

“Analysis of Mental Health and Impacts of Lockdown on students”



***A project report of Phase-I submitted to
Rajiv Gandhi Proudyogiki Vishwavidhyalaya, Bhopal
towards partial fulfillment of
the degree of
Bachelor of Engineering in Computer Engineering***

Guided By:

Ms. Priyanka Bamne
Associate Professor
Department of Computer Engg.

Ms. Preeti Khare
Associate Professor
Department of Computer Engg.

Submitted By:

0801CS171009 - Alefiya Kothari
0801CS171012 - Anshul Rathore
0801CS171047 - Muskan Hoondlani
0801CS171053 - Pradum Sahu
0801CS171091 - Vijayant Gadoria

**DEPARTMENT OF COMPUTER ENGINEERING
SHRI G.S. INSTITUTE OF TECHNOLOGY AND SCIENCE, INDORE(M.P.)
2020-2021**

SHRI G.S. INSTITUTE OF TECHNOLOGY AND SCIENCE, INDORE(M.P.)



RECOMMENDATION

The project report of Phase-I entitled “*Analysis of Mental Health and Impacts of Lockdown on students*” submitted by: **0801CS171009 - Alefiya Kothari, 0801CS171012 - Anshul Rathore, 0801CS171047 - Muskan Hoondlani, 0801CS171053 - Pradum Sahu, 0801CS171091 - Vijayant Gadoria**, students of B.E. IV year in the session 2019-2020, towards partial fulfillment of the degree of **Bachelor of Engineering in Computer Engineering** of Rajiv Gandhi Proudyogiki VishwaVidhyalaya, Bhopal is a satisfactory account of their work.

Ms. Priyanka Bamne
Project Guide
Department of Computer Engg.

Dr. Urjita Thakar
Head
Department of Computer Engg.

Ms. Preeti Khare
Project Guide
Department of Computer Engg.

Dean (Academics)
S.G.S.I.T.S. Indore

SHRI G.S. INSTITUTE OF TECHNOLOGY AND SCIENCE, INDORE(M.P.)



CERTIFICATE

The project report of Phase-I entitled “*Analysis of Mental Health and Impacts of Lockdown on students*” submitted by: **0801CS171009 - Alefiya Kothari, 0801CS171012 - Anshul Rathore, 0801CS171047 - Muskan Hoondlani, 0801CS171053 - Pradum Sahu, 0801CS171091 - Vijayant Gadoria**, students of B.E. IV year in the session 2019-2020, towards partial fulfillment of the degree of **Bachelor of Engineering in Computer Engineering** of Rajiv Gandhi Proudhyogiki VishwaVidhyalaya, Bhopal is a satisfactory account of their work.

Internal Examiner

External Examiner

Date:

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0801CS171009 - Alefiya Kothari

0801CS171012 - Anshul Rathore

0801CS171047 - Muskan Hoondlani

0801CS171053 - Pradum Sahu

0801CS171091 - Vijayant Gadria

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Introduction

1.1 Preamble

Fear, worry and stress are normal responses to perceived or real threats, and at times when we are faced with uncertainty or the unknown. So it is normal and understandable that people are experiencing fear in the context of the COVID-19 pandemic. Added to the fear of contracting the virus in a pandemic such as COVID-19 are the significant changes to our daily lives as our movements are restricted in support of efforts to contain and slow down the spread of the virus. Faced with new realities of working from home, temporary unemployment, home-schooling of children and lack of physical contact with other family members, friends and colleagues, it is important that we look after our mental, as well as our physical, health. Coping with stress in a healthy way will make you, the people you care about, and your community stronger. Thus it is important to understand the Impacts this lockdown has had on the lives of People.

1.2 Need of the Project

In light of this comprehension about the arising need for Analyzing mental health, we also need to constrain the scope of our understanding from vast and faded to contained and accurate. We have thus chosen this project to focus solely on the Impact of Lockdown on students. This project aims at examining the consequences of the uncertainty faced during the Covid-19 ensuing Lockdown. We, being students, have undergone and have had first-hand experiences with the precariousness of the situation regarding career, academics, curriculum, health and future.

Also, currently, the country is undergoing one of its worst recession fallout, and this is what is making the students stressed about what will happen to their future, will they get a job? Will they be able to crack exams? Can they go back to school/College soon? The Government at the centre is doing many things but is not focused on the basic problem that is stressed students, their mental health and happiness. And a part of this is also because of the lack of understanding about the matter and studies related to the facts of the situation. Hence it is climacteric at this point in the day and age to understand what the sculptures of the future of the largest democracy of the world, its students went through and what they would need to inculcate in order to make difficult times like this Pandemic more surmountable.

1.3 Problem Statement

The relevance of this project is no doubt the main reason for us to do it. Our lives these days are nothing but the aftermath of a period of great problems both physical and mental. Our tomorrow is directly related to our today, of which the maximum ground is covered by half a year of major setbacks. Students are vulnerable to such dejection and we will study the ‘why and what’s’ of it.

- Students were one of the most critical recipients of the conundrums of lockdown.
- The only feasible and structured way for us to have had coherent data was to subject a particular category of people, because the impact would be different on people from different walks of life.

Thus this project aims to study and comprehend the impacts of the lockdown on the health of the students. We have collected data from students of higher and senior secondary classes and above. This data would be used for Analysis and later be turned into a Machine Learning model using different Techniques of learning.

1.4 Objectives

Gather the input data through Questionnaire structured in 4 categories-

- Personal experiences, Physical health, Emotional and mental health.
- Analyse the data and the trends to draw out inferences, minimize redundancy, clean out faulty patterns.
- Predict the output from the data
- Give predicted results on the basis of levels and give suggestions and changes.

1.5 Proposed Approach

Data gathering: The data was collected over a period of 2 months(August-September), the questionnaire was circulated on all platforms that reach out to the Students’ community. The questionnaire contained questions about their feelings, eating habits, physical and emotional health. Once the questionnaire was completed the data was collected and curated in MS excel in the background, which would later be used to recognize patterns and labels for the dataset.

Preprocessing: Preprocessing of the data is the largest and the most crucial part of any Machine Learning problem. Thus following were the steps we took to ensure that the data to be trained was accurate and logical.

- Data Validation
- Data Cleaning
 - Null value Treatment
 - Apparent value conversion

- Data encoding
- Outliers Treatment
- Exploratory Data Analysis

1.6 Organization of the Report

Chapter 1 provides the introduction about the project, need of the project, problem statement, objectives.

Chapter 2 discusses the background of the project which includes the area, available tools, hardware, software used in the project, research papers used, and their limitations.

Chapter 3 equips with holistic analysis of the project which includes the detailed problem statement, requirement analysis i.e. functional non-functional requirements, feasibility study followed by various diagrams.

Chapter 4 deals with the design aspect of the project which encompasses various architectural diagrams along with information about various modules and various diagrams.

Chapter 5 discusses the implementation in detail.

Chapter 6 Conclusion

Background

2.1 Tools & Technologies

- **Data Collection:**
Google forms, MS Excel
- **Data Analysis:**
 - **Python IDE:** Jupyter Notebooks, Visual studio Code
- **Data Training:**
Python
- **Front-End:**
Django REST framework (<https://www.django-rest-framework.org/>) Django REST framework is a powerful and flexible toolkit for building Web APIs.
- **Database:**
 - **mySql:** MySQL is a database management system.
 - To add, access, and process data stored in a computer database, you need a database management system such as MySQL Server.

Literature Review

3.1 Summary of reviewed Literature

1. Cite: Cho G, Yim J, Choi Y, Ko J, Lee SH. Review of Machine Learning Algorithms for Diagnosing Mental Illness. *Psychiatry Investig.* 2019;16(4):262-269. doi:10.30773/pi.2018.12.21.2 [1] This Paper suggested that Enhanced technology in computers and the internet has driven scale and quality of data to be improved in various areas including healthcare sectors. Machine Learning (ML) has played a pivotal role in efficiently analyzing those big data, but a general misunderstanding of ML algorithms still exists in applying them (e.g., ML techniques can settle a problem of small sample size, or deep learning is the ML algorithm). This paper reviewed the research of diagnosing mental illness using ML algorithms and suggests how ML techniques can be employed and worked in practice. Research about mental illness diagnosis using ML techniques were carefully reviewed. Five traditional ML algorithms-Support Vector Machines (SVM), Gradient Boosting Machine (GBM), Random Forest, Naïve Bayes, and K-Nearest Neighborhood (KNN)-frequently used for mental health area researches were systematically organized and summarized. Chekroud et al. developed a ML algorithm to predict clinical remission from a 12-week course of medication. Data set consisted of 1949 patients with depression from level 1 of the Sequenced Treatment Alternatives to Relieve Depression. 25 variables were selected from 164 patient-reportable variables to make the most predictive outcome.

2. Cite: Shatte, A., Hutchinson, D., and Teague, S. (2019). Machine learning in mental health: A scoping review of methods and applications. *Psychological Medicine*, 49(9), 1426-1448. doi:10.1017/S0033291719000151 [2] This paper Published online by Cambridge University Press, aims to synthesise the literature on machine learning (ML) and big data applications for mental health, highlighting current research and applications in practice. The application of ML to mental health has demonstrated a range of benefits across the areas of diagnosis, treatment and support, research, and clinical administration. With the majority of studies identified focusing on the detection and diagnosis of mental health conditions, it is evident that there is significant room for the application of ML to other areas of psychology and mental health. The challenges of using ML techniques are discussed, as well as opportunities to improve and advance the field. The most common mental health conditions addressed included depression, schizophrenia, and Alzheimer's disease. ML techniques used included support vector machines, decision trees, neural networks, latent Dirichlet allocation, and clustering.

3. Review and verification of our Dataset by Psychiatrists Alka Verma and Ankita Rathore: After our data was collected, we were faced with the perils of validating the data to match the actual offline psychiatric evaluation conducted in clinics to diagnose a patient with a mental health Disorder. It thus became Instrumental to get our data, Questions, responses and the overall fabric of our project validated and verified by field experts, here, psychiatrists. We began the collaboration with them soon after the data collection stage in order to ensure that the data is coherent in accordance with psychiatric standards.

Data was studied and examined by the experts to draw out its relevance in both medical and technical spectrums. Upon reviewing, it was found that the Dataset was quite insightful and brought up trends that are mandatory for the purpose of analysis in this project. The nature of it was deemed incisive and intelligent. Following the initial review and subsequent meetings, weightages were assigned to each question on the scale of 5 depending on the facts of their answers and the symptom it was addressing. These weightages would later be used to label the data and encode it. This was necessary as most of the data was categorical and ordinal, but in order for Data wrangling, outlier treatment and other preprocessing to yield results preparatory to Data training, data needed to be transformed into numerical ordinal data. Thus the dataset was in all, reviewed, analysed and weighted by the professionals.

Analysis

4.1 Existing Systems

Deep learning (DL), as one of the most recent generation of AI technologies, has demonstrated superior performance in applications of DL algorithms in mental health outcome research.

Due to the increasing availability of data pertaining to an individual's mental health status, artificial intelligence (AI) and machine learning (ML) technologies are being applied to improve our understanding of mental health conditions and have been engaged to assist mental health providers for improved clinical decision-making. As one of the latest advances in AI and ML, deep learning (DL), which transforms the data through layers of nonlinear computational processing units, provides a new paradigm to effectively gain knowledge from complex data⁷. In recent years, DL algorithms have demonstrated superior performance in many data-rich application scenarios, including healthcare.

The privacy and security of the sensitive personal information are the main need of the users, which could hinder further development and wide adoption of the systems. Data duplication occurs when there is any update to the patient record.

4.2 Detailed Problem Statement

The very idea of this project emerges from the fact that utility and understanding can be achieved only from the rooms of relatability. Thus to put this point across more clearly, the journey of this project began during the pandemic from a place of true problem contemplation and seeking for solution, we thus went on to creating this from a place of the receiver entity to the creator entity. Pandemic was a phenomenon that the entire world witnessed in 2020, and the imposition of subsequent lockdown made the experience even more record worthy and mystic. People from different walks of life experienced and weaved out a pandemic story, good or bad on the facts and feeling of their personal gains and losses, giving us no valid right to deem the lockdown as a boon or a bane. But, one sure thing that had taken a toll was mental health. It is the first thing that comes to mind when we think of the world from a kaleidoscope uncertainty, distress, anguish and overall inconsistency. That's the foundation of this project, assessing one certain group of people (Students) and evaluating their mental well-being. To understand the cause-effect relationship the pandemic had had on their mind, heart and body. This is more than important for us to know today what

we can endure with what damages in order to prevent burdening our psyche with the lingering shards of losses and failures we endured as a society, at the end of the day, being aware of our mental health, making lifestyle changes, receiving appropriate diagnosis and suggestion would help us move in a direction of health and healing. The relevance of this project is no doubt the main reason for us to do it.

Talking of vulnerability, uncertainty, and anxiety, Students were one of the most critical recipients of the conundrums of lockdown. The only feasible and structured way for us to have had coherent data was to subject a particular category of people, because the impact would be different on people from different walks of life. Thus this project aims to study and comprehend the impacts of the lockdown on the health of the students. We have collected data from students of higher and senior secondary classes and above. This data would be used for Analysis and later be turned into a Machine Learning model using different Techniques of learning.

4.3 Requirement Analysis

4.3.1 Functional Requirements

Data Gathering

Requirement 1.1 System should be able to receive input data filled by users from the website.

Requirement 1.2 System should be able to gather information in a single place in a structured way.

Preprocessing and Analysis

Requirement 2.1 System should be able to perform analysis on the data gathered from users.

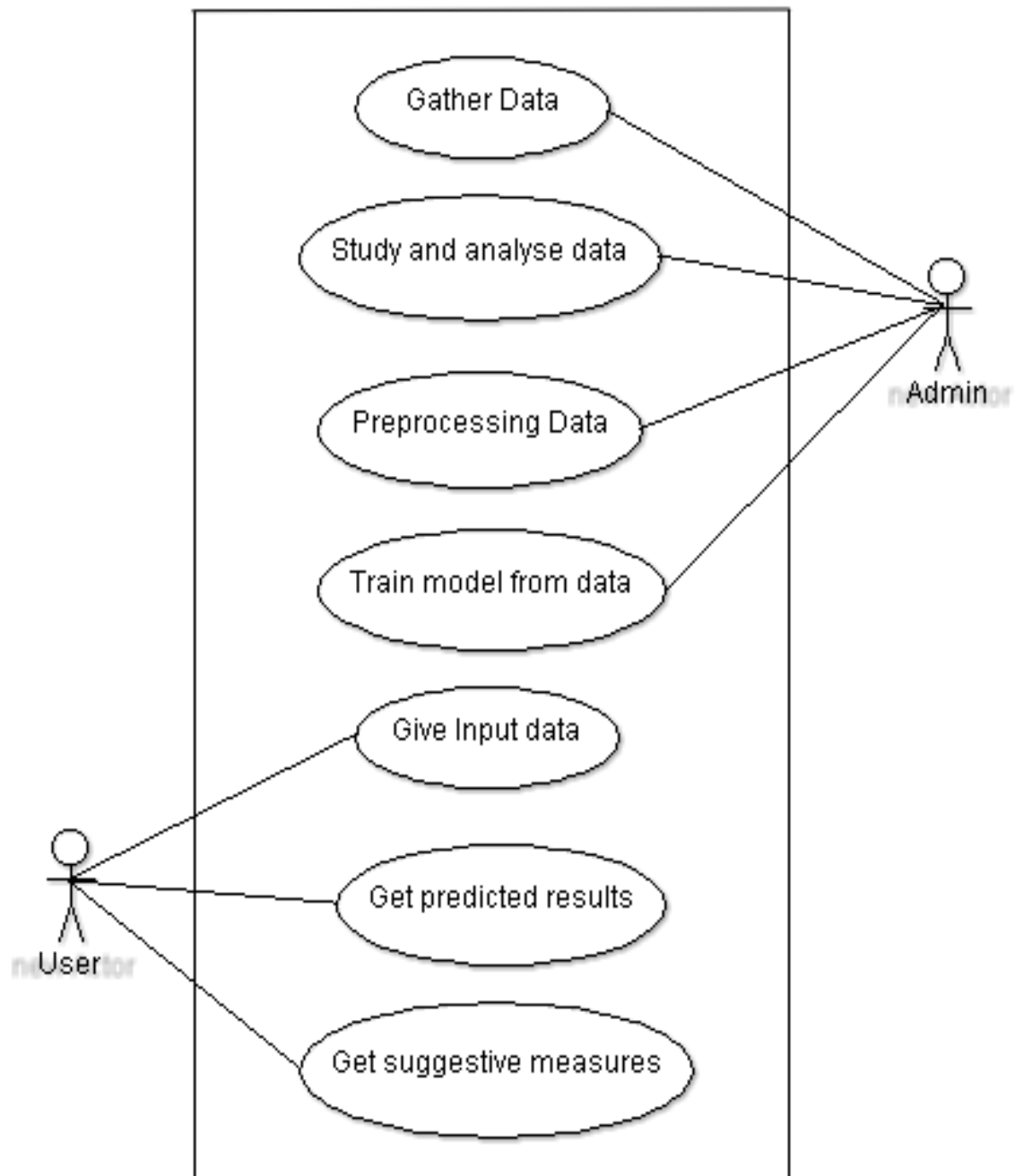
Requirement 2.2 System should be able to preprocess the data.

Prediction and Suggestion

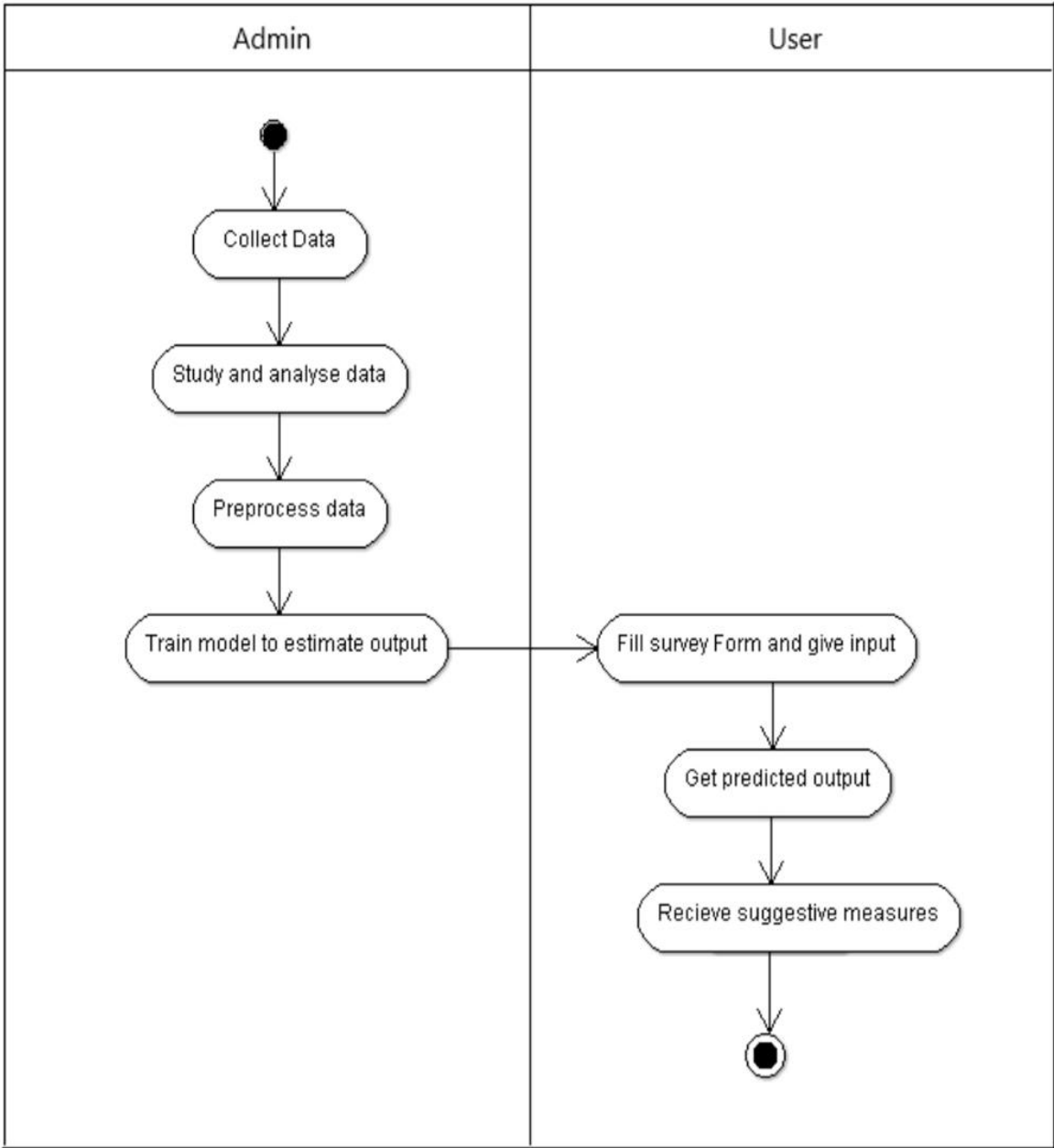
Requirement 3.1 System should be able to predict the required output from the data.

Requirement 3.2 System should be able to predict results on the basis of levels and give suggestions and changes.

4.3.2 Use Case Diagram



4.3.3 Activity Diagram



4.4 Non Functional Requirements

1. **Performance** - The system should be able to generate results within a considerable time; it should not take longer time to return results.
2. **Accuracy** - The system should give results within the permissible range of output it should not cross desirable limits.
3. **Scalability**- System should be able to receive and process larger amount of data as the data grown also retaining accuracy.
4. **Reliability**- System should give results in accordance to the coherence between similar input to similar output
5. **Secure**- The system should be secure, since information about mental health is sensitive and confidential

4.5 System Requirements

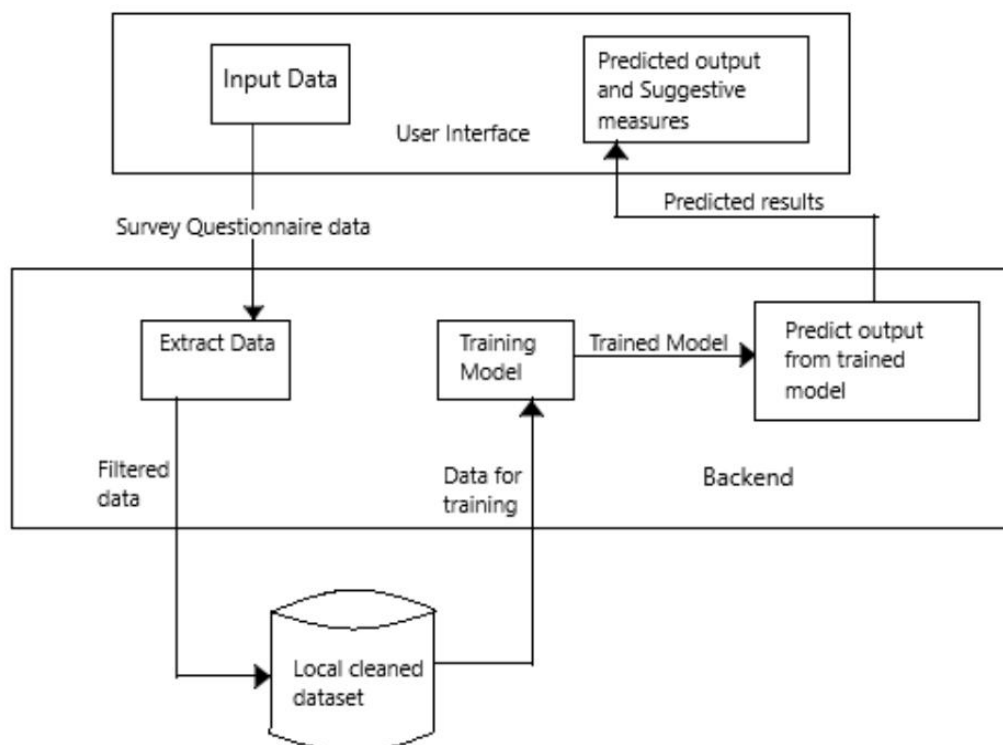
4.5.1 Software Requirements

For Development:

Python IDE: Jupyter Notebooks, Visual studio Code
Database: MySQL
UI: Django REST framework

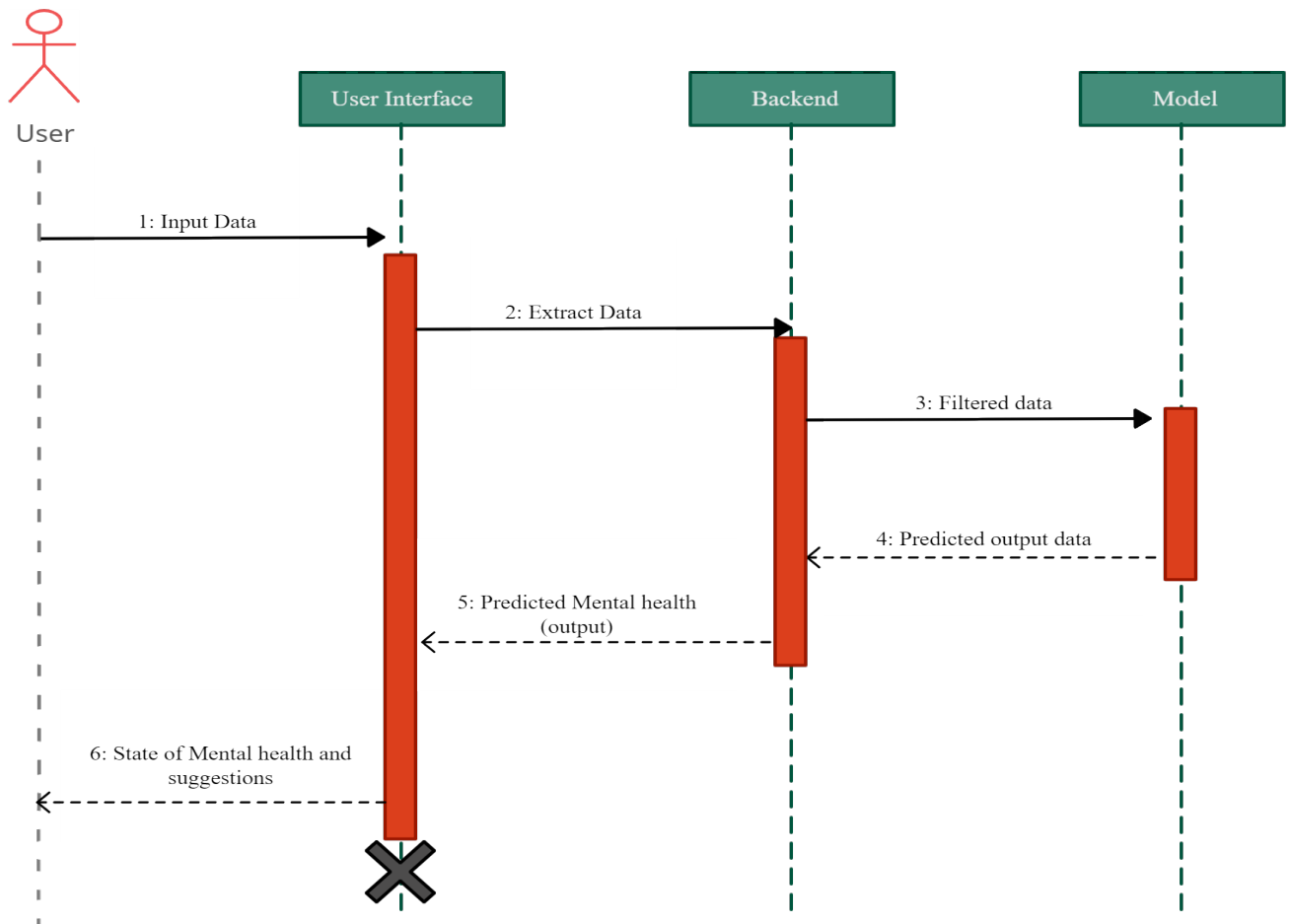
Design

5.1 System Architecture

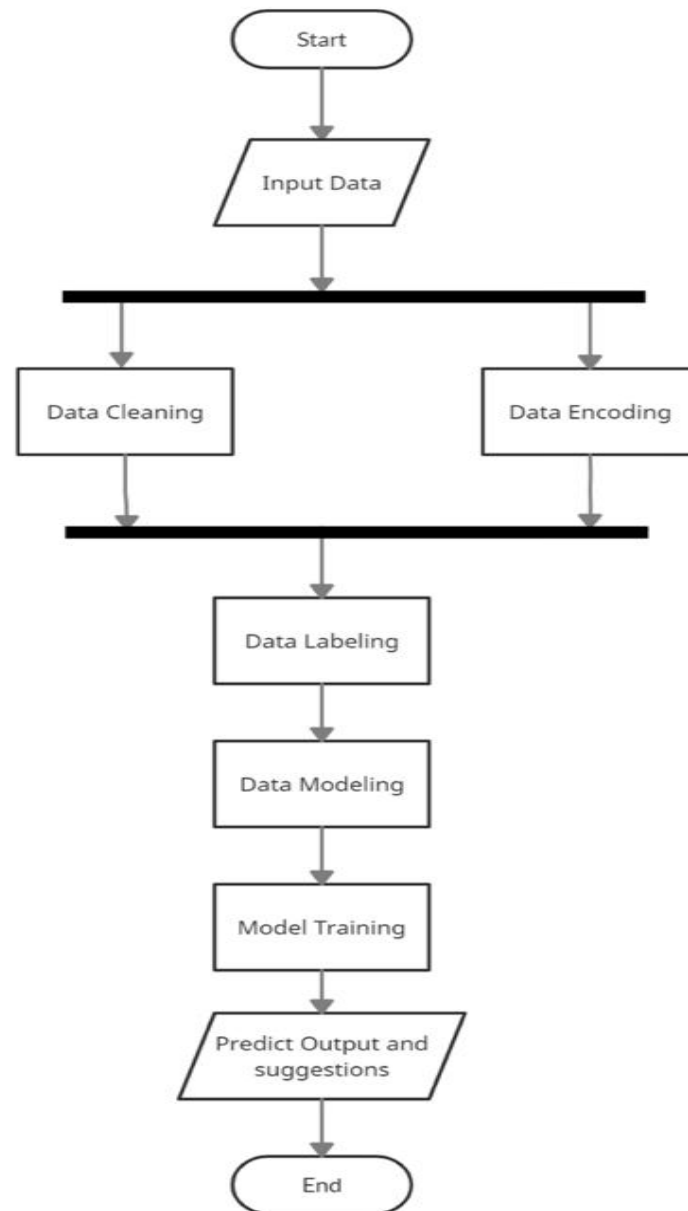


5.2 Software Design

5.2.1 Sequence Diagram



5.3 Algorithms / Flowchart Design



Implementation

6.1 Software Used

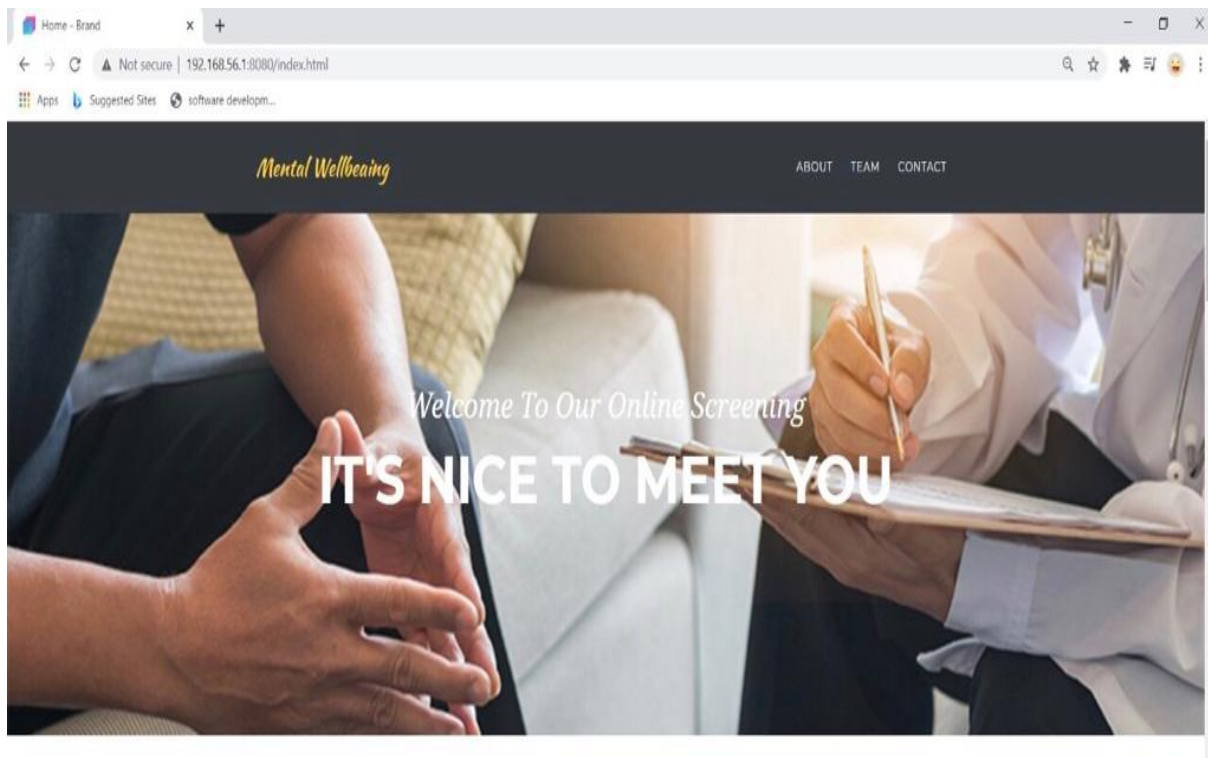
For Development:

Python IDE: Jupyter Notebooks, Visual studio Code

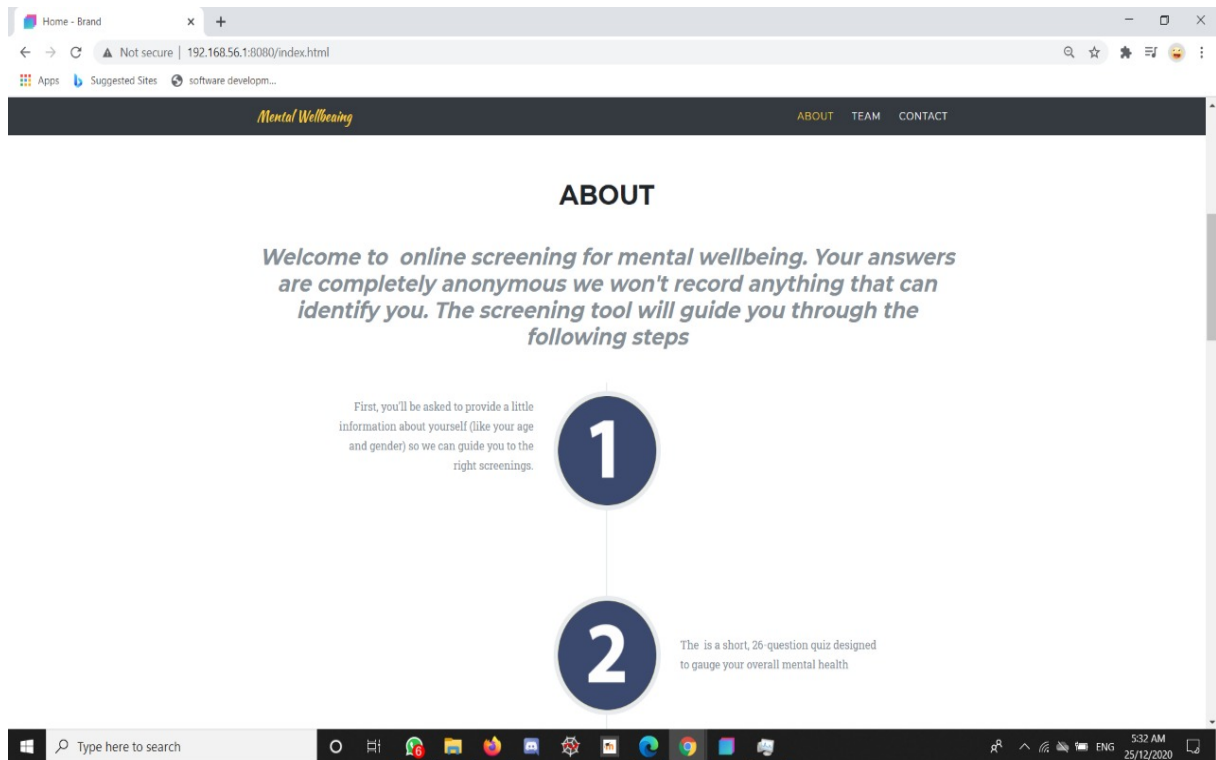
Database: MySQL

UI: Django REST framework

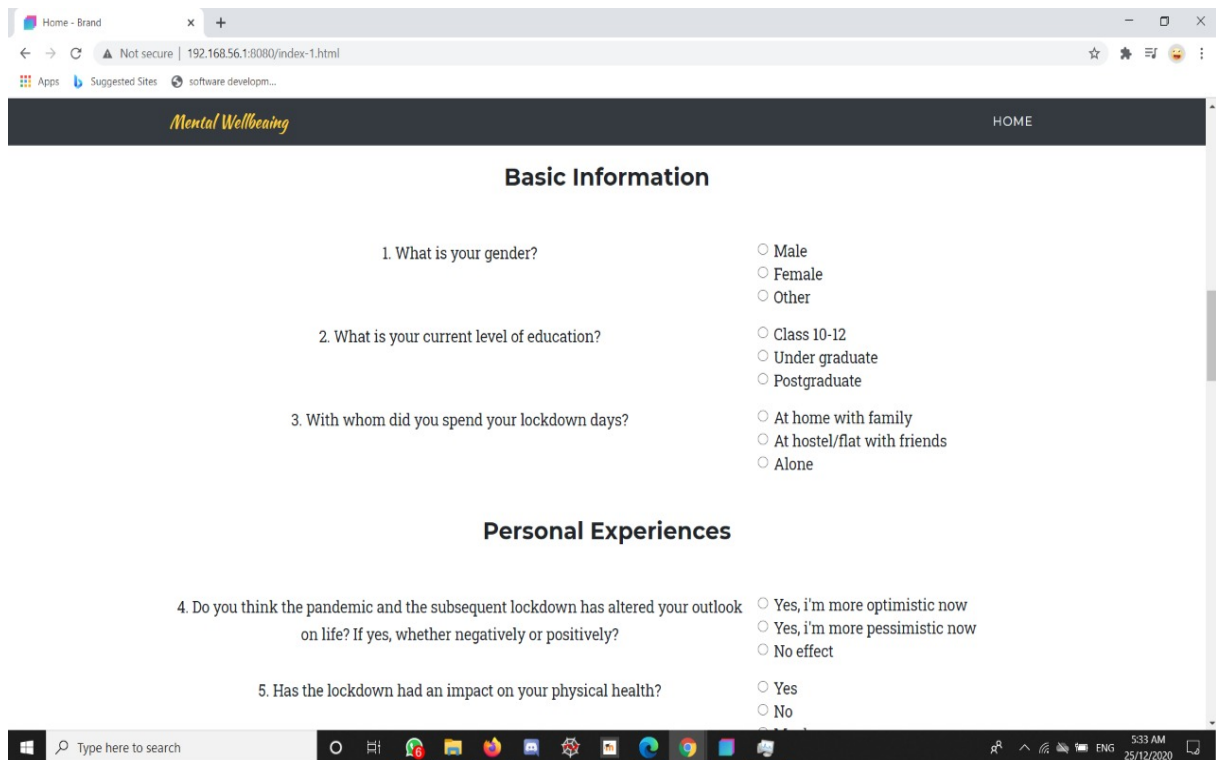
6.2 User Interface



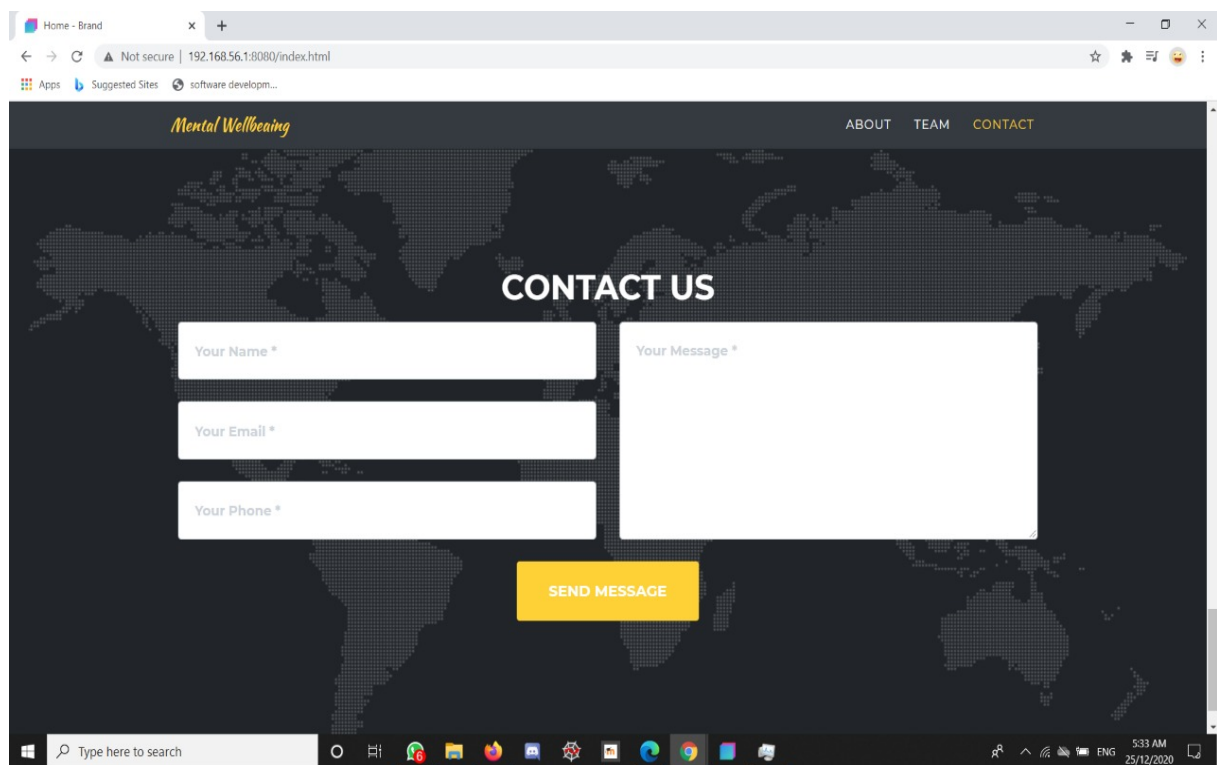
Home page



About page



Survey Questionnaire



Contact Us page

6.3 Input-Data

Students' Well-being survey: Questionnaire

Basic Information

- What is your gender?
Male Female Other
- What is your current level of education?
Class 10-12 Under graduate Postgraduate
- With whom did you spend your lockdown days?
At home with family At hostel/flat with friends Alone

Personal Experiences

- Do you think the pandemic and the subsequent lockdown has altered your outlook on life? If yes, whether negatively or positively?
Yes, I'm more optimistic now Yes, I'm more pessimistic now No effect
- Has the lockdown had an impact on your physical health?
Yes No Maybe
- Rate your lockdown experiences on a scale of 1-5 based on the following feelings.
Frustrating 1 2 3 4 5 Relieving

Productivity

- How often did you do something productive?
Quite Often Often Sometimes Rarely Never
- Did you do anything for academic improvement?
eg: Took up online courses or practiced a skill etc
Yes No
- How did you spend most of your time during the lockdown.
Studying /being academically inclined
Gaming
Household chores
Netflix or Other OTT
Sleeping
- Did you do anything for fun and recreation?
Yes, I pursued my hobbies No
- The average number of hours you spent on social media, in a day?
Less than 1 hour
1-2 hours
3-4 hours
Almost 6 hours
More than 6 hours

Physical Health

- How have your eating habits changed?
I under eat I overeat I eat in regulation

13. How has your body weight changed through the lockdown?

I've gained weight I've lost weight Unchanged

14. Did you experience a loss of appetite?

Significantly Somewhat Not much Not at all

15. How often did you exercise?

Regularly Somedays Never

16. What made up most of your diet?

Regular home cooked food Fried/ junk food Binge ate crisps and snacks

17. To what do you most attribute your eating behavior?

Boredom Hunger Emotional distress

Emotional Mental Health

18. Choose the word that best describes your lockdown experience.

Pleasant Humbling Chaotic Numb

19. How did you feel in regards to your studies or career?

Motivated Excited Didn't think about it Anxious Directionless

20. How do/ did you feel most of the time?

Happy Satisfied Agitated/Irritable Moody Sad

21. Did you experience a tragic loss of something important?

Yes No

22. How often did you indulge in the things you liked to do before?

Often Sometimes Rarely Never

23. How would you describe your sleep cycle?

Normal Disturbed Lack of sleep Oversleeping

24. Describe your relationship with your family and friends.

Fun and expressive Comforting and warm Formal and unyielding Toxic and Argumentative

25. Have ever suffered from a mental illness? If yes, what course of action was taken? if not, choose 'NA' .

NOTE: This question is not to be answered based on mere short term speculations but on persisting symptomatic grounds only. Choose 'NA' if you've never identified with a mental illness.

Reviewed appropriate therapy/ medication - Yes No NA

Talked about it with someone close - Yes No NA

26. Please write a very short summary of your lockdown experience in terms of your physical, mental, and emotional health.

27. Editor's note: We hope you liked our questionnaire; Let us know how much.

Dull Excellent
1 2 3 4 5

Conclusion

Work Accomplished:

- Brainstorming on the idea
- Data Collection
 - Analysis and Design:
 - * Analysis and study of input Data
 - * Data cleaning and Data Encoding
 - * Use case Diagram
 - * Activity Diagram
 - * System Architecture Diagram
 - * Flowchart Diagram
 - * Sequence Diagram
- Software requirement identification for development
- Project implementation (UI and basic linking of all screens)

Work to be done:

- Data Modeling
- Data Training

References

- [1] Cho G, Yim J, Choi Y, Ko J, Lee SH. Review of Machine Learning Algorithms for Diagnosing Mental Illness. *Psychiatry Investig.* 2019;16(4):262-269. doi:10.30773/pi.2018.12.21.2
- [2] Shatte, A., Hutchinson, D., Teague, S. (2019). Machine learning in mental health: A scoping review of methods and applications. *Psychological Medicine*, 49(9), 1426-1448. doi:10.1017/S0033291719000151