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Mental Health Disorder Anticipation Using ML and Blockchain

Ashwini Gosavi[1], Suvidya Ubale[2], Abhishek Turukmane[3], Kaustubh Chaudhari[4]
Students, Department of Computer Engineering[1,2,3,4]
Sinhgad College of Engineering, Pune, Maharashtra, India

Abstract: *In recent years, mental health has been one of the most ignored, yet critical, aspects of our overall well-being. This study proposes a system for a virtual mental health web-app due to financial, time, and space constraints, as well as a scarcity of resources. Mental illness is typically a snowball effect that demands regular monitoring and deliberate efforts to improve. This is possible with the help of a virtual mental health web-app. A conversation function, psychological examination, emotion recognition module, and mood improvement counselling system will all be included in the suggested web-app. We used a Decision Tree Classifier and Encryption. In terms of accuracy, our method outperformed the Decision Tree Classifier.*

Keywords: Deep Learning, Machine Learning, Decision Tree Classifier, Encryption, Natural Language Processing, Mental Health

I. INTRODUCTION

Mental health has become one of the most ignored, yet most serious, components of our entire well-being in recent years. Due to cost, time, and space constraints, as well as a scarcity of resources connected to in-person counseling, this study presents a system for a virtual mental health web app. Disturbed mental health is frequently a snowball effect that demands constant attention and purposeful efforts to improve. With the support of a virtual mental health web app, this is achievable. An objective type questions function, psychological assessment, and an emotion recognition module will all be included in the proposed assistant. For sentiment analysis, we employed the Decision Tree Classifier. Our approach outperformed the Decision Tree Classifier in terms of accuracy.

1.1 Problem Statement

To improve this technology so that people with mental diseases are not discovered and the number of persons with mental illnesses is reduced. We employ Decision Tree Classifier methods and natural language processing algorithms to identify these illnesses.

1.2 Project Scope

Scope of practice assists in the continued growth of the mental health workforce while also educating health systems, legislators, and regulators. A job description, a task list, or a metric for gauging outcomes are not the same as a scope of practice. However, it does demonstrate the breadth of a mental health nurse's responsibilities. This technique is also being used to improve precision. As a result, extensive study has been performed to address this problem. Despite this, the bulk of existing surveys focus on certain aspects of mental health detection or have a high degree of dimensionality.

II. SYSTEM ARCHITECTURE

2.1 Algorithm

A. Decision Tree Classifier Algorithm

Decision Tree is a Supervised learning technique that can be used for both classification and Regression problems, but mostly it is preferred for solving Classification problems. Below are the two reasons for using the Decision Tree:

1. Decision Trees usually mimic human thinking ability while making a decision, so it is easy to understand.
2. The logic behind the decision tree can be easily understood because it shows a tree-like structure.

In a decision tree, for predicting the class of the given dataset, the algorithm starts from the root node of the tree. This algorithm with the record (real dataset) attribute and, based on the comparison, follows the branch and jumps to the next

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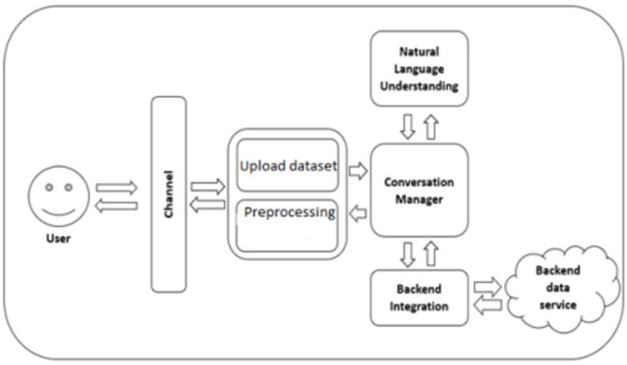
node. For the next node, the algorithm again compares the attribute value with the other sub-nodes and moves further. It continues the process until it reaches the leaf node of the tree.



2.2 Encryption Algorithm

The Fernet encryption algorithm guarantees that a message encrypted using it cannot be manipulated or read without the key. Fernet is an implementation of symmetric authenticated cryptography. Fernet also has support for implementing key rotation via MultiFernet.

A. Limitations of Encryption

Fernet is ideal for encrypting data that easily fits in memory. As a design feature, it does not expose unauthenticated bytes. This means that the complete message contents must be available in memory, making fernet generally unsuitable for very large files at this time.

B. Database Security with Fernet Encryption algorithm

Classmethod generate_key()

Generates a fresh fernet key. Keep this someplace safe! If you lose it you will no longer be able to decrypt messages; If anyone else gains access to it, they will be able to decrypt all of your messages, also they will be able to forge arbitrary messages that will be authenticated and decrypted.

encrypt(data)

Encrypts data passed. The result of this encryption is known as the “Fernet token” and has strong privacy and authenticity guarantees.

Parameters: data(bytes)- the message you would like to encrypt.

Returns bytes: A secure message that can not be read or altered without the key. It is URL-safebased64-encoded.

This is referred to as a “Fernet Token”.

Raises: TypError - This exception is raised if data is not bytes.

Decrypt(token,ttl=None)

Decrypts a Fernet token. If successfully decrypted you will receive the original plaintext as the result, otherwise an exception will be raised. It is safe to use this data immediately as a Fernet verifies that the data has not been tampered with before returning it.

Parameters: 1)token(bytes or str) - The Fernet token.This is the result of calling encrypt().

ttl(int)- optionally, the number of seconds old a message maybe for it to be valid. If the message is older than ttl seconds (from the time it was created) an exception will be raised. If ttl is not provided (or is None), the age of the message is not considered.

Returns bytes - The original plaintext.

Raises - 1)cryptography.fernet.InvalidToken

If the token is in any way invalid, this exception is raised. A token may be invalid for many reasons: it is older than the ttl, it is malformed, or it does not have a valid signature.

TypeError - this exception is raised if the token is not byres or str.

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III. LITERATURE SURVEY

[1] This paper brings to notice difficulties faced by doctors while diagnosing bipolar disorder. The dataset was fed to decision. Decision Tree classifier which helps in determinig significant feature in dataset which makes it decision factor at level of decision tree.Increasing, social media, student pressure, stress level, have led to unstable minds of teenage. We have used mood disorder questionnaire (MDQ) to classify and predict whether an individual is having bipolar disorder or not. It is classied into two types hypomania and mania. In hypomania mood swings last for short period while in mania they last for longer period of time. We have made MDQ on symptoms of mania because it does not consists of normal mood swings. Based on answers it will analyse and predict whether individual is having biploar disorder or not. From this study, we can conclude that Mood disorder Questionnaire is best method for bipolar detection by machine learning approach. By using this we can generate decision tree for different regions and can be further used.

[2] In case of working professionals mental health has always been challenging issue. The hectic lifestyle over a period of time leads to mental disorder like mood disorder and anxiety disorder. To overcome these issues, industries provide mental health incentivies to employees, but which is not enough to deal with problems. We process data from survey 2019 which contains data of professionals for both technical and non-technical employees. To predict mental health of employee we have processed data which finds features influencing mental health of employees. The features can be professional and personal both. To find best accuracy we have applied multiple machine learning algorithms. We have applied KNN, SVM, Logistic regression, Decision tree, Random forest, Navie Bayes amongst which Decision tree had best accuracy which is 84% with precision 83 followed by navie bayes with accuracy of 84% and precision 82. Paper contributes to proove that gender and company type both can have some influence on mental disorder. We can use deep learning and hybrid classifier for improving accuracy.

[3] There are early studies to attempt users for psychiatric counseling with chatbot. They lead to changes in drinking habit based on intervention approach via chat bot. The application does not con-sider the user's psychiatric status through the conversations, continuous user monitoring, and ethical judgment in the intervention. We contend that more accurate and continuous emotion recognition gives better satisfaction to users who need mental health care. In addition, appropriate clinical psychological response based on ethical responses is as well. We suggest a conversational service for psychiatric counseling that is adapted methodologies to understand counseling contents based on of high-level natural language understanding (NLU), and emotion recognition based on multi-modal approach. The methodologies enable continuous observation of emotional changes sensitively. In addition, the case-based counseling response model that combines ethical judgment model provides a suit- able response to clinical psychiatric counseling.

[4] Knowledge workers are the people who suffer from chronic stress. Due to deterioration of domestic economic situation stress at workplace is increased. In this paper to manage stress menatal health management system has been introduced. By collecting and analyzing data through physiological sensor it is determined that whether workers are stressed or not. There can be other types of data such as environmental data and task data. The goal of system is to develop such a mental health management system which combines multiple heterogeneous environmental, wearable data sources into valuable information and analyze stress. The system collects data such as working information, task information, environmental information and which is used for training and predicting purpose. Most of the data is collected using sensors Task information is handled by user as they register tasks over the system and data is collected periodically. We gather self report from mobile application which is designed by us. 3 types of mobile self-reports are generated, daily, weekly and periodic self -reports. Stress prediction and analysis block predicts and analyse stress using machine learning algorithm. In future, we will develop more efficient stress models which has human factors which are related to psychological elements.

[5] The basic idea of this paper is to determine the various factors affecting mental health apps both on positive and negative basis. We have collected user reviews for 105 mental health apps on google play and app store. Applied natural language processing techniques to preprocess data and for analysis. By automatically annotating reviews on user rating ground truth data is prepared. Vectorized the review using term frequency-Inverse document frequency techniques. Develpoed five supervised machine learning classifier for predicting sentiment polarity. Trained classifier by performing a binary classification experiment. Best performing classifier to predict sentiment polarity of unlabelled or unannotated reviews. SGD achieved best F1 score of 89.42% followed by SVM, LR, MNB with 89.39%, 89.37%, 89.07% respectively. Factors affecting the effectiveness of apps negatively are : usability issues, content issues, ethical issues, billing issues, customer support issues.We have also addressed the negative factors : Developers should create usable apps which should of high

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quality, complete, accessible and should provide features that support users in tasks, it should be low cost and ensure fare billing prices, privacy and security should be maintained. As part of future work extend approach to apps in other domain to uncover strengths and weakness and offer design that app developer can adopt.

[6] Electronic records helps people prevent diseases, cure it, provide basis for medical institutions and pharmaceutical companies. Security and integrity problems of electronic data is intractable. Based on cyphertext policy attribute-based encryption and IPFS strorage environment with blockchain technology combined we have constructed an attribute -based encryption for secure and efficient storage and sharing of medical records in IPFS environment. ciphertext policy attribute encryption controls access of electronic medical data and does not affect retrivel. Encrypted electronic data is stored in decentralized interplanetary file system which not only ensures security but also solves problem of single point failure. Advantages of our scheme are: Secure content storage, Verifiable keyword search, Access control. Attribute - based encryption technology with the help of this, people who are not related to patient cannot see the private data without authorization. IPFS storage platform was introduced to replace semi-honest but curious server to ensure security and also originality and tarcebility of data and solving security deficiency of central authority.

[7] patients and doctors spend time querying the required data when accessing electronic health records, but still obtained data are not so accurate and also access is sometimes restricted. This study proposes a medical data sharing scheme based on permissioned blockchain, which use ciphertext-based attribute encryption for confidentiality and access control. For ensuring patients identity, a polynomial equation is used to achieve an arbitary connection of keywords and blockchain is combined.without introduction of third-party search using keywords and cypertext stored separately on permissioned blockchain, which not only solves problem of semi-honest search but also limited blockchain storage space. Ciphertext-based attribute encryption is used to satisfy multi-user retrivel and realize fine-grained access. Arbitrary connection of multiple keywords is achieved by using polynomial equation which improves accuracy of data retrivel.The data public audit mechanism is adopted to achieve identity authentication of doctors, prevents doctors from uploading electronic records with false identity and ensure authenticity and reliability of uploaded data.

[8] This paper proposes a secure and lightweight algorithm encryption technology for protecting patients medical images privacy. It also included different security measurements, encounter parts, techniques for medical images encryption. Also various encryption techniques using encryption quality, memory requirement, and execution time were discussed. the study found that current method generated key based unsystematic sequence number that creats an enormous computation time. so as to secure medical images algorithm is designed to get optimum security. encryption techniques uses 3 stages for encryption of image considering 256 bits key value. Traditional encryption techniques cannot be applied directly to e-health data so, patients may lose privacy of data. such security threats have proposed several images encryption techniques to mitigate security problems. Thus, this paper has an lightweight encryption algorithm to develop a secure image encryption for medical industry. Numerous test images used to determine performance of algorithm. This algorithm for image cryptosystems has better efficiency than traditional techniques.

[9] In comparison with paper-based patients record electronic medical record have significant advantages for storage and retrival. Existing data scheme have issues with security, verifying authenticity of data source. To reslove this issues we have used cryptosystem and blockchain. Encrypted data are stored in cloud then address and information is written in blockchain. which ensures effective storage and no possibilty of irreversible modification. This scheme also combines attribute based encryption and attribute based signature used in many to many communication. ABE achieves privacy and access control while ABS verifies authenticity. operations of ciphertext decryption to CSP
reduces computational burden. It satifies immutability and unforgeability. All this results in high performance in computation and security as well.

[10] Sharing of medical files is a key point. This paper proposes medical file sharing based on blockchain and decentralized ABE. Patients have complete control over their files and need not worry about information leakage. decentralized model not only executes idea of decentralization but also it eradicates management problems by centralized institutions. It is more feasible due to safety and performance analysis.

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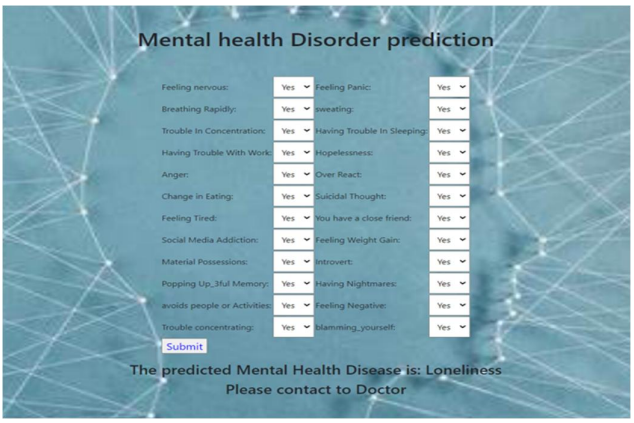
IV. RESULT



V. CONCLUSION

This system is used for providing client advantages as simply as possible. We're working to make the framework as simple to connect as possible. There will be no compelling reason to select the option by pressing the catch, just as there will be no compelling reason to wait for the answer. In this application, An objective type questions function, and an emotion recognition module will be included in the proposed assistant. It might also help many businesses get clients from all over the country. Poor mental health is a widespread problem today, and it's difficult for everyone suffering from mental illnesses to seek therapy because it may be too expensive for some, and others may not want to talk to a person about their problems. Many people will prefer virtual mental health web-app as a result. In this current system, they have limitations, and the vast majority are not free. In this study, we proposed a model that will alleviate some of the flaws in current systems. We recommend using an interactive system that output will be sent into an AI model that will analyze the full context of the user's conversation to determine the user's mental state.

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