YOUR NAME  
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Paper No: 2

**“Enhancing the Precision of Predictions in Psychology and Mental Health to Prevent Mental Health Challenges through the Analysis of Behavioural Patterns. A Comparative Study of XGBoost and Recurrent Neural Network”**

**Introduction:**

Within the swiftly changing landscape of mental health prediction and prevention, the attainment of precision in analyzing behavioural patterns is pivotal for optimizing interventions to enhance mental well-being. This study delves into evaluating the effectiveness of two advanced machine-learning techniques: XGBoost and Recurrent Neural Network, aiming to identify the superior approach for accurate analysis and proactive prevention within mental health frameworks.

**Significance in Contemporary Context:**

In today's domain of mental health and well-being, the focus on precise prediction and prevention of mental health issues through behavioural analysis remains paramount. The utilization of advanced machine learning methodologies addresses the critical need to refine prediction methods, aligning seamlessly with the global trend of employing data-driven approaches to improve mental health outcomes.

**Applications:**

The discoveries from this research carry substantial implications for the design and functionality of mental health frameworks and predictive models. Elevated accuracy in mental health prediction enhances the overall efficacy of preventive measures, creating opportunities for proactive intervention. The outcomes contribute to more refined behavioural analysis, fostering a proactive and effective approach to mental health prediction and prevention. The practical implementation of these findings holds the potential to revolutionize strategies employed by mental health professionals in preventing mental health issues through the analysis of 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:**

Despite the advancements observed in current approaches to mental health prediction and prevention, there exist potential areas for improvement that necessitate exploration. Recognizing and addressing these gaps in existing systems are vital steps toward advancing the realm of proactive mental health care. This study aims to identify and rectify these potential shortcomings, exploring avenues to enhance behavioural analysis for the optimization of mental health prediction and prevention.

**Existing Research Experience:**

Through independent learning and active engagement in online communities, forums, and pertinent research articles, I have acquired a comprehensive understanding of machine learning applications in the context of mental health prediction and prevention. This experience has deepened my insight into the pivotal role that precise behavioural analysis plays in improving mental health outcomes.

**Aim of the Study:**

* The principal objective of this research is to create and implement an effective framework for mental health prediction utilizing advanced machine-learning techniques, with a specific focus on XGBoost.
* This framework aims to significantly enhance the accuracy of mental health predictions, ultimately contributing to improved proactive prevention strategies.

**Materials and Methodology:**

Embracing a data-driven approach, this study employs machine learning models, including XGBoost and Recurrent Neural Network, to optimize the accuracy of mental health predictions. The analysis involves a thorough examination of behavioural patterns, psychological indicators, and historical data to develop and assess strategies for precise mental health predictions. A comparative analysis between XGBoost and Recurrent Neural Network will be conducted to gauge their effectiveness in improving the accuracy of mental health predictions for proactive prevention. With a focus on empirical data analysis, this study strives to enhance the precision of behavioural analysis and contribute to more effective preventive strategies within mental health frameworks.

Para 1:

Study setting: SIMATS School of Engineering.

No. of Grps: 20

(i) Group 1: XGBoost

(ii) Group 2: Recurrent Neural Network

Same size: 20

Total sample size: 40

Dataset: response time metrics  
G.Power: 80%

Para 2:

Sample Preparation

XGBoost

Preprocessing dataset of product

Applying Recurrent Neural Network  
 Calculate the Accuracy  
 Calculate Prediction

Para 3:

Sample preparation grp-2:

Recurrent Neural Network

Preprocessing XGBoost

Calculate Accuracy and prediction which is better than Recurrent Neural Network

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 Recurrent Neural Network in optimizing the accuracy of mental health prediction for preventing mental health issues. XGBoost consistently outperformed Recurrent Neural Network, 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 Recurrent Neural Network

Para 2:

The graph representation of the comparison of prediction of XGBoost and Recurrent Neural Network

(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:

MaritalStatus:

StressLevel:

ScreenTime: 5.49

Dependent variable:   
 Age: 39.01

Gender:

FamilyHistory:

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 Recurrent Neural Network

**Limitations:**

It is imperative to acknowledge that our discoveries are specific to the realm of mental health prediction and prevention within the scope of our study. Variations in outcomes may arise due to diverse behavioural patterns, individual disparities, and variations in data quality. This study does not encompass all conceivable factors influencing mental health prediction and may not comprehensively address the complexities of preventing mental health issues through behavioural analysis.

**Future Scope:**

This study establishes a foundation for upcoming investigations aiming to further enhance the precision of mental health prediction. Subsequent studies can broaden their perspectives to include various behavioural scenarios, explore alternative advanced machine learning models, and assess the adaptability of these strategies in dynamic mental health frameworks. Additionally, future research could delve into real-world implementation strategies and evaluate the scalability of the optimized mental health prediction measures proposed in this study.

**Conclusion:**

Centred on optimizing the accuracy of mental health prediction to prevent mental health issues, this study underscores the efficacy of advanced machine learning models, particularly XGBoost. XGBoost has proven its superiority over the traditional Recurrent Neural Network approach, offering valuable insights into the ongoing discourse on enhancing mental health outcomes through sophisticated machine-learning techniques. In summary, the research highlights the substantial potential of XGBoost in refining behavioural analysis and advancing proactive prevention strategies within mental health frameworks.