CARESS: Transforming Mental Health

Using ML Model

PROJECT SYNOPSIS

***~~OF MAJOR PROJECT~~***

BACHELOR OF TECHNOLOGY

CSE

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Table of Contents

***~~Content~~***

***~~Page no.~~***

***~~Introduction~~***

***~~3~~***

***~~Rationale~~***

***~~4~~***

***~~Objectives~~***

***~~5~~***

***~~Literature Review~~***

***~~6-8~~***

***~~Feasibility Study~~***

***~~9~~***

***~~Methodology/Planning of Work~~***

***~~10~~***

***~~Facilities required for proposed work~~***

***~~11~~***

***~~Expected Outcomes~~***

***~~11~~***

***~~References~~***

***~~11~~***

**Introduction**

In the ever-evolving landscape of the modern world, the well-being of individuals has come under siege. As we journey through the 21st century, we find ourselves navigating a terrain mend-to-ende profound impact of work stress, anxiety, and the silent but pervasive shadow of depression. This unsettling reality has profound implications, not just for personal lives but for the broader canvas of societal development and progress.

Depression, a silent behemoth, has entrenched itself as one of the most formidable adversaries that humanity faces today. It lurks in the lives of countless individuals, casting a long and often torturous shadow over their daily existence. And while it infiltrates every age group, it has ensnared a significant demographic: the youth, a generation responsible for steering the course of a nation's growth and prosperity.

The alarming truth is that these youthful catalysts for change find themselves shackled in the chains of depression and anxiety, their potential muted, their vigor sapped. This affliction is no longer confined to isolated pockets but has woven itself into the fabric of our society. Sadly, it persists in the shadows, rarely discussed openly, and often shrouded in stigma and misunderstanding.

But within the heart of this disconcerting narrative lies a glimmer of hope. Herein, we present a solution, a beacon of light cutting through the darkness that has plagued so many lives. Our project seeks to address these profound challenges that are suffocating the spirit of progress and well-being. Through innovation, compassion, and unwavering commitment, we endeavor to break the silence, shatter the chains, and pave the path towards a brighter, healthier, and more prosperous future. This is our mission, our cause, and our collective responsibility.

Join us as we embark on this transformative journey, guided by the vision of a society where mental health is nurtured, where depression and anxiety are met with understanding and support, and where the potential of our youth can flourish without restraint. Together, we dare to dream of a world where mental wellness is not just an aspiration but a reality, and we take the first step toward this audacious vision.

Rationale

**Escalating Mental Health Crisis:** The acknowledgment of worsening health status due to work-related stress and anxiety underscores the urgency of addressing mental health challenges. Depression is a leading mental health issue, and its prevalence is on the rise. The project is driven by the pressing need to combat this crisis effectively.

**Youth and National Prosperity:** The youth are often seen as the backbone of a nation's growth and development. The fact that a substantial portion of the youth is affected by depression and anxiety is a cause for alarm. Their mental well-being directly impacts a country's progress, innovation, and prosperity. By addressing their mental health, the project seeks to contribute to national development.

**Overcoming Stigma:** The culture of silence and stigma surrounding mental health issues inhibits individuals from seeking help and perpetuates the problem. This project aims to challenge this stigma by promoting open discussions about mental health. By doing so, it not only provides solutions but also normalizes seeking support for mental well-being.

**Proactive Approach:** The project's rationale lies in its proactive approach to addressing mental health issues. Instead of merely reacting to mental health crises, it aims to predict and prevent them using advanced machine learning techniques. This forward-looking approach has the potential to reduce the burden on healthcare systems and improve individuals' lives.

**Data-Driven Solutions:** Leveraging machine learning for mental health prediction aligns with the growing trend of using data-driven insights for decision-making. By utilizing advanced technology, the project demonstrates a commitment to innovation and evidence-based solutions.

**Overall Well-being:** Ultimately, the rationale for this project is rooted in the fundamental principle of improving the quality of life for individuals. It seeks to offer a solution that can lead to healthier, happier, and more productive lives for those suffering from mental health challenges.

Objectives

**Raise Awareness:**

The project aims to break the silence surrounding mental health issues by promoting open discussions and awareness campaigns. This will help to reduce the stigma associated with depression and anxiety.

**Offer Support:**

To provide a support system for individuals grappling with mental health problems, offering them the guidance and resources needed to cope with their challenges and seek professional help when required.

**Prevention and Resilience Building:**

Implement preventive strategies, including stress management and resilience-building programs, aimed at reducing the incidence of depression and anxiety among the youth and the working population.

**Research and Innovation:**

The project seeks to engage in research to better understand the root causes of depression and anxiety, and develop innovative solutions and interventions to address these issues effectively.

**Collaboration:**

Collaboration with mental health professionals, NGOs, governmental organizations, and community stakeholders to create a comprehensive network of support and resources for individuals suffering from mental health issues.

Literature Review

**1) Mental Health Prediction Using Machine Learning: Taxonomy, Applications and Challenges**

***~~Jetli Chung~~~~1~~~~and Jason Teo~~***

***~~The increase of mental health problems and the need for effective medical health care have led to an investigation of machine learning that can be applied in mental health problems. This paper presents a recent systematic review of machine learning approaches in predicting mental health problems. Furthermore, we will discuss the challenges, limitations, and future directions for the application of machine learning in the mental health field. We collect research articles and studies that are related to the machine learning approaches in predicting mental health problems by searching reliable databases. Moreover, we adhere to the PRISMA methodology in conducting this systematic review. We include a total of 30 research articles in this review after the screening and identification processes. Then, we categorize the collected research articles based on the mental health problems such as schizophrenia, bipolar disorder, anxiety and depression, posttraumatic stress disorder, and mental health problems among children. Discussing the findings, we reflect on the challenges and limitations faced by the researchers on machine learning in mental health problems. Additionally, we provide concrete recommendations on the potential future research and development of applying machine learning in the mental health field.~~***

***~~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.~~***

2) **Predicting Mental Health Illness using Machine Learning Algorithms**

Konda Vaishnavi, U Nikhitha Kamath, B Ashwath Rao and N V Subba Reddy

**As there are many available techniques of machine learning, it is very important to compare those techniques and then identify the best among them that will suit the domain of interest. Nowadays, we have many special programs in the medical field that predict disease very accurately in advance so that treatment can be done effectively and efficiently. In this proposed work we have compared five different techniques of machine learning which are used to classify the dataset on various problems of mental health. It is very clear from the results that all the five machine learning techniques give more accurate results. The accuracy of all the classifiers are above 79%. The data set used in the research is very minimal and in the future, a large data set can be used and the research can be applied on the same for more accuracy. Blockchain technology-based e-voting system.**

that opposing the discourses of interaction throughout the dataset to construct and grant agency for the humans. Their findings demonstrate how the five discourses produce a paradoxical object and subject views of the human, potentially dehumanizing it accidentally **The study assessed the performance of eight different machine learning algorithms which classify the dataset into various issues of mental health. Their results show that the three classifiers tested, namely the Multiclass Classifier, Multilayer Perceptron, and the LAD Tree, generate results that are more accurate than the others [4]. This paper explains that mental health analysis in terms that are intuitive to different target groups. They have created a system for determining an individual’s mental health status and prediction models were built using this framework. Clustering methods were also been used to determine the number of clusters before developing models. MOS was used to validate the class labels produced, which were then used to train the classifier. The trials showed that KNN, SVM, and Random Forest performed nearly equally well. The usage of ensemble classifiers was also discovered to considerably increase the performance of mental health prediction with a 90% accuracy rate [6]. In this, the research has concentrated on the benefits of machine learning in improving mental health identification and diagnosis of Alzheimer’s disease, depression, and other mental illnesses schizophrenia. Overall, machine learning has the potential to increase clinical and research efficiency while also providing fresh insight into mental health and wellbeing [5]. The key contribution of this paper is that the ILIOU preprocessing method can be utilized to significantly improve the performance of classification algorithms in similar datasets and it can also be used to forecast different types of depression. Depression prediction is critical for patients to receive the most appropriate treatment as soon as feasible [3]. Artificial intelligence is becoming a bigger aspect of medicine, and it will help with mental health research and practice. To realize the full promise of AI, a varied community of specialists involved in mental health research and care, including scientists, clinicians, patients, and regulators, must communicate and interact [2]. They have analyzed by using discourse analysis in this study to better understand the practices of representation in human-centered machine learning (HCML). From this, case prediction of mental health status on social media data, they have found a dataset of 55 interdisciplinary studies. Their findings show** .

***~~3) PREDICTION OF MENTAL HEALTH USING MACHINE LEARNING~~***

***~~Dr.J.Arokia Renjit , Adlin Sajeesha M.J , Sangavai V.D , Sree Devi D.S~~***

A summary is a recap of important information about the source, but a synthesis is a re-organization, reshuffling of information. It might give a new interpretation of old material or combine new with old interpretations or it might trace the intellectual progression of the field, including major debates. Depending on the situation, the literature review may evaluate the sources and advise the reader on the most pertinent or relevant of them. 2.1 Machine Learning-based Approach for Depression Detection in Twitter Using Content and Activity Features by Hatoon AlSagri, and Mourad Ykhlef mentioned that they aim to exploit machine learning techniques for detecting a probable depressed Security Analysis of India’s Voting Machine - Hari K. Prasad, Arun Kankipati, Sai Krishna Sakhamuri in the year 2010 [8] Security Analysis was performed on real Indian EVM system. This paper states that EVM can be tampered Twitter user based on both network behaviour and tweets. For this purpose, they trained and tested classifiers to distinguish whether a user is depressed or not using features extracted from his/her activities in the network and tweets. The results showed that the more features are used, the higher the accuracy and F-measure scores in detecting depressed users. This method is a data-driven, predictive approach for the early detection of depression or other mental illnesses.

2.2 Predicting the Utilization of Mental Health Treatment with Various Machine Learning Algorithms by Meera Sharma Sonak Mahapatra, Adeethyia Shankar mentioned that proper diagnosis and treatment for people with mental health disorders remains underdeveloped in modernday’s society due to the widely ever-present public stigma attached to caring about mental health. Recently there have been attempts in the data science world to predict if a person is suicidal (and other diagnostic approaches) yet all face major setbacks. To begin, big data has many ethical issues related to privacy and reusability without permission—especially in regards to using feeds from social media. Additionally, people diagnosed with specific mental health conditions may not actually seek treatment, so data may be incorrect. In this research, we address both of these problems by using anonymous datasets to predict the answer to a different question— whether or not people are seeking mental health treatment. We also use a large variety of machine learning and deep learning classifiers and predictive models to predictwith a high accuracy rate through statistical analysis. As a result, these individuals would be more productive, reducing social and economic costs in the tech workplace. 2.3 Prediction of Mental Disorder for employees in the IT Industry by Sandhya P, Mahek Kantesaria mentioned that they’ve taken the dataset of the questionnaires which were asked to an IT industry employee. Based on their answers the result is derived. Here the output will be whether the person needs attention or not. Different machine learning techniques are used to get the results. This prediction also tells us that it is very important for IT employees to get a regular mental health check-up to track their health. The employers should have a medical service provided in their company and they should also give benefits to the affected employees There are many suggestions that employers and employees could keep in mind. Employers need to keep track of the number of their employees having mental disorders. Employers should allow a flexible work environment with flexible work scheduling and break timings. They should allow employees to work from home or have a flexible place of work. 2.4 Prediction of Mental Health Problems Among Children Using Machine Learning Techniques by Ms. Sumathi M.R, Dr. B. Poorna mentioned that twenty-five attributes have been identified as necessary for analysing the issues from the reports. The attributes have been decreased by applying Feature Selection algorithms over the complete data set of attribute . The efficiency over the complete attribute set and selected attribute set on various machine learning techniques have been analysed. It is obvious from the final results that the three classifiers Multilayer Perceptron, Multiclass Classifier, and LAD Tree bring more efficient results and there is only a slight variation between their performances over complete attribute set and specific set of attribute . The research has compared eight machine learning techniques (classifiers) on classifying the dataset to different mental health problems. The data set is very minimal and in the future, the research may be applied to a large data set to obtain more accuracy.

4) **Mental Health Prediction Using Machine Learning**

Satvik Gurjar, Chetna Patil, Ritesh Suryawanshi, Madhura Adadande, Ashwin Khore, Noshir Tarapore

There has been many studies and researches where people have been predicting mental health problems like depression and anxiety using the algorithms of machine learning, like decision tree, support vector machine, random forest and convolution neural network for the collection and classification of data from blog posts. For converting text into meaningful vectors like Bag-of-words, topic modeling etc. these techniques are used. In some cases, python programming has also been used for modeling experiments, with the best result among all the classifiers [2] being generated by CNN with the accuracy of 78 percent. In one study 470 seamen were questioned about their occupation, socio-economic background and health condition along sixteen other parameters like age, weight, family earning, marital status, etc. Different machine learning algorithms like logistic regression, naïve bayes, random forest, Catboost and SVM were applied for classification [7]. On getting the result Catboost showed the highest accuracy and precision of 82.6 percent and 84.1 percent respectively. Sau et al. (2017) manually collected data from the Medical College and Hospital of Kolkata, West Bengal on 630 elderly individuals, 520 of whom were in special care. After applying different classification methods Bayesian Network, logistic, multiple layer perceptron, Naïve Bayes, random forest, random tree, J48, sequential random optimization, random sub-space and K star they observed that random forest produced the best accuracy rate of 91% and 89% among the two data sets of 110 and 520 people, respectively. For feature selection and classification, WEKA tool was used in [1]. Change in heart rate, change in blood pressure and acoustics of speech [8],[3] are some of the symptoms of depression and weak emotional state. Diagnosis of Ptsd through speech has been done in recent times. A typical. A typical speech-based PTSD diagnostic system consists of three components including data acquisition, feature extraction and classification [6]. In the data acquiring stage a patient is asked questions and the speech dialogue of that patient is recorded. The feature extraction component then processes the speech data and extracts features for the classification component to predict whether or not the subject being interviewed has any level of PTSD. Though other modalities such as EEG, fMRI and MRI were also studied for PTSD diagnosis [5], [4], the data collection process for these modalities is expensive and cannot meet the growing need. Speech is non-invasive and the interview can be conducted remotely via telephone or recording media so that privacy of the patient is strictly protected, making the speech-based method an ideal diagnostic tool for diagnosis and treatment monitoring. In January 2019 research was published about insomnia being predicted through ML algorithms where fourteen parameters were considered. Multiple classification algorithms were applied like DT, random forest, etc. among all the models SVM came out to have the best accuracy of 91.634 percent and the f measure score was 92.13. They have further applied to a dataset of 100 patients where the SVM comes with a good accuracy of 92%. They have declared mobility problems, vision problems as primary factors [9]. The objective of this research paper is to help people understand about their problems and give doctors an overview into their patient’s psyche. All of this could only be possible when we use models with the most accuracy. 3. DESIGN Fig -3.1: Block Diagram The system goes through multiple stages before the final value could be predicted accurately. These stages are data collection, data preprocessing, data encoding, training and testing of the algorithm. Once the desired accuracy is obtained, we can integrate the system with an application for real world use.

Feasibility Study

Feasibility of Project HopeRise: Transforming Mental Health :

***~~Technical Feasibility:~~***

***~~Data Availability: To create an effective machine learning model for predicting mental health issues, a substantial amount of relevant and high-quality data is required. The feasibility of the project depends on the availability of such data sources.~~***

***~~Machine Learning Expertise: The project requires the expertise to develop, train, and deploy machine learning models. The technical capacity to work with AI and ML tools is essential for the successful implementation of the solution.~~***

***~~Financial Feasibility:~~***

***~~Funding: Securing the necessary financial resources to support the development and maintenance of the ML model, awareness campaigns, and support infrastructure is crucial. The feasibility of the project depends on the availability of adequate funding.~~***

***~~Cost-Benefit Analysis: A comprehensive cost-benefit analysis should be conducted to ensure that the project's potential benefits, such as improved mental health and increased productivity, outweigh the costs associated with its implementation.~~***

***~~Human Resources:~~***

***~~Team Expertise: The project requires a multidisciplinary team, including data scientists, mental health professionals, project managers, and communication specialists. The availability of such expertise is essential for the project's feasibility.~~***

***~~Volunteer and Community Engagement: Involving volunteers and engaging the community can enhance the feasibility of the project by reducing costs and increasing support and participation.~~***

***~~Legal and Ethical Considerations:~~***

***~~Data Privacy and Ethics: Handling sensitive mental health data requires strict adherence to legal and ethical standards. Ensuring compliance with data protection regulations and ethical guidelines is crucial.~~***

***~~Awareness and Stigma Reduction:~~***

***~~Community Engagement: Reducing the culture of silence and stigma around mental health issues is vital but can be challenging. Feasibility relies on the willingness of the community to engage in open discussions and support the initiative.~~***

***~~Support Infrastructure:~~***

***~~Availability of Mental Health Resources: The feasibility of the project also depends on the accessibility and availability of mental health resources, such as counseling services and treatment options, for individuals identified by the ML model as at risk.~~***

***~~Sustainability:~~***

***~~Long-term Sustainability: A sustainable plan for the project's continuation after the initial implementation phase is essential. It should consider funding, resource availability, and ongoing community support.~~***

***~~Evaluation and Adaptation:~~***

***~~Monitoring and Evaluation: The project's feasibility depends on its ability to continuously monitor and evaluate its effectiveness. The ability to adapt and refine the project based on real-world outcomes is critical for its long-term success.~~***

Need for Project HopeRise: Transforming Mental Health:

***• ~~Rising Mental Health Challenges: The acknowledgment of a worsening health status among a significant portion of the population due to work-related stress and anxiety highlights the pressing need for effective interventions. Mental health challenges are not mere personal issues; they have far-reaching consequences on the overall well-being of individuals and society.~~***

***• ~~Depression as a Major Concern: Depression is recognized as the most significant mental health issue faced by individuals today. Its high prevalence and the severity of its impact on people's lives emphasize the urgency of dedicating resources and efforts to address this issue comprehensively.~~***

***• ~~Youth and National Development: The revelation that a substantial portion of the youth, who are pivotal to a country's growth and development, is suffering from depression and anxiety is deeply concerning. Youth are the future workforce and leaders of a nation, and their mental health directly influences the nation's progress and prosperity. Neglecting their well-being could hinder economic growth, innovation, and social stability.~~***

***• ~~The Culture of Silence: The existence of a culture of silence and stigma surrounding mental health issues, such as depression and anxiety, is a significant barrier to addressing these concerns effectively. This culture prevents individuals from seeking help, exacerbating the problem and keeping it hidden from public discourse.~~***

***• ~~Providing a Solution: The project's significance is heightened by its proactive approach to tackle these pressing challenges. By addressing mental health openly and promoting awareness, the project seeks to break the chains of depression and anxiety. Additionally, its use of advanced machine learning techniques for prediction and prevention demonstrates a commitment to employing innovative and data-driven solutions to combat mental health issues.~~***

Significance of Project HopeRise: Transforming Mental Health:

***• ~~Rising Mental Health Challenges: The acknowledgment of a worsening health status among many individuals due to work stress and anxiety underscores the urgency of the problem. Mental health concerns are not only affecting individuals but also impacting their overall quality of life.~~***

***• ~~Depression as a Major Concern: Depression is identified as the most significant mental health issue faced by people today. Its prevalence and severity demand dedicated attention and intervention.~~***

***• ~~Youth and National Development: The recognition that a substantial portion of the youth, who play a pivotal role in a country's growth and development, are suffering from depression and anxiety is alarming. Addressing their mental health is not only a matter of personal well-being but also crucial for the progress and prosperity of the nation.~~***

***• ~~The Culture of Silence: The statement emphasizes that mental health issues, such as depression and anxiety, are often shrouded in silence and stigma. The reluctance to openly discuss these concerns perpetuates the problem and prevents those in need from seeking help.~~***

***• ~~Providing a Solution: The project's significance is further underscored by its proactive approach to offer a solution to these pressing challenges. It aims to break the chains of depression and anxiety by addressing the issue openly, promoting awareness, and using advanced machine learning techniques to predict and prevent mental health issues.~~***

Methodology/Planning of work

**Methodology:**

The project will employ a multifaceted approach, combining awareness campaigns, educational initiatives, support networks, and research efforts.

These will include:

***• ~~Conducting workshops, seminars, and public forums to raise awareness about mental health issues.~~***

***• ~~Developing online and offline resources, including a website and helplines, to provide support and information.~~***

***• ~~Implementing school and workplace programs to equip individuals with coping mechanisms and resilience-building skills.~~***

***• ~~Establishing partnerships with mental health experts and organizations for referrals and support.~~***

***• ~~Conducting research to understand the local context of mental health challenges and develop tailored solutions.~~***

Facilities required for proposed work

***~~The proposed work can be carried out with standard computing facilities. A computer with sufficient processing power and memory to support development environments for Flutter and Firebase integration. Access to the internet and development platforms like GitHub would also be essential for collaboration and version control.~~***

Expected Outcomes

***• ~~Reduced stigma and increased awareness about mental health issues.~~***

***• ~~A decrease in the incidence of depression and anxiety.~~***

***• ~~Enhanced resilience and coping skills among the youth and the working population.~~***

***• ~~A comprehensive network of support and resources for individuals in need.~~***

***• ~~Evidence-based insights for future policies and initiatives in the field of mental health.~~***

References

***• ~~Jetli Chung and Jason Teo Received 5 April 2021; Revised 23 June 2021; Accepted 29 September 2021; Published 5 January 2022~~***

***• ~~Konda Vaishnavi, U Nikhitha Kamath, B Ashwath Rao and N V Subba Reddy.~~***

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