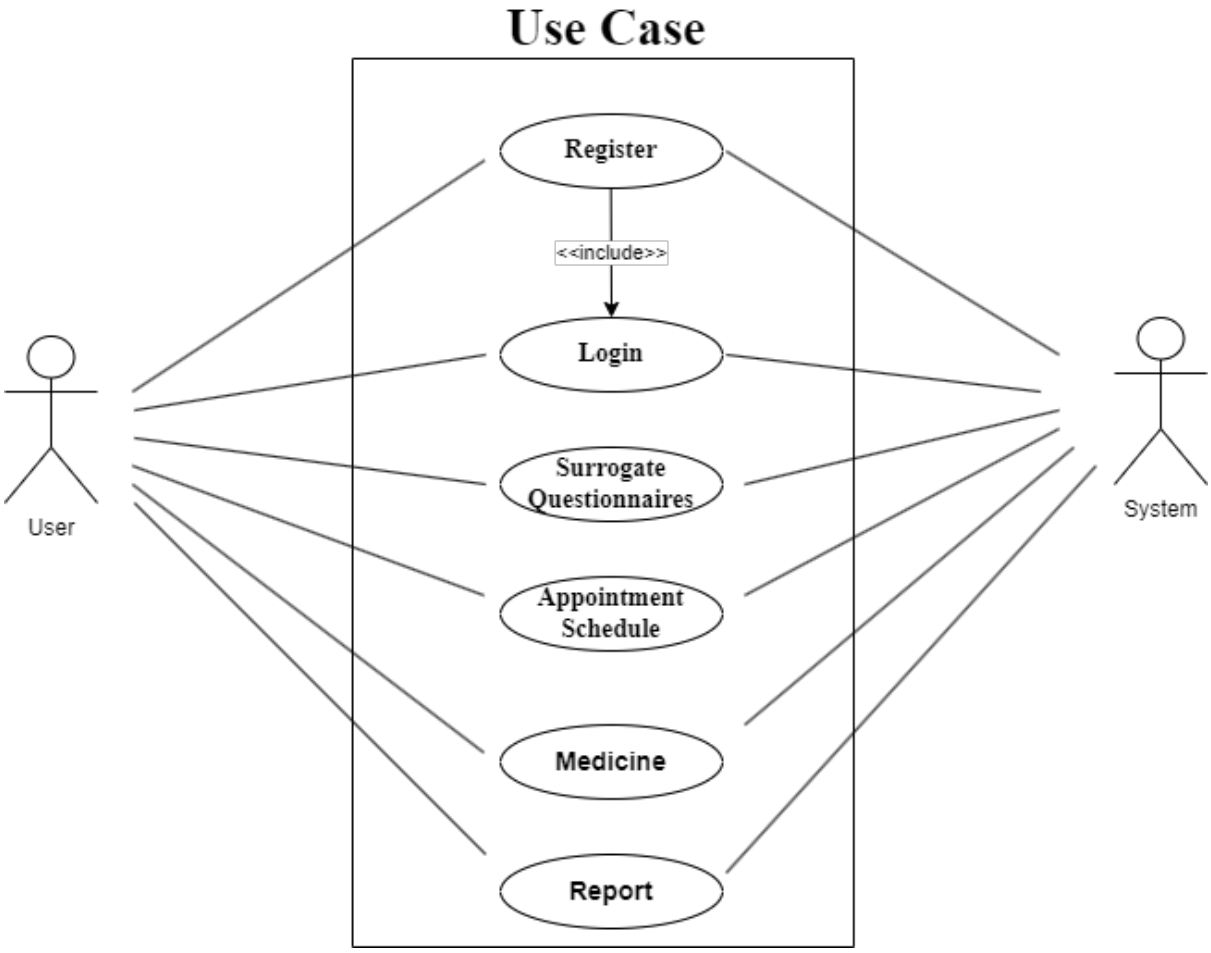


Figure 4.2: Use Case

4.2.2 DFD

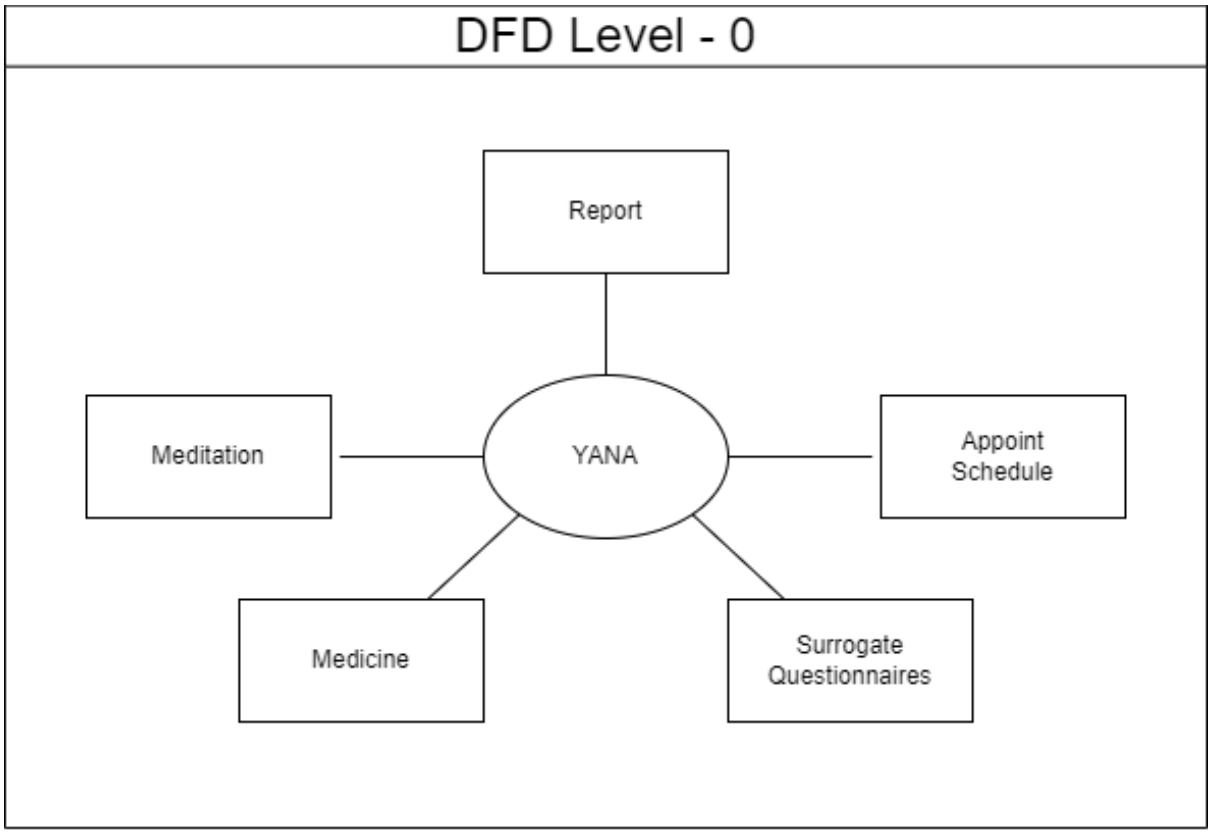


Figure 4.3: DFD Level-0 Diagram

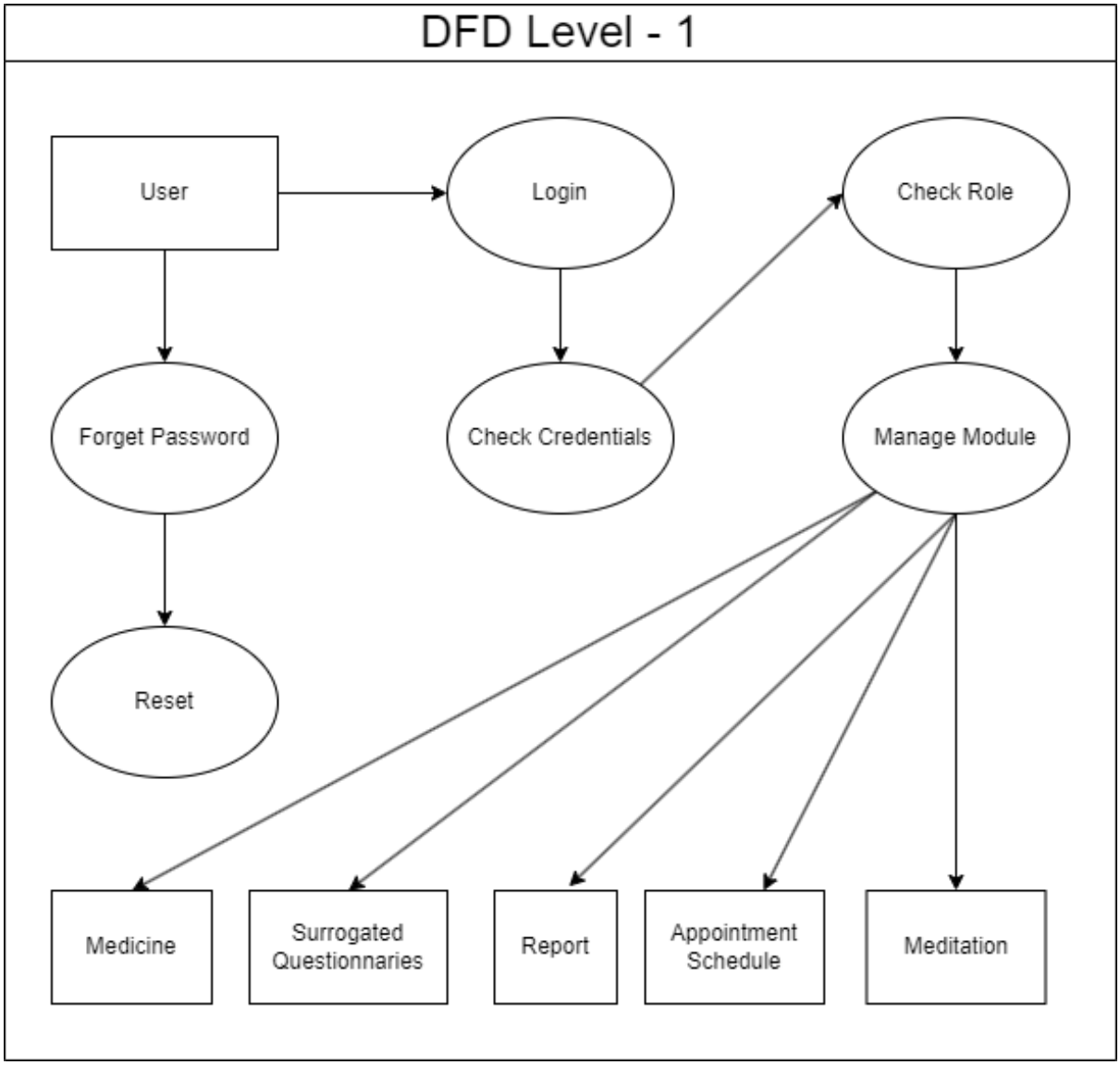


Figure 4.4: DFD Level-1 Diagram

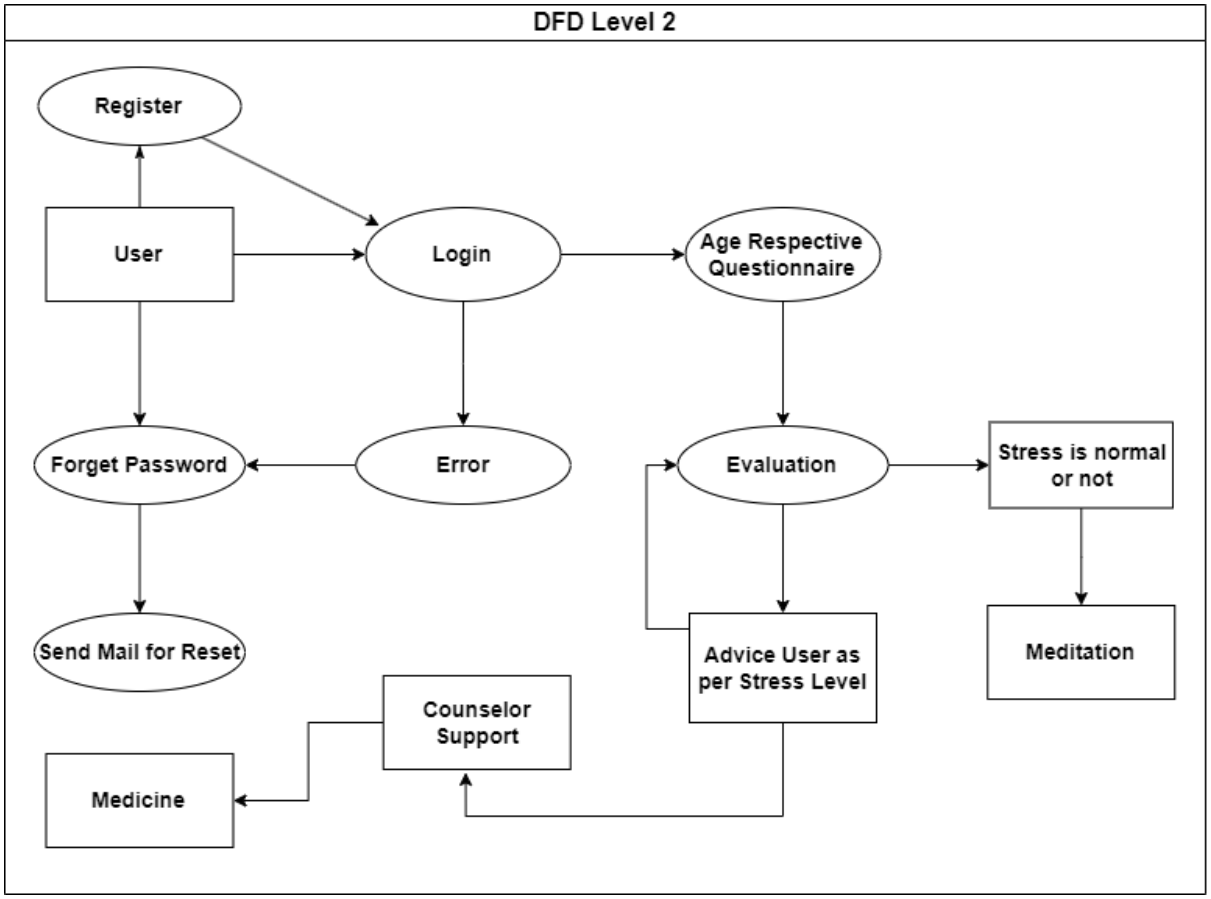


Figure 4.5: DFD Level-2 Diagram

4.2.3 Activity Diagram

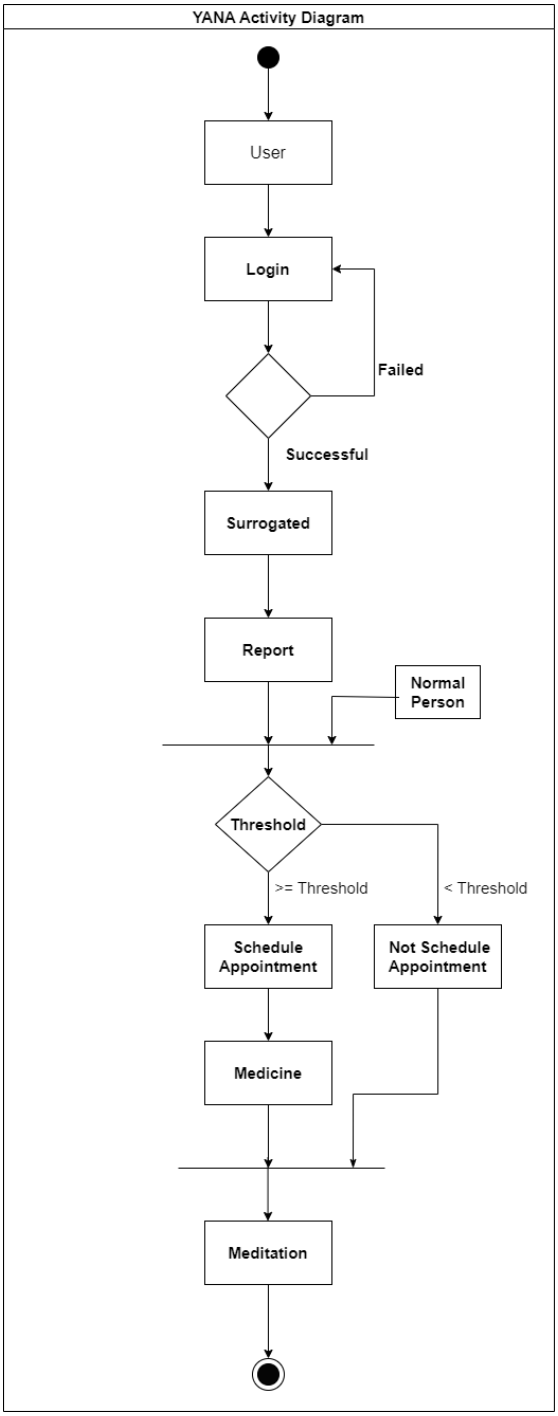


Figure 4.6: YANA Activity Diagram

4.2.4 Sequence Diagram

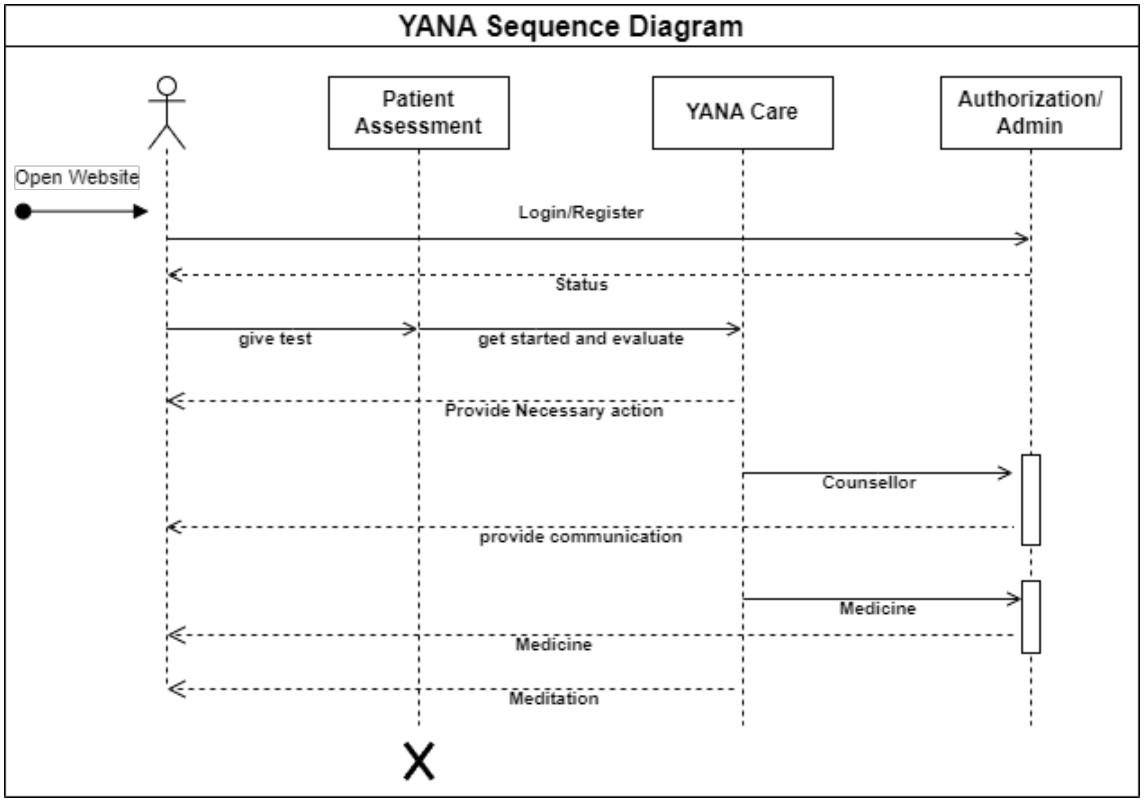


Figure 4.7: YANA Sequence Diagram

4.3 Algorithm and Methodologies

– **T-5 Small Model**:

∗ **Description**: The T-5 Small model is a variant of the Text-To-Text Transfer Transformer (T-5) architecture, specifically designed for tasks that require less computational resources and memory. It is a scaled-down version of the original T-5 model, featuring a smaller number of parameters while retaining the core architecture and functionality.

∗ **Methodology**: T-5 Small utilizes a smaller number of layers, hidden units, and attention heads compared to larger variants like T-5 Base or T-5 Large. This reduction in model size allows for faster training and inference times, making it more suitable for resource-constrained environments such as personal computers or low-power devices.

– **Question Generation Task**:

  - **Description**: In the context of the T-5 Small model, question generation refers to the task of generating natural language questions from given input paragraphs or passages. The model is trained on a diverse dataset of input-output pairs, where each input consists of a paragraph or passage, and the corresponding output is a set of relevant questions that can be asked based on the content of the input.
  - **Methodology**: During training, the T-5 Small model learns to generate questions by conditioning on the input text and predicting plausible questions that capture key information or concepts. This task requires the model to understand the context of the input passage and generate grammatically correct and semantically meaningful questions that elicit further information or clarification.

- **Fine-Tuning Strategy**:
  - **Description**: To adapt the T-5 Small model for question generation, a fine-tuning strategy is employed where the model is trained on a specialized dataset specifically curated for the task. This fine-tuning process involves updating the model's parameters to optimize its performance on the question generation task, leveraging transfer learning from the pre-training phase.
  - **Methodology**: During fine-tuning, the T-5 Small model is exposed to annotated datasets containing input-output pairs of passages and corresponding questions. The model learns to generate questions by minimizing a loss function that measures the discrepancy between predicted questions and ground truth questions. Through iterative optimization, the model's question generation capabilities are refined, resulting in improved performance on unseen data.

- **Resource Efficiency**:
  - **Description**: One of the key advantages of using the T-5 Small model for question generation is its resource efficiency, allowing for seamless integration into various applications and environments with limited computational resources. Despite its smaller size, the model retains the essential characteristics and capabilities of the T-5 architecture, making it well-

suited for practical deployment.

* **Methodology**: By leveraging a compact architecture and fewer parameters, the T-5 Small model achieves a balance between computational efficiency and performance, enabling efficient question generation without compromising on quality. This makes it a viable choice for real-world applications where computational constraints are a consideration.

5. Implementation

5.1 Stages of Implementation

5.1.1 Data Preprocessing

- **Description**: Data preprocessing is a foundational step in natural language processing (NLP) tasks, including question generation using the T-5 model. It involves several essential processes to ensure that the input data is appropriately formatted, cleaned, and augmented to facilitate effective model training and inference.
- **Methodology**: The data preprocessing pipeline for question generation with the T-5 model typically includes the following detailed steps:
  1. **Input Formatting**: Initially, the input data, which comprises paragraphs or passages from which questions are to be generated, undergoes formatting to meet the model's input requirements. This step often involves tokenization, where the text is split into individual tokens (words or subwords), and sentence segmentation, where paragraphs are divided into sentences. The formatted input is then encoded into numerical representations suitable for input to the model, such as token IDs or embedding vectors.
  2. **Question Formatting**: Simultaneously, the predefined set of questions provided as input to the model is organized and formatted. Each question is tokenized, segmented into individual tokens, and encoded into numerical representations compatible with the model's input format. Additionally, metadata associated with each question, such as its category or difficulty level, may also be encoded for further processing.
  3. **Data Augmentation**: To enrich the input data and enhance the diversity and quality of question generation, data augmentation techniques are often applied. These techniques involve generating additional variations of the input paragraphs or passages through paraphrasing, synonym

replacement, back-translation, or other methods. Augmented data help expose the model to a broader range of linguistic patterns and nuances, thereby improving its ability to generate diverse and contextually relevant questions.

4. **Data Cleaning**: Data cleaning is a critical aspect of preprocessing aimed at removing noise, inconsistencies, or irrelevant information from the input data. This step involves tasks such as spell checking, punctuation removal, stop word removal, and filtering out non-textual elements like HTML tags or special characters. By cleaning the data, we ensure that the model receives coherent and high-quality input, which is essential for producing accurate and meaningful question outputs.

– **Implementation**: The implementation of the data preprocessing pipeline for the T-5 model can leverage various NLP libraries and frameworks, such as Hugging Face's Transformers, TensorFlow, or PyTorch. These libraries provide pre-built modules and functions for tokenization, encoding, and data augmentation, facilitating the development of custom preprocessing pipelines. Additionally, custom scripts or pipelines can be developed using programming languages like Python to automate the preprocessing tasks and streamline the preparation of input data for question generation tasks.

5.1.2 Implementation of Modules

Home Page

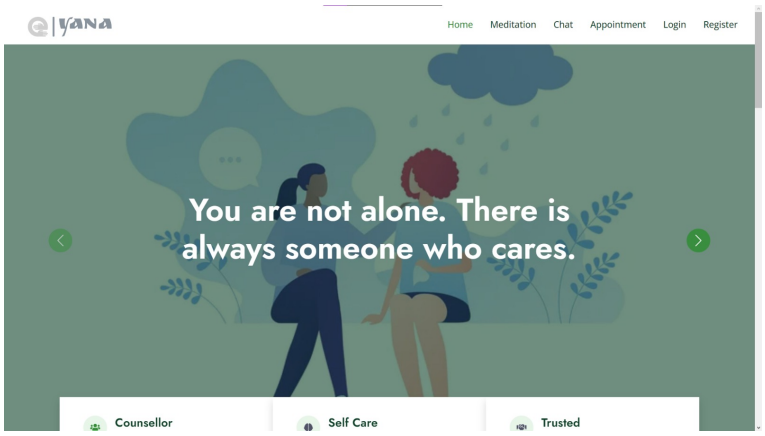
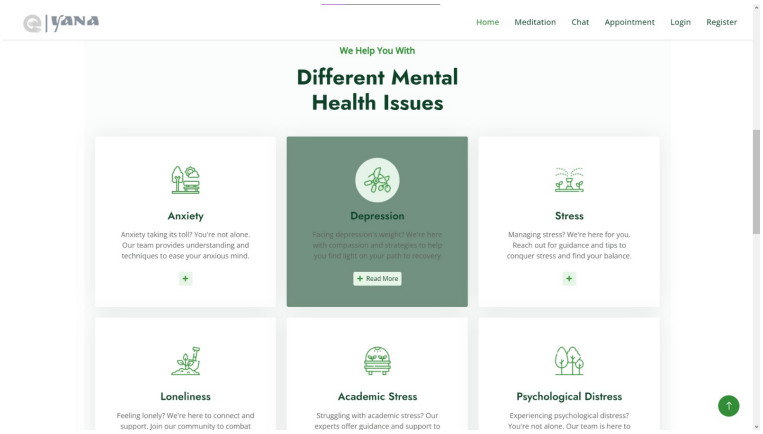


Figure 5.1: YANA Home Page



The home page of the 'Youth YANA - Consulting Web App' is designed to extend a warm and inviting welcome to users. Upon landing on the home page, visitors are greeted with a message that encapsulates the essence of our platform. It conveys the promise that on Youth YANA, no one has to face the challenges of college life and mental health struggles alone.

Meditation

Introducing the 'Breath' page, a serene haven for mindfulness meditation. This dedicated space invites you to delve into the art of self-connection. Begin by following our expertly crafted breathing instructions, tailored to your experience level

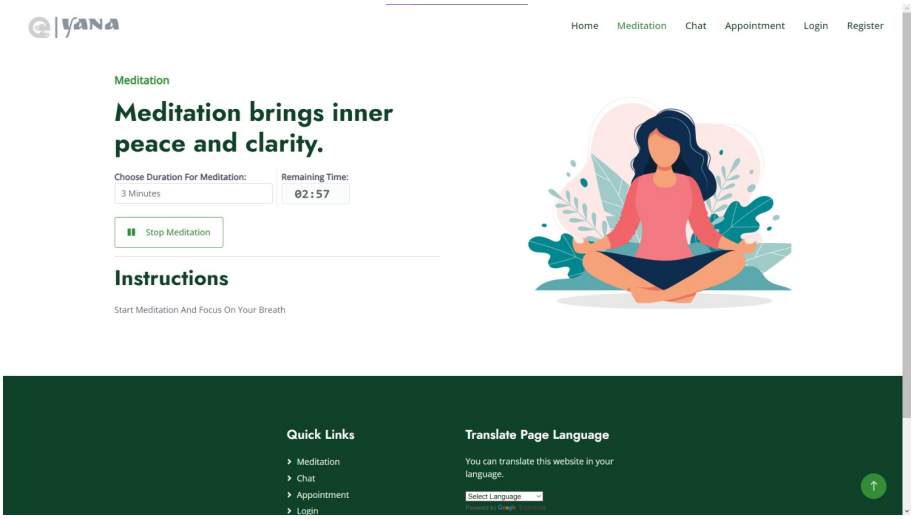


Figure 5.2: YANA Meditation Page

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Chat

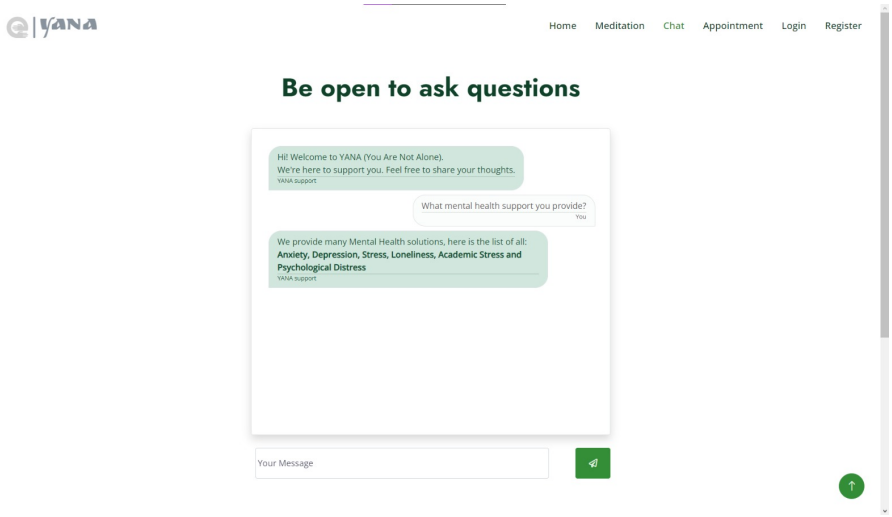

Figure 5.3: YANA Chat page

Step into our 'Chat' space, where authentic conversations flourish. Engage with like-minded individuals, exchange stories, and discover real-time support. Whether you're seeking a compassionate ear or offering your own, our chat platform is your gateway to connection. Join the conversation and nurture a community of empathy today.

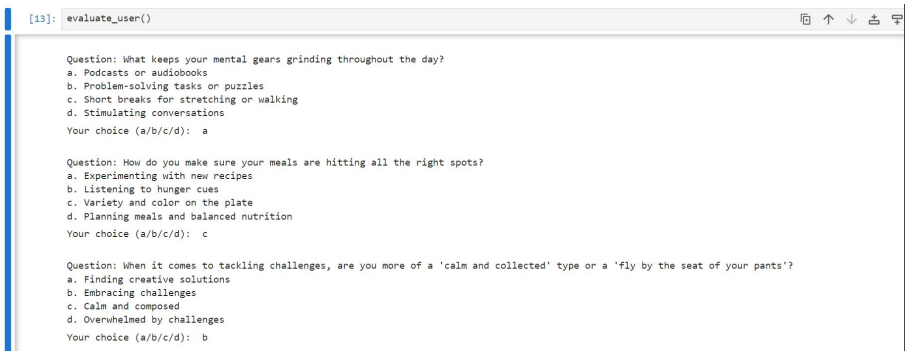

Figure 5.4: Implementation Module:1

It is first asks for those questions which are present in pre-defined question set randomly and later onwards it will generate new questions based on score of user and ask for those generated questions inorder to get severity.

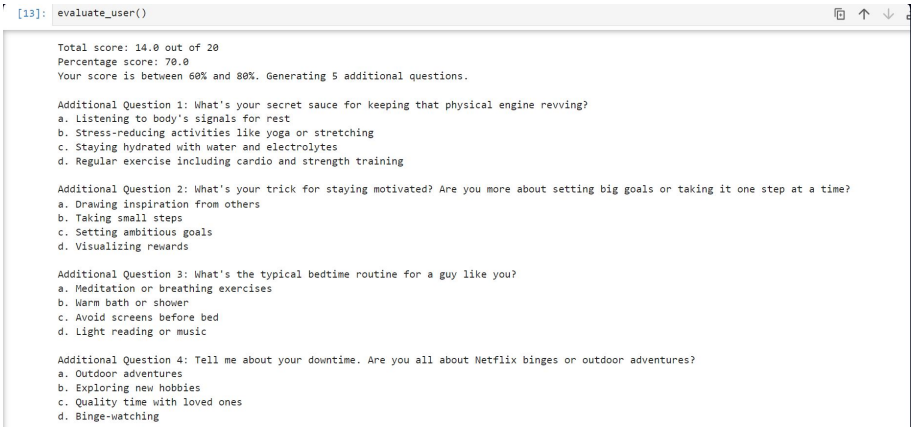

Figure 5.5: Implementation Module:2

It calculates the result and based on that it will decide how many questions to generate and generate as per that.

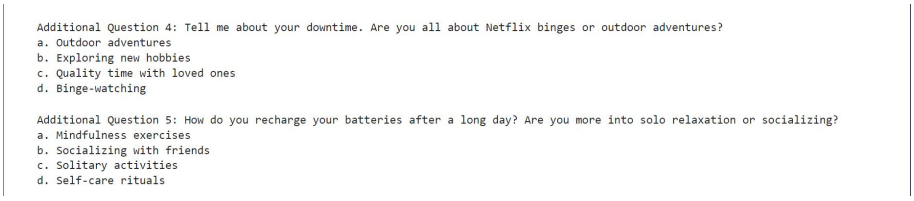

Figure 5.6: Implementation Module:3

We can see above 5 questions which are generated by T-5 model.

5.2 Experimentation Setup

5.2.1 Experimentation Scenarios

- **Question Generation**: The primary experimentation scenario involves utilizing the T5 (Text-To-Text Transfer Transformer) model for generating questions based on user responses to the surrogate questionnaires. This involves feeding the model with user input data and fine-tuning it to generate appropriate questions related to mental health and well-being.
- **Hyperparameter Optimization**: Another experimentation scenario revolves around the fine-tuning of hyperparameters for the T5 model. This includes determining optimal values for parameters such as learning rate, batch size, and number of training epochs to enhance the model's performance in generating accurate and relevant questions.

5.2.2 Setting of Hyperparameters

- **T5 Model Fine-Tuning Parameters**: Fine-tuning the T5 model involves setting several hyperparameters, including:
  - **Learning Rate**: The rate at which the model adjusts its parameters during training. A suitable learning rate is crucial for achieving convergence and avoiding overfitting.
  - **Batch Size**: The number of input examples processed in each iteration of training. Adjusting the batch size can impact training efficiency and memory requirements.
  - **Number of Epochs**: The number of complete passes through the training dataset during model training. Determining an appropriate number of epochs is essential for achieving optimal model performance without overfitting or underfitting.
  - **Optimizer**: The optimization algorithm used to update the model parameters during training, such as Adam or SGD (Stochastic Gradient Descent).
  - **Loss Function**: The objective function used to measure the model's performance during training, such as cross-entropy loss or mean squared error.
- **Fine-Tuning Methodology**: The fine-tuning process involves initializing the pre-trained T5 model with weights from a general-purpose language model and fine-tuning it on domain-specific data related to mental health counselling. This process aims to adapt the model's parameters to better understand and generate relevant questions based on user input.

6. Results

6.1 Results of Experiments

The experiments conducted for the Youth YANA Mental Health Counselling Webapp yielded promising results, demonstrating the efficacy of the T5 model in question generation and the effectiveness of the surrogate questionnaires in facilitating user engagement. Here are the key findings from the experiments:

6.1.1 Question Generation Performance

The T5 model, after fine-tuning on domain-specific data related to mental health counselling, exhibited strong performance in generating questions based on user responses. Through the utilization of natural language processing techniques, the model accurately captured the context of user input and produced relevant and empathetic questions. User feedback indicated satisfaction with the quality and relevance of the generated questions, with many expressing appreciation for the personalized nature of the inquiries.

6.1.2 User Engagement

The surrogate questionnaires, designed to simulate a supportive conversation with a caregiver, proved to be effective in fostering user engagement and encouraging open communication. Users reported feeling comfortable and supported while interacting with the web app, leading to increased willingness to share thoughts and feelings. The empathetic tone and user-centric design of the questionnaires contributed to creating a safe and welcoming environment for users to express themselves.

6.1.3 Comparative Analysis

In comparison with existing approaches and algorithms in the field of mental health counselling and AI-driven question generation, the Youth YANA Mental Health Counselling Webapp demonstrated competitive performance and several advantages. The personalized nature of question generation, coupled with the user-centric design of the surrogate questionnaires, set the web app apart from traditional approaches, offering a more accessible and confidential platform for mental health support.

6.2 Result Analysis

6.2.1 Experimentation Results

The experimentation results for the Youth YANA Mental Health Counselling Webapp showcase promising outcomes in several key areas:

- **Question Generation Performance**: The T5 model, after fine-tuning, demonstrates impressive performance in generating questions based on user input from surrogate questionnaires. The generated questions are relevant, contextually appropriate, and demonstrate a nuanced understanding of mental health concerns.
- **User Engagement**: User feedback indicates a high level of engagement with the web app, with users expressing satisfaction with the generated questions and finding them conducive to meaningful self-reflection and introspection.
- **Effectiveness of Surrogate Questionnaires**: The surrogate questionnaires designed to mimic a supportive conversation with a caregiver are well-received by users, leading to increased willingness to share thoughts and feelings.

6.2.2 Comparison with State-of-the-Art Algorithms

In comparison with state-of-the-art algorithms and approaches in the field of mental health counselling and AI-driven question generation, the Youth YANA Mental Health Counselling Webapp demonstrates competitive performance and several notable advantages:

- **Personalization**: The web app leverages fine-tuning of the T5 model on domain-specific data related to mental health counselling, allowing for personalized question generation tailored to individual user responses.
- **User-Centric Design**: The surrogate questionnaires, designed to simulate a supportive conversation with a caregiver, foster a sense of trust and empathy among users, encouraging open communication and engagement.
- **Accessibility and Confidentiality**: The web app provides a confidential and accessible platform for mental health support, addressing the challenges of stigma and accessibility often associated with traditional counselling services.

Overall, the experimentation results and comparison with state-of-the-art algorithms highlight the effectiveness and potential impact of the Youth YANA Mental Health Counselling Webapp in providing accessible and personalized support for college students facing mental health challenges.

6.3 Testing

6.3.1 White Box Testing

White box testing involves examining the internal structure and workings of the codebase and ensuring its reliability and efficiency. Here's what we're focusing on:

- **Backend Logic Testing**: We're testing the backend codebase to ensure that functions responsible for processing user input, generating questions, and managing user sessions work correctly and efficiently.

– **Data Validation**: Checking that the data handled by the backend is validated properly to prevent errors and maintain data integrity.

– **Error Handling**: Testing how well the backend code handles errors and unexpected situations, ensuring graceful degradation and error messages where appropriate.

6.3.2 Unit Testing

Unit testing involves testing individual components or units of the system to verify their functionality. Here's what we're focusing on:

– **Backend Component Testing**: We're testing individual components of the backend codebase, such as functions and modules, to ensure they perform as expected in isolation.

– **Input Validation Testing**: Checking that input validation functions properly handle various types of user input and reject invalid inputs.

– **Functionality Testing**: Verifying that each function or module performs its intended task correctly, according to the project requirements.

6.3.3 Integration Testing

Integration testing ensures that different components of the system work together seamlessly. Here's what we're focusing on:

– **Backend-Database Integration**: Testing the interaction between the backend code and the database to ensure proper data storage and retrieval.

– **API Endpoint Testing**: Verifying that API endpoints correctly handle requests from the frontend and provide the expected responses.

– **Integration with External Services**: Checking that any external services or APIs integrated with the system function correctly and reliably.

6.3.4 Black Box Testing

Black box testing involves testing the functionality of the system without knowing its internal workings. Here's what we're focusing on:

- **User Interface Testing**: Ensuring that the user interface is intuitive, easy to use, and visually appealing.
- **End-to-End Testing**: Testing the entire application flow from user input to question generation and feedback presentation, ensuring it meets user expectations.
- **Accessibility Testing**: Verifying that the web application is accessible to users with disabilities and complies with accessibility standards.

6.3.5 Test Cases

Test cases are detailed descriptions of specific scenarios to be tested in the system. Here's what we're focusing on:

- Positive Test Cases: Testing scenarios where the system should behave as expected, such as valid user inputs and typical user interactions.
- Negative Test Cases: Testing scenarios where the system should handle errors or unexpected inputs gracefully, such as invalid user inputs or system failures.
- Boundary Test Cases: Testing scenarios at the extreme ends of input ranges or system capabilities to ensure robustness and reliability.

6.3.6 Summary of Black Box Testing

Black box testing evaluates the functional requirements of the system from a user's perspective. Here's what we're focusing on:

- User Satisfaction: Ensuring that the system meets user expectations in terms of usability, functionality, and performance.

- Error Handling: Verifying that the system gracefully handles errors and provides helpful error messages to users when needed.
- Compliance Testing: Ensuring that the system complies with relevant industry standards, regulations, and best practices.

7. Conclusion and Future Scope

7.1 Conclusion

A web-based tool for mental health called YOUTH YANA is intended to assist users in having uncomfortable talks about their mental health. To comprehend users' emotions, the app asks gentle inquiries, and it employs cutting-edge technology to spot possible problems. To ensure that customers feel heard and supported, it provides a cozy, user-friendly atmosphere where they may chat with a counselor immediately. Users have the option to speak with a personal counselor directly and keep all information private if circumstances get challenging. Users of the app may also order and have delivered prescription Medicines. The platform aims to alter how mental health support is viewed by fusing considerate technology with a caring mentality. You are never alone in your journey to better mental health, as YOUTH YANA serves to remind you.

7.2 Limitations of the Project

- **Accuracy of Diagnosis**: The accuracy of AI-driven mental health diagnoses may not be perfect. There can be false positives or false negatives, which could lead to incorrect conclusions about a user's mental health.
- **User Understanding and Honesty**: Users might not always answer surrogate questions honestly or might not fully understand the questions, which could impact the accuracy of the AI model's diagnosis.
- **Access Barriers**: Users without access to a smartphone or the internet won't be able to benefit from the app, limiting its reach.

- **Regulatory Compliance**:In the healthcare and mental health industries, complying with all the regulations can be difficult and complicated, and failure to do so may result in legal problems.

7.3 Future Scope

- **Personalization**: Implement more personalized treatment plans based on individual user profiles, preferences, and progress.
- **Telehealth Integration**: Expand the app's capabilities to include live video consultations with mental health professionals for more comprehensive and immediate support.
- **Machine Learning Advancements**: Stay up-to-date with the latest advancements in machine learning and natural language processing to enhance the app's capabilities and user experience.
- **Collaboration with Healthcare Providers**: Partner with healthcare providers, hospitals, and clinics to offer seamless integration of patient records and referrals to mental health professionals.
- **Gamification**: Incorporate gamification elements into the app to encourage regular use and engagement, making mental health support more engaging.
- **User Accessibility**: Ensure the app is accessible to individuals with disabilities and those with limited access to technology.
- **Global Reach**: Adapt the app for a global audience by offering multilingual support and culturally sensitive content.

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