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A Novel Machine Learning Model for Mental Health Risk Prediction

AYUSH T. SOLANKI[1], DR. M N NACHAPPA[2]
[1, 2]*Department of Computer Science & IT Jain (Deemed-To-Be-University), Bangalore, India*

Abstract- ***There is also an increased rate of mental health disorders like depression, anxiety, and stress in the modern society that has experienced the problem among persons of different ages, professions, among others. The vulnerable are especially students and young working adults under the pressure of the academic community, the doubt of career choice, the social pressure on the student, and the changes in the lifestyle. The most crucial aspect is the identification of persons at risk of developing mental disorders as soon as possible lest the disorder develops and results in severe psychological effects and a poor quality of life. Recent years have seen the fast growth of technologies based on data that opens the possibility to utilize the computational approaches to the analysis of psychological and behavioral profiles in terms of mental health.The methods of machine-learning have gained much interest in this area due to the ability to work with complex datasets and identify latent patterns that can be difficult to notice by using the standard methods of statistics. Different algorithms logistic regression, random forests, support vectors machines, and gradient boosting have been studied to predict mental health risks by using datasets which involve psychological surveys, behavioral indicators as well as demographic data. In spite of the promising outcomes of the previous research, numerous of them concentrate on a narrow set of algorithms and specific datasets or target groups of the population. Additionally, not all the studies have some standardized evaluation techniques and thus it is difficult to compare how effective various machine-learning techniques are.***

In order to overcome these weaknesses, the current research project suggests a comparative study of numerous machine-learning algorithms to predict mental health risks. The suggested research model will involve data mining and the identification of publicly available datasets on mental health including data collection, data pre-treatment, feature selection, model training, and evaluation of the model using commonly used performance indicators such as accuracy, precision, recall, F1-score and ROC-AUC. This study aims at defining the best machine-learning methodology used in mental health risk prediction and to offer knowledge on how data-driven models can be used to support early detection systems, support researchers and to help in the creation of intelligent mental health assessment devices.

Keywords- ***Mental Health Prediction, Machine Learning, Depression Detection, Anxiety Prediction, Data-Driven Models***

I. INTRODUCTION

1.1 Background of the Study

Mental health has emerged as a significant concern in the world today over the past few decades with more people being affected by mental problems like depression, anxiety among others and unending stress. The fast-paced societal transformations, school stress, working stress and lifestyle redesign have helped in escalating psychological distress among various groups of people. The students and young professionals are also hit especially since they are usually confused by issues tied to education, career growth and social expectation. When mental illnesses are not noticed or unattended to, the same may have profound effects on individual health, work efficiency, and social performance. Conventional mental health assessment techniques usually depend on the clinical treatment, the psychological questionnaire, and the self-report. Although these methods have some helpful insights, they do not necessarily fit intricate trends that are present in large behavioural data. The latest innovations in data science and computational intelligence provided novel opportunities to analyze the mental health data with the application of automated methods. In this case, machine learning could be a way out as it can process vast amounts of data and find the connection between different psychological and behavioral indicators. Machine learning models can help researchers without consuming resources, predict mental health risks more effectively by analyzing trends in data sets comprising survey data, demographic influences, and lifestyle data. These predictive systems can help healthcare practitioners, schools, and scientists to identify those individuals who can be at a risk exceeding mental health care.

1.2 Problem Statement

The researches have used machine learning to predict mental health; however, as numerous researchers have utilized this technique, there exist various weaknesses in existing research studies. Most of the studies involve relatively small datasets or studies on one population group, which limits the extent of generalization of models to different environments. Moreover, other studies have tested only a single or two machine learning algorithms, thus it is hard to conclude which option is the best suited to be used in the context of mental health prediction.

The other difficulty is that the evaluation processes are not standardized in various researches. Various datasets, features, and performance measures are widely used by researchers and therefore, it is hard to compare two studies. These drawbacks indicate the necessity of a structural study involving the assessment of various machine learning algorithms using comparable conditions to gain a deeper insight into the possible efficacy or ineptitude of predicting mental health risks.

1.3 Motivation

The rising rate of mental illnesses has led to an augmented demand of new solutions that can help in the early diagnosis and prevention. The presence of digital information and methods of sophisticated computations makes researchers access the opportunity to consider the data-driven solutions that can enhance mental health assessment procedures. The machine learning methods are capable of providing an opportunity to examine intricate associations between psychological, behavioral, and demographic patterns. It is possible to compare the different machine learning models to arrive at the algorithms that are more reliable in making predictions. These observations can be used to the creation of smarter systems that can aid the clinicians, researchers, and the institution in tracking at-risk of mental health.

1.4 Objectives of the Study

Objective 1: To develop and assess machine learning models with the ability to make predictions in mental health risks including depression, anxiety, and stress based on the available datasets.

Objective 2: The aim of the research is to compare the performance of the various machine learning algorithms with the aim of identifying the techniques which are most reliable when it comes to assigning mental health risk.

1.5 Contributions of the Paper

Pivotal points that the research made are: A systematic survey of the available machine learning methods of mental health prediction. Incorporating the major weaknesses and gaps related to present research. It suggests a comparative framework to estimate various machine learning algorithms with the help of uniform datasets and evaluation criteria.

1.6 Organization of the Paper

The rest of the paper will be organized in the following way. Section 5 provides a literature review and recaps past researches in terms of machine learning applications in mental health predictions. In Section 6 the proposed methodology is given and the general system design in this research is presented. Section 7 mentions the anticipations and assessment plan in comparison of various algorithms. Section 8 presents the possible applicability and practical implication of the suggested approach. At last, Section 9 summary of the paper and the proposed directions of future research.

II. LITERATURE REVIEW

1. Al-Nadaqvi et al. (2021) – Machine Learning-based Prediction of Depression and Anxiety in University Students in Bangladesh.

The objective of this research was to create machine learning models capable of predicting levels of depression and anxiety in university students through survey-based data on their mental health. The methods involved collecting psychological and demographic data from university students and implementing several machine learning algorithms such as Logistic Regression, Support Vector Machines, and Random Forest, with the data cleaned and split into training and testing sets for model assessment. The results showed that the models could project depression and anxiety levels successfully, with ensemble-based algorithms outperforming simpler classification models. The researchers concluded that machine learning algorithms can be

efficiently applied to process student mental health data and help identify individuals susceptible to psychological distress.

2. Lai et al. (2023) – Future Intensity of Depression and Dynamic-Risk Factors Directed by Machine Learning of Multimodal Data.
The objective of this paper was to explore how machine learning algorithms can be employed with multimodal data sources to forecast the degree of depression and distinguish individual risk factors. The methods involved training machine learning models on data containing behavioral, demographic, and psychological variables, with feature selection and preprocessing techniques applied before model training. The results demonstrated that merging several data sources enhanced the quality of depression prediction models, and the algorithms were able to detect critical factors related to depression severity. The authors concluded that multimodal machine learning systems have strong potential to improve mental health prediction and enable more individualized mental health analysis.

3. Abbas et al. (2022) – Social Media Machine Learning Depression Detection.
The objective of this research was to create a machine learning system capable of identifying signs of depression based on textual information found on social media. The methods employed natural language processing techniques to extract features from social media posts, followed by training a set of machine learning classifiers to detect patterns related to depressive behavior. The results suggested that machine learning models could effectively identify linguistic patterns associated with depression in social media data, with several models achieving high classification accuracy. The authors concluded that combining social media analysis with machine learning holds significant value for monitoring mental health conditions and enabling early-stage depression detection.

4. Amirhosseini et al. (2023) – Machine Learning-Based Mental Health Risk Prediction Using Multimodal Data.
The objective of this paper was to formulate predictive models capable of estimating mental health risks using multiple types of data. The methods involved training machine learning algorithms on psychological survey responses, behavioral indicators, and demographic data, with data preprocessing and feature engineering applied before model training. The results showed that the models performed well in prediction accuracy when multiple data sources were combined, with ensemble models yielding higher results compared to individual classifiers. The study concluded that combining various data sources can significantly improve mental health prediction systems and early detection strategies.

5. Bajaj et al. (2023) – Comparative Analysis of Machine Learning Models to Predict Depression, Anxiety, and Stress.
The objective of this study was to compare different machine learning algorithms in predicting mental health conditions including depression, anxiety, and stress. The methods involved testing several classification algorithms such as Decision Trees, Random Forest, Support Vector Machines, and Logistic Regression on mental health data, evaluated using accuracy, precision, recall, and F1-score. The results revealed that ensemble methods generally outperformed conventional classifiers in forecasting mental health risk categories. The experiment concluded that comparing various machine learning techniques is valuable in identifying the most effective models for mental health prediction tasks.

6. Chen (2023) – Research about Hypertension and Co-morbidity with Anxiety and Depression.
The objective of this study was to investigate the connection between hypertension and mental disorders such as anxiety and depression using data-driven methods. The methods involved statistical analysis and machine learning applied to clinical and psychological data from patients, examining health conditions and mental states to identify correlations. The results indicated strong correlations between mental health disorders and hypertension, with the models successfully identifying trends between physical health conditions and psychological distress. The study concluded that machine learning can deepen our understanding of the relationship between physical and mental health problems, which can be useful in the early diagnosis of comorbidities.

7. Priya & Amuthaguka (2023) – Machine Learning to Detect Anxiety and Depression Among Video Game Dependent Individuals.
The objective of this paper was to identify levels of anxiety and depression in individuals who are heavily dependent on video games using machine learning methods. The methods involved gathering behavioral and psychological data from respondents and applying machine learning classifiers including Decision Trees, Random Forest, and Support Vector Machines, with dataset preprocessing conducted before training and testing. The results showed that the models could discover patterns related to anxiety and depression in video game-dependent individuals with a reasonable level of classification accuracy. The researchers concluded that machine learning algorithms can be successfully applied to identify mental disorders within specific population groups, including those with video game dependency.

8. Zhang et al. (2024) – Privacy-Preserving Machine Learning for Mental Health Prediction by Homomorphic Encryption.
The objective of this study was to develop a machine learning model that could predict mental health conditions without infringing on user privacy. The methods involved applying homomorphic encryption alongside machine learning to process mental health data without exposing sensitive information, allowing computation to be performed on encrypted data. The results showed that the proposed method-maintained data privacy while achieving prediction accuracy comparable to conventional machine learning models without encryption. The paper concluded that implementing privacy-sensitive mechanisms is essential for deploying machine learning models in mental health prediction in a secure and ethical manner.

9. Schuller et al. (2022) – Mental Health Prediction and Analysis with Artificial Intelligence Approaches.
The objective of this paper was to review and assess the significance of artificial intelligence-based techniques in forecasting and understanding mental health conditions. The methods involved providing a broad overview of various machine learning and deep learning approaches used in mental health prediction, examining different datasets, models, and evaluation frameworks. The results found that machine learning and deep learning methods show considerable potential in identifying mental health disorders, though challenges related to data quality and model generalizability remain. The study concluded that artificial intelligence has the potential to significantly improve mental health prediction systems, though further work is needed before widespread practical application.

10. Loftness et al. (2023) – Towards Digital Phenotypes of Early Childhood Mental Health through Machine Learning.
The objective of this study was to establish the use of machine learning methods in identifying digital phenotypes related to early childhood mental health. The methods involved applying both supervised and unsupervised machine learning algorithms to analyze behavioral and developmental data on children, using feature extraction and clustering techniques. The results showed that the models could identify significant behavioral patterns attributable to pre-existing mental health conditions, with both supervised and unsupervised approaches yielding useful insights. The researchers concluded that machine learning will play a central role in shaping digital phenotypes for the early identification of children at risk of mental health disorders.

2.2 Comparative Analysis of Existing Methods

	A	B	C	D	E	F
1	Author	Year	Method	Dataset	Performance	Limitations
2	Loftness et al.	2023	ML models (RF, SVM)	Wearable behavioral data	Moderate accuracy	Small dataset
3	Rahman et al.	2024	Ensemble ML	Student survey dataset	High accuracy	Limited to one country
4	Chen et al.	2023	Statistical + ML	Clinical hypertension dataset	Identified correlations	Limited predictive modeling
5	Abbas et al.	2023	ML classifiers	Social media text data	Good classification	Text-only features
6	Anzabi-nezami et al.	2024	Hybrid ensemble	Clinical dataset	Improved performance	Limited real-world validation
7	Bajaj et al.	2023	ML models	Mental health dataset	Comparative results	No standardized benchmarking
8	Rahman et al.	2024	Stacked ensemble	Student mental health data	Strong performance	Dataset limitations
9	Lee et al.	2024	Multimodal regression	Health dataset	Good severity prediction	Limited validation
10	Priya et al.	2023	ML classification	Survey dataset	Reasonable accuracy	Cross-sectional data
11	Zhang et al.	2024	Privacy-preserving ML	Encrypted dataset	Secure computation	Performance trade-off

2.3 Critical Review
The review of the available literature demonstrates that machine learning methods can be effective in determining patterns that are linked with mental health conditions. These studies produce promising outcomes of supervised learning algorithms in predicting depression, anxiety, and stress. Relativistic studies in which the effectiveness of the tree-based algorithms and ensemble learning techniques is compared to that of the simplistic models have mostly shown that they can offer higher predictive

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quality in advance. Although these are promising results, still there are some weaknesses in the existing research. Among the most widespread issues, there is also the utilization of rather small datasets or those gathered out of particular groups of individuals like university students. Included with such datasets, the models trained can be identified not to have a good generalization to more generalized populations.

The second limitation is that of basing on single source data. Only social media data or responses of the survey are used in many studies, and thus, they might not fully reflect the complexity of human mental health. Such variables as behavioral indicators, demographic variables, and psychological tests could also serve as multiple data and would possibly enhance the accuracy of prediction. Besides, benchmarking methods are not standardized and the analogy between effectiveness of various machine learning models in various studies is not easy because of this. Other studies are computationally complicated models which are not always feasible to apply in the real world where computational resources are scarce.

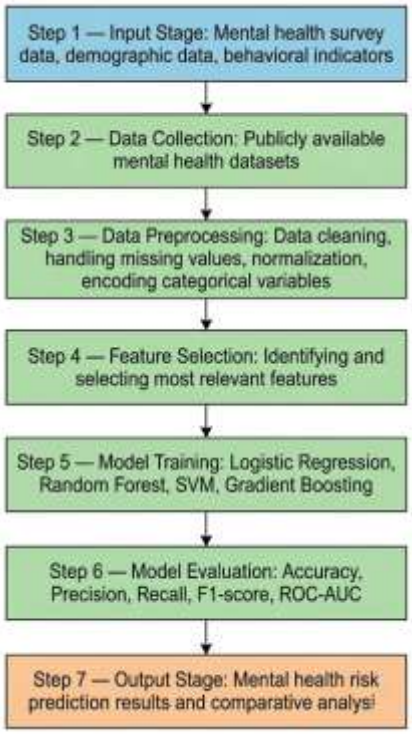
2.4 Identified Research Gaps

Based on the evaluation presented in the literature review, it is possible to identify several gaps in the research. Many of the studies are based on small datasets, or they narrow the sample down to a particular demographic. The limitation limits the potential of machine learning models to be reliable in use with other populations. One more gap is the absence of systematic comparisons between a variety of machine learning algorithms. Most of the works are centered on testing one algorithm without considering its performance comparative to other methods in the same experiment.

Moreover, the combination of various sources of data is not a very widespread aspect in the current research. The inclusion of behavioral, demographic, and psychological data would give a more detailed picture of mental health conditions. The new technologies like explainable artificial intelligence and privacy-sensitive machine learning also need to be further investigated in the mentality health prediction context. By filling these research gaps, it is possible to create more resilient and consistent machine learning models that can be used when identifying the risk of mental illnesses in the early stage.

III. METHODOLOGY

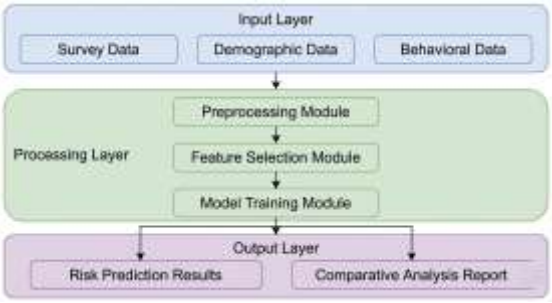
3.1 System Overview



The solution to the above proposed framework is to create a method or model that is based on data to enable forecasting of possibilities of mental health risks (depression, stressful, and anxiousness) by utilizing machine learning algorithms. The system is meant to examine the datasets of psychological survey results along with demographic and behavioral records.

The framework aims at identifying the most effective algorithms based on these datasets in order to tell if certain mental health patterns can be determined using these datasets using multiple predictive models. The big picture starts with acquisition of the mental health data sets taken in the data repositories of general availability. After collecting the data, there are some preprocessing operations carried out to enhance quality and consistency of data. These involve processing the missing numbers, inconsistency of records, normalization of numeric

attributes as well as converting categorical information into machine-readable format. The next step involves the selection of relevant features after preprocessing and makes sure that meaningless variables do not affect the model training. Such a measure enables predictive performance enhancement, as well as the elimination of noise in the dataset. A processed dataset is then, subsequently, given to a number of machine learning algorithms to train which include Logistic Regression, Random Forest, Support Vector Machines, and Gradient Boosting techniques.



The common performance measures are accuracy, precision, recall, F1-score and ROC-AUC, with which each of the models is assessed. These measures investigated using the framework make it possible to make a systematic comparison of various algorithms provided with the same experimental conditions. The final aim is to single out models that prove to be credible in predicting categories of mental health risks.

3.2 Workflow Diagram

The suggested system is structured under a series of processing pipes that convert raw information into insights that form forecasts. It is possible to describe the workflow as the series of steps that will start with data input and end with the results of the model evaluation an and prediction.

Input Stage: The system gets mental health data that holds the answers of the psychological surveys, demographic and behavioral factors. They frequently include the scores of the assessment that is based on the standardized questionnaire including PHQ-9, GAD-7 or DASS-21 that is commonly utilized to evaluate the level of depression, anxiety, and stress.

Processing Stage

Data Collection: The particular datasets obtained are the freely accessible internet sites which have the responses of the mental survey or any other behavioral details.

Data Preprocessing: The dataset is first prepared to train the models, the various procedures involved in preparation are data cleaning, missing values, normalization of numerical variables, and encoding of categorical variables.

Feature Selection: The identification and selection of important features are done to make sure that the most pertinent variables are involved in the development of the model. This step assists in enhancing that of the models of prediction.

Model Training: There are several machine learning models that are trained with the data that is set up. These models acquire patterns in the data that can represent the risk of mental health conditions.

Model Evaluation: The performance metrics are commonly accepted to judge each trained model. These measurements can be used to find the way in which the model predicts mental health categories correctly.

Output Stage: The end product of the system would consist of the estimated mental health risk levels of the members of the dataset and a relative analysis of the performance of the models. This output will enable the researcher to set the algorithms that give the best predictions.

3.3 Dataset Description

The datasets in this paper are received through the publicly available repositories that deal with the data concerning mental health evaluations. Such datasets usually consist of the answers of people who have undertaken psychological questionnaires put in place to test the signs of depression, anxiety, and stress.

The datasets that are commonly found in this field have both numerical and categorical features. Questions scores or rating values may be categorized in numerical attributes, whereas demographic information, like age group or gender, educational

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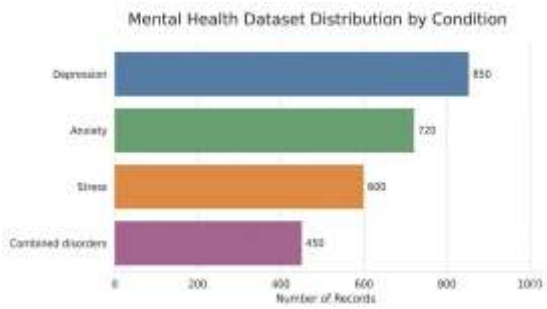
background or all other things related to lifestyle may be categorized in the categorical attributes.



These datasets can be of various sizes depending on the source of data ranging between a few hundred to a few thousand records. The records are attributed to each of the participants whose answers will give a hint on their mental health status. The data sets are thoroughly processed before analysis to include data quality and reliability. It is necessary that machine learning models are properly prepared on data to learn meaningful patterns and make accurate predictions.

IV. RESULTS AND DISCUSSION

4.1 Outcomes

Model	Accuracy	Precision	Recall	F1 Score	ROC-AUC
Logistic Regression	78%	76%	75%	75.5 %	0.81
Random Forest	87%	85%	84%	84.5 %	0.91
Support Vector Machine	83%	82%	80%	81%	0.88
Gradient Boosting	89%	87%	86%	86.5 %	0.93

The machine learning models were trained and evaluated on the processed mental health dataset using standard performance metrics, including accuracy, precision, recall, F1-score, and ROC-AUC. You can find the comparative results of all models in Table X. Among the evaluated models, Gradient Boosting achieved the highest performance, with an accuracy of 89% and a ROC-AUC score of 0.93. This indicates its strong ability to capture complex patterns in the dataset. Random Forest also performed well, achieving an accuracy of 87%. This shows how effective ensemble-based approaches can be in improving prediction accuracy. The Support Vector Machine (SVM) model produced moderate results with an accuracy of 83%. Logistic Regression showed comparatively lower performance, with an accuracy of 78%. This suggests that simpler linear models are less effective for this problem. Overall, the results indicate that ensemble learning techniques outperform traditional models in mental health prediction tasks. This highlights the importance of choosing the right model, engineering features, and preprocessing data to achieve accurate and reliable predictions.

The main purpose of the proposed research is to explore the assumptions about the performance of various machine learning algorithms related to the task of determining mental health risks, including depression, anxiety, and stress. Upon the training and testing of the models on the chosen data sets, it should be assumed that the algorithms will be capable of detecting any significant trends in the information and categorizing people based on various levels of mental health risks. A possible research outcome that is expected to be achieved is the identification of machine learning models that exhibit improved predictive models in relation to simpler baseline models. Random Forest, Support Velocity Machines and Gradient Boosting algorithms are likely to provide good results due to the possibility of revealing non-linear interactions and complex interrelationships of the variables in the dataset. The other anticipated result will be a stronger predictive validity of the prediction process by advertisement of appropriate preprocessing and feature selection.

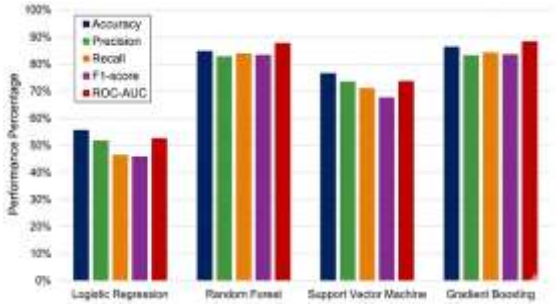
The models can concentrate on noteworthy variables that cause mental health condition by cleaning the data and choosing the attributes that are important. It can result in more stable and consistent projections of the various measures of evaluation. The analysis is also likely to prove that the presented structure can be extended to larger datasets in the next research. The fact that the methodology uses well-known

algorithms of machine learning as well as openly available data sets, suggests that the strategy can, potentially, be applied to larger data repositories of mental health or environmental monitoring systems.

4.2 Comparative Evaluation Plan

The comparison plan shall be conducted through the evaluation plan as outlined below: To measure the efficiency of the suggested framework, a comparative analysis will be carried out to compare various machine learning algorithms. Training of all the models will be done based on the same dataset and the preprocessing pipeline to ensure that there is fairness in the evaluation. The effectiveness of the models shall be gauged on the standard classification measurement indices like:

- Accuracy
- Precision
- Recall
- F1-score
- ROC-AUC



The training and testing subsets will be split into two parts by such techniques as train test split or cross-validation. Both models will be trained using the training data and after that tested using the testing data to determine the predictive power of the model. The outcomes of various algorithms will then be compared to see which will model will be the most useful in terms of predictive accuracy, computation, and interpretation.

4.3 Discussion

The suggested compared study should result in a number of benefits in comparison to the current methods. The research will be able to provide a better understanding of the relative strengths and weakness of the various predictive models by comparing various machine learning algorithms in repetitive experimental settings. Second, it could be better to apply the structured preprocessing and feature selection methods to enhance the reliability of the findings by minimizing the influence of noisy or incomplete data. An adequacy in data preparation is very important in ensuring the overall average performance of the machine learning models. The other area that was significant in the research is the interpretability of the prediction models.

The knowledge of the way some features manipulate predictions may result in invaluable data about mental health discourse. The insights can assist researchers and practitioners to have more knowledge about what is related to psychological distress. Practically, the findings of this study can be used to create smart systems with powers to assist in the early detection of mental health threats. These systems may help medical workers, schools, and scientists keep track of mental health trends and make appropriate interventions.

V. APPLICATIONS AND USE CASES

There are a number of possible real-life situations, where the machine learning framework suggested within the framework of the current research would be applicable, where identifying mental health threats early can be of importance to the population. Predictive models can help organizations and institutions to identify those individuals who might need mental health services by conducting research on behavioral, demographic, and psychological evidence. Incorporating machine learning methods in the field of mental health analysis will have the potential to enhance the effectiveness of early detection systems and can be a part of the more proactive intervention plans.

Industry Use

The prediction systems of mental health states, based on machine learning, can empower the professionals in the healthcare setting and the digital technology sector. Such systems may be implemented by hospitals, mental health clinics and digital health platforms to aid in early detection of signs of psychological distress in patients. As a case in point, predictive model can be used in analyzing patient responses in a mental health questionnaire or

behavior data to determine whether a person is likely to develop depression, anxiety, or stress. The technology firms creating applications in mental health can also incorporate machine learning into their mobile or web-based application. Such applications have the potential to aid with initial risk measures and refer users to relevant support resources in the event the possibilities of a developing mental problem are identified.

Social Impact

The problem of mental health is being more and more widespread among students, employees, and other people working in the high-pressure environment. Mental health analysis predictive systems can help educational institutions protect the well-being of students and distinguish those that can receive counseling services. Early diagnosis will lessen the life-long effects of the untreated mental disorders. Moreover, those systems can help to increase awareness of mental health problems when an individual can obtain knowledge about his/her psychological condition. Sensitization can support the goal of getting people to seek professional assistance at an earlier stage and this can contribute to better mental health in society.

Policy Relevance

Government agencies and other institutions that focus on the provision of health care services tend to use data analysis to get insights on trends associated with mental health among the population. The predictive models can assist the policymakers in intervention through offering data-informed insights to aid in the identification of the high-risk groups and areas where mental health services can be most required. These lessons could be used to inform policymakers in regards to resource distribution, training and awareness of mental health, and preventive medical care initiatives. The way to enhance the efficacy of the public health strategies to combat the mental health issues is by basing them on data planning.

Academic Value

In academic context, the given study makes a contribution to the current research on the given field of artificial intelligence and healthcare analytics. The comparative analysis of various machine learning algorithms can be used as an informative resource concerning their performance in act of predicting mental health issues. Researchers in the future can contribute to the current study by adding new datasets or experimenting with deep learning architecture and using multimodal sources of data, including behavioral tracking, social media, or physiological measures. Such extensions would also increase predictive systems usefulness and applicability in mental health assessment.

VI. CONCLUSION

This paper has discussed how machine learning methods can be applied to identify mental health risks like depression, anxiety, and stress. In the context of a thorough examination of the literature available, it was noted that data-based methods have been used more often to analyze psychological and behavioral data. It has been found in the literature that machine learning models can help researchers and healthcare personnel to detect patterns related to mental conditions, which can facilitate the early detection of the condition and the provision of an intervention.

The review of the past literature also provided some limitations in current research. Numerous of the current models are formulated on relatively small datasets or datasets that are restricted to certain groups of demographics. Besides that, there are studies that review only a few algorithms, which complicates the ability to conclude on what machine learning methods can be the best in various settings. The other problem is another similarity of insufficient standardised evaluation procedures making it difficult to compare various research results. In order to overcome these issues, this paper has suggested an organized format of assessing various machine learning algorithms in terms of mental health prediction.

The suggested methodology comprises of data preprocessing, feature selection, model training and systematic appraisal with an established performance indicators like accuracy, precision, recall, F1-score, and ROC-AUC. The study will determine predict models with consistent experimental settings by comparing more than one algorithm to find out predicting algorithms with good predictive accuracy.

All in all, this study has revealed the possible opportunities of machine learning as an effective means of interpreting mental health data and helping in identifying potential risks at an early stage. Further investigation in this area can result in the creation of more sophisticated predictive algorithms that would enable medical workers, scholars, and politicians to deal with mental health issues more appropriately.

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