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Social Network Mental Disorders Detection

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Abstract: ***With the rise in popularity of online social networks (OSNs), new terms such as Phubbing and Nomophobia have been introduced, and Social network mental illnesses (SNMDs) such as Information Overload and Net Compulsion have been noted Studies show that 1 in 8 Americans experience it suffer from problems internet use, as well as SNMD Overuse, depression, social withdrawal, and other negative behaviors can occur if SNMDs are socially relevant and frequent for them interactive users through online social media. Internet addiction (IAD) is a behavioral disorder, and research on depression in online social networks is increasing unlike most previous attention-grabbing research emphasizes individual behaviors and entries but does not fully explore social network structures and psychological possibilities we propose a learning approach for those that require a thorough examination of OSN topologies.***
Keywords: Information Overload, Cyber Relationship, Net Compulsion, Tkinter

I. INTRODUCTION

A. Introduction

With the explosive growth in popularity of social networking and messaging apps, Online Social Networks (OSNs) have become part of our daily lives. OSNs seemingly increase their user's social contacts but they may decrease face to face inter-personal interactions in the real world. Due to these new terms like Phubbing (Phone Snubbing) and Nomophobia (No mobile phone phobia) have been introduced[1]. It has also given rise to many Social network mental disorders (SNMDs) such as information overload or net compulsion asso- ciated with loss of sense of time or a neglect of basic drives – including anger, tension, or depression when computer/apps are not accessi- ble. In fact,some social network mental disorders (SNMDs), such as Information Overload and Net Compulsion, have been recently noted.For exam- ple, studies point out that 1 in 8 Americans suffer from problematic Internet use. Moreover, leading journals in mental health, such as the Ameri-can Journal of Psychiatry, have reported that the SNMDs may incur excessive use, depression, social withdrawal, and a range of other nega- tive repercussions[2]. Indeed, these symptoms are important components of diagnostic criteria for SNMDs e.g., excessive use of social networkingapps – usually associated with a loss of the sense oftime or a neglect of basic drives, and withdrawal – including feelings of anger, tension, and/or depres- sion when the computer/apps are inaccessible. SNMDs are social-oriented and tend to happento users who usually interact with others via online social media. Those with SNMDs usually lack offline interactions, and as a result, seek cyber-relationships to compensate. Today, identi- fication of potential mental disorders often falls onthe shoulders of supervisors (such as teachers or parents) passively.

B. Need of Work

Internet Addiction Disorder (IAD) is a type of behaviour addiction with the patients addicted to the Internet, just like those addicting to drugs or alcohol[3]. Many research works in Psychol- ogy and Psychiatry have studied the important factors, possible consequences, and correlations of IAD. They investigated the problem of simulated gambling via digital and social media to analyze the correlation of different factors, e.g., grade, eth-nicity. Internet user behaviour can be used to investigate the reason for addiction. We can exam-ine the risk factors related to Internet addiction, and also investigate the association of sleep qual- ity and suicide attempts of Internet addicts. On the other hand, recent research in Psychology and Sociology reports several mental factors related tosocial network mental disorders.

Research on mental disorders in online social networks receives increasing attention recently. Among them, content-based textual features are extracted from user-generated information (such as blogs, social media) for sentiment analysis and topic detection. An NLP-based approach is used to collect and extract linguistic and content-based features from online social media to identify Borderline Personality Disorder and Bipolar Disorder patients. The topical and linguistic features are extracted from online social media for depression patients to analyze their patterns.

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To analyze emotion and linguistic styles of social media data for Major Depressive Disorder (MDD)[3]. How- ever, most previous research focuses on individual behaviors and their generated textual contents but do not carefully examine the structure of social networks and potential Psychological features. Moreover, the developed schemes are not designed to handle the sparse data from multiple OSNs. In contrast, we propose a new multi-source machine learning approach, i.e., STM, to extract proxy features in Psychology for different diseases that require careful examination of the OSN topologies, such as Cyber-Relationship Addiction and Net Compulsion. As per our literature survey, there is a strong correlation between suicidal attempts and SNMDs[1].Research also reveals that social net-work addiction may negatively impact emotional status causing higher hostility, depressive mood and compulsive disorder. Even more alarming is that the delay of early intervention may seriously damage individuals social functioning. Hence ,we need to have the ability to actively detect potential SNMD users on OSNs at an early stage.

C. Objectives

1) To analyze various symptoms experienced by the user.
2) To develop a machine learning framework for detecting SNMD's
3) To create a GUI based application for the user's understanding.

D. Problem Definition

Nowaday's in Health Industry there are various problems related to machines or devices which will give wrong or unaccepted results, so to avoid those results and get the correct and desired results we are building a program or project which will give accurate predictions based on information pro- vided by the user and also based on the datasets that are available in that machine. The health industry is information yet and knowledge poor and this industry is a very vast industry that has a lot of work to be done. So, with the help of all those algorithms, techniques and methodologies we have done this project which will help the peoples who are in the need. So the problem here is that many people go to hospitals or clinics to know how is their mental health but they have to travel to get to know their answers and to avoid all those reasons and confusion we are making a project which will help all those person's and all the patients who are in need to know the condition of their mental health, and at sometimes if the per- son has been observing few symptoms and he/she is not sure about the disorder he/she is encoun- tered with so this will lead to various diseases in future. So, to avoid that and get to know the dis- order in the early stages of the symptoms this disorder prediction will help a lot to the various people.

II. REQUIREMENT ANALYSIS AND SPECIFICATION

A. Information Gathering

A machine learning framework can be created for detecting SNMDs which we call Social Network Mental Disorder Detection (SNMDD).
This is a Supervised Classification Problem to detect 3 types of SNMDs:

- Cyber Relationship Addiction.
- Net Compulsion.
- Information Overload.

Technologies used-

- Python 3:version 3.6
- Machine learning algorithms

Software Requirements-

- Operating System : Windows7 or Higher Ver-sions
- Platform : Pycharm
- Front End : Python Tkinter
- Back End : Python and Files
- Programming Language : Python

Hardware requirements-

- System : IntelCorei3,i5,i7and2GHzMinimum
- RAM : 512Mb orabove
- HardDisk : 10GBor above
- Input Device : Keyboard and Mouse
- Output Device : Monitor or PC
- Monitor Resolution : 1024*768

Libraries used-

- Pandas
- Numpy
- Sklearn
- Tkinter

B. Survey

On 5th March 2021, we visited Dhanvantari Nurs- ing Home in Kolhapur to getting details about the mental conditions of people. We had a detailed discussion about the cause of technology addictionon people and its effects. As per our discussion, it is clear that we need to take precautionary mea- sures in the initial stage to avoid critical effects in the future. Below case studies is a clear indication of the severity of these disorders. Effects such as phone addiction, constant gaming/gambling and many similar seem to be very normal and harm- less at the initial stage but the lesser-known factis that these things can be fatal for the people andcan have a major loss. It affects the emotional sta-bility of a person and this needs to be taken care of.

Internet addiction tied to increased suicidality

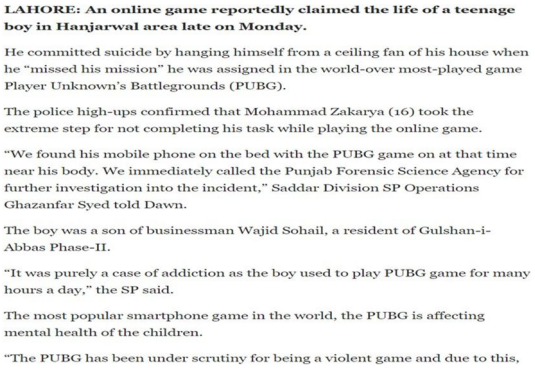
ADD TOPIC TO EMAIL ALERTS

Evidence from multinational observational studies showed that internet addiction was linked to higher rates of suicidal ideation and attempts, even after adjusting for potential confounding variables like depression.

"Since depression has been associated with both suicidal behaviors and internet addiction, the independent association between internet addiction and suicidality remains unclear, although it may be partly mediated by depression," **Ming-Kung Wu, MD**, from the department of psychiatry, Kaohsiung Chang Gung Memorial Hospital and Chang Gung University College of Medicine in Taiwan, and colleagues wrote. "However, to our best knowledge, no meta-analysis has investigated the relationship between suicidal behaviors and internet addiction."

In this systematic review and meta-analysis, researchers examined observational studies that looked at the link between internet addiction and suicidality. Wu and colleagues searched major electronic databases using internet addiction, internet gaming disorder, internet use disorder, pathological internet use, compulsive internet use or problematic internet use and suicide or depression as key words. They extracted data on the rates of suicidal ideation, planning and attempts in people with internet addiction and controls.

Fig. 1 Teen commits suicide after 'missing task' in online game



LAHORE: An online game reportedly claimed the life of a teenage boy in Hanjarwal area late on Monday.

He committed suicide by hanging himself from a ceiling fan of his house when he "missed his mission" he was assigned in the world-over most-played game Player Unknown's Battlegrounds (PUBG).

The police high-ups confirmed that Mohammad Zakarya (16) took the extreme step for not completing his task while playing the online game.

"We found his mobile phone on the bed with the PUBG game on at that time near his body. We immediately called the Punjab Forensic Science Agency for further investigation into the incident," Saddar Division SP Operations Ghazanfar Syed told Dawn.

The boy was a son of businessman Wajid Sohail, a resident of Gulshan-i-Abbas Phase-II.

"It was purely a case of addiction as the boy used to play PUBG game for many hours a day," the SP said.

The most popular smartphone game in the world, the PUBG is affecting mental health of the children.

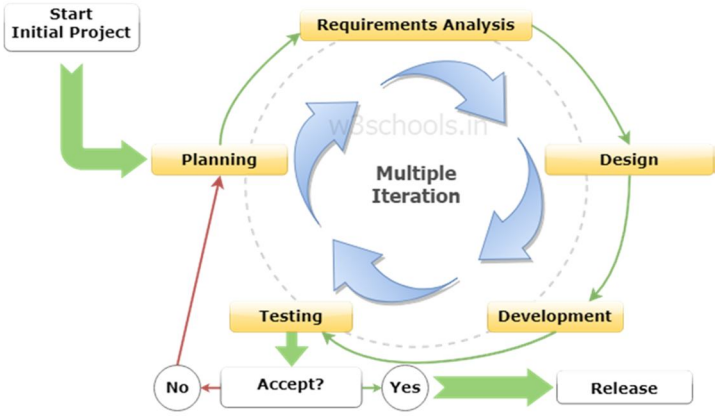
"The PUBG has been under scrutiny for being a violent game and due to this,

Fig. 2 Teen commits suicide after 'missing task' in onlinegame

Prediction using traditional methods and mod- els involves various risk factors and it consists of various measures of algorithms such as datasets, programs and much more to add on[1]. High-risk and Low-risk patient classification is done based on the tests that are done in the group. But these models are only valuable in clinical situa- tions and not in the big industry sector. So, to include the disorder predictions in various mental health-related industries, we have used the con- cepts of machine learning and supervised learningmethods to build the predictions system[2].

After doing the research and comparison of all the algorithms and theorems of machine learning we have concluded that all those algorithms such as Decision Tree ,KNN ,Na¨ıve Bayes, Regression and Random Forest Algorithm all are important in building a disease prediction system has pre- dict the disorder of the patients from which he/she is suffering from. After using various techniques such as neural networks to make predictions of thedisorder and after doing that we conclude that it can predict up to 90% accuracy rate after doing the experimentation and verifying the results. The information of patient statistics, results, dis- ease history is recorded in EHR, which enablesthe identification of the potential data-centric solution, which reduces the cost of medical case studies[3]. The existing system can predict the dis- order but not the subtype of the disorder and it fails to predict the condition of the people.

C. Life Cycle Model



In this project, we are using an agile model. The waterfall model is the oldest model used by the IT industry to develop software. The Agile software development model was mainly intended for help- ing developers build a project which can adapt to transforming requests quickly. So, the most impor-tant endeavour for developing the Agile modelis to make easy and rapid project achievement. For attaining this task, developers need to pre- serve agility during development. Agility can be achieved by correcting the progression to the project by eliminating activities that may not be crucial for that specific project.

Following are the phases in the Agile model areas follows:

1) *Design the Requirements:* When you have iden-tified the project, work with stakeholders todefine requirements. You can use the user flowdiagram or the high-level UML diagram to show the work of new features and show how itwill apply to your existing system.
2) *Testing:* In this phase, the Quality Assurance team examines the product's performance and looks for the bug.
3) *Employment:* In this phase, the team issues a product for the user's work environment.
4) *Feedback:* After releasing the product, the last step is feedback. In this, the team receives feed-back about the product and works through the feedback.

III. SRS

1) The user should be able to check for all cate- gories of SNMDs.
2) The user should receive simple understandableresults.
3) The framework should give a proper explana-tion of the results obtained.

IV. DESIGN

The Design goals consist of various designs which we have implemented in our system mental health disorder prediction using machine learning. This system has been built with various designs such as data flow diagram, sequence diagram, class diagram, use case diagram, component diagram, activity diagram, statechart diagram, deployment diagram. After doing the sevarious diagrams andbased on these diagrams we have done our project.

1) *Entering Symptoms:* He/she has to select the symptoms from the given drop-down menu.
2) *Prediction:* The predictive model predict the disorder of a person he might have ,based on the user entered symptoms.

A. Modules

1) Front End

GUI Application using Tkinter Our GUI Design is a simple Tkinter framework that is veryeasy to understand and use. The user will just have to enter basic information which is easily available to get information about the respective SNMDs and also the results available are easy tounderstand.

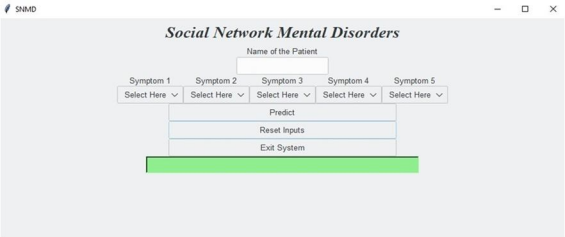


Fig. 3 GUI

2) Back End

1) *Data Acquisition:* The Dataset was readily available on the platforms Kaggle from which we can take the required information or the features from the dataset.
2) *Feature Extraction:* Our data con- sists of three categories Information Over- load(IO), Cyber Relationship(CR) and Net Com- pulsion(NC).Through our study we could find out different symptoms related to these three categories of SNMDs. IO includes a variety of symp- toms like Depression, Headache, Poor Concen- tration, Sleeping Problem, Anxious, Unfocused, Stressed, Memory Impairment. CR includes Depression, Headache, Memory Impairment, Mood Swing, Social Isolation, Low Self Esteem, Feeling of Guilt, Restlessness, Bore- dom.NC includes Depression, Headache, Lying About Internet Use, Inability to Prioritize, No Sense of time, Feeling of Euphoria, Anger. We take these symptoms experienced by the user and use it in our model to evaluate the respective SNMD.
3) *Model Evaluation:* As the number of SAD patients (positive examples) is much fewer than the number of no SAD patients (negative examples), we employ an outlier detection approach, i.e., One-class SVM, to identify the decision boundary of the negative examples (non- SAD patients)[2], and if a user does not fall into the decision boundary, the user is classifiedas a positive example (SAD patient). Moreover,we also compare the performance of using solely One-class SVM and the ensemble of multiple One- class SVMs (Ensemble for show Furthermore, the classical SVM classifier (SVM for short) is also employed as a baseline, where we up sample the positive examples such that the training set includes the same number of positive and nega- tive examples. In our evaluation, we adopt 5-fold cross-validation and report the accuracy, preci- sion, recall, and the F1-score of each approach.

B. System Architecture

Mental health disorder prediction using machine learning predicts the presence of the disorder for the user based on various symptoms and the infor-mation the user gives such as depression, anxiety and many more such general information through the symptoms[3].

The architecture of the system mental health disorder prediction using machine learning consists of various datasets through which we will compare the symptoms of the user and predicts it, then the datasets are transformed into smaller sets and from there it gets classified based on the classification algorithms later on the

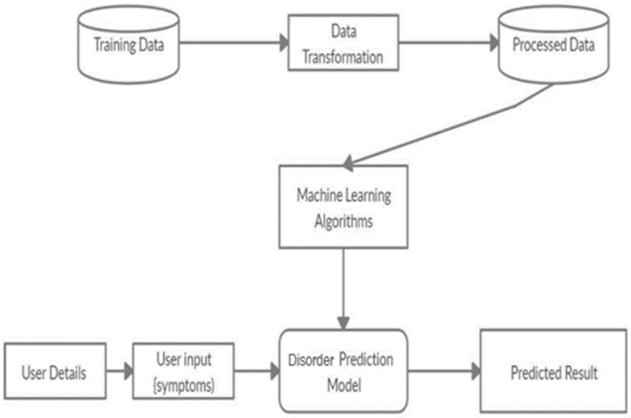


Fig. 4 System Architecture

Classified data is then processed into the machine learning technologies through which the data getsprocessed and goes into the disorder prediction model using all the inputs from the user that is mentioned above[1]. Then after the user entering the above information and overall processed data combines and compares in the prediction model of the system and finally predicts the disorder. An architecture diagram is a graphical representation of a set of concepts, that is part of the architecture, including their principles, elements and compo- nents. The diagram explains the system software in the perception of the overview of the system.

C. Data Flow Diagram

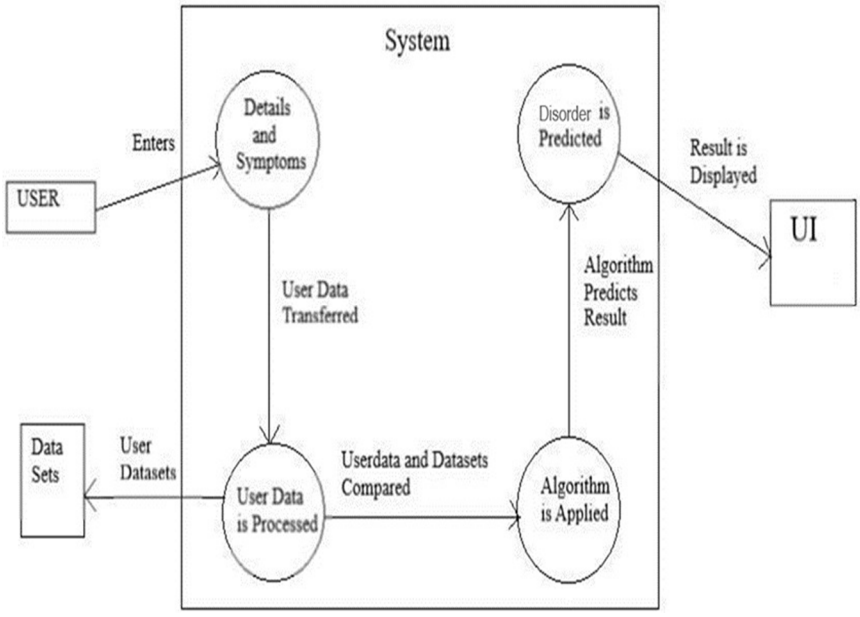


Fig. 5 Data Flow Diagram

The dataflow diagram of the project mental health disorder prediction using machine learning consists of all the various aspects a normal flow diagram requires. This data flow diagram shows how from starting the model flows from one step to another like he enter into the system then enters all the information's and all other general information along with the symptoms that goes into the system, compares with the prediction model andif true it is predicted the appropriate results otherwise it shows the details where the user if gone wrong while entering the information.

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V. IMPLEMENTATION DETAILS

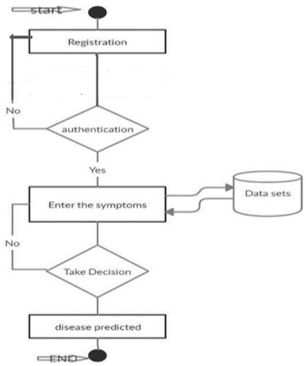

Fig. 6 Implementation flow

The project Mental health disorder Prediction using Machine Learning is developed to overcome general disorders in earlier stages as we all know in the competitive environment of economic devel- opment the mankind has involved so much that he/she is not concerned about health according to research there are 40% peoples how ignores about general symptoms which lead to harmful mental disorder later. The Project "Social Net- work Mental Disorders Detection" is implemented using python completely[1]. Even the interface of this project is done using python's library inter- face called Tkinter. Here the first user needs to the name and needs to select the symptoms from the given drop-down menu, for a more accurate result the user needs to enter all the given symptoms, then the system will provide the accurate result. This prediction is done with the help of an algorithm of machine learning such as a Decision Tree. When the user enters all the symptoms then he need to press the buttons of predict. The project is designed user-friendly and also secure to use every user requires authentication to enter into the system after which it provides the result based on the user input let me explain the complete implementation.

A. Working of Project stepwise below

1) First, enter the name of the patient.
2) After the user enters the system user has to provide the symptoms which he/she is going through based on which we have several algorithms which predict the disease and also dis- plays the percentage of accuracy.
3) The user needs to enter all the columns of symptoms to get an accurate result.
4) Data collection and dataset preparation This will involve the collection of medical information from various sources like hospitals, then pre-processing is applied to the dataset which will remove all the unnecessary data and extract important features from data.
5) Training and experimentation on datasets The Mental Health disorder Prediction model will be trained on the dataset of diseases to do the prediction accuracy and produce. In this project, we used Decision Tree Algorithm.
6) Deployment and analysis on the real-life scenario the trained and tested prediction model will be deployed in a real-life scenario made by the human experts & will be leveraged for further improvement in the methodology.

B. Decision Tree Algorithm

Decision tree induction is the learning of decision trees from class-labeled training tuples. A decision tree is a flowchart-like tree structure,[1]

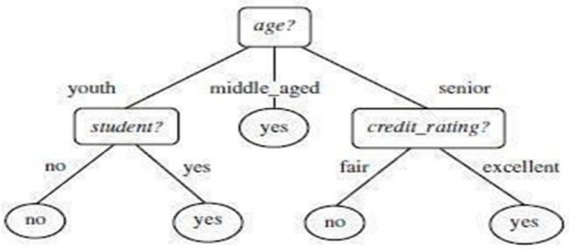

Fig. 7 Decision tree

1) Decision tree induction is a non-parametricapproach for building classification models.
2) Finding an optimal decision tree is an NP-complete problem
3) Techniques developed for constructing decisiontrees are computationally inexpensive, making it possible to construct models even when thetraining set size is very large.
4) Decision trees, especially smaller-sized trees are relatively easy to interpret.
5) Decision trees provide an expressive representa-tion for learning discrete-valued functions.
6) Decision tree algorithms are quite robust to the presence of noise, especially when methods foravoiding overfitting.

C. *Development Tools Used*

1) *PyCharm:* It is an integrated development environment (IDE) used in computer program- ming, specifically for the Python language. It is developed by the Czech company JetBrains.It provides code analysis, a graphical debug- ger, an integrated unit tester, integration with version control systems (VCSes), and supportsweb developmentwith Django as well as Data Science with Anaconda. PyCharm is cross- platform, with Windows, macOS and Linuxversions.

2) *Libraries*

a) *Pandas:* Pandas is a fast, powerful, flexible and easy to use open-source data analy- sis and manipulation tool, built on top ofthe Python programming language. Data analysis was done using pandas.
b) *Numpy:* NumPy was used as an efficient multi-dimensional container of generic data. Arbitrary datatypes can be defined.
c) *Sklearn:* This module was used to implementthe different machine learning algorithms used in the project.
d) *Tkinter:* Tkinter is the Python interface to the Tk GUI toolkit shipped with Python. The GUI of the projected id was created using the library.

3) *Microsoft Excel:* Used Microsoft's product Excel to cover a range of machine learning tasks such as data mining, data analytics, smartvisualization

D. *Supporting Tools Used*

Train test split is a function in Sklearn model selection for splitting data arrays into two sub- sets: for training data and testing data. With thisfunction, you don't need to divide the dataset manually.

VI. TESTING AND RESULT

Testing is a process of executing a program or application with the intent of finding software bugs. Software Testing is necessary because we all make mistakes. Some of those mistakes are unimportant, but some of them are expensive or dangerous. We need to check everything and any- thing we produce because things can always go wrong – humans make mistakes all the time.

A. *Testing of Initialization and Components*

Table 1 Test Case for Prediction Result

Serial Number of Test Case	TC01
Module Under Test	Prediction Result
Description	The user needs to enterthe name and symp- toms to get the predic-tion result.
Input	Name and Symptoms
Output	If a user enters all 5 correct symptoms then the accuracy will be high. If a user enters only a few symptoms then accuracy willbelow.
Remarks	Test Successful.

B. Snapshots

Fig. 8 Fill in the name

Fig. 9 Minimum 3 symptoms need to enter

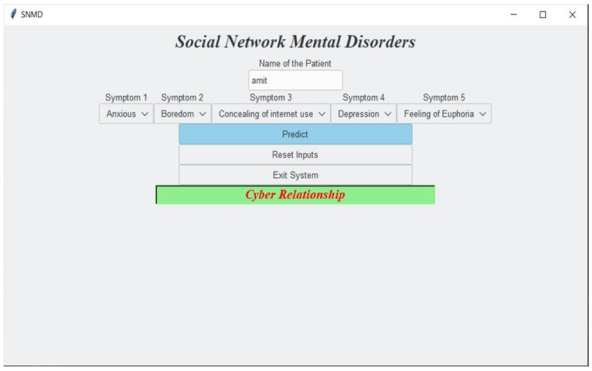

Fig. 10 Predication output1

VII. CONCLUSION

[H] Mental health conditions should be addressed long before they reach the most critical points in the disease process. Many people do not seek treatment in the early stages of mental illnesses because they don't recognize the symptoms. Tech-nology can have a large impact on users' mental and physical health. Being overly connected can cause psychological issues such as distraction, nar-cissism, the expectation of instant gratification, and even depression. In this era where there isa necessity for people to be overly dependent on technology, the effects caused by it on the mentalhealth of people must be addressed and taken careof at a very initial state. This project will help spread awareness about these issues and check them. We will also try to give more information about the same so that early precautions can be taken and critical effects can be avoided.

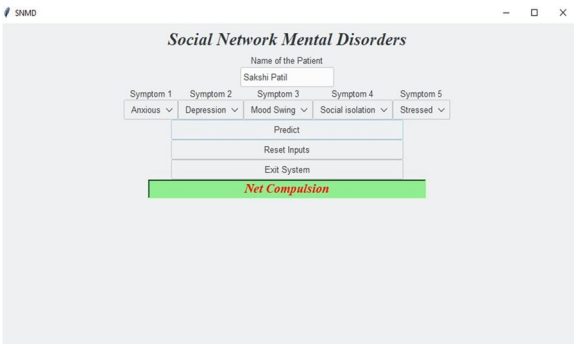

Fig. 11 Predication output2

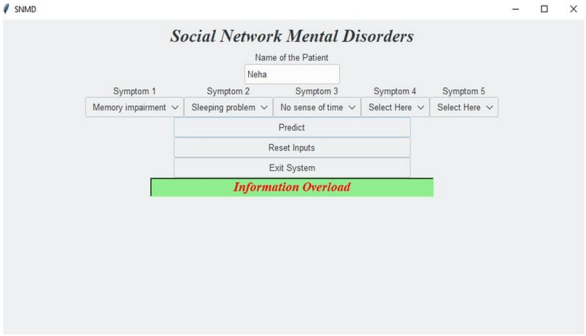

Fig. 12 Predication output3

VIII. FUTURE ENHANCEMENT

1) Facility for modifying user detail.
2) More interactive user interface.
3) Facilities for Backup creation.
4) Can be done as a Webpage.
5) Can be done as Mobile Application.
6) More Details and Latest Diseases.

IX. STATEMENTS AND DECLARATIONS

A. Competing Interests

The authors declare that they have no conflict of interest. All the authors have agreed to thesubmission.

B. Code base

https://github.com/sid732/Social-Network- Metal-Disorders-Detection

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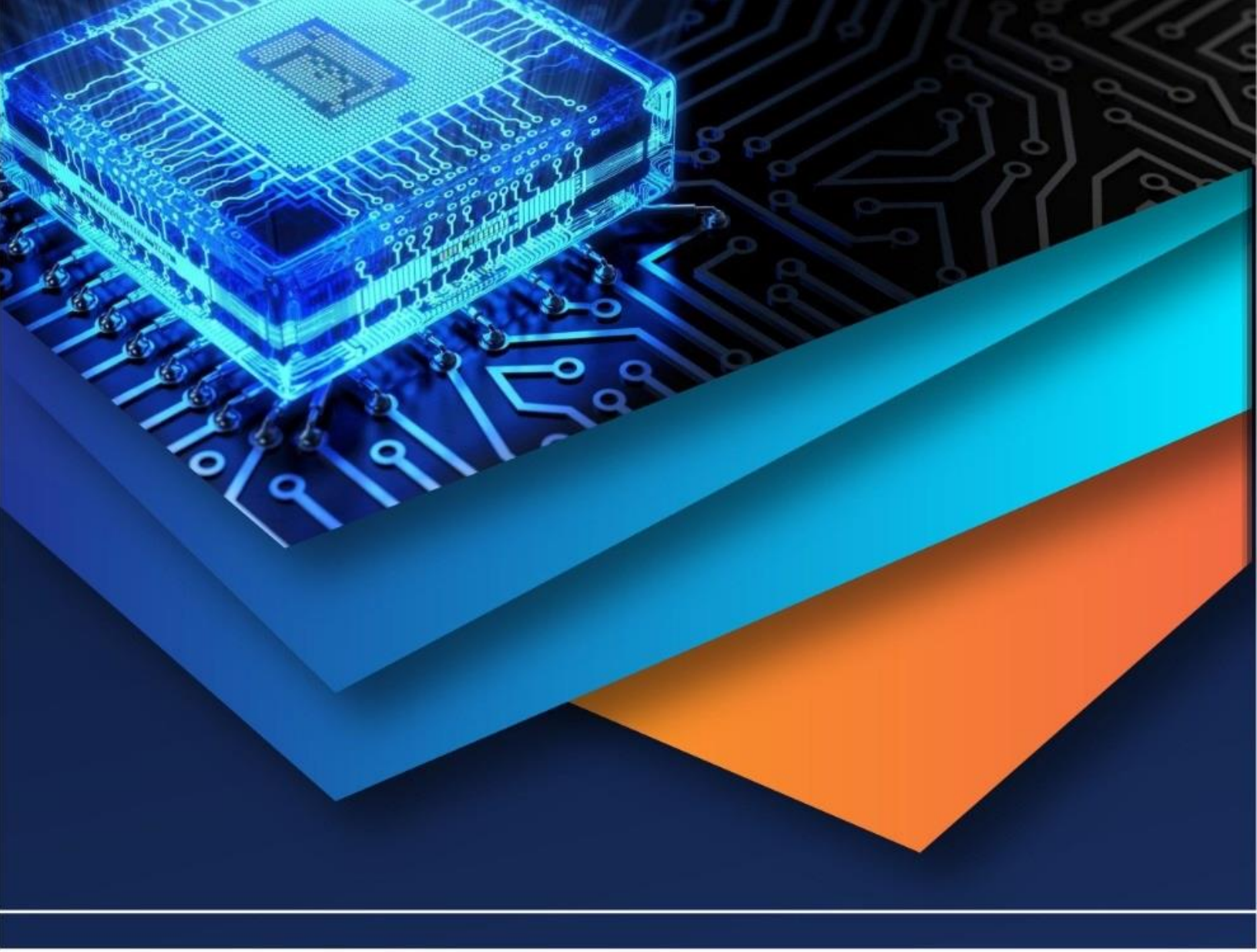

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