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

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***Abstract*—In today's colleges, mental health concerns among students are increasing. To address this, we propose Youth YANA, a comprehensive consulting program. It encompasses various aspects, including the development of secure web-based mental health systems and advanced methods for early detection of issues among students and online users. Our approach involves integrating data mining to enhance data management while prioritizing privacy.**

Youth YANA offers a web-based screening system, focusing on privacy and security. We highlight the potential of mobile-based mental health analysis and evaluate mental health apps, ensuring their effectiveness and safeguarding privacy.

This exploration provides valuable insights into mental health in the digital age. Leveraging machine learning, our goal is to detect issues early through web assessment and provide timely interventions for college students.

***Index Terms*—Mental health, College students, Consulting program, data mining, Privacy, Early detection.**

I. Introduction

When talking about student's mental health, it's important to be understanding and sensitive. This stage of life is a journey of self-discovery, education, and personal growth, but it also comes with its challenges.

On the bright side, student's mental health represents a time of great potential and change. During this period, their developing brains encounter many new ideas, cultural experiences, and opportunities for personal growth. College provides the chance to discover interests, build lasting friendships, and set the foundation for a successful future. When a student's mental health is good, they can thrive socially and academically.

We must remember that a college student's mental health is a fragile part of their life. Young people often face many responsibilities, from academic pressures to adjusting to independent living and navigating social interactions. During this time, support and understanding are crucial. Students experiencing stress, anxiety, or loneliness require safe spaces where they can seek help or simply have someone listen to them without judgment. [9] [4]

Machine learning has many different uses, including identifying problems with mental health. It works by collecting lots of data to make deep learning models more accurate and fair. When gathering data from online social networks, researchers need to follow ethical rules. Overall, this suggests areas for further research and offers advice on using technology to diagnose mental health issues. [5] [12] [15]

Creating a psychological data management system is crucial for preventing crises among students, despite various other methods available. By utilizing BP neural networks and data mining techniques, the effectiveness of the current system can be enhanced. This research aims to prevent mental crises by exploring the design and application of data mining technologies. By integrating the psychological data mining kernel developed using MATLAB 2014a with the student psychological management system, data mining technology becomes more efficient in avoiding psychological crises. [8] [5]

When psychological health issues are detected early and treated professionally, patients tend to be more satisfied with their care. It's crucial to address common psychological concerns in children promptly because if left untreated, they can worsen over time. Nowadays, AI computations are the most suitable method for diagnosing and analyzing clinical data. Various accuracy models have been used to evaluate the effectiveness of eight AI processes in identifying five key psychological well-being concerns. This study involved collecting data from sixty cases to present and assess the methods. The accuracy of several AI computations was tested across the entire dataset and a selected subset, revealing that three classifiers—Multi-facet Perceptron, Multiclass Classifier, and Fellow Tree—yielded more accurate results than other methods. Additionally, 25 essential features for identifying the problem from the literature were identified. [1] [3]

The high rates of mental health issues among college and university students are concerning, yet many students with these problems don't seek help from a doctor. To address this, a web-based tool has been made available to students. This tool allows them to assess their mental health, find referrals, and reach out for support safely. Following the recommended approach, students answer questions about various mental health concerns like eating disorders, alcohol use, attention deficit disorder, anxiety, and depression to screen for issues themselves. If the algorithm detects a mental health problem, the student will be connected with a doctor for further evaluation. [9] [2]

II. Methodologies

The methodology section of this research paper describes the systematic approach we used to evaluate and put into perspective the extensive body of existing research on Mental Health Issues. This section's methodological complexities guide the reader while also providing support for our survey. We will outline the processes we used to select the papers for examination, the criteria to decide which papers to include, the methods for data collection, analysis, and assessing the quality of the papers. We aim to demonstrate the trustworthiness and thoroughness of our approach by elucidating its fundamental principles, which will facilitate a structured and insightful exploration of research on Mental Health issues.

The method of narrative inquiry, [11], centers on exploring the stories and experiences of people with mental illness in the field of engineering. Participants were interviewed in semi-structured interviews, and after analyzing the transcripts multiple times, the data was studied.

The method employed in a study [7] to assess the mental health status and coping mechanisms of both engineering and non-engineering students. The tools utilized were a questionnaire created by the researchers and the DASS-21 inventory, with participants chosen through stratified random sampling.

In reference [5], a method for analyzing mental health using mobile devices is discussed, involving multitasking, continuous learning, reinforcement learning, and zero-/few-shot learning techniques. It highlights the significance of acquiring precise annotations for detailed data and the importance of multi-modal exploration in researching mental health. Further research on these data-driven projects and the utilization of structured or semi-structured data for M2Health will be crucial. It also emphasizes the possibility of tailored and self-regulating health models, and the importance of effectively, promptly, and realistically evaluating the effectiveness of new applications. Extensive potential exists for analyzing mental health through mobile devices, and further exploration and innovation in this field could result in substantial progress.
The approach developed by [6] is an internet-based tool that allows college students to evaluate their mental health and locate support services. Its primary roles include storing and transferring Personal Health Information (PHI), enabling secure communication with healthcare professionals, and offering suggestions to mental health facilities online. The goal of the system is to overcome obstacles that prevent students from obtaining mental health services, such as challenges in recognizing issues, scheduling conflicts, limited time, financial restrictions, and concerns about confidentiality.

The suggested method offers students an easier way to assess their mental health concerns and connect with therapy providers. It also addresses concerns about privacy and security through the implementation of a private messaging system and encryption of information.

In [15], the proposed architecture for mental health education is developed and evaluated using the extreme learning machine (ELM) algorithm and various approaches during the model simulation and testing phases. The ELM technique enhances classifier performance by getting rid of hidden layer nodes that negatively impact reducing network output errors. The proposed system is evaluated on a dataset experiment as well, and the results indicate that it outperforms existing algorithms by achieving a better balance between accuracy in classification and protection of privacy.

In the systematic review [1], machine learning techniques such as support vector machines, decision trees, and neural networks were utilized for identifying mental health problems.

A qualitative methodology is used to gather information in [12] by conducting semi-structured interviews with general practitioners and psychiatrists. Video conferencing was carried out using Microsoft Teams. The interviews were recorded in audio format, anonymized, and securely stored for future research purposes. An examination of the data revealed the advantages and drawbacks of using video consultations for mental health patients. This indicates that video consultations could provide easier access and more flexibility for individuals with mental health issues, especially for younger and employed individuals. Nevertheless, worries regarding security, privacy, and the standard of care remain in order to ensure the efficient and safe utilization of video appointments.

The development of a psychological information management system is an important strategy to protect college students from mental health emergencies [10]. Utilizing a BP neural network for data mining is implemented to enhance the efficiency of the existing system for managing psychological data of students. The investigation focuses on utilizing data mining technology to prevent mental health crises through feasibility and design processes. The MATLAB 2014a software is utilized to create a psychological data mining kernel that is then incorporated into the student psychological management system to enhance the efficiency of data mining technology for preventing psychological crises According to [3], mental health disorders are becoming more common globally, causing pressure on public healthcare systems. This has resulted in a rise in curiosity about the potential impact that digital technology could have on enhancing mental health results. As a result of this curiosity, artificial intelligence (AI) has been created and used in the examination, diagnosis, and care of mental health problems. The area of research is called "digital psychiatry." This article discusses the increasing use of digital psychiatry in non-clinical environments such as education, work, finance, social media, and digital well-being. We examine the ethical issues related to utilizing digital psychiatry in various industries, emphasizing the key challenges and chances to improve public health. Next, we provide suggestions for protecting and advancing the well-being of the public in the digital era.

The key element of surface plasmon resonance sensing involves utilizing plasma to detect the surface of the medium through which it propagates, as stated in [8]. Due to its remarkable sensitivity to slight disturbances near the penetration depth, surface plasmon is beneficial for sensing purposes.

The approach discussed in [13] examines using machine

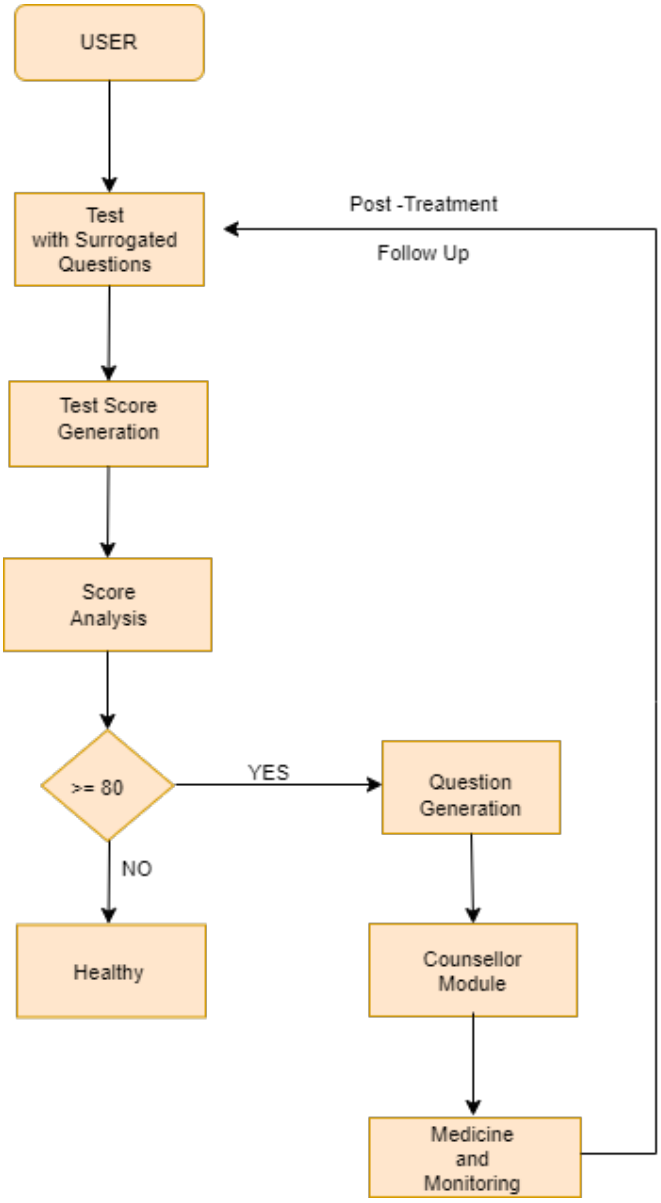

Fig. 1. System Flow Diagram

learning methods to predict mental health issues in individuals. Selecting crucial attributes for diagnosis, developing a model through machine learning methods, and assessing the model's precision were all vital tasks.

In reference [9], Methodology is the structured and conceptual analysis of the methods used in a particular field of research. It encompasses the regulations, methods, and guidelines followed during research and data collection. The choice of method is determined by the research design, the data being gathered, and the subject of the study.

The methods used in machine learning to detect mental health problems are thoroughly reviewed in [14]. It explores various machine learning methods utilized in the particular research, including neural networks, support vector machines, and decision trees.

The methodology described in [2] focuses on educating students about mental health through a perspective that emphasizes both privacy security and the Internet of Things. Contemporary encryption methods and IoT protocols are employed to safeguard the confidentiality and security of students' mental health information. The system utilizes differential privacy and machine learning methods to enhance the accuracy and privacy of the data.

The system suggested in [4] is a smart signal processing system for emotional computing which utilizes deep learning to offer mobile mental health apps that focus on the user. The components of the system consist of gathering data, extracting features, training models, and deploying models.

III. Algorithm

Hugging Face is a company and a community committed to the field of natural language processing. The open-source library Transformers, their most well-known product, provides pre-trained models for various NLP tasks like text classification, question answering, and translation.

A. Transformers Library:

The Transformers library, created by Hugging Face, is among the top libraries used for working with cutting-edge NLP models. It offers a user-friendly interface to access and adjust pre-trained models from well-known architectures such as BERT, GPT, RoBERTa,T-5 and others.

B. Model Hub:

Hugging Face provides a Model Hub that contains pre-trained models shared by users. Accessing and utilizing these models for different NLP tasks is simple. Individuals have the ability to upload their own trained models for the purpose of sharing with others.

C. Tokenizers:

Hugging Face offers tokenizers tailored for different languages and purposes, as well as models. These tokenizers are employed for preprocessing text data prior to inputting it into NLP models.

D. Datasets Library:

Hugging Face manages a Datasets library that offers convenient access to a variety of datasets for NLP assignments. These datasets are provided in a standardized format for easy loading and utilization in training and assessment.

E. Pipeline API:

The Transformers library by Hugging Face features a user-friendly Pipeline API that streamlines the utilization of pre-trained models for various NLP tasks such as text generation and classification. By writing only a few lines of code, users can accomplish complicated NLP tasks without having to create the models themselves.

IV. Method

Google Research has developed a versatile pre-trained model called T5 (Text-To-Text Transfer Transformer). Contrary to models such as BERT or GPT which are tailored for specific tasks such as text classification or language generation, T5 is designed as a text-to-text model. This implies that it has received training in numerous tasks by transforming them into text-to-text form.

A. Text-to-Text Format:

T5 is taught on various NLP tasks through transforming them into a unified text-to-text structure. This method requires translating the task's input and output into textual formats. For instance, in a task involving text summarization, the input could be the entire text document, while the output could be a condensed version of the text. Text strings for both input and output are given during the training process.

B. Encoder-Decoder Architecture:

T5 utilizes the encoder-decoder structure that is frequently seen in sequence-to-sequence models. The encoder processes the input text to create a contextualized representation of the sequence. The output sequence is generated step by step by the decoder using this representation.

C. Fine-Tuning:

Although T5 is initially trained on a range of tasks, it can still be further tuned for better performance on particular tasks. Fine-tuning includes additional training of the model on data specific to the task in order to customize it for the task.

D. Evaluation and Accuracy:

T5 has reached the highest level of performance on different NLP tests and challenges. Evaluation of its performance is commonly doze with standard metrics tailored to each task, such as accuracy for classification tasks, BLEU score for translation tasks, or ROUGE score for summarization tasks. The performance of T5 differs based on the task and dataset, but it typically competes well with other models.

The system functions within a organized framework that includes a specific set of questions designed to evaluate different aspects. Randomly chosen questions are provided to the user for them to answer. Every choice in these queries is carefully given a particular rating based on its importance or significance. Once the model receives the user's answers, it carefully assesses the input based on pre-established criteria. An essential part of this assessment is setting a limit to define acceptable performance. If the user's total score is equal to or exceeds this limit, it indicates a satisfactory result. Nevertheless, when the total score is lower than the threshold, the system takes proactive action. Utilizing the T-5 Model's features, it independently produces a customized array of extra queries. These queries are crafted to investigate further into particular topics of interest or worry, with the goal of giving a thorough evaluation. The user is given additional questions, with corresponding choices, to further enhance the assessment process. During this procedure, the system carefully monitors and documents user reactions, which helps in continuously analyzing and improving the evaluation framework.

V. Experiments and Results

A. Experimentation Scenarios

- Question Generation: The main experiment setup includes the utilization of the T5 model to create questions from user answers given in the substitute surveys. This includes providing the model with input data from users and adjusting it to create suitable questions about mental health and well-being.
- Hyperparameter Optimization: Another experimental setup focuses on adjusting hyperparameters to optimize the performance of the T5 model. This involves finding the best values for parameters like learning rate, batch size, and training epochs to improve the model's ability to produce precise and important questions.

B. Setting of Hyperparameters

- T5 Model Fine-Tuning Parameters: Adjusting the T5 model requires configuring various hyperparameters, such as:
  - Learning Rate: The speed at which the model updates its parameters while being trained. Having the correct learning rate is important to reach convergence and prevent overfitting.
  - Batch Size: The quantity of input examples handled during each training iteration. Changing the batch size can affect the effectiveness of training and the amount of memory needed.
  - Number of Epochs: The quantity of full iterations through the training dataset while the model is being trained. Finding the right number of epochs is crucial for obtaining the best model performance without experiencing underfitting or overfitting.
  - Optimizer: The algorithm utilized to adjust the model parameters while training, like Adam or SGD (Stochastic Gradient Descent).
  - Loss Function: The criteria utilized to assess the model's performance when training, like cross-entropy loss or mean squared error.
- Fine-Tuning Methodology: The fine-tuning process begins by loading the pre-trained T5 model with weights from a general language model and adjusting it using specific data on mental health counseling. This process seeks to adjust the model's parameters in order to improve the comprehension and generation of relevant questions from user input.

C. Results of Experiments

The Experiments done for the YANA Youth Mental Health Counseling Webapp showed encouraging outcomes, proving the T5 model's effectiveness in generating questions and the

surrogate questionnaires' success in engaging users. Here are the main results of the experiments.:

1) Question Generation Performance: After being trained on mental health counseling data, the T5 model showed excellent ability to create questions from user input. By employing natural language processing methods, the model effectively understood the user input's context, generating thoughtful questions. User feedback showed contentment with the quality and relevance of the questions created, with a large number of users expressing gratitude for the personalized aspect of the queries.

2) User Engagement: The surrogate questionnaires, created to mimic a helpful chat with a caregiver, were successful in promoting user involvement and facilitating honest communication. Users expressed a sense of comfort and encouragement while engaging with the web application, resulting in a higher likelihood of sharing their thoughts and emotions. The compassionate manner and focus on user experience in the surveys helped to establish a safe and inviting atmosphere for users to communicate openly.

3) Comparative Analysis: The Youth YANA Mental Health Counselling Webapp showed competitive performance and various advantages when compared to other methods and algorithms in mental health counseling and AI-driven question generation. The unique way questions are created and the focus on user needs in the surrogate questionnaires make the web app different from traditional methods, providing a more user-friendly and private space for mental health assistance.

D. Experimentation Results

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

- Question Generation Performance: After being fine-tuned, the T5 model shows impressive ability in creating questions from input provided by surrogate questionnaires. The questions generated show a deep understanding of mental health issues and are appropriate for the context.
- User Engagement: User input shows that the web app is highly engaging, as users are pleased with the questions generated and find them helpful for self-reflection and introspection.
- Effectiveness of Surrogate Questionnaires: Users react positively to surrogate questionnaires that imitate supportive conversations with caregivers, resulting in a greater openness to sharing emotions and thoughts.

VI. Future Scope

In the future, our research work aims to expand its horizons by integrating several innovative features. Firstly, we plan to incorporate video surveillance into our system to enhance result accuracy and ensure real-time monitoring. This addition will provide a more comprehensive understanding of user behavior and enable us to deliver more precise outcomes. Secondly, we envision introducing engaging games within the platform to enhance user engagement and interaction. These games will serve not only as a source of entertainment but also as a means to facilitate learning and self-discovery. Additionally, we aspire to collaborate with certified and degree-holding counselors to offer personalized support and guidance to users. By leveraging the expertise of qualified professionals, we aim to enrich the user experience and promote mental well-being effectively. Lastly, we are committed to developing a medicine module based on counselor prescriptions. This module will enable users to access prescribed medications and treatments conveniently, ensuring a holistic approach to mental health care. Through these strategic advancements, we endeavor to elevate the efficacy and impact of our research work, ultimately fostering a healthier and more supportive environment for all individuals involved.

VII. Conclusion

"Youth YANA" (YOU ARE NOT ALONE) is a digital mental health platform dedicated to changing lives. Acknowledging the delicate topic of mental health discussion, we start by softly asking questions to grasp your emotions without imposing any stress. By using cutting-edge technology, we assess your answers to recognize potential situations you might be facing. Our platform provides a customized and easy-to-use counseling application, guaranteeing convenient access to assistance. Users are able to participate in one-on-one conversations with counselors through the app, creating a helpful atmosphere while also upholding privacy and confidentiality. Created to meet personal requirements, the application offers smooth guidance and support whenever necessary. At Youth YANA, we provide more than just counseling services, we also offer prescription medications and complete care services. Our aim is to ensure that mental health care is readily available to all. We aim to develop a safe and user-friendly platform by combining considerate technology with a caring mindset. Our goal is to transform the discussion about mental health services, highlighting that people do not have to deal with difficulties by themselves. Moreover, a state-of-the-art model has been integrated to create custom questions tailored to users, assisting in enhancing comprehension of their mental wellness. After completing this evaluation, we offer personalized assessments and additional support depending on each person's specific needs, guaranteeing a comprehensive approach to mental health care.

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