School of Computer Science and Engineering

(Computer Science & Engineering)

Faculty of Engineering & Technology

Jain Global Campus, Kanakapura Taluk - 562112

Ramanagara District, Karnataka, India

2023-2024

(IV Semester)

A Project Report on

"Design and development of a method for predicting students' transformation for Maximum depressive disorder and suicidal tendency"

Submitted in partial fulfilment for the award of the degree of

BACHELOR OF TECHNOLOGY

IN

COMPUTER SCIENCE AND ENGINEERING

Submitted by

PARTH JAIN

22BTRCN200

GMB VIGNESH KUMAR

22BTRCN089

CHANDRA BHUSAN KUMAR YADAV

22BTRCN057

Under the guidance of

Dr. Chandrasekar Venkatachalam

Professor

Department of Computer Science and Engineering

School of Computer Science & Engineering

Faculty of Engineering & Technology

JAIN (Deemed to-be University)

FACULTY OF ENGINEERING AND TECHNOLOGY

Department of Computer Science and Engineering

School of Computer Science & Engineering

Faculty of Engineering & Technology

Jain Global Campus, Kanakapura Taluk - 562112

Ramanagara District, Karnataka, India

CERTIFICATE

This is to certify that the project work titled **"Design and development of a method for predicting students transformation for Maximum depressive disorder and suicidal tendency"** is carried out by **PARTH JAIN (22BTRCN200), GMB VIGNESH KUMAR (22BTRCN089), CHANDRA BHUSAN KUMAR YADAV (22BTRCN057)** a bonfire student(s) of Bachelor of Technology at the School of Engineering & Technology, Faculty of Engineering & Technology, JAIN (Deemed-to-be University), Bangalore in partial fulfillment for the award of degree in Bachelor of Technology in Computer Science and Engineering, during the year **2023-2024**.

Dr.Chandrasekar Venkatachalam	**Dr. Mahesh T R**	**Dr. Geetha G**
Professor Dept. of CS&E, Date:	Program Head, Computer Science and Engineering, School of Computer Science & Engineering Faculty of Engineering & Technology JAIN (Deemed to-be University) Date:	Director, School of Computer Science & Engineering Faculty of Engineering & Technology JAIN (Deemed to-be University) Date:

Name of the Examiner Signature of Examiner

1.

2

DECLARATION

We , **PARTH JAIN (22BTRCN200), GMB VIGNESH KUMAR (22BTRCN089), CHANDRA BHUSAN KUMAR YADAV (22BTRCN057)** student of IV semester B.Tech in **Computer Science and Engineering**, at School of Engineering & Technology, Faculty of Engineering & Technology, **JAIN (Deemed to-be University)**, hereby declare that the internship work titled has been carried out by us and submitted in partial fulfilment for the award of degree in **Bachelor of Technology in Computer Science and Engineering** during the academic year **2023-2024**. Further, the matter presented in the work has not been submitted previously by anybody for the award of any degree or any diploma to any other University, to the best of our knowledge and faith.

PARTH JAIN:	Signature
22BTRCN200:	
GMB VIGNESH KUMAR:	Signature
22BTRCN089:	
CHANDRA BHUSAN KUMAR YADAV:	Signature
22BTRCN057:	

Place: Bangalore

Date:

ACKNOWLEDGEMENT

It is a great pleasure for me to acknowledge the assistance and support of a large number of individuals who have been responsible for the successful completion of this project work.

First, I take this opportunity to express my sincere gratitude to Faculty of Engineering & Technology, JAIN (Deemed to-be University) for providing me with a great opportunity to pursue my Bachelors / Master's Degree in this institution.

I am deeply thankful to several individuals whose invaluable contributions have made this project a reality. I wish to extend my heartfelt gratitude to ***Dr. Chandraj Roy Chand, Chancellor****, for his tireless commitment to fostering excellence in teaching and research at Jain (Deemed-to-be-University). I am also profoundly grateful to the honorable* ***Vice Chancellor, Dr. Raj Singh, and Dr. Dinesh Nilkant, Pro Vice Chancellor****, for their unwavering support. Furthermore, I would like to express my sincere thanks to* ***Dr. Jitendra Kumar Mishra, Registrar****, whose guidance has imparted invaluable qualities and skills that will serve us well in our future endeavors.*

I extend my sincere gratitude to ***Dr. Hariprasad S A, Director*** *of the Faculty of Engineering & Technology,* ***and Dr. Geetha G, Director*** *of the School of Computer Science & Engineering within the Faculty of Engineering & Technology, for their constant encouragement and expert advice. Additionally, I would like to express my appreciation to* ***Dr. Krishnan Batri, Deputy Director (Course and Delivery), and Dr. V. Vivek, Deputy Director (Students & Industry Relations),*** *for their invaluable contributions and support throughout this project.*

It is a matter of immense pleasure to express my sincere thanks to **Dr. Mahesh T R,** ***Program Head, Computer Science and Engineering****, School of Computer Science & Engineering Faculty of Engineering & Technology for providing right academic guidance that made my task possible.*

I would like to thank our guide **Dr. Chandrasekar Venkatachalam**, Professor ***Dept. of Computer Science and Engineering****, for sparing his valuable time to extend help in every step of my work, which paved the way for smooth progress and fruitful culmination of the project.*

I would like to thank our Project Coordinator ***Dr. Shiva Kumar****, and all the staff members of Computer Science and Engineering for their support.*

I am also grateful to my family and friends who provided me with every requirement throughout the course. I would like to thank one and all who directly or indirectly helped me in completing the work successfully.

Signature of Student(s)

ABSTRACT

This project aims to develop a dynamic model to identify and predict students suffering from major depressive disorder (MDD) and its progression to suicidal tendencies. The model will utilize an online test, administered twice a year, to assess students' MDD risk levels using a fuzzy decision tree approach. The test will categorize students into three levels of MDD severity, and logistic regression will predict when students are likely to transition from one level to another, including the risk of suicidal tendencies. The project's objectives include designing an effective questionnaire, preprocessing data, classifying students into MDD risk groups, predicting transitions between risk levels, and suggesting targeted interventions to mitigate MDD risk among students.

The project helps to identify college students suffering from different levels of major depressive disorder (MDD) and predict those at risk of developing suicidal tendencies. The model will involve an online test administered twice a year, using a carefully designed questionnaire to assess MDD risk levels. The responses will be analysed using a fuzzy decision tree method to categorize students into three levels of MDD (Level 1, Level 2, and Level 3). Logistic regression will then be used to predict when students are likely to transition from one level to another, including the risk of developing suicidal tendencies.

The objectives of this project are to create an effective online questionnaire to assess MDD risk levels, pre-process the collected data to eliminate errors and uncertainties, classify students into different MDD risk levels (Level 1, Level 2, and Level 3), predict when students are likely to transition to a higher MDD risk level or develop suicidal tendencies, and recommend appropriate interventions and support at each level to mitigate MDD risk.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

NOMENCLATURE USED

MDD	Major Depressive Disorder
ML	Machine Learning
LR	Logistic Regression
DL	Deep Learning
CNN	Convolutional Neural Network
NLP	Natural Language Processing
EEG	Electroencephalography

Chapter 1

1. INTRODUCTION

Mental health concerns are on the rise among college students, with major depressive disorder (MDD) being a particularly pressing issue. This condition, marked by prolonged feelings of sadness, emptiness, and irritability, can significantly impair daily functioning and overall well-being. Unfortunately, despite being a treatable condition, many students struggling with MDD often fail to receive the diagnosis and treatment they need. The goal of this project is to create a ML model that can detect students experiencing varying degrees of major depressive disorder (MDD) and forecast which individuals are likely to escalate to more severe forms of the condition, including those at risk of suicidal thoughts.

1.1. Background & Motivation

The increasing prevalence and complexity of mental health disorders have highlighted the need for more effective and efficient diagnostic and treatment strategies. Traditional approaches, which often rely on clinical judgment and trial-and-error, can be slow, costly, and ineffective. The recent explosion of mental health-related data, including neuroimaging, genomic, and electronic health records, has created a unique opportunity for machine learning to uncover hidden patterns and relationships. Driven by the potential to revolutionize mental health care, researchers are now exploring the application of machine learning techniques to improve diagnostic accuracy, treatment outcomes, and patient well-being, with the goal of developing personalized, data-driven solutions.

1.2. Objective

The overarching goal of this research is to harness the capabilities of machine learning to enhance the diagnosis, treatment, and management of mental health conditions. This study seeks to design, develop, and assess the efficacy of machine learning models in accurately detecting suicidal ideation in depressed individuals, and predicting treatment responses for those with major depressive disorder. By applying machine learning techniques, this research aims to uncover new diagnostic markers, improve diagnostic precision, ultimately leading to better health outcomes for individuals affected by mental health disorders.

1.3. Delimitation of research

The research project's limitations are confined to college/university students, specifically targeting Major Depressive Disorder (MDD) and its progression to suicidal tendency, with a narrow scope excluding other mental health conditions. The study's methodology is restricted to an online test with a predefined questionnaire, utilizing fuzzy decision trees and logistic regression, without exploring alternative approaches. Additionally, the twice-yearly testing frequency may not fully capture MDD's dynamic nature, and the project stops short of implementing or evaluating interventions to mitigate MDD risk.

1.4. Benefits of research

This research has the potential to yield numerous benefits, including enabling timely interventions to prevent severe depression and suicide attempts, improving mental health outcomes and academic performance, and providing personalized support to students in need. By identifying at-risk students early, the model can help reduce suicide rates, inform the development of effective campus mental health services, and raise awareness about MDD and suicidal tendencies. Furthermore, the research can lead to data-driven decision making, be scaled up to support a larger student population, and contribute to the advancement of knowledge in this critical area.

Chapter 2

2. LITERATURE SURVEY

2.1. Literature Review

M. Margarette Sanchez et al explores using machine learning (ML) in the field of mental health has shown promising results in improving the diagnosis and treatment of various disorders. In the context of major depressive disorder (MDD) and bipolar disorder (BD), a machine learning algorithm has been proposed to distinguish between the two using resting-state EEG data. The algorithm involves multi-step preprocessing to enhance EEG data quality, feature extraction using Symbolic Transfer Entropy (STE) to capture brain connectivity, and classification using machine learning models [3].

S. B. Hassan et al explores in addition to diagnosis, ML has also been applied to recognize suicidal intent in depressed populations. An automated conversational platform using NLP and machine learning techniques has been developed to identify depression-associated risks. The platform analyzes conversations to recognize sentiments into four categories: 'happy', 'neutral', 'depressive', and 'suicidal' states. The platform uses Google Dialogflow ML algorithm and triggers a local call to a suicide prevention helpline for 'suicidal' states. [4].

W. Mumtaz et al explores to diagnose MDD based on EEG data. A study involving participants performing a visual oddball task while EEG data was collected found that P300 intensities were significantly lower in MDD patients compared to healthy controls, and the latencies were longer. Limitations include the use of a single EEG sensor, need for validation in diverse populations, and reliance on cross-sectional data, highlighting the need for further research and development. [5].

M. Bhagawati et al discusses ML techniques can also be used to develop personalized treatment plans for MDD patients. ML can analyse data from brain imaging studies to identify potential biomarkers for MDD and take into account risk factors such as sex, age, social class, and marital status. Anatomical changes observed in the brains of MDD patients, including the frontal lobe, thalamus, striatum, parietal lobe, and hippocampus, can also be considered. Several limitations and challenges, including data access and privacy concerns, algorithm complexity and interpretability, ethical use of patient data, and generalizability across different patient demographics and healthcare systems. [6]. N.

Mumenin et al presents in the context of suicide prediction, a hybrid deep learning (DL) technique combining Convolutional Neural Network (CNN) and Gated Recurrent Unit (GRU) has been proposed for suicidal ideation detection from social network data. The model's performance is limited by several challenges, including data bias and representation, privacy concerns, contextual understanding, model interpretability, real-time application, clinical validation, and integration with mental health services, which must be addressed to ensure its effectiveness and safety in detecting suicidal ideation on social media. [7].

A. Mousa et al reviews the application of machine learning algorithms in mental health has shown promising results in recent studies. One study explored the use of machine learning classifiers to differentiate between major depressive disorder (MDD) and Parkinson's disease (PD) patients based on cognitive performance. The study employed a computer-based cognitive task that measures human cognitive performance, specifically reinforcement learning, which is related to dopamine system function. [8].

V. Baby et al presents an integrated approach for suicidal tendency detection using a multi-modal approach that combines facial gesture recognition, voice pattern recognition, and text pattern recognition. The system uses machine learning algorithms and deep learning techniques to analyse user inputs from various sources, such as Twitter tweets, audio signals, and facial expressions. [9]. H. Kwon et al proposes a study proposed a prefrontal brain wave asymmetry-based image with a deep learning-based model to prescreen depression patients using EEG data. The results showed an accuracy of 75% with Convolution Neural Network (CNN) and 87.5% with VGG16. [10].

1.1 Comparative Analysis with Existing methods

Author& Year	Approach	Remarks
Gi Sung Oh et al. (2021)	The method involves creating a psychological stability treatment space using immersion factors, including color sense, and evaluating its effectiveness using ITQ, PQ, and QIDS-SR.	* Immersion levels were assessed using ITQ and PQ scales, indicating high immersion quality. * **Limitation**: Potential limitations include standardizing subjective immersion experiences across diverse patient groups. * Ensuring long-term therapeutic benefits beyond immediate emotional stabilization.
Chun-Chih Huang et al. (2022)	The approach used in this study is a novel machine learning-based method that utilizes a revisited 3D CNN model, Semi-CNN, to	* The study aims to distinguish between MDD, BD, and healthy controls using resting-state MEG signals during euthymic phases. * The model achieved high accuracy rates of 96.05% on test data and 95.71% via 5-fold cross-validation.

	classify MDD and BD based on their resting-state MEG signals during euthymic phases.	* **Limitation**: Limitations of the study include the need for validation in larger, more diverse patient cohorts.
Ruba Fadul et al. (2023)	The approach used is a deep learning-based method utilizing keystroke dynamics from touchscreen typing patterns with CNN, LSTM, and CNN-LSTM models to detect depressive tendencies.	* The study investigates the use of touchscreen typing patterns as digital biomarkers to diagnose depressive disorder (DD). * Deep learning techniques, including CNN, LSTM, and CNN-LSTM models, are employed to analyze keystroke dynamics. * **Limitation**: Limitations include the relatively small sample size.
Wajid Mumtaz et al. (2015)	The approach used is a machine learning scheme involving DFA feature extraction, feature selection, and logistic regression classification to discriminate MDD patients from healthy controls.	* The article proposes a machine learning scheme to discriminate MDD patients from healthy controls using EEG data and DFA feature extraction. * The study concludes that scaling exponents can be used as discriminants of clinically diagnosed MDD patients. * **Limitation**: Limitations of the study include Medication effects, uncontrolled variables, and small sample size may have influenced the results.
Chetna Gupta et al. (2022)	The approach used is a fusion of conventional and non-conventional methods, including EEG, fMRI, text, audio, and image-based methods, with machine learning (ML) and deep learning (DL) algorithms to diagnose major depressive disorder (MDD).	* The article discusses the use of conventional and AI technologies for the diagnosis of Major Depressive Disorder (MDD). * The article highlights the accuracy of these methods, with some achieving up to 98.32% accuracy in detecting MDD. * **Limitation**: Limitations of the studies include various constraints such as small sample size, medication effects, uncontrolled variables, complexity.
Chiyoung Lee et al. (2022)	The approach used was a cross-sectional study employing six machine learning classification methods with 10-fold cross-validation and feature selection to predict depression among U.S. adults with hypertension.	* The study developed prediction models for depression among U.S. adults with hypertension using six machine learning approaches. * The developed models can aid in developing screening tools and informing healthcare professionals about effective prevention strategies. * **Limitation**: The study's cross-sectional design limits the ability to draw causal inferences, and longitudinal data would be more effective in establishing causality and understanding the temporal relationship between hypertension and depression.
Min Xia et al. (2023)	The approach used in this study is an end-to-end integrated Deep Learning (DL) model that combines a multi-head self-attention mechanism to learn potential connectivity relationships among EEG channels, a parallel two-branch convolution neural network module to extract higher-level features, and a fully connected layer for classification.	* The study used a relatively small sample size (30 MDD patients and 28 healthy controls), which may limit the model's generalizability and robustness across different populations. * **Limitation**: There is a potential risk of overfitting, where the model may perform well on the training data but poorly on unseen data, due to the small sample size. * The model's performance is highly dependent on the quality of the EEG data, and any noise or artifacts in the EEG recordings could adversely affect the model's accuracy and reliability.

Zifan Jiang et al. (2021)	The approach used in this study is a novel deep neural network framework that combines CNN-based automated facial expression recognition with regional CNN detector and Imagenet pre-trained CNN to extract emotions and facial action units from video interviews.	* The approach used in this study is a framework for classifying Major Depressive Disorder (MDD) remission and treatment response using facial expression features extracted from videos. * Uncontrolled variables such as sleep patterns, appetite, and lifestyle may have affected the results, as patients were outpatients. * **Limitation**: The findings are limited to the specific clinical population studied and may not be directly applicable to other populations without retraining the models.

2.2. Inferences Drawn from Literature Review

Machine learning has shown great potential in improving the diagnosis and treatment of mental health disorders, such as major depressive disorder and bipolar disorder. For example, ML algorithms have been developed to accurately distinguish between these two disorders using EEG data, and to identify suicidal intent in depressed individuals through conversational platforms. Moreover, ML can be used to diagnose MDD based on EEG data and develop personalized treatment plans by analyzing brain imaging data. However, to fully harness the power of ML in mental health, it's essential to address various limitations and challenges, including data quality, algorithm complexity, and privacy concerns.

To address challenges in mental health research, researchers can employ several strategies. These include standardizing subjective experiences across diverse groups, ensuring long-term therapeutic benefits, validating findings in larger and more varied patient samples, increasing sample sizes through data techniques and multi-site collaborations, controlling for factors like medication effects and other uncontrolled variables, establishing causal relationships through longitudinal studies, preventing overfitting, and accounting for variables like sleep, appetite, and lifestyle. By adopting these approaches, researchers can overcome methodological issues and improve the reliability and real-world applicability of their work, ultimately advancing the field of mental health research and enhancing patient care.

Chapter 3

3. PROBLEM FORMULATION AND PROPOSED WORK

3.1. Introduction

Depression is a pervasive mental health disorder that affects a significant proportion of individuals, including students in colleges and universities. Major Depressive Disorder (MDD) is a mood disorder characterized by persistent feelings of sadness, emptiness, or irritability, accompanied by somatic and cognitive changes that impair an individual's ability to function. Despite being one of the most treatable disorders, MDD often goes undiagnosed and untreated, leading to severe consequences, including suicidal tendencies.

3.2. Problem Statement

The prevalence of MDD among students is alarming, with approximately 10-15% of teens experiencing depression at any given time. Moreover, research suggests that one in every four adolescents will experience an episode of major depression during their college years, with the average age of onset being 16-22 years. The lack of timely intervention and proper diagnosis exacerbates the problem, making it essential to develop a dynamic model that can identify students suffering from different levels of MDD and predict those at risk of transitioning to suicidal tendencies.

3.3. System Architecture / Model

The proposed system consists of five main components that work together to identify and predict Major Depressive Disorder (MDD) risk levels among students. The first component involves developing an appropriate questionnaire for an online test that extracts various levels of MDD risk among students. This questionnaire is administered online to students twice a year and collects data on demographic information, psychological symptoms, behavioural patterns, and environmental factors that contribute to MDD risk.

The second component involves pre-processing the data received after the online test to eliminate missing values and uncertainties. Data cleaning and normalization techniques are applied to prepare the data for analysis. This ensures that the data is complete and accurate, which is essential for making reliable predictions.

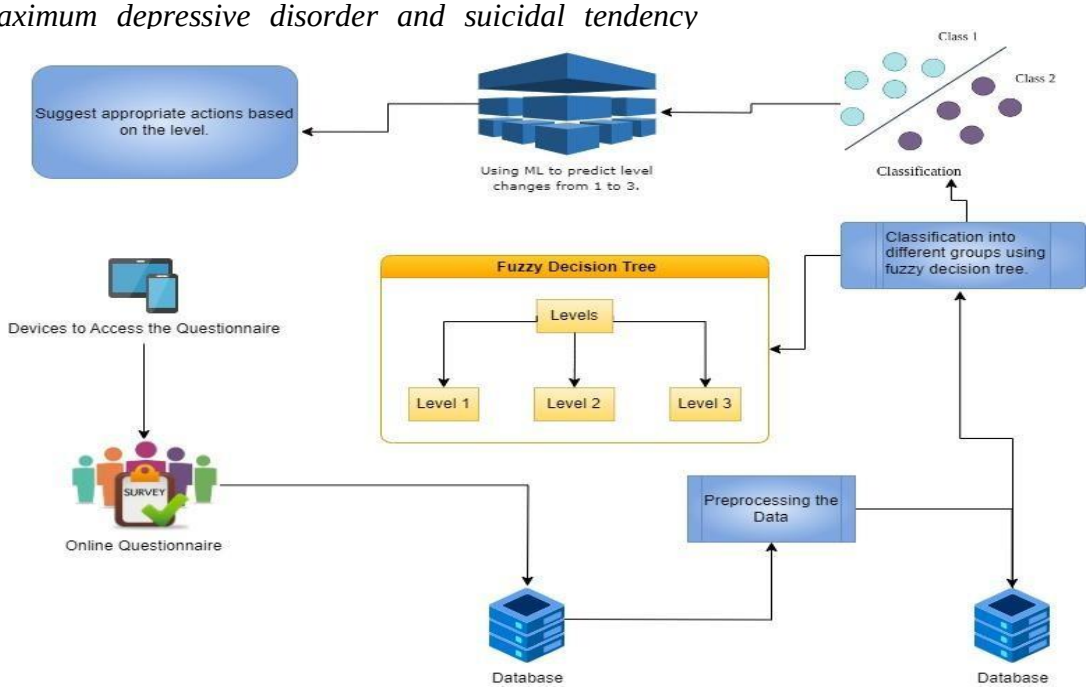

Fig. 2.1 Architecture of the Proposed System

The third component uses a fuzzy decision tree algorithm to classify students into different groups based on their MDD risk levels. The algorithm assigns students to one of three levels: Level 1 (low risk), Level 2 (moderate risk), and Level 3 (high risk). This classification is based on the student's responses to the questionnaire and takes into account the complexity and uncertainty of the data.

The fourth component uses a logistic regression model to predict when students will transition from one level to another. For example, the model predicts the probability of a student transitioning from Level 1 to Level 2, Level 2 to Level 3, and Level 3 to suicidal tendency. This prediction is based on the student's current MDD risk level and other relevant factors.

The final component involves post-processing and intervention. Based on the predicted transition probabilities, appropriate actions are suggested for each level. For example, low-risk students may receive general mental health resources and support, while moderate-risk students may receive targeted interventions such as counselling or therapy. High-risk students may receive intensive interventions such as crisis intervention or referral to mental health services. The system provides personalized recommendations for each student based on their MDD risk level and predicted transition probabilities.

3.4. Proposed Work

The proposed project aims to develop a dynamic model to identify students suffering from different levels of Major Depressive Disorder (MDD) and predict those who may transform from serious MDD to suicidal tendency. The model will utilize an online test with a well-defined questionnaire, fuzzy decision tree classification, and logistic regression prediction. The project's objectives are well-defined, and the approach seems promising in addressing the growing concern of depression among students.

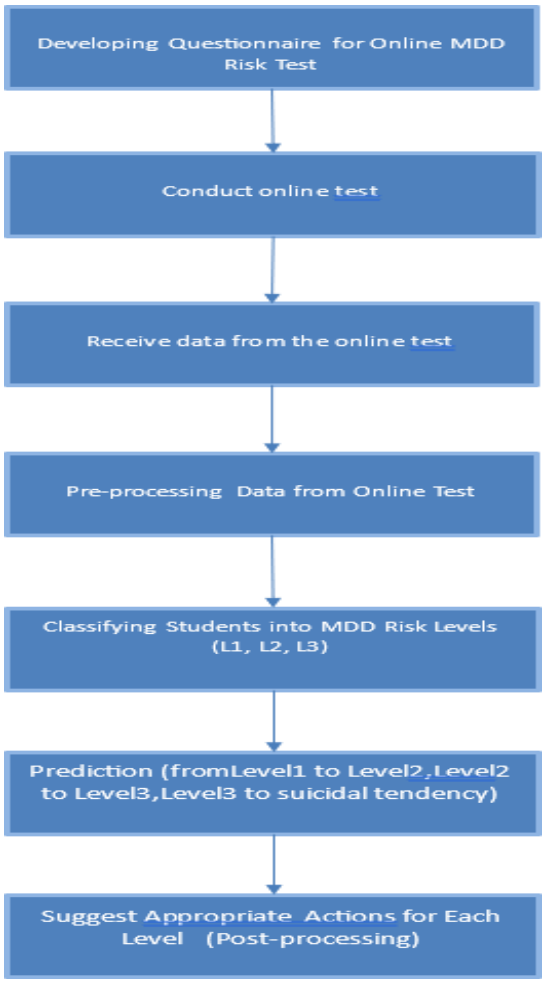

Fig. 2.2 Flow Chart based on the Proposed Method

Chapter 4

4. CONCLUSIONS AND FUTURE SCOPE

The proposed project aims to develop a dynamic model to identify students suffering from different levels of Major Depressive Disorder (MDD) and predict those who may transform from serious MDD to suicidal tendency. The model will utilize an online test with a well-defined questionnaire, fuzzy decision tree classification, and logistic regression prediction. The project's objectives are well-defined, and the approach seems promising in addressing the growing concern of depression among students.

In the near future, we plan to implement this project by developing the online test and collecting data from a large sample of students, training and testing the fuzzy decision tree and logistic regression models, deploying the model in a real-world setting, and integrating it with existing support systems. We will conduct a pilot study to evaluate the model's effectiveness and refine it based on the results. Following the pilot study, we will implement the model on a larger scale, expanding it to more institutions and demographics, and continue to monitor and evaluate its performance, adjusting as needed. With this implementation, we aim to make a significant impact in identifying and supporting students at risk of depression, ultimately contributing to a healthier and more supportive educational environment.

REFERENCES

[1] G. S. Oh and S. H. Oh, "Development and verification of Immersive contents to alleviate mental illness: Focusing on mild depressive disorder," 2021 International Conference on Information and Communication Technology Convergence (ICTC), Jeju Island, Korea, Republic of, 2021, pp. 685-688, doi: 10.1109/ICTC52510.2021.9621157.

[2] J. Kim, T. Nakamura, H. Kikuchi, K. Yoshiuchi, T. Sasaki and Y. Yamamoto, "Covariation of Depressive Mood and Spontaneous Physical Activity in Major Depressive Disorder: Toward Continuous Monitoring of Depressive Mood," in IEEE Journal of Biomedical and Health Informatics, vol. 19, no. 4, pp. 1347-1355, July 2015, doi: 10.1109/JBHI.2015.2440764.

[3] M. Margarette Sanchez et al., "A Machine Learning Algorithm to Discriminating Between Bipolar and Major Depressive Disorders Based on Resting EEG Data," 2022 44th Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC), Glasgow, Scotland, United Kingdom, 2022, pp. 2635-2638, doi: 10.1109/EMBC48229.2022.9871453.

[4] S. B. Hassan, S. B. Hassan and U. Zakia, "Recognizing Suicidal Intent in Depressed Population using NLP: A Pilot Study," 2020 11th IEEE Annual Information Technology, Electronics and Mobile Communication Conference (IEMCON), Vancouver, BC, Canada, 2020, pp. 0121-0128, doi: 10.1109/IEMCON51383.2020.9284832.

[5] W. Mumtaz, A. S. Malik, S. S. A. Ali and M. A. M. Yasin, "P300 intensities and latencies for major depressive disorder detection," 2015 IEEE International Conference on Signal and Image Processing Applications (ICSIPA), Kuala Lumpur, Malaysia, 2015, pp. 542-545, doi: 10.1109/ICSIPA.2015.7412250.

[6] M. Bhagawati and S. Paul, "Machine Learning for Major Depressive Disorder: An Overview," *2021 9th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO)*, Noida, India, 2021, pp. 1-4, doi: 10.1109/ICRITO51393.2021.9596323.

[7] N. Mumenin, M. R. Basar, A. B. M. K. Hossain, M. A. Hossain, M. L. Hasan and M. N. Hossain, "Suicidal Ideation Detection from Social Media Texts Using an Interpretable Hybrid Model," *2023 6th International Conference on Electrical Information and Communication Technology (EICT)*, Khulna, Bangladesh, 2023, pp. 1-6, doi: 10.1109/EICT61409.2023.10427944.

[8] A. Mousa, A. Natsheh, R. Jayousi and M. M. Herzallah, "Training Machine Learning Classifiers on Differentiating Major Depressive Disorder and Parkinson's Disease Using

Cognitive Performance," *2023 International Conference on Information Technology (ICIT)*, Amman, Jordan, 2023, pp. 230-235, doi: 10.1109/ICIT58056.2023.10225962.

[9] V. Baby, D. Sudheshna, D. Sarvani, S. Vesangi and S. R. Regatte, "An Integrated Approach for Suicidal Tendency Detection," *2022 4th International Conference on Advances in Computing, Communication Control and Networking (ICAC3N)*, Greater Noida, India, 2022, pp. 400-405, doi: 10.1109/ICAC3N56670.2022.10074359.

[10] H. Kwon, S. Kang, W. Park, J. Park and Y. Lee, "Deep Learning based Pre-screening method for Depression with Imagery Frontal EEG Channels," *2019 International Conference on Information and Communication Technology Convergence (ICTC)*, Jeju, Korea (South), 2019, pp. 378-380, doi: 10.1109/ICTC46691.2019.8939919.

[11] R. Fadul, H. Alfalahi, A. A. Shehhi and L. Hadjileontiadis, "Depressive Disorder Remote Detection through Touchscreen Typing Behaviour," *2023 45th Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC)*, Sydney, Australia, 2023, pp. 1-4, doi: 10.1109/EMBC40787.2023.10340393.

[12] C. Gupta and V. Khullar, "Exploring the Role of Conventional and Non-Conventional Technologies in Identifying MDD," *2022 IEEE International Conference on Service Operations and Logistics, and Informatics (SOLI)*, Delhi, India, 2022, pp. 1-6, doi: 10.1109/SOLI57430.2022.10294421.

[13] W. Mumtaz, A. S. Malik, S. S. A. Ali, M. A. M. Yasin and H. Amin, "Detrended fluctuation analysis for major depressive disorder," *2015 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, Milan, Italy, 2015, pp. 4162-4165, doi: 10.1109/EMBC.2015.7319311.

[14] Lee C, Kim H (2022) Machine learning-based predictive modeling of depression in hypertensive populations. PLOS ONE 17(7): e0272330.

[15] M. Xia, Y. Zhang, Y. Wu and X. Wang, "An End-to-End Deep Learning Model for EEG-Based Major Depressive Disorder Classification," in *IEEE Access*, vol. 11, pp. 41337-41347, 2023, doi: 10.1109/ACCESS.2023.3270426.

[16] Z. Jiang, S. Harati, A. Crowell, H. S. Mayberg, S. Nemati and G. D. Clifford, "Classifying Major Depressive Disorder and Response to Deep Brain Stimulation Over Time by Analyzing Facial Expressions," in *IEEE Transactions on Biomedical Engineering*, vol. 68, no. 2, pp. 664-672, Feb. 2021, doi: 10.1109/TBME.2020.3010472.

INFORMATION REGARDING STUDENT(S)

STUDENT NAME	EMAIL ID	PERMANENT ADDRESS	PHONE NUMBER	LANDLINE NUMBER	PLACEMENT DETAILS	PHOTOGRAPH
PARTH JAIN	JAINPARTH2222@GMAIL.COM	HOUSE NO 13, WARD 1, SHANICHARA MOHALLA , HOSHANGABAD, INDIA	8529982502	9828804467	INHOUSE PROJECT	
G M B VIGNESH KUMAR	JUUG22BTECH50617@GMAIL.COM	MAHATAMA NAGAR, CHITTOOR, ANDHRAPRADESH, INDIA	8309734715	8309734715	INHOUSE PROJECT	
CHANDRA BHUSAN KUMAR YADAV	JUISCH20220010845@GMAIL.COM	SITALPUR, BAIRGANIYA, RAUTAHAT(NEPAL)	8271462406	8271462406	INHOUSE PROJECT	

PHOTOGRAPH ALONG WITH GUIDE