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# Solution for Mental Health Psychological Disorders Using Machine Learning Algorithms

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**ABSTRACT:** As we know that people around the globe work hard to keep up with this racing world. Each individual is dealing with different health issues, one of the most known issue is depression or stress which may eventually lead to death or other brutal activities. These abnormalities can be termed as the Bipolar disorder which can be treated by undergoing some treatment suggested by specialists. For this research, data has been collected from working people which comprises of all kinds of questions for detection and the dataset has been run through some machine learning algorithms. Provides More Accuracy while using Random Forest and SVM algorithm when compared with other techniques.

**KEYWORDS:** Bipolar disorder, Random Forest, SVM, Decision Tree, Machine learning.

## I. INTRODUCTION

Mental health can influence everyday living, relations, and physical health. In any case, this connection additionally works the other way. Factors in individuals' lives, relational associations, and physical variables would all be able to add to mental health disturbances. Caring for mental issues can improve a person's perspective over life in a positive way. Doing this can help in achieving harmony in life. Conditions, for example, stress, despondency, and nervousness would all be able to influence mental health and disturb an individual's everyday practice. Despite the fact that the term mental health is in like manner use, numerous conditions that specialists perceive as mental issue have physical roots. Modifiable variables for mental health issue include:  $f$  financial conditions, such whether work is accessible in the neighborhood  $f$  occupation  $f$  a person's level of social consideration  $f$  education  $f$  living quality Non-modifiable variables include: Mental disorders impact around 25 percent of elders; just about 6 percent are truly disabled and named having real mental sickness. These disorders are habitually associated with endless physical infirmities, for instance, coronary disease and diabetes. They in like manner increase the peril of physical injury and going through disasters, severity, and suicides. Suicide alone was at risk for 35,345 deaths in the U.S in 2019 (the latest year for which last data are available), making it the tenth driving explanation behind death. Among adolescents and young adults, suicide is responsible for extra deaths than the blend of harmful development, heart ailment, innate irregularities, respiratory disorder, influenza, , iron deficiency, and kidney and liver disease. The treatment of mental affliction has been held somewhere around the inclination that disorders of feeling, thinking, and direct somehow need realness and rather reflect particular weakness or poor life choices.

## II. RELATED WORK

### Prediction and Risk Assessment

Machine learning models have been developed to predict suicide risk based on various factor ssuchasdemographic information, clinical history, and social media activity. Researchers have used machine learning to predict the likelihood of relapse in individuals undergoing treatment for substance abuse disorders. Machine learning algorithms have been employed to personalize treatment plans for individuals with mental health disorders based on their specific symptoms, genetic makeup, and treatment response. Machine learning models have been utilized to monitor medication adherence in patients with mental health disorders, helping clinicians intervene when necessary to improve treatment outcomes.

### Remote Monitoring and Intervention

Various mobile applications use machine learning algorithms to provide mental health support, including mood tracking, stress management, and personalized interventions based on user data. Wearable devices equipped with biosensors and machine learning capabilities can monitor physiological signals such as heart rate variability and provide real-time feedback to help manage anxiety symptoms

### III. LITERATURE SURVEY

**1. W. Feng, J. Sun, L. Zhang, C. Cao, and Q. Yang, "A support vectormachine based Naive Bayes algorithm for spam ltering," in Proc. IEEE35th Int. Perform. Comput.Commun. Conf. (IPCCC), Dec. 2016**

The detection of DDoS attacks is an important topic in the field of network security. The occurrence of software defined network (SDN) (Zhang et al., 2018) brings up some novel methods to this topic in which some deep learning algorithm is adopted to model the attack behavior based on collecting from the SDN controller. However, the existing methods such as neural network algorithm are not practical enough to be applied. In this paper, the SDN environment by mininet and floodlight (Ning et al., 2014) simulation platform is constructed, 6-tuple characteristic values of the switch flow table is extracted, and then DDoS attack model is built by combining the SVM classification algorithms. The experiments show that average accuracy rate of our method is with a small amount of flow collecting. Our work is of good value for the detection of DDoS attack in SDN.

**2. E. G. Dada, J. S. Bassi, H. Chiroma, S. M. Abdulhamid, A. O. Adetunmbi, and O. E. Ajibuwa, "Machine learning for email spam ltering: Review, approaches and open research problems," Heliyon, vol. 5, no. 6, Jun. 2019, Art. no. e01802, doi: 10.1016/j.heliyon.2019.e01802.**

The upsurge in the volume of unwanted emails called spam has created an intense need for the development of more dependable and robust antispam filters. Machine learning methods of recent are being used to successfully detect and filter spam emails. We present a systematic review of some of the popular machine learning based email spam filtering approaches. Our review covers survey of the important concepts, attempts, efficiency, and the research trend in spam filtering. The preliminary discussion in the study background examines the applications of machine learning techniques to the email spam filtering process of the leading internet service providers (ISPs) like Gmail, Yahoo and Outlook emails spam filters. Discussion on general email spam filtering process, and the various efforts by different researchers in combating spam through the use machine learning techniques was done. Our review compares the strengths and drawbacks of existing machine learning approaches and the open research problems in spam filtering. We recommended deep leaning and deep adversarial learning as the future techniques that can effectively handle the menace of spam emails

**3. W. Awad and S. ELseuo, "Machine learning methods for spam E-Mailclassification," Int. J. Comput. Sci. Inf. Technol., vol. 3, no. 1, pp. 173184, Feb. 2017, doi: 10.5121/ijesit.2011.3112.**

The increaseng volume of unsolicited bulk e-mail (also known as spam) has generated a need for reliable anti-spam filters. Machine learning techniques now days used to automatically filter the spam e-mail in a very successful rate. In this paper we review some of the most popular machine learning methods (Bayesian classification, k-NN, ANNs, SVMs, Artificial immune system and Rough sets) and of their applicability to the problem of spam Email classification. Descriptions of the algorithms are presented, and the comparison of their performance on the SpamAssassin spam corpus is presented.

**4. S. Mohammed, O. Mohammed, and J. Fiaidhi, "Classifying unsolicitedbulk email (UBE) using Python machine learning techniques," Int.J. Hybrid Inf.**

**Technol. Available: [https://www.researchgate.net/publication/236970412\\_Classifying\\_Unsolicited\\_Bulk\\_Email\\_UBE\\_using\\_Python\\_Machine\\_Learning\\_Techniques](https://www.researchgate.net/publication/236970412_Classifying_Unsolicited_Bulk_Email_UBE_using_Python_Machine_Learning_Techniques).**

Email has become one of the fastest and most economical forms of communication. However, the increase of email users has resulted in the dramatic increase of spam emails during the past few years. As spammers always try to find a way to evade existing filters, new filters need to be developed to catch spam. Generally, the main tool for email filtering is based on text classification. A classifier then is a system that classifies incoming messages as spam or legitimate (ham) using classification methods. The most important methods of classification utilize machine learning techniques. There are a plethora of options when it comes to deciding how to add a machine learning component to a python email classification. This article describes an approach for spam filtering using Python where the interesting spam or ham words (spam-ham lexicon) are filtered first from the training dataset and then this lexicon is used to generate the training and testing tables that are used by variety of data mining algorithms. Our experimentation using one dataset reveals the affectivity of the Naï ve Bayes and the SVM classifiers for spam filtering



**5. A. Wijaya and A. Bisri, "Hybrid decision tree and logistic regression classifier for email spam detection," in Proc. 8th Int. Conf. Inf. Technol. Electr. Eng. (ICITEE), Oct. 2016, pp. 14, doi: 10.1109/ICITEED.2016.7863267**

Email spam is an increasing problem because it is disrupting and time consuming for users, since it is easy and cheap to send emails. Email spam filtering can be done with a binary classification with machine learning as a classifier. To date, email spam detection is still challenging since email spam still happens a lot and the detection still needs improvement. Decision Tree (DT) is one of the famous classifiers since DT is able to handle nominal and numerical attributes and increasing the efficiency of computing. However, DT has a weakness in over-sensitivity to the training set and the noise data or instance that can degrade the performance. In this study, we propose a hybrid combination of Logistic Regression (LR) and DT for email spam detection. LR is used to reduce noisy data or instances before data is fed to DT induction. Noisy data reduction is done by LR by filtering correct predictions with a certain false negative threshold. In this study, the Spambase dataset is used to evaluate the proposed method. From the experiment, the results show that the proposed method yields impressive and promising results with an accuracy of 91.67%. It can be concluded that LR is able to improve DT performance by reducing noisy data.

#### IV. PROPOSED ALGORITHM

##### *Random forests*

Random forests, also known as random decision forests, represent an ensemble learning technique used for classification, regression, and other tasks. They function by constructing numerous decision trees during training. For classification tasks, the output of the random forest is determined by the class selected by the majority of trees. Conversely, for regression tasks, the mean or average prediction of the individual trees is returned. Random decision forests aim to mitigate the issue of decision trees overfitting to their training set. In general, random forests tend to outperform individual decision trees, although they may have lower accuracy compared to gradient boosted trees. Nonetheless, the performance of random forests can be influenced by the characteristics of the data. The concept of random decision forests was first introduced in 1995 by Tin Kam Ho, who utilized the random subspace method. This method, as formulated by Ho, serves as an implementation of the "stochastic discrimination" approach to classification initially proposed by Eugene Kleinberg.

##### *Support Vector Machine (SVM)*

Support Vector Machine (SVM) represents a discriminant machine learning technique commonly used in classification tasks. It aims to find a discriminant function, based on an independently and identically distributed training dataset, that accurately predicts labels for newly acquired instances. Unlike generative machine learning approaches, which necessitate computations of conditional probability distributions, a discriminant classification function assigns a data point  $x$  to one of the classes involved in the classification task. Compared to generative approaches, discriminant methods may be less powerful, particularly in outlier detection scenarios. However, they require fewer computational resources and less training data, especially in multidimensional feature spaces and when only posterior probabilities are necessary. Geometrically, learning a classifier equates to identifying the equation for a multidimensional surface that optimally separates the different classes in the feature space.

##### *Gradient boosting*

Gradient boosting is a versatile machine learning technique employed in regression and classification tasks, among others. It constructs a prediction model in the form of an ensemble of weak prediction models, typically decision trees. When using decision trees as the weak learner, the resulting algorithm is referred to as gradient-boosted trees, often surpassing the performance of random forests. The construction of a gradient-boosted trees model occurs in a stage-wise manner, similar to other boosting methods, but it stands out by allowing the optimization of an arbitrary differentiable loss function.

##### *K-Nearest Neighbors (KNN)*

K-Nearest Neighbors (KNN) is a straightforward yet highly effective classification algorithm that operates based on a similarity measure. It is non-parametric and employs lazy learning, meaning it does not "learn" until presented with a test example. Whenever there is a new data point to classify, KNN identifies its K-nearest neighbors from the training data and determines its classification based on their majority vote or weighted vote.

### V. SYSTEM ARCHITECTURE

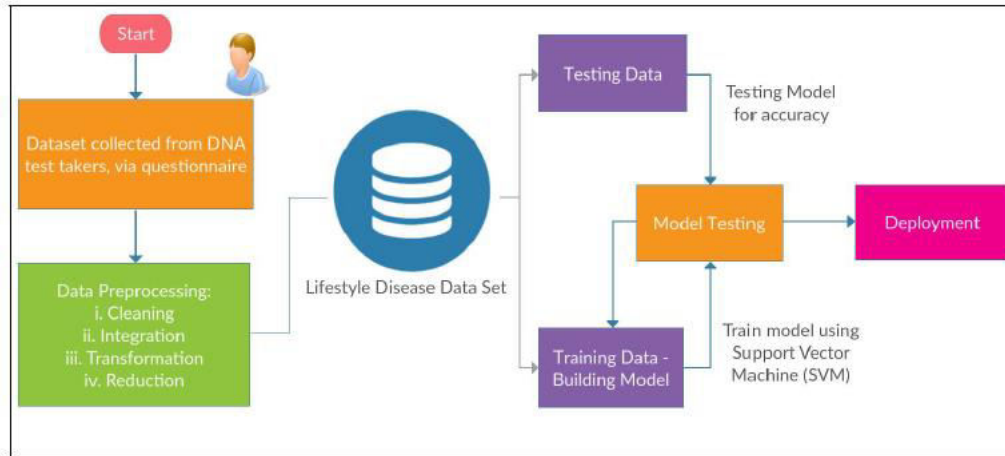


Fig. 3. Block diagram of proposed system for lifestyle disease prediction.

### VI. SIMULATION RESULTS

The system is developed using Python language with required libraries. Implemented using three machine learning algorithm on the given dataset for mental disorder detection shows that Random forest model outperforms other models. SVM and Random forest algorithms have high accuracy compared to other Decision Tree algorithm. TABLE I. EXPERIMENTAL RESULTS OF PROPOSED SYSTEM The above table represents the accuracy of machine learning algorithms for mental disorder detection. The below figure shows the experimental study of Decision Tree algorithm. Fig. 1. Experimental Results of Decision Tree Algorithm Fig. 2. Experimental Results of Random Forest Algorithm Fig. 3. Experimental Results of SVM Algorithm Algorithm Accuracy SVM algorithm 86.34 Decision Tree 78.48 Random Forest 87.02

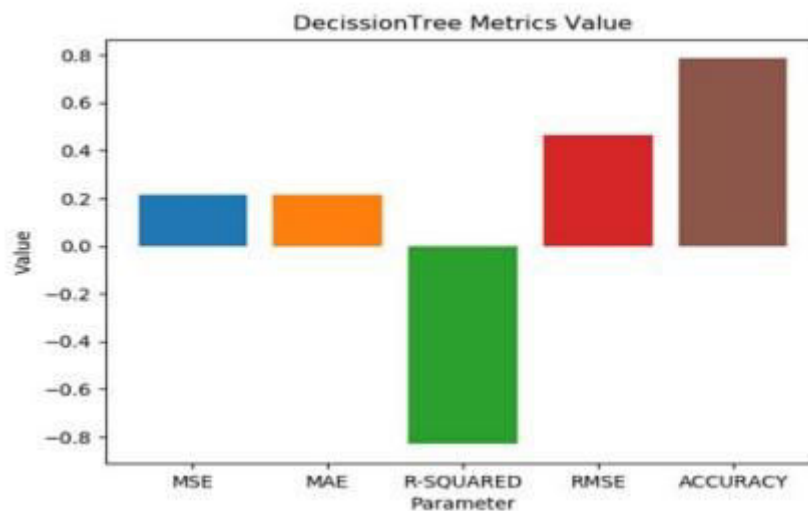


Fig. 1. Experimental Results of Decision Tree Algorithm

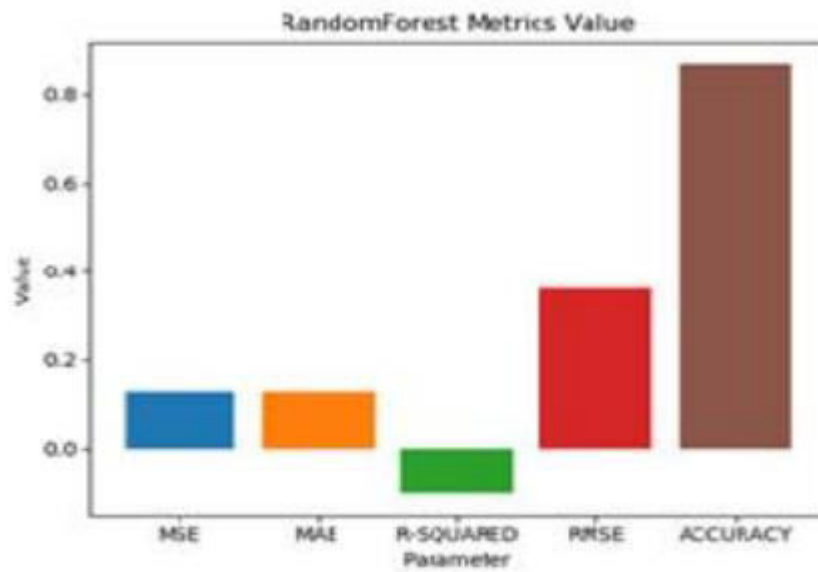


Fig. 2. Experimental Results of Random Forest Algorithm

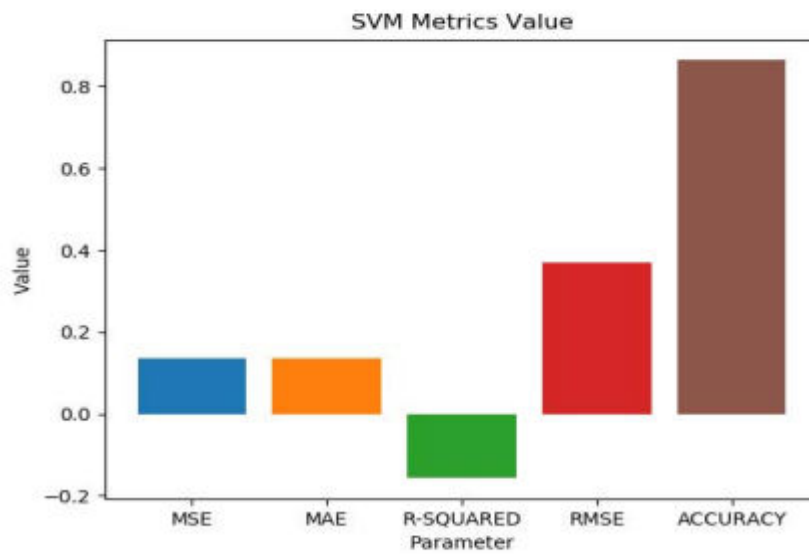


Fig. 3. Experimental Results of SVM Algorithm

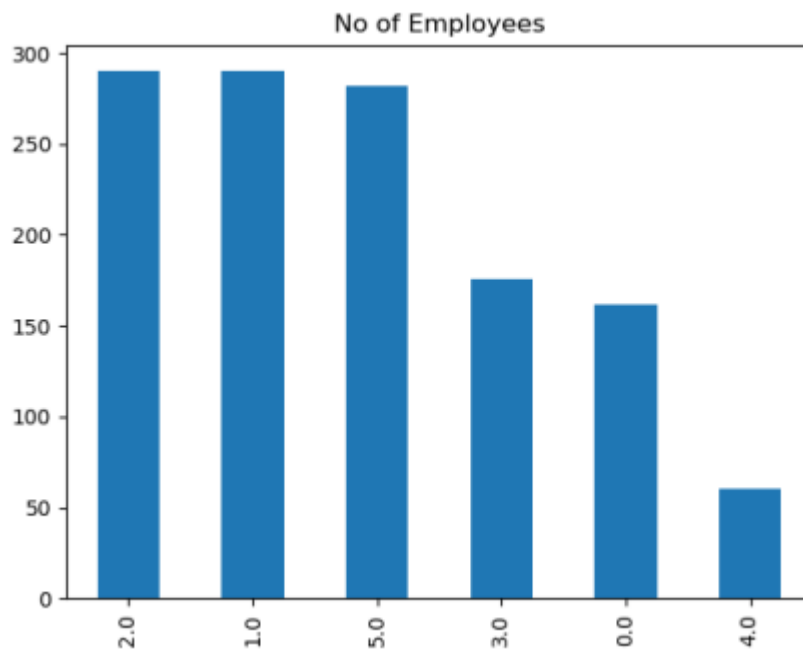
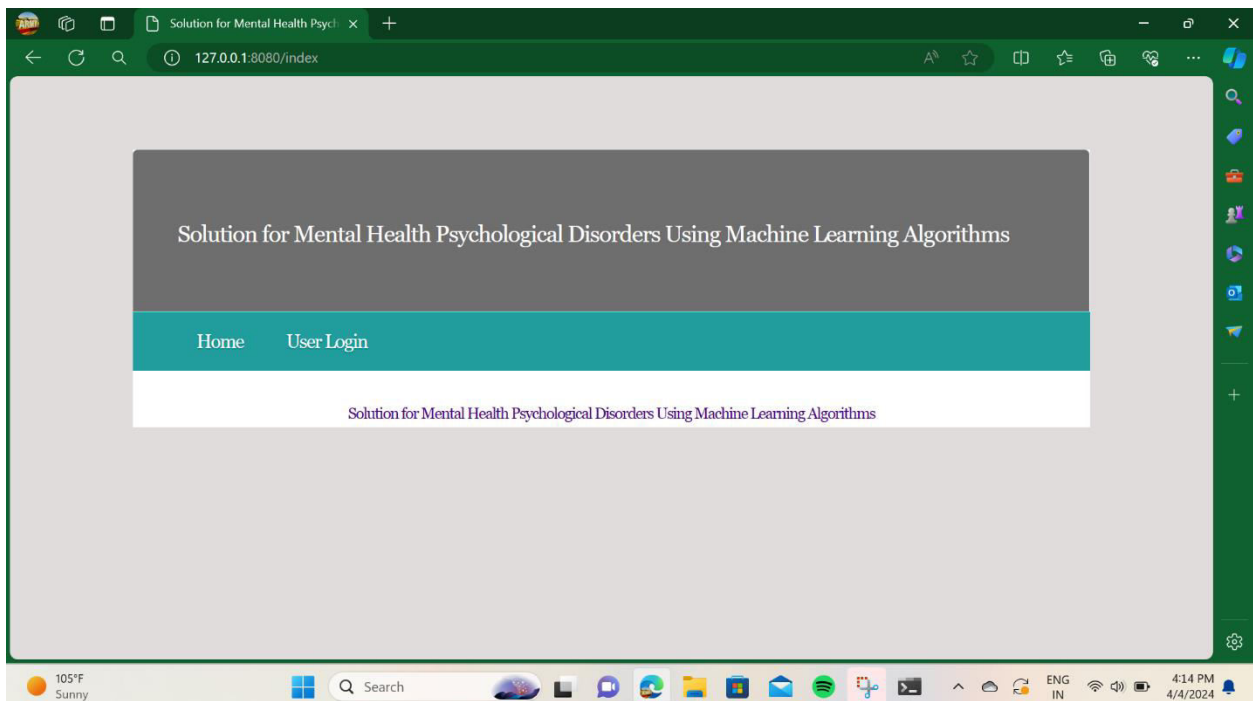
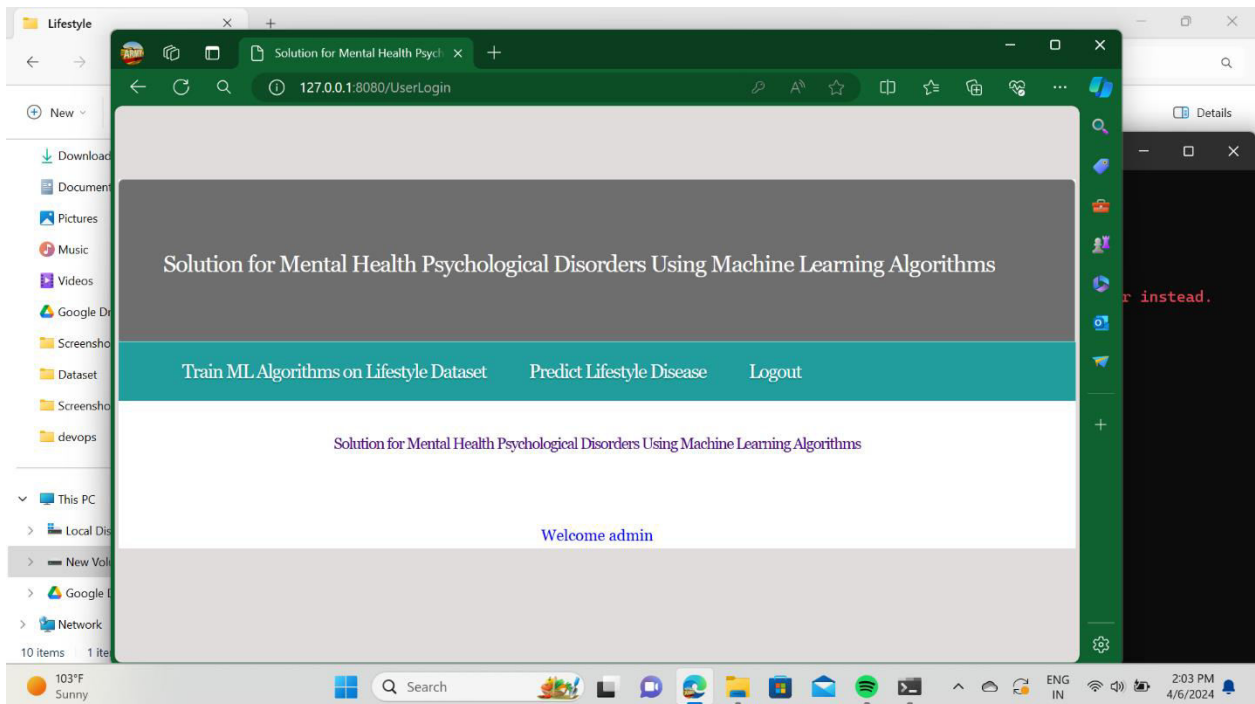
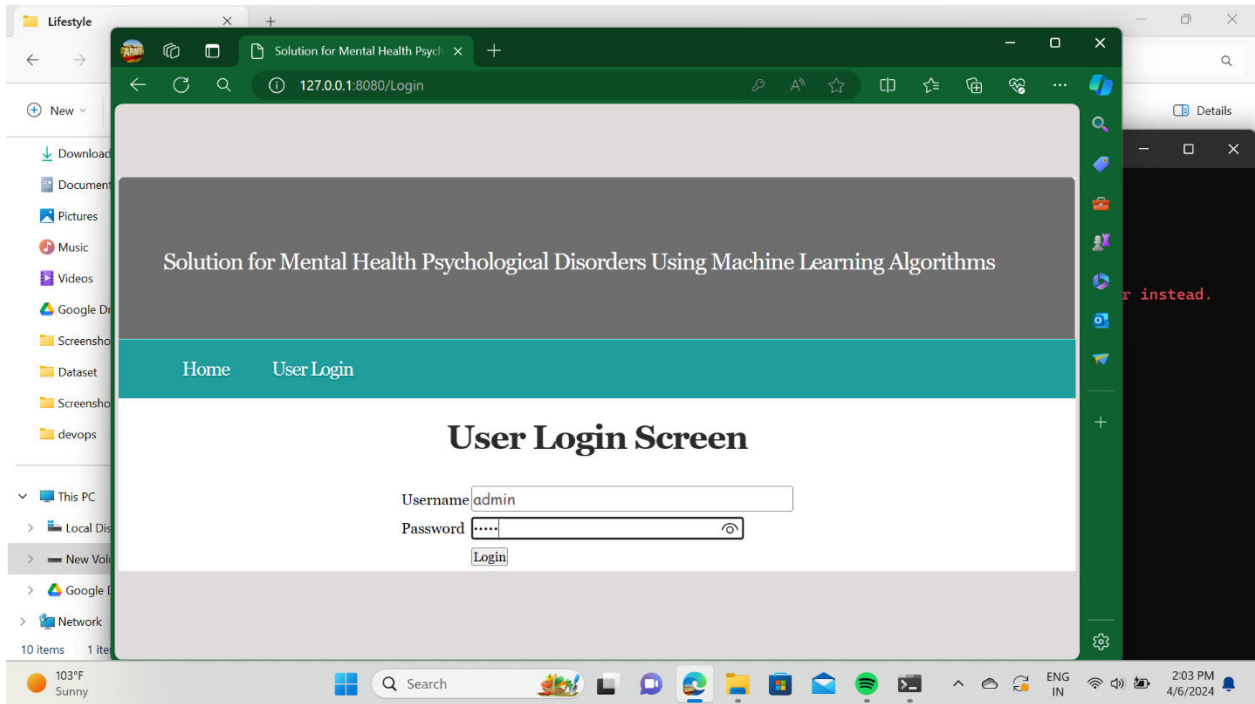
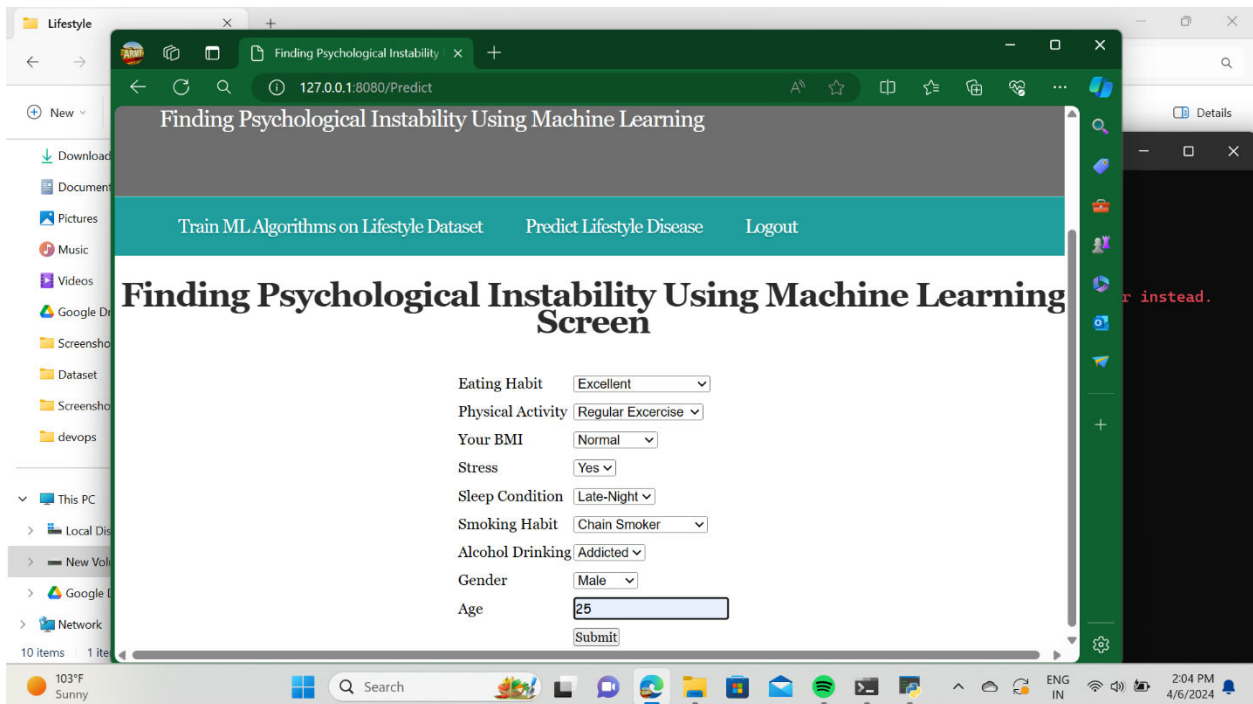
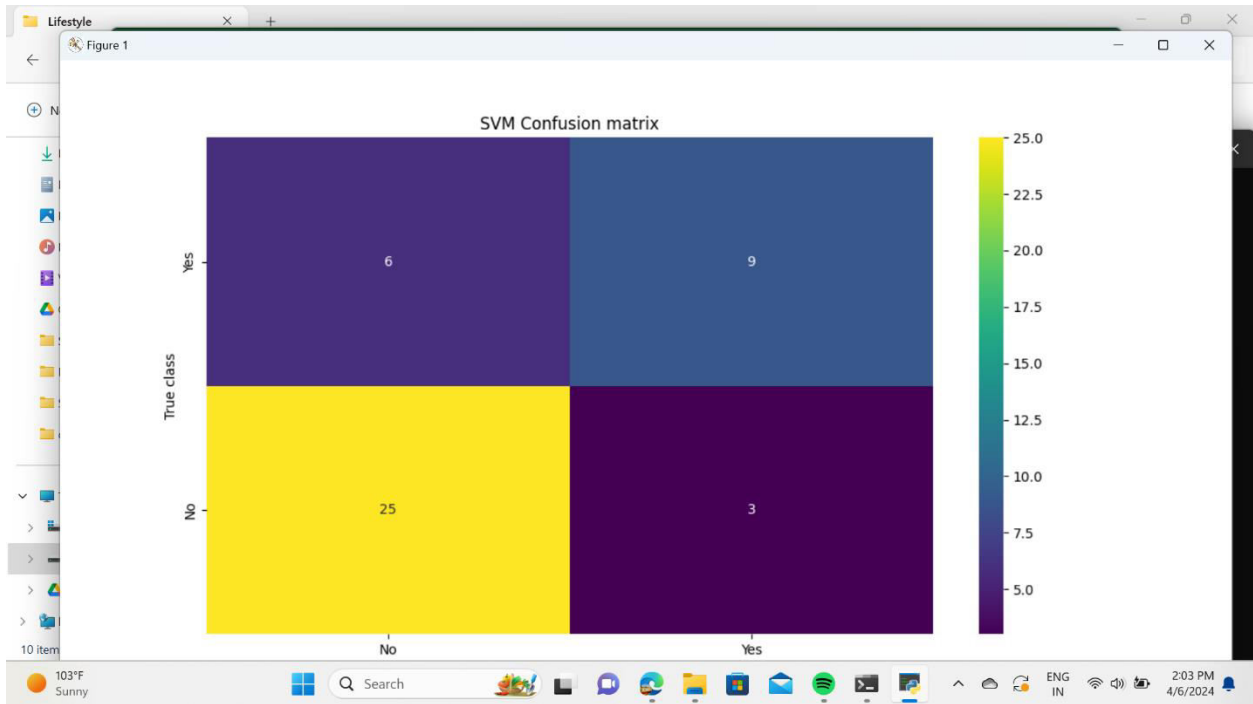


Fig. 4. The following screen shows the Visualization of number of employees









**Finding Psychological Instability Using Machine Learning**

Train ML Algorithms on Lifestyle Dataset    Predict Lifestyle Disease    Logout

### Finding Psychological Instability Using Machine Learning Screen

Eating Habit:

Physical Activity:

Your BMI:

Stress:

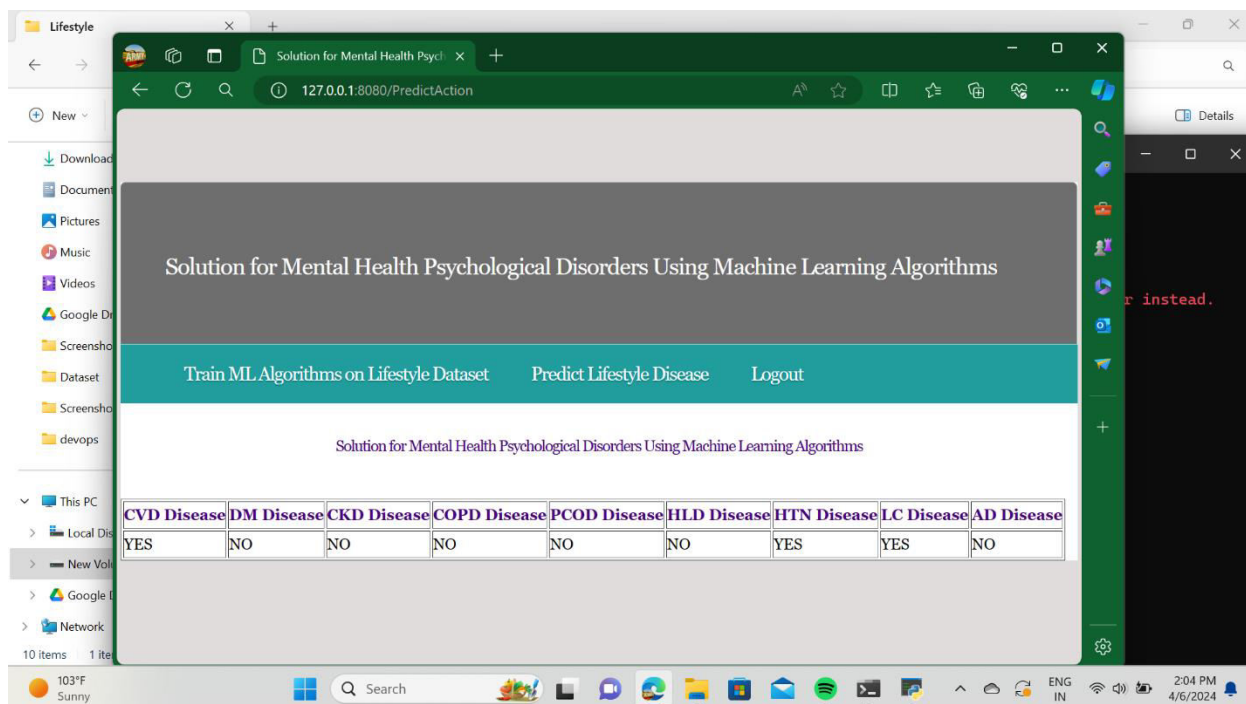
Sleep Condition:

Smoking Habit:

Alcohol Drinking:

Gender:

Age:



## V. CONCLUSION AND FUTURE WORK

There are various methods which are utilized for detection of mental illness among individuals of various ages. The method utilized by these systems utilizes the method of detection via analyzing the mental issue detection through the set of questionnaires, in order to anticipate the downturn levels among various age groups. The machine learning algorithms are utilized for mental confusion detection. The dataset with 1200 samples are considered for study. We utilized SVM, Decision Tree and Random woodland for learning and detection. The experimental outcomes demonstrated that the Random Forest achieves the most elevated accuracy around 87%. In future, we are intrigued to expand the work with some profound learning models, for example, Neural Networks or convolution neural networks.

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