

MENTAL HEALTH AWARENESS USING MACHINE LEARNING

**PROJECT SYNOPSIS
OF MAJOR PROJECT**

**BACHELOR OF TECHNOLOGY
COMPUTER SCIENCE AND
ENGINEERING**

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August 2023



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BATCH:-PCSE25-21

PROPOSED TOPIC: MENTAL HEALTH AWARENESS
USING MACHINE LEARNING

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Introduction:

[1]

Mental health is a major concern worldwide. The burden of mental disorders is likely to have been underestimated because of inadequate appreciation of the inter-play between mental illness and other health disorders. In recent years, there has been increasing acknowledgement of the importance of mental health of a person. Unfortunately, many people don't receive the treatment that they need because of the stigma associated with mental health. Some don't even realize that treatment is available. When these people suffer quietly, they feel lonely and disenfranchised. As always, consulting a doctor or trained mental health professional is important.

Your overall health and well-being is critically important therefore diagnosing mental health is difficult because people aren't willing to talk about their mental problems as freely as physical problems therefore they can use this technology to self-diagnose it. This project includes technologies like stress prediction tool, emotion detector, a therapeutic AI assistant and a mood diary.

The stress prediction tool: Stress is becoming an increasingly prevalent health issue, seriously affecting people and putting their health and lives at risk. Early prediction of stress and the level of stress can help to reduce its impact and different serious health issues related to this mental state. For this, automated systems are required so they can accurately predict stress levels. This tool provides an approach that can detect stress accurately and efficiently using machine learning techniques.

The emotion detector: A facial expression can be said as the movement of muscles beneath the skin of the face. Facial expressions are a form of nonverbal communication. Human face could convey countless emotions without saying a single word.

The three main components of Emotion Detection are as follows:

1. Image Preprocessing
2. Feature Extraction
3. Feature Classification

The mood diary: This tool will help users to write about their feelings in detail. If you have a mood disorder, your general emotional state or mood is distorted or inconsistent with your circumstances and interferes with your ability to function. You may be extremely sad, empty or irritable (depressed), or you may have periods of depression alternating with being excessively happy (mania). This diary is mainly helpful for those who have mood disorders. The most common types of mood disorders are major depression, dysthymia (dysthymic disorder), bipolar disorder, mood disorder due to a general medical condition, and substance-induced mood disorder.

Therapeutic AI assistant: This tool will help the user to communicate with the computer and is designed in such a way that the users are made to believe that they are talking to an actual human being but rather they are talking to a machine. Users can ask any kinds of doubts they have regarding their mental state without feeling that they might be judged. This is created by writing a program in java language.

Rationale

[2]

Early identification, accurate diagnosis and effective treatment of mental health and substance use conditions can alleviate enormous suffering for young people and their families dealing with behavioral health challenges. Providing early care can help young people to more quickly recover and benefit from their education, to develop positive relationships, to gain access to employment, and ultimately to lead more meaningful and productive lives. MHA believes that early identification of mental health and substance use issues should occur where and when young people are mostly likely to present concerns, such as in school. In addition to schools, primary health care providers and other community leaders should be given the tools and supports necessary to identify signs of mental health or substance use issues at the earliest possible time.

Community outreach and education are necessary to identify problems in order to refer youth to additional comprehensive assessment and to the care they need to cope with mental health and substance use challenges. Funding and promotion of community outreach and education to identify early signs of mental health and substance use conditions can arm parents, teachers, friends, spiritual leaders, mentors, and community leaders with knowledge, skills, and resources for identifying and referring youth into necessary care. Additional research is needed to identify the best curricula for community-wide education that will most likely lead to proper referral and reduce the severity and duration of mental illness and addiction. Whenever warning signs are observed, resources should be available to parents or guardians to access comprehensive mental health and substance use evaluations and services needed to promote recovery. Access to adequate care can reduce barriers to learning and improve educational, behavioral and health outcomes for our youth. The best services promote collaboration among all of the people available to help, including families, educators, child welfare case workers, health insurers, and community mental health and substance use treatment providers. Barriers should be reduced and incentives created to ensure increase collaboration across systems and funding sources.

OBJECTIVES:

1)EMOTION DETECTION

2)STRESS PREDICTION

3)MOOD DAIRY

4)THERAPEUTIC AI ASSISTANT

LITREATURE REVIEW ON EMOTION PREDICTION:

[3]

The movements of muscles convey the emotions of individual to people who see them. They are the means through which social information is conveyed between humans but they also occur in most other mammals and some other animal species. Humans can adopt a facial expression voluntarily or involuntarily. Involuntary expression are those that when people make when they are ill, hurt or feeling uncomfortable.

One way to look at effective computing is human computer interaction in which a device has the ability to detect and respond to the emotions exhibited by the users. Emotion recognition can help in monitoring the emotional health of the users and screening for emotion-related physiology and mental disease. Emotions are not only expressed through psychological behavioral performance, but also through a series of physiological changes. These physiological changes are not being controlled by humans. Thus, physiological signals can possibly reflect the true feelings of subjects.

There are several kinds of physiological signals that have been successfully applied to emotion recognition, including electrocardiogram (ECG), galvanic skin response (GSR), electroencephalogram (EEG), respiratory suspended particulate (RSP) and blood volume pulse (BVP). These physiological signals, most importantly ECG reflect the relationship between the heart beating and emotion changes. Researchers have performed much work on emotion recognition based on ECG. Heart Rate Variability (HRV) which is extracted from an ECG is considered to be one of the important parameters of emotion recognition.

Our aim is to work in the real time in which we detect the emotions from images that has been captured by live webcam. Now the webcam will be running a video and the faces are going to be detected in the frames according to the facial landmarks which will contain the eyes, eyebrows, nose, mouth, corners of the face. Then the features were extracted from these facial landmarks (dots) faces which will be utilized for the detection of the facial emotions. After the emotions are identified, we look for any discomfort in the emotions through image processing techniques.

LITREATURE REVIEW ON CHATBOT AS A PERSONAL ASSISTANT:

Chatbots usually work as an optimizer of customer service. Chatbots are designed in such a way that the users are made to believe that they are talking to an actual human being but rather they are talking to a machine. The main advantage of this explicit characteristic of a chatbot is that it can be given a virtual personality of its own just like a specific person of a particular profession. A chatbot can be used to not only to chat and get information but it takes artificial intelligence in a whole new light.

The main advantage of a chatbot is that it can provide services at any given rate. They respond immediately to the users' demands with precisely relevant information. This enhances the rate of the communication operation. In simple terms, chatbots make your service faster and as a personal assistant it is the best. You can use it for the betterment of common people. Chatbots are designed to be the ultimate virtual assistant, helping you to accomplish various tasks ranging from answering questions, getting driving directions, turning up the thermostat in your smart home, or play your favorite tunes and even draft a question and answer survey.

LITERATURE REVIEW ON:

Stress Detection using Machine Learning and Deep Learning Article issued:

Stress is a normal phenomenon in today's world, and it causes people to respond to a variety of factors, resulting in physiological and behavioural changes. If we keep stress in our minds for too long, it will have an effect on our bodies. Many health conditions associated with stress can be avoided if stress is detected sooner. When a person is stressed, a pattern can be detected using various bio-signals such as thermal, electrical, impedance, acoustic, optical, and so on, and stress levels can be identified using these bio-signals. This paper uses a dataset that was obtained using an Internet of Things (IOT) sensor, which led to the collection of information about a real-life situation involving a person's mental health. To obtain a pattern for stress detection, data from sensors such as the Galvanic Skin Response Sensor (GSR) and the Electrocardiogram (ECG) were collected. The dataset will then be categorised using Multilayer Perceptron (MLP), Decision Tree (DT), K-Nearest Neighbour (KNN), Support Vector Machine (SVM), and Deep

Learning algorithms (DL). Accuracy, precision, recall, and F1-Score are used to assess the data's performance. Finally, Decision Tree (DT) had the best performance where DT have accuracy 95%, precision 96%, recall 96% and F1-score 96% among all machine learning classifiers.

The main goal of this paper is to detect stress level in SAID dataset. The dataset has been splitted into training dataset contain 70% and testing dataset contain 30% as shown in Figure 6. In this experiments Multilayer Perceptron (MLP), Decision Tree (DT), K- Nearest Neighbour (KNN), Support Vector Machine (SVM) and Deep Learning (DL) are been used and been detailed up in Table 2. Table 6 also shows that the accuracy has reached up 79% until 96% for SAID dataset. Based on the result from Table 6 below, Support Vector Machine (SVM) had the overall worst performance where SVM have accuracy 79%, precision 81%, recall 75% and F1-score 77%, whereas Decision Tree (DT) had the best performance where DT have accuracy 95%, precision 96%, recall 96% and F1-score 96% among all machine learning classifiers.

LITERATURE REVIEW: MACHINE LEARNING TECHNIQUES FOR STRESS PREDICTION IN WORKING EMPLOYEES

This paper uses a dataset that was obtained using an Internet of Things (IOT) sensor, which led to the collection of information about a real-life situation involving a person's mental health. The dataset will then be categorized using Decision Tree (DT), K-Nearest Neighbor (KNN), Support Vector Machine (SVM), and Deep Learning algorithms (DL). Accuracy, precision, recall to assess the data's performance. Finally, Decision Tree (DT) had the best performance where DT have accuracy 95%, precision 96%, recall 96%.

Techniques used here were mainly KNN, decision tree and SVM. Some shortcomings of the paper also came into light which were that accuracy is low. With an accuracy of 87%, the use of Machine Learning is used as techniques for identifying stress.

FEASIBILITY STUDY:

[5]

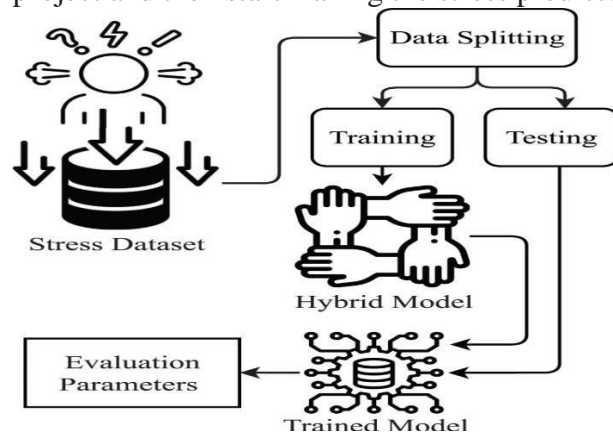
The need for this project lies in addressing the growing global mental health crisis. By leveraging machine learning, the software can enhance awareness, provide accessible resources, and promote early intervention, thereby positively impacting individuals' mental well-being on a larger scale. By utilizing machine learning, this project aims to revolutionize mental health awareness and support. It can identify early signs of mental health challenges, deliver personalized resources, and offer a 24/7 accessible platform, thereby empowering individuals to proactively manage their well-being. Moreover, the project's potential to analyze anonymised data could unravel patterns, triggers, and coping mechanisms, contributing to a deeper comprehension of mental health on a societal level. Ultimately, the endeavor holds the promise of not only transforming individual lives but also nurturing a more informed and empathetic society ready to address the profound impact of mental health. With the rapid evolution of machine learning and data analytics, the technical infrastructure required for such a venture is readily available.

The abundance of digital platforms and the growing familiarity with online resources further enhance the project's viability. The collaboration of mental health professionals, data scientists, and software developers ensures a diverse skill set to address challenges effectively. Moreover, the project's potential to provide personalized mental health support aligns with the increasing trend towards individualized healthcare solutions. While ethical considerations and data privacy demand meticulous attention, established frameworks and regulations offer guidance.

Financially, the project's impact on mental health awareness could attract funding from various sources, including health organizations, technology companies, and philanthropic entities. Overall, the fusion of technological capabilities and the urgency of mental health awareness substantiates the feasibility of this endeavor, poised to make a substantial and lasting impact on society. By harnessing the power of machine learning, it transcends geographical and temporal boundaries to provide accessible, personalized, and timely support. This endeavor not only bridges the awareness gap surrounding mental health but also dismantles the barriers that inhibit individuals from seeking help. By nurturing open conversations, reducing stigma, and equipping individuals with knowledge and tools, this project propels society towards a more compassionate, informed, and resilient future. Its significance lies not only in enhancing mental well-being but also in shaping a world where mental health is accorded the attention, understanding, and resources it rightfully deserves.

Methodology:

We start by first making the website for the project and then start making the stress predictor



We will be using machine learning for stress prediction. There are various techniques of machine learning so will be choosing the one with the highest accuracy. To increase the accuracy of the machine learning techniques we can also use two techniques together which is called a hybrid

Then we start making the emotions detector. The three main components of Emotion Detection are as follows:

1. Image Preprocessing- or image recognition which refers to the technology that identifies places, logos, people, objects, buildings, and other things in images.
2. Feature Extraction- Feature extraction is a process of dimensional reduction by which an initial set of raw data is reduced for some processing purpose.
3. Feature Classification- aims to create a model that can classify seven distinct emotions: happy, sad, surprise, angry, disgust, neutral, and fear.

After making the emotion detector we move onto making the AI assistant that is like a chatbot and can be created easily by using java language.

Then we will add information about various mental disorders like depression, anxiety disorders, schizophrenia, eating disorders and addictive behaviors to create awareness among people so that if they suffer from any of the symptoms they can get treated.

Quizzes for determining whether a person has a specific disorder or not. The questions in the quiz will include the symptoms.

A mood diary will also be added to the website so that users can write about their feelings in detail. If you have a mood disorder, your general emotional state or mood is distorted or inconsistent with your circumstances and interferes with your ability to function. You may be extremely sad, empty or irritable (depressed), or you may have periods of depression alternating with being excessively happy (mania). This diary is mainly helpful for those who have mood disorders.

Expected Outcome:

[7]

Many different techniques and algorithms had been introduced and proposed to test and solve the mental health problems. There are still many solutions that can be refined. In addition, there are still many problems to be discovered and tested using a wide variety of settings in machine learning for the mental health domain. As classifying the mental health data is generally a very challenging problem, the features used in the machine learning algorithms will significantly affect the performance of the classification. The existing studies and research show that machine learning can be a useful tool in helping understand psychiatric disorders. Besides that, it may also help distinguish and classify the mental health problems among patients for further treatment. Newer approaches that use data that arise from the integration of various sensor modalities present in technologically advanced devices have proven to be a convenient resource to recognize the mood state and responses from patients among others. It is noticeable that most of the research and studies are still struggling to validate the results because of insufficiency of acceptable validated evidence, especially from the external sources. Besides that, most of the machine learning might not have the same performance across all the problems. The performance of the machine learning models will vary depending on the data samples obtained and the features of the data. Moreover, machine learning models can also be affected by preprocessing activities such as data cleaning and parameter tuning in order to achieve optimal results. Hence, it is very important for researchers to investigate and analyze the data with various machine learning algorithms to choose the highest accuracy among the machine learning algorithms. Not only that, challenges and limitations faced by the researchers need to be managed with proper care to achieve satisfactory results that could improve the clinical practice and decision-making.

REFERENCES:

[8]

- 1) Z. Zainudin¹ , S. Hasan¹ , S.M. Shamsuddin¹ and S. Argawal² ¹ School of Computing, Faculty Engineering, Universiti Teknologi Malaysia, Malaysia ² Information Technology Department, Indian Institute of Information Technology, Allahabad Prayagraj, India
- 2) Chatbot as a Personal Assistant
Gayatri Nair, Soumya Johnson and V. Sathya (Guide) Assistant Professor, Department of Computer Science and Engineering, SRM Institute of Science and Technology (Deemed to University u/s 3 of UGC Act, 1956), Chennai, India
- 3) Eldar, C. Yonina, Compressed sensing: theory and applications, Cambridge University, 2012.
- 4) MACHINE LEARNING TECHNIQUES FOR STRESS PREDICTION IN WORKING EMPLOYEES
Altamash A Maniyar*¹, Jeevan Kumar SH*², Nithej N*³,
Ramya HK*⁴, Aishwarya T*⁵