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# Mental Health Prediction Using Machine Learning

K. Praveen Kumar[1], A. Mahesh[2], B. Swathi[3] and Nusrath Jahan[4]

[1] *Assistant Professor, Department of Computer Science and Engineering , CMR Technical Campus, Medchal, Telangana, India.*
[2] *UG Student, Department of Computer Science and Engineering , CMR Technical Campus, Medchal, Telangana, India.*
[3] *UG Student, Department of Computer Science and Engineering , CMR Technical Campus, Medchal, Telangana, India.*
[4] *UG Student, Department of Computer Science and Engineering , CMR Technical Campus, Medchal, Telangana, India.*

**ABSTRACT:**

The emotional, psychological and social welfare of a person is revealed by their mental health. It influences how an individual will think, feel or handle a situation. Positive mental health helps an individual to work productively and achieve their full potential. At each point in life, mental health is vital, from childhood to adulthood. Numerous factors contribute to mental health issues which lead to mental illness like stress, social anxiety, depression, obsessive compulsive disorder, drug addiction, workplace issues and personality disorders. The onset of mental illness should be determined without flaws for maintaining an appropriate life balance. We have collected data from online available datasets. The data has been label encoded for better prediction. The data is being subject to various machine learning techniques to obtain labels. These classified labels will then be used to build a model to predict the mental health of an individual. Our target population is in the working class i.e people above the age of 18. Once the model is built, it will be integrated to a website so that it can predict the outcome as per the details provided by the user.

***Keywords:*** *Age, Gender, Qualification, Family Background, Monthly Income,Country,State.*

## 1. INTRODUCTION

Mental Health Prediction using machine learning is used to help a person of his/her mental condition in a positive state or negative state. Positive state defines that the person is normal state that he can handle his things by his/her own. Negative state defines the person is not in a normal way that he/she is in some stress or financial issues or health issues these can define the person is in a Positive state or Negative state If he/she in negative state that they require treatment to solve their problem. In this we are using some database to define their state and whether they require treatment or not.

## 2. SYSTEM ANALYSIS

System Analysis is the important phase in the system development process. the System is studied to the minute details and analysed. The system analyst plays an important role of an interrogator and dwells deep into the working of the present system. In analysis, a detailed study of these operations performed by the system and their relationships within and outside the system is done. A key question considered here is, "what must be done to solve the problem?" The system is viewed as a whole and the inputs to the system are identified. Once analysis is completed the analyst has a firm understanding of what is to be done.

## 3. EXISTING SYSTEM

The existing systems gives the immense understanding of the mental health analysis amongst different target groups using different technology. The classification models performance can be improved using deep learning methods such as recurrent neural networks.

## 4. PROPOSED SYSTEM

To resolve the mental well-being machine learning technique play important role. It holds great promise to transform mental health care. Its tools also hold the potential to extend the current capabilities of clinicians, to deal with complex problems and ever-expanding information streams that stretch the limits of human ability. we have developed a framework for determining the mental health state of an individual. For further improvements the concept of Machine Learning can be used for very large dataset. Our proposed different levels of questionnaire and based on the results of that provide free checking of a person's mental state and help him by diagnosis prediction.

## 5. REQUIREMENTS

For any system requirements plays a major role because that gives us an idea of how much cost it is going to cost for along with the size of manufacturing it. Requirements can be classified into Hardware and Software where Hardware requirements give us the understanding on the interface and logical understanding whereas software requirements gives us understanding of the code, software to be used and below are the detail requirements for this proposed project.

- System : i5 processor
- Hard disk : 100 GB
- Ram : 4 GB

- Operating system : Windows 7
- Coding : Python
- Tool : Jupyter notebook, Colab

## 6. ARCHITECTURE

The architecture of this mental health is that to check the state of a person in a negative state or positive. For Predict the state of person we need to have database that are required for predicting the result. This architecture shows that once we have to take the dataset and after taking the dataset, we have data pre-processing means we have training set and testing set after doing that we have take an appropriate algorithm for calculating the results. The results shows the mental condition of person

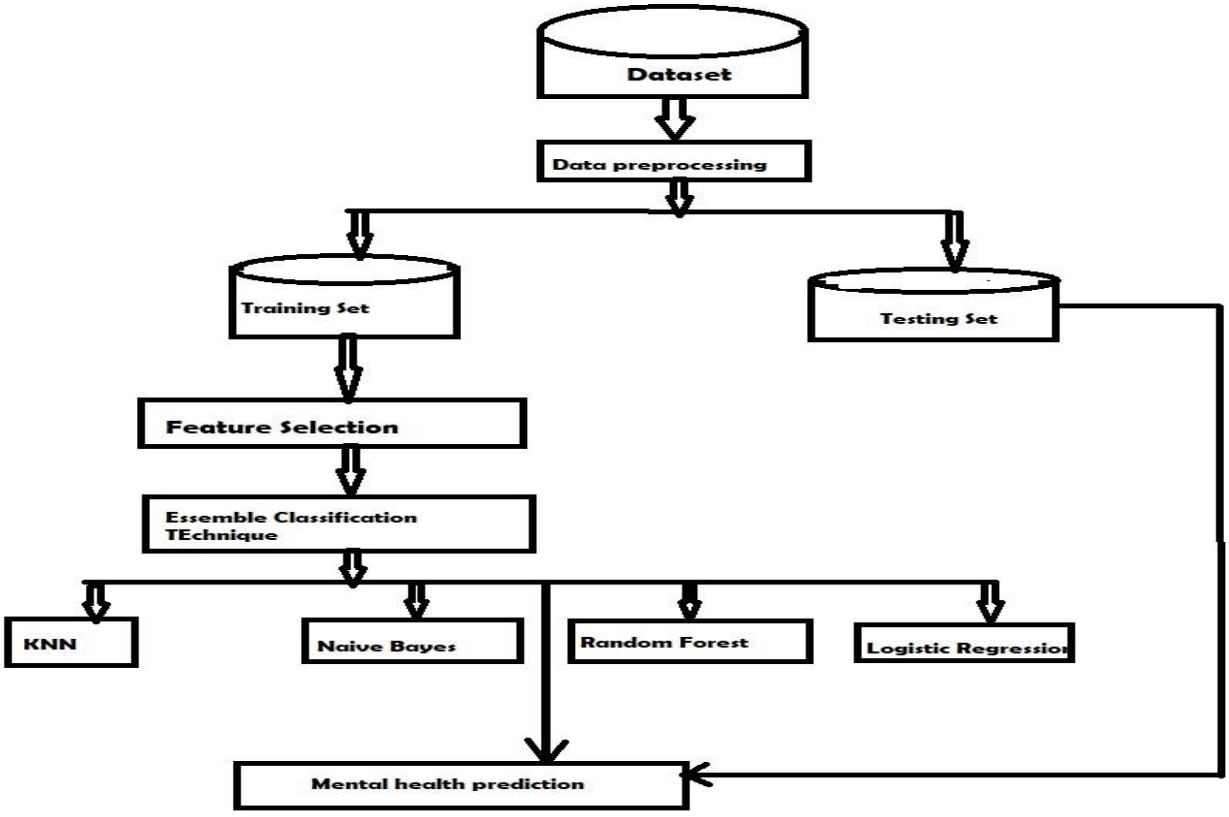


Fig: Architecture of Mental health prediction using machine learning

## 7. MODULES DESCRIPTION

In terms of modules, we will be concentrating the below listed ones:

DATA PREPROCESSING

▪ Data preprocessing is a technique that is used to convert raw data into a clean dataset.

▪ The data is gathered from different sources is in raw format which is not feasible for the analysis

.▪ In order to perform data preprocessing using Python, we need to import some predefined Python libraries they are :

▪ Numpy: Numpy Python library is used for including any type of mathematical operation in the code.

▪ Pandas: The last library is the Pandas library, which is one of the most famous Python libraries and used for importing and managing the datasets.

▪ Matplotlib – Matplotlib is a Python 2D plotting library that is used to plot any type of charts in Python.

## 8. USE CASE, SEQUENCE, & CLASS DAIGRAM

These diagrams give a picture of the detail process we follow from capturing the image to the displaying the output. **i.**

**Use case Diagram:**

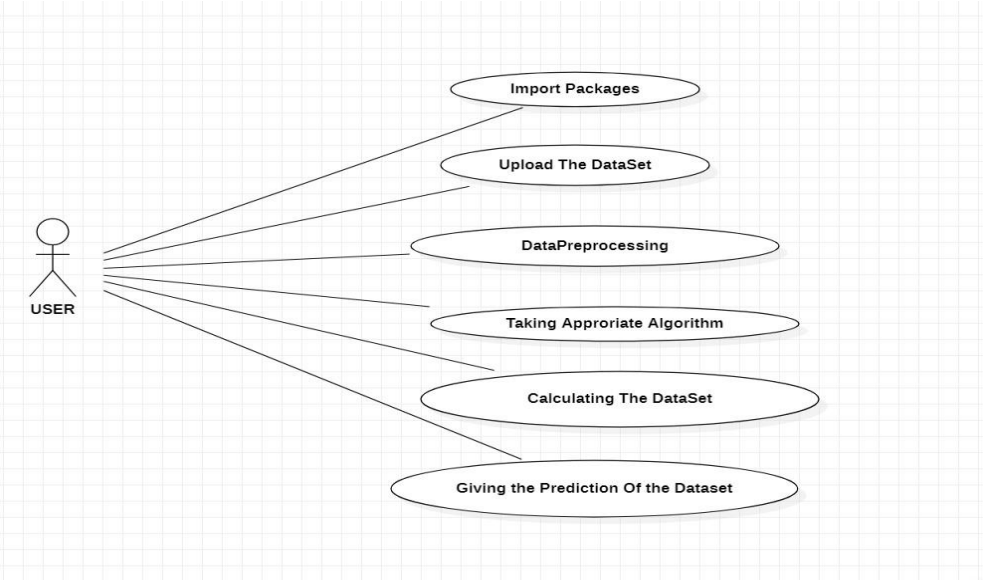


FIG -6 Use Case Diagram for User

**ii. Class Diagram:**

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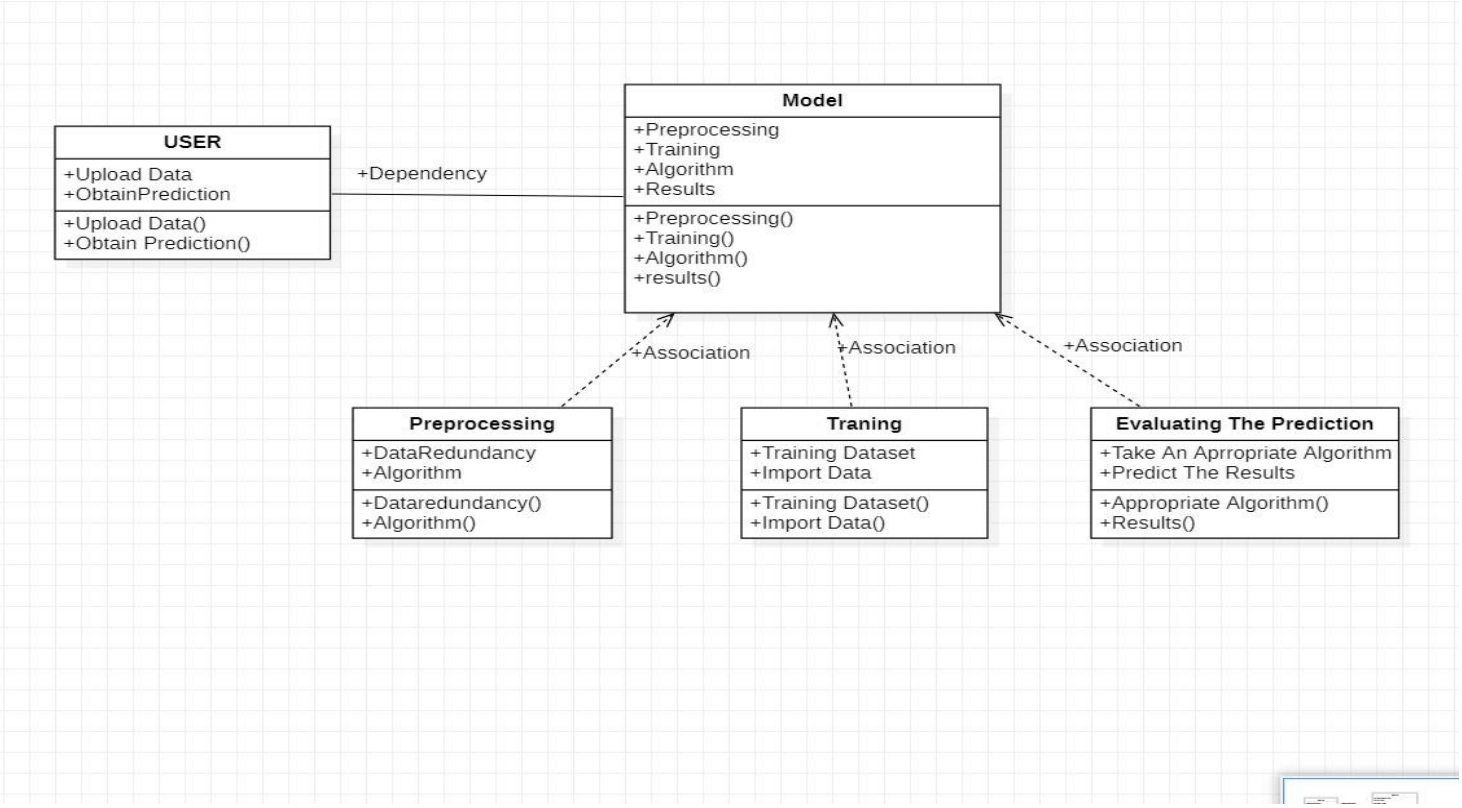


FIG – 7 Class Diagram

### iii. Sequence Diagram

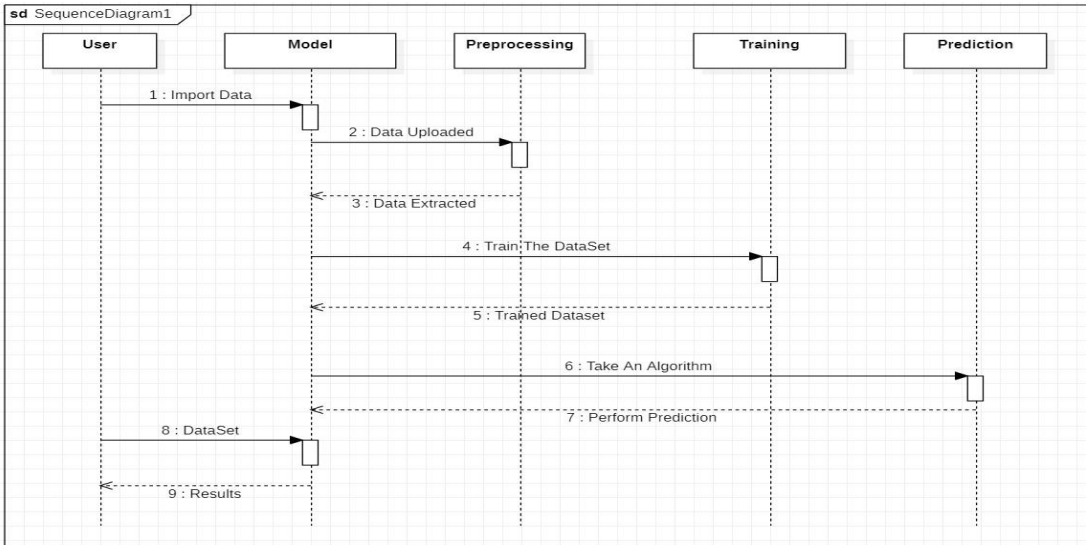


FIG -8 Sequence Diagram of User

### iv. Activity Diagram

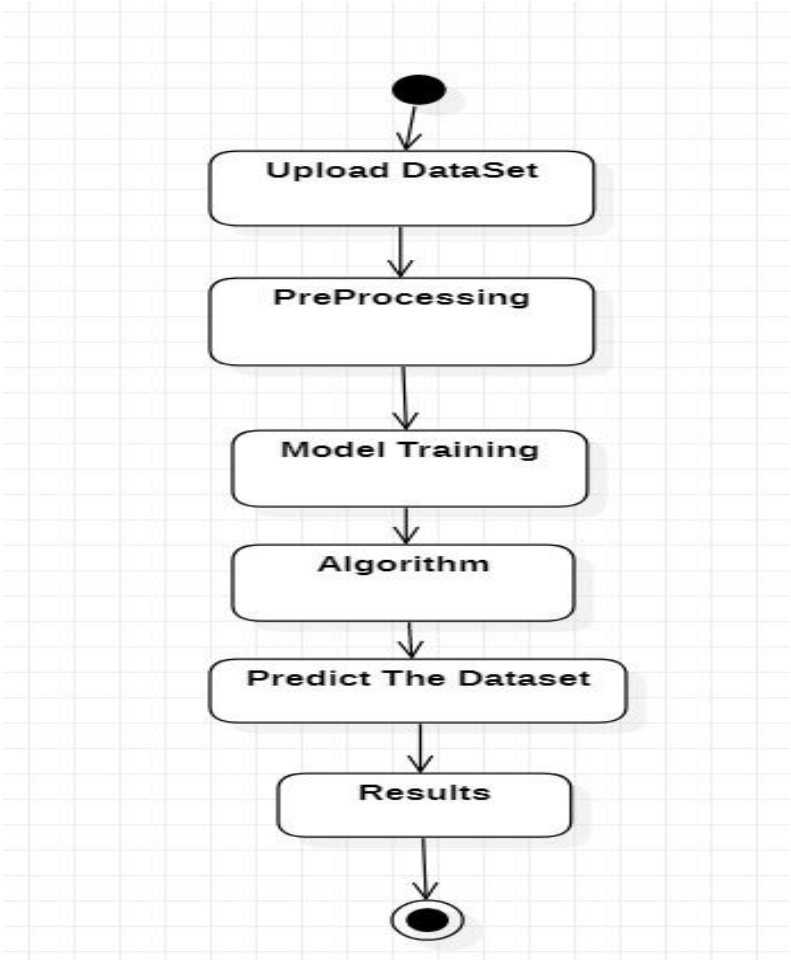


FIG -10 Activity Diagram

## 9. TESTING

The purpose of testing to find the final errors or to know what else we can do in order to improve the solution. There are different types of tests which has a specific requirement.

a- Unit testing: Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .it is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

b- Integration Test Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components

c- Functional Testing: Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals.

Uploading Dataset

| Test case ID | Test case name | Purpose | Test Case | Output |
|---|---|---|---|---|
| 1 | User Upload The DataSet | Use for Prediction | The User upload the dataset for prediction | Calculates the Dataset Given |

**Detection**

| Test case ID | Test case name | Purpose | Input | Output |
|---|---|---|---|---|
| 1 | Prediction | To Predict the mental health | A dataset is given as input | Mental health Prediction of a person |

## 10. RESULTS

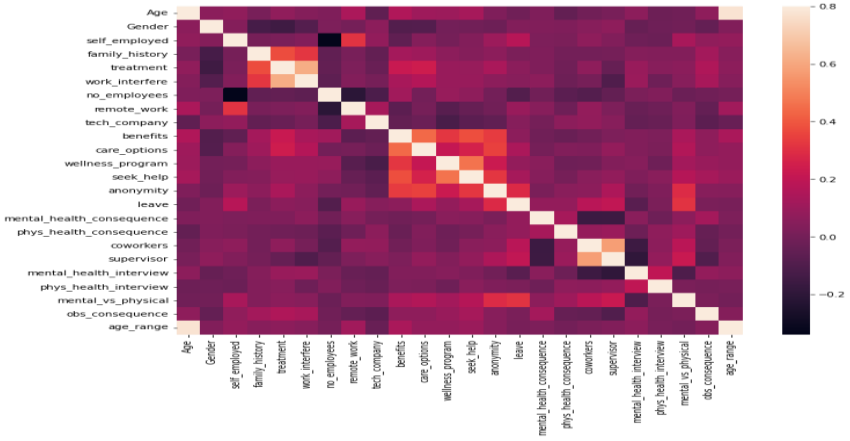


FIG 1: Correlation Matrix

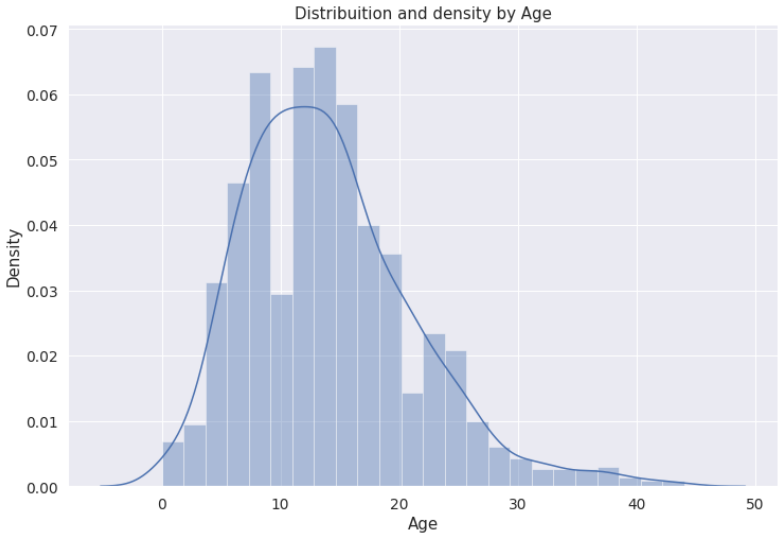


Fig 2: Distribution and density by age

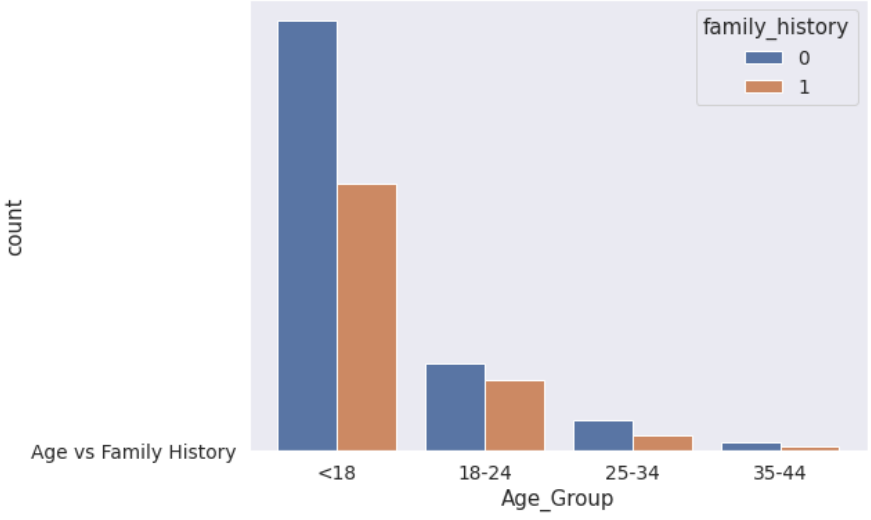


Fig 3 : Family Histroy

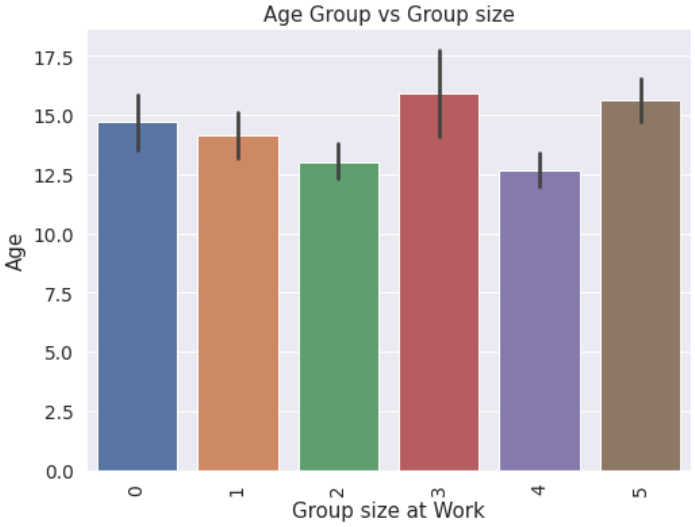


Fig4: Age Group VS Group Size

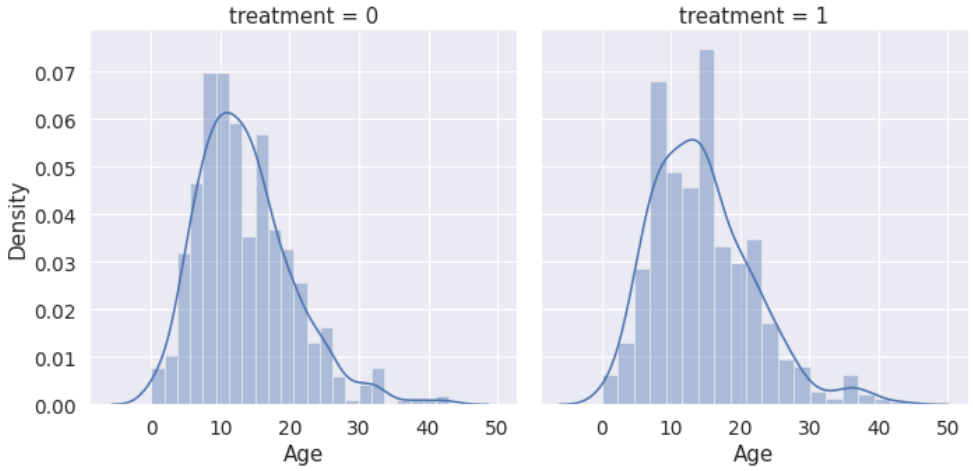


Fig 5 : Treatment Prediction

## CONCLUSION

Many different techniques and algorithms had been introduced and proposed to test and solve the mental health problems. There are still many solutions that can be refined. In addition, there are still many problems to be discovered and tested using a wide variety of settings in machine learning for the mental health domain. As classifying the mental health data is generally a very challenging problem, the features used in the machine learning algorithms will significantly affect the performance of the classification. The existing studies and research show that machine learning can be a useful tool in helping understand psychiatric disorders. Besides that, it may also help distinguish and classify the mental health problems among patients for further treatment. Newer approaches that use data that arise from the integration of various sensor modalities present in technologically advanced devices have proven to be a convenient resource to recognize the mood state and responses from patients among others. It is noticeable that most of the research and studies are still struggling to validate the results because of insufficiency of acceptable validated evidence, especially from the external sources. Besides that, most of the machine learning might not have the same performance across all the problems. The performance of the machine learning models will vary depending on the data samples obtained and the features of the data. Moreover, machine learning models can also be affected by preprocessing activities such as data cleaning and parameter tuning in order to achieve optimal results

## FUTURE SCOPE

We will investigate and analyse the data with various machine learning algorithms to choose the highest accuracy among the machine learning algorithms. Not only that, challenges and limitations faced by the us need to be managed with proper care to achieve satisfactory results that could improve the clinical practice and decisionmaking.

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