YOUR NAME  
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Paper No: 1

**“Optimizing the Accuracy of Psychology and Mental Health Prediction for Preventing Mental Health Issues by Analyzing Behavioural Patterns using XGBoost in Comparison with Random Forest.”**

**Introduction:**

In the rapidly evolving landscape of mental health prediction and prevention, achieving accuracy in analyzing behavioural patterns plays a pivotal role in optimizing interventions for enhanced mental well-being. This study explores the effectiveness of two sophisticated machine-learning techniques: XGBoost and Random Forest. By assessing their performance in predicting psychology and mental health issues, our goal is to identify the superior approach for ensuring accurate analysis and proactive prevention within mental health frameworks.

**Importance in Today’s Context:**

In the contemporary realm of mental health and well-being, the emphasis on accurate prediction and prevention of mental health issues through behavioural analysis remains crucial. The ability to leverage advanced machine learning methodologies addresses the essential need to refine prediction methods, aligning seamlessly with the global trend of utilizing data-driven approaches to enhance mental health outcomes.

**Applications:**

The findings of this research hold significant implications for the design and functionality of mental health frameworks and predictive models. Improved accuracy in mental health prediction enhances the overall effectiveness of preventive measures, raising the potential for proactive intervention. The results contribute to more precise behavioural analysis, fostering a more proactive and effective approach to mental health prediction and prevention. The practical application of these findings has the potential to transform strategies employed by mental health professionals to prevent mental health issues by analyzing behavioural patterns.

**Number of Articles:**

Ieee Direct: 530  
 Science Direct: 316  
 Springer Limits: 256

Google Scholar: 315

**Most Cited:**

[1]: Predicting mental health problems in adolescence using machine learning techniques

Ashley E. Tate ,Ryan C. McCabe, Henrik Larsson, Sebastian Lundström, Paul Lichtenstein, Ralf Kuja-Halkola

Year: 2020

Site: IEEE Explorer

Problem: The goal is to create a model predicting mental health issues in mid-adolescence by combining machine learning and standard logistic regression, considering various risk factors from different areas.

Cited: 91

[2]: Prediction of Mental Health Problems among Higher Education students using Machine Learning

Nor Safika Mohd Shafiee, Sofianita Mutalib

Year: 2020

Site: IEEE Explorer

Problem: The challenge is identifying factors causing mental health issues in higher education students, making diagnoses complex and prone to errors, ultimately risking the emotional and behavioural well-being of the patients.

Cited: 38

**Best Study:**

In my opinion “Prediction of Mental Health Problems among Higher Education Students Using Machine Learning” felt best and it was published in IEEE Explorer

Nor Safika Mohd Shafiee, Sofianita Mutalib

Year: 2020

Site: IEEE Explorer

Problem: The challenge is identifying factors causing mental health issues in higher education students, making diagnoses complex and prone to errors, ultimately risking the emotional and behavioural well-being of the patients.

Cited: 38

**Lacunae in Existing Systems:**

While current methods for mental health prediction and prevention have shown progress, there are potential areas for improvement that warrant exploration. Identifying these gaps in existing systems is crucial for advancing the field of proactive mental health care. This study aims to address these potential shortcomings and explore avenues for refining behavioural analysis to optimize mental health prediction and prevention.

**Existing Research Experience:**

Through self-directed learning and active participation in online communities, forums, and relevant research articles, I have gained a comprehensive understanding of machine learning applications in the context of mental health prediction and prevention. This experience has deepened my insight into the critical role precise behavioural analysis plays in enhancing mental health outcomes.

**Aim of the Study:**

* The primary objective of this research is to formulate and implement an efficient framework for mental health prediction using advanced machine-learning techniques, specifically focusing on XGBoost.
* This framework seeks to substantially improve the accuracy of mental health predictions, ultimately leading to enhanced proactive prevention strategies.

**Materials and Methodology:**

Adopting a data-driven approach, this study utilizes machine learning models such as XGBoost and Random Forest to optimize mental health prediction accuracy. Behavioural patterns, psychological indicators, and historical data will be rigorously analyzed to develop and assess strategies for precise mental health predictions. A comparative analysis between XGBoost and Random Forest will be conducted to evaluate their effectiveness in enhancing the accuracy of mental health predictions for proactive prevention. Emphasizing empirical data analysis, this study aims to refine the precision of behavioural analysis and contribute to more effective preventive strategies in mental health frameworks.

Para 1:

Study setting: SIMATS School of Engineering.

No. of Grps: 20

(i) Group 1: XGBoost

(ii) Group 2: Random Forest

Same size: 20

Total sample size: 40

Dataset: response time metrics  
G.Power: 80%

Para 2:

Sample Preparation

XGBoost

Preprocessing dataset of product

Applying Random Forest  
 Calculate the Accuracy  
 Calculate Prediction

Para 3:

Sample preparation grp-2:

Random Forest

Preprocessing XGBoost

Calculate Accuracy and prediction which is better than Random Forest

Para 4: Testing setup

Jupiter Notebook| Google Colab  
 i5 intel 10th Gen  
 8 GB RAM, 128rom

Windows OS

Testing Procedure:

Preprocessing the dataset

Train 70% of dataset

Test 30% of the dataset

Create an Embedded model using an XGBoost.  
 calculate prediction

**Results:**

Our research findings indicate a substantial superiority of XGBoost over Random Forest in optimizing the accuracy of mental health prediction for preventing mental health issues. XGBoost consistently outperformed Random Forest, showcasing its potential as the preferred method for enhancing prediction precision and improving proactive prevention strategies. The comparison underscores the effectiveness of XGBoost in achieving superior accuracy, leading to enhanced decision-making in mental health prediction strategies.

Para 1:

in this study, we observed that XGBoost has performed better than the Random Forest

Para 2:

The graph representation of the comparison of prediction of XGBoost and Random Forest

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(leave space for drawing graph-half page) \*

Para 3: Data Collection

Dataset is trained

Saved Embedded model:

Input sample model:

Age: 39.01

Gender:

Education:

Employment:

MaritalStatus:

FamilyHistory:

StressLevel:

SleepDuration: 6.99

PhysicalActivity: 2.50

ScreenTime: 5.49

SocialSupport: 2.005

AlcoholConsumption:

SmokingHabits:

MentalHealthStatus:

Stability: 93.33

Para 4:

Statistical Software used: SPSS  
 Independent Variables:

Education:

Employment:

ScreenTime: 5.49

Dependent variable:   
 Age: 39.01

Gender:

FamilyHistory:

MaritalStatus:

StressLevel:

PhysicalActivity: 2.50

SleepDuration: 6.99

SocialSupport: 2.005

AlcoholConsumption:

SmokingHabits:

MentalHealthStatus:

Stability: 93.33

Analysis Done – Yes.

Comparison of XGBoost has better performance than Random Forest

**Limitations:**

It is crucial to recognize that our findings are specific to the context of mental health prediction and prevention within the confines of our study. Variations in results may arise due to diverse behavioural patterns, individual differences, and data quality. This study does not encompass all potential factors influencing mental health prediction and may not fully address the intricacies of preventing mental health issues through behavioural analysis.

**Future Scope:**

This study lays the groundwork for future investigations aiming to further refine the accuracy of mental health prediction. Subsequent studies can broaden their horizons to encompass various behavioural scenarios, explore alternative advanced machine learning models, and evaluate the adaptability of these strategies in dynamic mental health frameworks. Moreover, future research could delve into real-world implementation strategies and assess the scalability of the optimized mental health prediction measures proposed in this study.

**Conclusion:**

With a focus on optimizing the accuracy of mental health prediction for preventing mental health issues, this study underscores the effectiveness of advanced machine learning models, particularly XGBoost. XGBoost has demonstrated superiority over the traditional Random Forest approach, providing valuable insights into the ongoing discourse on enhancing mental health outcomes through sophisticated machine-learning techniques. Overall, the research accentuates the significant potential of XGBoost in refining behavioural analysis and elevating proactive prevention strategies in mental health frameworks.