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CalmQuest Using Machine Learning

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Abstract - Mental health is a vital aspect of overall well-being, and there are various ways to improve it. A multifaceted approach that involves psychotherapy, mindfulness-based interventions, physical exercise, medication, self-care practices, social support, education, and workplace support can be effective in promoting mental health and well-being. By prioritizing mental health and seeking appropriate support, individuals can lead fulfilling lives and reach their full potential. Prevention and early intervention are crucial to promoting mental health and reducing the negative impact of mental health disorders on individuals, families, and society as a whole.

This project revolves around a dynamic website equipped with a Chabot and a range of multimedia resources to provide accessible and personalized assistance to individuals navigating their mental health journeys. The website serves as a virtual haven, offering a user-friendly interface and intuitive navigation. Upon arrival, visitors are greeted with a warm welcome and guided towards the Survey. The Chabot - an empathetic and knowledgeable companion available 24/7 engages users in meaningful conversations, understanding their concerns, and offering tailored guidance along with valuable mental health resources.

Key Words: Anxiety, Depression, Web Application, Prediction, Sentiment Analysis, Machine Learning, Classification, Random Forest Classifier, Mental Health.

1.INTRODUCTION

Mental health is an essential component of an individual's overall well-being, encompassing their emotional, psychological, and social functioning. It is a state of well-being in which an individual can cope with the stresses of life, work productively, and contribute to their community. Good mental health allows individuals to form healthy relationships, make sound decisions, and manage their emotions effectively.

However, mental health disorders can disrupt an individual's emotional, psychological, and social functioning, leading to a range of negative consequences. Mental health disorders can affect people of all ages, genders, and backgrounds and can be caused by a variety of factors, including genetics, environmental factors, and life experiences. Common mental health disorders include depression, anxiety, bipolar disorder, schizophrenia, and post-traumatic stress disorder (PTSD).

Effective treatment for mental health disorders often involves a combination of therapy, medication, and lifestyle changes. Early intervention and prevention are crucial in promoting mental health and reducing the negative impact of mental health disorders on individuals, families, and society as a whole. In recent years, there has been a growing awareness of the importance of mental health, and efforts to promote mental health and reduce the stigma associated with mental illness have gained traction.

Mental sickness is one of the most dangerous and life threatening ailments. One must always take good care of their mental state of mind. There are various proposed system to identify the mental conditions of an individual. These systems were developed using some combination of machine learning algorithms working with collected data sets to train and test the model.

1.1 Machine Learning

Machine Learning (ML) is a subset of artificial intelligence (AI) that involves the use of statistical and computational algorithms to enable computer systems to learn from data and make predictions or decisions without being explicitly programmed.

In other words, machine learning algorithms can automatically learn patterns and relationships from input data and then use this knowledge to make predictions or take actions on new, unseen data. The process of machine learning typically involves the following steps: data collection, data preprocessing, feature extraction, model selection, training, evaluation, and deployment.

In machine learning, a computer system is trained on a dataset and learns to recognize patterns and make predictions or decisions based on that data. The algorithms are designed to identify and learn from patterns in the data, and to make predictions or decisions based on new, unseen data.

1.2 Classification

Classification is a process of categorizing objects or data points into different classes or categories based on their features or attributes. In machine learning, classification is a type of supervised learning that involves training a model to classify new data points based on patterns and relationships learned from a labeled dataset.

In a classification problem, the input data consists of features or attributes, and the output is a class label. The goal of the classifier is to learn a mapping between the input features and the class label, so that it can accurately predict the class label of new, unseen data points. Identify and learn from patterns in the data, and to make predictions or decisions based on new, unseen data.

1.3 Python

Python is a high-level, interpreted programming language that is designed to be easy to read, write, and maintain. It was created in the late 1980s by Guido van Rossum and is now one of the most popular programming languages in use today. Python is known for its simplicity, readability, and flexibility, as well as its wide range of libraries and frameworks that make it suitable for a variety of applications, including web development, scientific computing, data analysis, artificial intelligence, and more. It is open-source software, which means that it is free to use and modify, and it runs on most major platforms, including Windows, macOS, Linux, and UNIX unseen data.

In this project, we have used following Python libraries:

1.3.1 Pandas

Pandas is an open-source data manipulation and analysis library for the Python programming language. It provides a fast, efficient, and flexible way to work with structured data, such as spreadsheets and databases. Pandas offers a range of tools for data manipulation, including data cleaning, reshaping, merging, and slicing. It also provides advanced functionality for data analysis, such as statistical analysis, time series analysis, and data visualization.

1.3.2 Pickles

Pickling is a process of serializing and de-serializing Python objects, which allows objects to be saved to disk and retrieved later. The Pickle module in Python provides an easy and efficient way to pickle objects, which can then be stored or transmitted across different platforms.

There are several reasons why one might choose to use Pickle:

- Persistence
- Efficiency
- Compatibility
- Security
- Flexibility

2. BACKGROUND AND MOTIVATION

In our daily life, mental health is need of essential. Mental health is an essential component of an individual's overall well-being, encompassing their emotional, psychological, and social functioning. It is a state of well-being in which an individual can cope with the stresses of life, work productively, and contribute to their community. Good mental health allows individuals to form healthy relationships, make sound decisions, and manage their emotions effectively.

LITERATURE REVIEW

Here are some literature reviews on mental health improvement websites and apps:

1."A Systematic Review of Mental Health Mobile Apps: Usefulness, Engagement, and Integration with Treatment" by Ben-Zeev et al. (2015)

This review examines the usefulness, engagement, and integration of mental health mobile apps with treatment. The authors found that mental health mobile apps have the potential to improve mental health outcomes by increasing engagement in treatment and providing access to resources and tools for self-management.

2."Digital Mental Health Interventions: A Systematic Review and Meta-analysis of Randomized Controlled Trials" by Torous et al. (2017)

This review assesses the effectiveness of digital mental health interventions, including websites and apps, in improving mental health outcomes. The authors found that digital interventions have a small to moderate effect on reducing symptoms of depression and anxiety, and that the interventions are particularly effective when they are guided by a healthcare professional.

3."Evaluating the Impact of Web-Based Cognitive Behavioral Therapy (W-CBT) on Mental Health Outcomes in a Primary Care Population with Depression or Anxiety: A Randomized Controlled Trial" by Kordy et al. (2018)

This study evaluates the impact of a web-based cognitive-behavioral therapy (W-CBT) program on mental health outcomes in a primary care population with depression or anxiety. The authors found that the W-CBT program was effective in reducing symptoms of depression and anxiety, and that participants reported high satisfaction with the program.

4."Mental Health Apps in the UK: A Survey of Adoption and Usage" by Firth et al. (2019)

This survey examines the adoption and usage of mental health apps in the UK. The authors found that mental health apps are widely used, particularly among younger individuals, but that there is a need for better regulation and quality control of the apps.

In summary, literature reviews suggest that mental health improvement websites and apps can be effective in improving mental health outcomes, increasing access to care, and reducing barriers to treatment. However, the effectiveness of these interventions depends on several factors, including user engagement, usability, personalization, and cost-effectiveness.

MOTIVATION

During pandemics (from 2 years) because of strict lockdown we had to stay in home. We had a lot of time as we had nothing to do, we people keep thinking about various stuff and because of over thinking, frustration, less confidence we get annoyed/angry Isolation, jobless, loss of money and many more thoughts revolves in our mind and that impacts our mental health. Many peoples became drug and alcoholic addicted. Peoples can't speak about their mental health openly. They have fear that anyone will judge them and tease them.

Thus a mental health website project can be a powerful way to support people who are struggling with mental health challenges, reduce stigma and increase awareness about mental health issues, and provide valuable resources and support to individuals, families, and communities. Here are some potential motivations.

- Addressing a growing mental health crisis
- Improving access to mental health care
- Advancing mental health search
- Raising awareness
- Reducing Stigma

3. METHODOLOGY

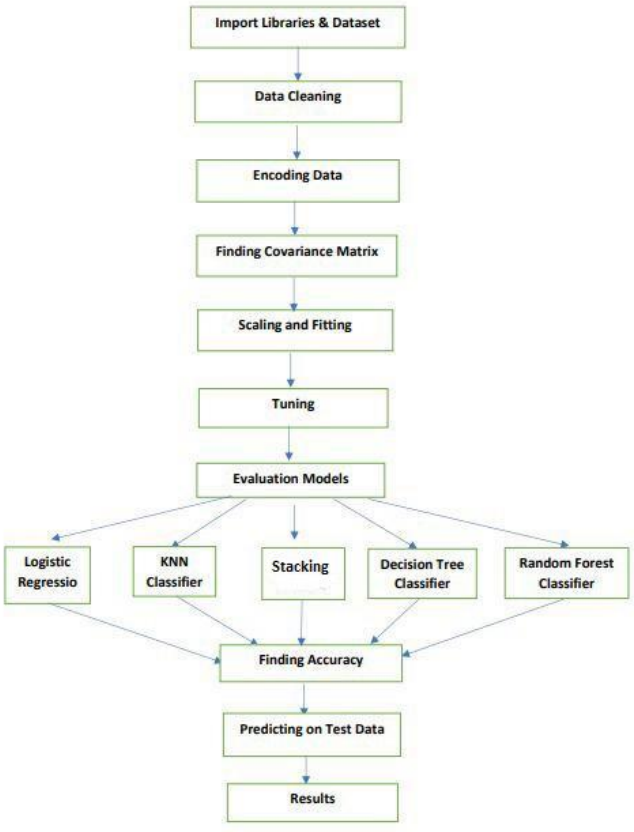

Fig -1: Steps to Carry Out Investigation

List of steps used to carry out the investigation are as follows:

1) Library and Data Loading
2) Data Cleaning
3) Encoding Data
4) Comparison between categories of variables
5) Data Relationship
6) Tuning the data
7) Evaluating Models
8) Random Forest Classification
9) Creating Predictions on Data Sets
10) Submission

4. PROPOSED SYSTEM

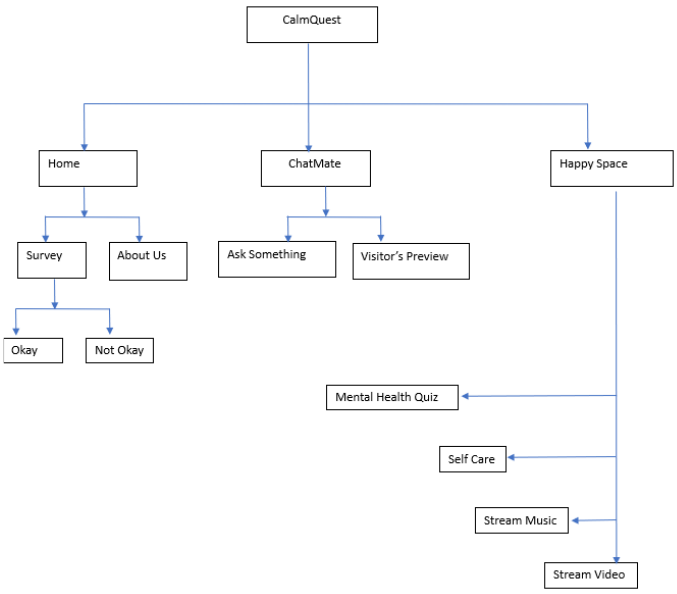

Fig -2: Architecture diagram of our system

The Figure represents the architecture of our system and the application. The Random forest Machine Learning Algorithm not only will predict the diseases but also its sub diseases. Map Reduce Algorithm which increases the efficiency of the operation and also it reduces the retrieval time of the query.

The proposed system is different from the ancestor's thought of execution It uses random forest machine learning procedure for calculating diseases and its respective sub diseases which in turn increase the efficiency and performance and query response time is reduced too. Along with that, it gives separate patterns to each patient which gives the patient personalized experience.

In addition to that, it provides definite rations for specific patients to pattern his/her condition. Thus, making our system broadly open by all at moderate cost. algorithms working with collected data sets to train and test the model.

5. Result and Discussion

CalmQuest is a web application can be used as a mental health improvement tool to reduce anxiety and stress like problems in youth. This is featured with some of the curing techniques and a quiz/survey is taken from the user to analyze the mental health status of the user and then they can treat themselves as they wish using the certain option provided in the website, benefits of CalmQuest:

- Free to use.
- Music therapy is provided.
- Self-assessment quiz is provided to make user feel relaxed.

- Chat and review section is very interesting and useful for users to share their thoughts.
- Thoughts are written on each page of this website so that it will keep user motivated throughout the journey on this.
- Interactive and calm themes are used.

Fig -3: Home Page of our Project

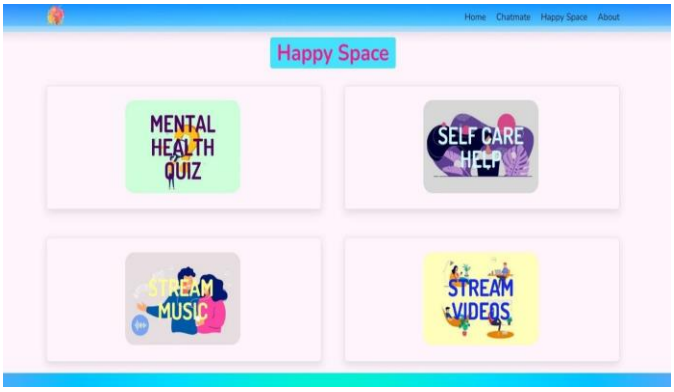

Fig -4: Happy Space Section with Multimedia

This proposed system reduces the error rate and simultaneously increases the percentage of accuracy.

5.1 Decision Tree

The existing system is decision tree part of supervised learning used for classification of problem. Works by following a set of if-else condition to represent the data and categorize them.

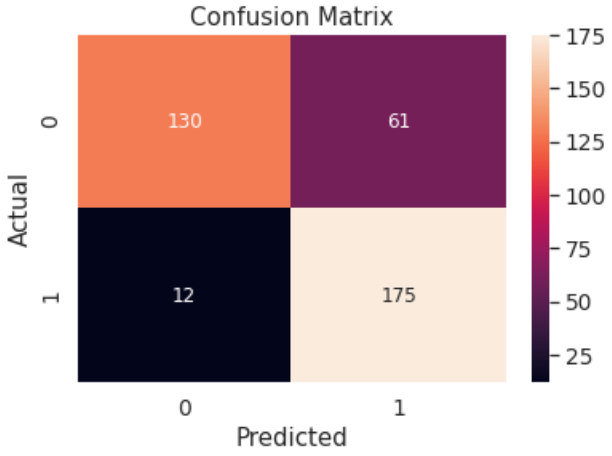

Fig -5: Confusion Matrix of Decision Tree

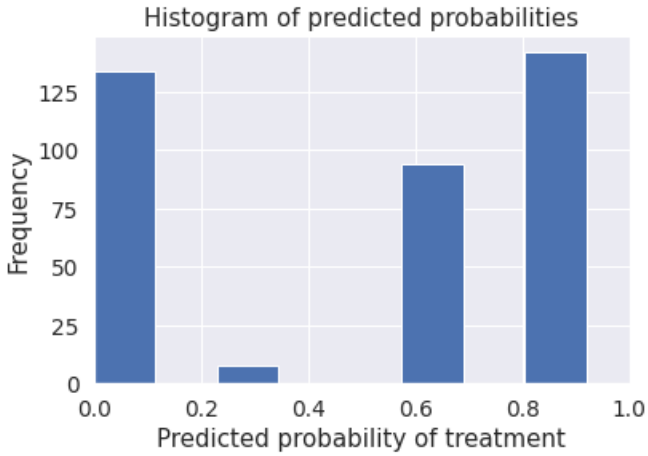

Fig -6: Histogram of Predicted Probabilities

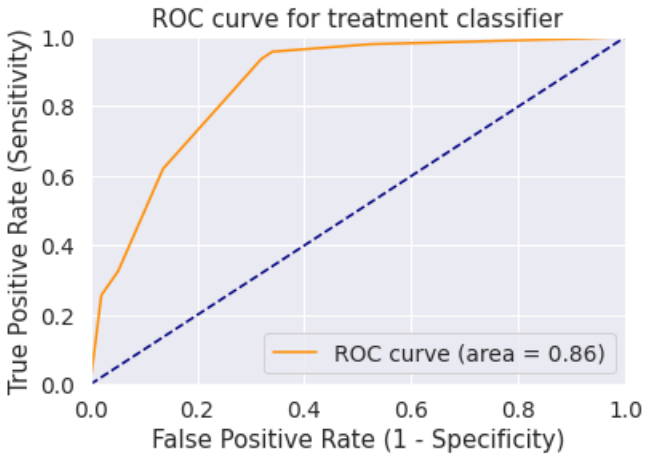

Fig -7: ROC curve for Treatment Classifier

5.2 Random Forest Algorithm

The proposed system uses random forest algorithm since it consists many decision trees within them, they use feature randomness while building each single tree to create the uncorrelated forest containing trees so that accuracy produced by this system automatically increases.

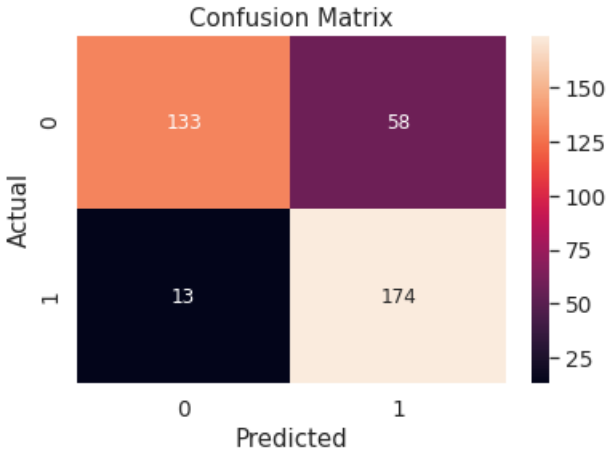

Fig -8: Confusion Matrix of Random Forest Algorithm

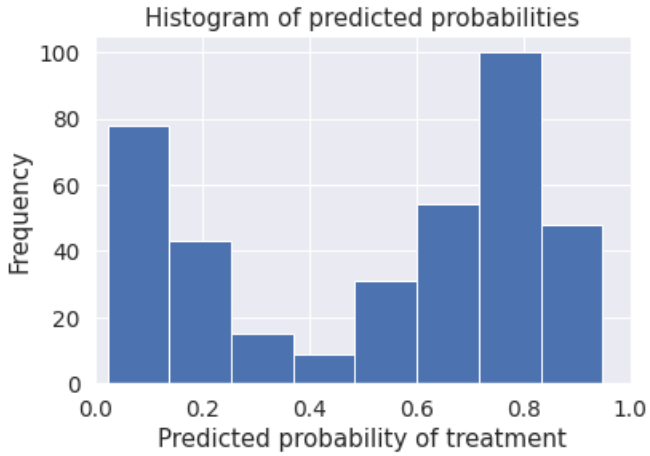

Fig -9: Histogram of Predicted Probabilities

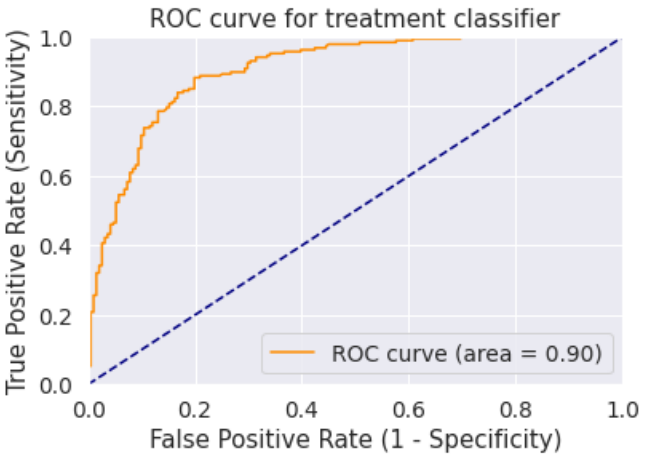

Fig -10: ROC Curve for Treatment Probabilities

6. CONCLUSIONS

In conclusion, a mental health improvement website provides easily accessible resources, reducing stigma, and increasing awareness and understanding of mental health issues, a mental health improvement website can help to improve outcomes for people who are struggling with mental health challenges. Through careful planning, thoughtful content development, and ongoing attention to user feedback and website performance, a mental health improvement website can be a powerful tool for promoting mental health and improving outcomes for individuals, families, and communities. It is important to continue to prioritize mental health and well-being, and a mental health improvement website can be one way to do so.

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