Application of Neural Network Algorithms to Implement Drug Abuse Research on Identifying Cannabis Use Disorder through Analysing Personality Traits

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Abstract

Frequent cannabis use will certainly lead to a reasonable mental complication. Daily and long-time period cannabis use is associated with more intellectual loss. This is identified as cannabis use disorder (CUD). The CUD starting at the teen age is the strongest predictors of cognitive impairment. However, it's miles uncertain which comes first. Whether CUD results in early onset cannabis use or cannabisearly use in lives reasons the CUD. The aim of this paper is to investigate the most influential features origins the CUD among the cannabis user’s personality traits. Depending on the self-extracted data collected from 1885 individuals three of the NN models were built. These three NN models apply the 10-Fold cross validation and 30-70 Hold-Out validation methods to provide the reliability of the prediction results. Among the three methods the RNN Hold-Out method achieves 99.19% as best accuracy result.

Keywords: Cannabis Consumption, CUD, Neural Network, FFNN, CFNN, PNN.

1. Introduction

The use of cannabis plant continues for several years. It is used as a medical substance to cure pain and strokes. This plant also applied to provide treatment for malaria, costiveness, pain caused by rheumatism and insensitivity in giving birth. It consists of around 540 natural substances. The collective chemical construction counting more than 100 substances are acknowledged as Phyto cannabinoids. In India and Egypt for the past 3000 years the use of this drug as therapeutic substance is in practice [1]. Around the globe the cannabis is being used as illegitimate drug by the surveillance of international regulations. It is predicted that during 2017 worldwide there is about 164-219 million people are using this drug. This is roughly 3.8% from international adult population. The people live in several islands bounded by continental Asia and America, excessive revenue generating countries within Europe and north America use the cannabis regularly. In recent time the practice of this drug is improved in few minimum and average revenue generating countries. But in Asia it is recorded very low [2]. Including marijuana under the same provisions of international drug treaties as heroin, cocaine, and amphetamines has been controversial, and public movements for its legalization have been continuing since 1960s. It is being investigated as an anti-nausea agent in the treatment of epilepsy, muscle cramp, atherosclerosis, neural pain, neurodegenerative illnesses and cancer. More than several years the cannabis is applied as medical agent and pain-killer. Even though the use of cannabis for the treatmentof pain can be traced back to 5000 years ago, there is still only little information on its mechanismsof action. Although
the practice of cannabis as a pain killer may date back 5,000 years, little knowledge is identified about its functioning of performance. Of course, it is questionable that cannabis can reduce pain or not. So far, most of the indications aimed at its application has been anecdotal and not very strong. The most effective treatment for polysubstance use disorders (PSUDs) integrates psychologic and pharmacologic identifications. Psychological identifications, together with cognitive behaviour therapy (CBT), motivation enrichment therapy (MET), and avoidance-based emergency managing provide a useful treatment therapy. The side-effects of consistent cannabis use on the endogenous cannabinoid structure, and numerous behavioural and scientific studies suggest aside from that. Additionally, CUD transpires in about 1 in 10 consistent users and up to a third of daily users. We are in the early stages of legalizing cannabis for medical and recreational use, reducing restrictions and research [3].

Cannabis use disorder (CUD) is the identification of danger providing marijuana addiction. The diagnosis indicates that marijuana can negatively affect people, not necessarily addicts. However, there is room for the identification of cannabis is addictive or not. as to whether or not. The extent to which a drug is addictive is influenced by several factors, including the pharmacological mechanism of action of the drug. The concentration of the original drug consumed. The setting and environment in which the drug is consumed is identified. Most significantly the specific characteristics of the individual consuming the drug are considered. In CUD, whether cannabis use that creates problems or problems creates the user to consume cannabis is still under discussion [4]. With respect to this view, modifications are taking place over a 12-month duration recommend with CUD is that two or more initial criteria. It is basically for a reason that the name has only modified. The name from “cannabis use” was modified with “cannabis consumption” or “cannabis addiction” It doesn't convey that cannabis isn't addictive.

In reality several studies specifies that cannabis is certainly addictive. To identify CUD, a health specialist individual evaluates the patient’s histories. This consists of whether or not a patient immediate family member contains the habit of cannabis abuse or mental fitness troubles. Additionally, they consist of medicinal records and contain environmental strain [5]. Medical Test institutes assist us to recognize cannabis use. However, a good drug assessment does no longer reject it out. Instead, it's far superior and vital to have a detailed observation regarding the cannabis consumption as compared to quantify this within the blood. A CUD projection can depend on its effects—consisting of the eleven standards or signs and symptoms mentioned by the specialists. The severity of the individual risk factor may be represented by means of mid-range, moderate-range and severe-range. If few signs and symptoms are identified he is in mid-range. Suppose 4 to 5 signs or symptoms identified then he is considered as in moderate-range. The severe-range possible contains six and more than six signs and symptoms [6].

The CUD classification which separates complex use of cannabis consumption or cannabis addiction that a person could have rigorous CUD while not having any acceptance or restlessness of the hallmarks of addiction. By the identical intention they could involve the standards for slight CUD in spite of undergoing excessive bodily tolerance and restlessness. CUD is strongly related to each predominant unhappiness [7] and comprehensive tensional syndrome. Few researches have additionally observed better charges of CUD in human beings with post-stressful strain disorder. Several research works propose many connections among CUD and different precise substance use problems as well. A Neural Network (NN) is a sequence of algorithms that provide useful hands to understand principal relationships from the group of record concluding by means of a procedure that reflects in a manner like the human mind functions. In NN technique [8] the structure of neurons consists of both natural and artificial construct the network. NN are dependent of analytic strategies. They are assembled by the procedure of understanding through inside intellectual structure. The method of mastering from current knowledge, the neurological arrangements of the mind and the ability to predict from new observations from unique variables and also through various explanations makes the NN model predictions as acceptable one. NN is a kind of Data Mining strategy. The initial step is to build a network is contains a desired count of “layers” each and each layer with a identified count of “neurons”. The extent building of network is necessity [9] to match the prescribed complexity of the investigated phenomenon. The original network is then exposed to the process
of “training.” In that stage, neurons observe an iterative method to the range of inputs and variables to modify the weightiness of the network to ideally predict or locate a “fit” to the training records on which the learning is achieved. After the stage of training from an available data set, the novel network is prepared and it is able to be executed to generate predictions. Neural networks have been efficiently used throughout valuable, complicated domains. The application domains include the regions business, medicine, production, geology, and astronomy.Neural networks apply identical delicate modelling strategies adaptable in modelling extraordinarily complicated applications. In practice the neural networks models are commonly nonlinear in nature.

For a few years linear modelling has been the typically applied techniques in majority of modelling domain due to the fact that linear representations have prominent optimization strategies. Neural networks are learned with the aid of using example. The neural applications initially generatesample data. Next to the initial stage they invoke learning algorithms [10] to automatically identify the hidden facts from the training data. Although the neural applications do require to have a few investigative information about the way to select and identify suitable data, choice of suitable neural network model and the method of extracting the results from the data.

2. Related Work

The Data as of the National Survey of Drug Use and Health (NSDUH) indicates that during 2018, approximately 10.5% of Americans grater than aged 18 years stated as used cannabis within a month. There is developing proof which elevates in frequent use amongst states which have legalized non-medical cannabis, despite the fact that the quantity through which those versions may be attributed to the impact of legalization [11] or wider secular inclinations remain uncertain. In accumulation to manipulating who makes use of cannabis, validation may additionally affect the sorts of cannabis goods used. Even though dry aromatic plant or flower has traditionally been the major cannabis kind product utilized in North America. current proof shows growing use of alternative cannabis product along with essences, foods and vaped oils, precisely in ‘legal’ marketplaces. In Canada, the frequency of cannabis use has continued pretty strong during the last decade. Despite the fact that countrywide estimation factor to modest boom within the wide variety of kids and youth during the last 12 months instantly preceding legalization [12]. Proceeding to certification in 2018, a projected 22.2% of Canadians aged greater than 16 years stated consuming cannabis in the earlier month of 2018. Still, there may be a absence of facts throughout authorities to permit direct assessments of the outcomes of non-medical cannabis legalization in Canada and US. Reasonable data is essential to recognize the effect of rules and regulations that are searching for to limit intricate hashish use, together with use amongst younger humans and hashish merchandise which have a better capacity for unfavourable outcomes. The information gathered from Colorado, Oregon and Washington advocate that using other varieties of cannabis multiplied sliver after legalization [13]. The kind of product used is crucial given variations among goods in limited time period pharmacokinetic outcomes in addition to capable variations in longer term dangers associated with delivery of goods like smoking and worries related to high-efficiency. Now-a-days maximum observations of cannabis goods have been resulting from selling information, with little observations from population-based surveys. A gather distinct fact including either the frequency [14] or amount of cannabis used by a specific person is hardly gained. There is always a requirement to study the cannabis user patterns of use for improve the empathetic challenging patterns of use. This will provide a use full occurrence of adverse conclusions. In addition to set up secure edgestowards the use of throughout modes of delivery.

The chance of development since cannabis use to CUD will increase with regularity of its use. In USA, grown person by CUD consume cannabis on an average of 6.2 compared with 10 days per year. Roughly 17.0% per week and 19.0% per day [15] cannabis consumers happened to contain the cannabis dependence. The combined use of tobacco with cannabis is related to elevated chance of CUD. Elevated count of withdrawal signs and decreased signs of quitting than people who consume cannabis without tobacco. The motivation for the excessive signs of other diseases among cannabis use and different drug use are disputed. It is doubtful from epidemiological and animal research whether or not cannabis has a fundamental impact at the danger of the usage of different drugs. The doubt is also extended whether or not the connection is defined with the aid of
using a shared legal responsibility [16] to interact in one-of-a-kind varieties of drug use, or multiplied habit of consumption to different illicit pills thru drug markets or affiliating with different illicit drug users.

3. Research Method

Here the neurons we used to annotate are not biological. They are really a very simple constructs of the biological neurons. They are understood as fundamentals in a program which are made up of silicon circuits. The networks found through these artificial neurons can perform a point of processing reflecting the human brain. Certainly, this network may be trained to accomplish valuable processing. To achieve the advancement from this network we certainly need to achieve the well-designed concept followed by the implementation. The concept includes the method of thinking around a particular problem. This will provide the assessment and clarity do not have before. This process comprises a simple idea, which may be particularly precise including the mathematical explanation.[17] The neuron design for a single input is shown in Figure 1. The scalar input \( p \) is reproduced to compute \( wp \) is concluded by the scalar weight \( w \). A bias is multiplied by the next input \( l \) and then passed to summer. This output \( n \) is frequently identified as net input. This input is feed into the transfer function \( f \). Always the transfer function will produce the scalar neuron output \( a \).

\[
a = f(wp) + b
\]

![Figure 1. Model of a Neuron](image)

3.1. Neural Network

In this advanced digital environment, everything revolves a lot around the patterns hidden in the sample data. The hidden pattern is identified either physically or mathematically making use of numerous algorithms. In the field of digital environment, the sample is characterised via values called function vector. The technique to learn the hidden pattern from sample data by making use of numerous training algorithms is popularly termed as the process of pattern recognition. This is accomplished by means of the class of learning built by means of prior knowledge generated. Additional measures are to mine statistical evidence existing withinside the sample, and their illustrations. The utilization possibility of this process regularly attracts the attention of the researches in the direction of it. The unprocessed data is converted to perform a selected principles which a computer system to categorize and use it. This pattern recognition comprises both classification and grouping of similar identical patterns in to one [18]. The process carried out to perform Classification is recognized as supervised learning. While performing the classification task the appropriate class label is appointed to identical gatherings through the knowledge produced by means of training. In the case of clustering, the information is accomplished by means of grouping the data from training set. The Clustering is recognized as unsupervised learning. A right pattern recognition procedure should efficiently differentiate the maximum of important [19] prominent patterns successfully and quickly. It should have capable to categorize and classify unknown similarity of the data belongs to. The successes of any NN model heavily rely on the features of an object. These features are identified as function of measurements. These features may contain the property continuous, isolated, or diverse binary variable measure. The feature or otherwise known as properties generated from object enumerates almost a few crucial behaviours. The object can be our face, eyes, ears, nostril and etc the set of properties generated from those items will be provided to the NN model as input or training set. This input training set which comprises the properties is termed as feature vector. The knowledge achieved by the NN model through training by means of various data-mining algorithms [20] is popularly identified as learning or training. Further the trained model converts its learned knowledge to gain new findings in precise manner.
The appropriate learning is the highest crucial task to be achieved by any algorithm. Basically, the overall performance of the machine is evaluated by the given training set. It is basically relying upon the suitable algorithm which is built to carry out the learning. Usually, every dataset will always divide into two groupings. The initial one is used to perform the training task with the built model and the next one is to perform test. The method to correlate the training set used to identify the hidden knowledge is accomplished by means of learning principles of the utilized data-mining algorithms to represent suitable class [21]. The test set carry out the examination to identify appropriate suitable class. This guarantee whether or not the system become aware of the correct output after performing the training or not. The important motivation behind the test set is to evaluate the accuracy which the built NN model achieves.

3.2. Feed Forward Neural Network

Feedforward neural-network algorithms are basically working on the principle of biologically inspired to attain the classification task. It includes excellent wide variety of basic element called neuron matching the processing unit in a computer system. The input layer, output layer and the hidden layer of the NN are structured by these neurons. Every neuron withinside the layer is connected by all neurons accessible in subsequent layers. The construction among the neurons certainly contains variation among weights. These weights determined to build the network will decide the quality of knowledge attained by any network. These neurons in each neural network always identified as nodes. A certain part of dataset is split in to training set considered as input is progresses thru every layer which are available in the network. To conclude a class, it ends at the output layer. This set of rules is referred as feedforward neural-networks [22] for the reason that through the algorithm’s progression any feedback among the layers will not be available since the usual operation begins. The advancement of this network is carried out by including two phases. The preliminary one is the gaining knowledge through training or learning and the next one is classification through testing. One important aspect of this FFNet is that the weight among the neuron could be revised all thru preliminary stage.

The neuron weights are adjusted in a manner that the algorithm is able to diagnose hidden pattern in the dataset. As expected, the output which attains the correct class, will accomplish with a maximum output rate.

3.3. Cascade Forward Neural Network

The essential and valuable setbacks in demonstrating a neural network is to figure out the appropriate quantity of hidden layers. To conquer this difficulty CFNN rules engage a new element in line with excess of expected error. The algorithm plays properly with the aid of using a structure to the network. In addition, it minimises the learning time required to clear up the proposed task. The technique to construct a network starts with the aid of using the single-layer network and the specified hidden neurons are future added. After achieving the training, one additional hidden neuron is added and the weights are modified to increase the scope. This is to reduce the correlation achieved from output of added hidden neuron compared with the network generated left-over error. The CFNN highly recognized as a sequential layered network [23]. The CFNN mostly built with the aid of input/output layers and a single hidden layer intermediate to both input/output layers. All those layers are constructed thru inclusion of several groups of neurons. The dissimilarity among CFNN and FNN structure is achieved by the weight connection which takes place within the input and all prior layers. The CFNN include the capability to understand and classify the relationship which exists among the set of linear or nonlinear input/output. The mathematical equation regarding the proposed work is illustrated as follows:

\[
y_p = \sum_{i=1}^{n} f^1 \omega_i^x x^1 + f^0 (\sum_{j=1}^{n} \omega_j^0 x^j f^0 \sum_{i=1}^{n} \omega_i^h x^i) \quad (1)
\]

\[
y_p = \sum_{i=1}^{n} f^1 \omega_i^x x^1 + f^0 (\omega + \sum_{j=1}^{n} \omega_j^0 x^j f^0 (\omega_i^0 + \sum_{i=1}^{n} \omega_i^h x^i)) \quad (2)
\]

\[
E = \frac{1}{2} \sum_{p=1}^{n} (y_p - q_p) = \frac{1}{2} \sum_{p=1}^{n} (e_p)^2 \quad (3)
\]
3.4. Recurrent Neural Network

The human mind is the best example of effective recurrent network construction. To preserve this behaviour energetic this algorithm occupies a major position by means of influencing our dynamics within leading towards perceiving, reacting and understanding the hidden patterns. To carry out the prediction the recurrent networks [24] react reflecting the working principle as like as the human mind. The recurrent networks are constructed by using only single-feedback connectivity with the network. In contrast with the feedforward networks overall accuracy estimation of this network may be accomplished by means of the size of compressed network.

Primarily MLP is limited to attain the expected result while headlining the topologic connection problem. With the help of the associatory remembrances the developers provide focused determination to attain dependency found among the created input and output. A temporal nation illustration in the dynamic network connection activates the recurrent network. The RNN comprise effective computation measures to offer way to numerous temporal processing models and applications [25]. Always the recurrent networks are constructed with normal differential equations.

Concurrently is also discovered that they are capable to be applied in the digital environment with fashionable software program by means of integrating the differential equations. The RNN may be categorized in to 2 different categories. The preliminary one is the globally recurrent networks (GRNet). The next one is locally recurrent globally feedforward network (LRGFFNet).

Figure 2. FFNN, CFNN and RNN network Architecture.
The GRNet contains the capability to accept FFNet between every neuron. The LRGFFNet is constructed with the dynamics unspoken restricted neuron system. The difficulty with GRNet is they regularly conflict [26] with achieving balance during the learning process. They additionally involve complicated and time captivating training algorithms. At the same time, they are constructed just as like as the MLP. The construction of dynamic neuron systems includes inside feedbacks. The inter-connection between these neurons is certainly a feedforward inter-connection. They comprise much less difficulty in building and achieving the training. A certain improvement in this algorithm is that the previously determined knowledge can be integrated and feed into this execution without much effort.

3.5 Levenberg Marquardt Optimization (LM)

The LM optimization method is intended by providing a connection between Gradient-Descent and Gauss-Newton techniques. These two techniques are popularly identified in the Neural-Network environment as numerical minimization algorithms. LM accomplishes the concept of neural neighbourhood pointing in the direction of the increase in memory and decrees in the time [27]. The determined sum of squared errors by the Gradient-Descent technique is minimized by improving the parameters towards achieving maximum gradient.

The Gauss-Newton method decreases the sum of squared error with an assumption that the least-squared function is regionally quadratic in comparison with the parameter. To finish, it attains the minimal of this quadratic. This function dynamically [28] modified by updating to the parameter between Gauss-Newton update and Gradient-Descent update.

\[
X^2(p) = \sum_{i=1}^{m} \left( \frac{y_{ti} - \hat{y}_{ti}}{\sigma_{y_i}} \right)^2
\]

\[
= (y - \hat{y}(p))^T w (y - \hat{y}(p))
\]

\[
y^T w y - 2 y^T w \hat{y} + \hat{y}^T W \hat{y}
\]

Where \(\sigma_{y_i}\) Measurement Error of \(y(t_i)\)

W is the Diagonal of \(W_n = \frac{1}{\sigma_{y_i}}\)

4. Results and Discussion

This article includes two critical aspects. The initial part is the detailed information regarding the dataset. The second analyse the generated output from the execution of three NN algorithms. The determined algorithm here is to generate the results are Feed Forward NN (FFNN), Cascade Forward NN (CFNN) and the Recurrent neural networks (RNN). This research is basically aimed at determining the essential necessities regarding the determination of the predictor variables from the dataset. This research further provides focus on the features which provide healthy contribution to identify the class. This provides a certain help in the feature selection process. A variety of predictor variables incorporate direct connection in finding output categories. In proposed work the accumulated scores Nscore, Escore, Oscore, Ascore, Cscore, Impulsive and Sensation Seeing incorporate the direct connection to identify the particular class. This is presented in Table 1. Rest of the data contain the indirect contribution.

<table>
<thead>
<tr>
<th></th>
<th>Nscore</th>
<th>Escore</th>
<th>Oscore</th>
<th>Ascore</th>
<th>Cscore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannabis</td>
<td>0.000218</td>
<td>0.000166</td>
<td>0.000558</td>
<td>0</td>
<td>0.000282</td>
</tr>
</tbody>
</table>

Table 1: NEO-Five Factor Feature importance in classification
Figure 3. Feature Importance in Classification Process.

The Figure 3 represents the feature significance as a bar diagram for all our 12 attributes. Here the intention is to present the unique description nearly around the data involved in this study.

4.1. Experimental evaluation

The training and testing in this research work is carried by considering all of the 12 features to distinguish the appropriate class which the testing data belongs to. We transformed the seven-class presented in the dataset as binary-class dataset. Out of the two groupings the initial one ‘drugs never used’ belongs to class one. The next ‘drugs used’ belongs to class two. From the available 18 drugs in the dataset the drug “Cannabis” alone given focus in this research. The successful expected outcome from this model through the incoming new data is evaluated by means of few of the performance metrics. The performance is measured through validating the confusion matrix. The metrics achieved in this research are Accuracy, Precision, Specificity and F-Score. The corresponding formula utilized is listed below.

\[
\text{Accuracy} = \frac{TP + TN}{TP + TN + FP + FN} \tag{7}
\]

\[
\text{Precision} = \frac{TP}{TP + FP} \tag{8}
\]

\[
\text{Specificity} = \frac{TN}{TN + FP} \tag{9}
\]

\[
\text{F – Score} = \frac{2 \cdot \text{PRE} \cdot \text{REC}}{\text{PRE} + \text{REC}} \tag{10}
\]
4.2. Experimental Results of Predictive Models

The Figure four shows the simulation outcomes performed via comparing the neural network toolbar. For the FFNN assessment it took 505 epochs to gain a 1e-07 Mu as support cost and 1e+10 Mu as target cost. Performance rate initiated at 0.289 and stopped at 0.119 to achieve the total gain from validation assessments. The best gain from overall validation performance is 0.010051 achieved at second epoch.

<table>
<thead>
<tr>
<th>Model</th>
<th>Feed Forward</th>
<th>Cascade Forward</th>
<th>Recurrent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HO</td>
<td>CV</td>
<td>HO</td>
</tr>
<tr>
<td>Accuracy</td>
<td>80.28</td>
<td>98.1968</td>
<td>83.18</td>
</tr>
<tr>
<td>Precision</td>
<td>0.58</td>
<td>0.61</td>
<td>0.67</td>
</tr>
<tr>
<td>Specificity</td>
<td>0.90</td>
<td>0.92</td>
<td>0.93</td>
</tr>
<tr>
<td>F-Score</td>
<td>0.51</td>
<td>0.58</td>
<td>0.54</td>
</tr>
<tr>
<td>Training Time</td>
<td>5.25</td>
<td>25.11</td>
<td>4.11</td>
</tr>
</tbody>
</table>

Table 2. Classification results through FFNN, CFNN and RNN

The Error histogram describes the manner the wrongly classified instances are scattered from samples used for the validation purpose. It is measured as 20 bins in this proposed model. From this it is possible to decide which validation samples provide the maximum error rate. This procedure perceives the energy of the achieved NN model. The figure 4 indicates the plot from training state of constructed FFNN model. This shows the comparison among the predicted and target values. The y-axis shows the total number of instances took to perform the classification and the x-axis show the error achieved in same process. The predicted value denoted as dependent variable and the target value denoted as the independent variable in the proposed work. This target quantity brings the stability between achieved output and original target. If the error rate otherwise known as residue is very nearer to the predicted output, then that model is considered as a best model. The residue is achieved through adding mounted Target. The ideal value for the mounted target is always zero; at times it may be as minimal as possible.

Figure 4. FFNN Simulation Results
Figure 5. CFNN plot.

The figure five shows the simulation plots corresponding to the CFNN Hold-out and Cross validation processes. The CFNN model attain 94 epochs to obtain 0.001 Mu value, 1e+10 Mu as stopped value and the target value is 1e+10 among total validation checks. The satisfactory validation gain is gained at the ninety first epoch as 0.13841. The gradient target value is 3.0432e-10.

Figure 6 RNN Simulation Plot.
The figure 6 shows the simulation plots corresponding to the CFNN Hold-out and Cross validation processes retrieved through the execution of MATLAB NN toolbox. The RNN attain a 0.453 preliminary performance cost and 0.12 as final performance cost after completing 44 epochs. The initial gradient cost is 0.392 and target gradient cost is 1e-15. The overall validation check performed by this RNN Hold-Out model is 31 epochs and Cross-Validation model is 500 epochs. The best validation performance achieved for the Hold-Out 0.11398 at 13 epochs and for the Cross-Validation method 0.013376 at initial epoch.

5. Comparison of Results

The proposed model is trained by performing a linear-based feature selection process to identify the best features in the training process. Basically, this feature will provide a useful contribution to extract the hidden knowledge in the dataset to predict the target class in an accurate manner. In the training phase three NN algorithms expect the character tendencies via self-extracted drug intake report. From the dataset the Cannabis is selected and 3 NN strategies specifically FFNN, CFNN and the PNN have been taken into consideration to carry out the training and testing. These classifiers often recognized to obtain exact results from the self-extracted drug intake report achieved by means of personality traits. MATLAB is used to teach the constructed NN models with 30-70 Hold-Out validation model and a 10-Fold-Cross validation model. For every classifier, the Accuracy, Precision, specificity, F-score and Training time have been found and stored. These achieved results were tabulated in Table-2. Among the 3 classifiers the CFNN Hold-Out techniques offer excellent accuracy (98.96%).

![Held Out Validation Performance](image)

**Figure 7 Hold-Out validation chart**

The Figure seven and eight constitute the graphical illustration of Hold-Out and 10-Fold-cross validation of our proposed strategies classification results. proposed work observe that
6. Conclusion Future Work and Limitations

Conclusion

The proposed research article explores the sights of personality traits prediction from drug consumption dataset. The abusable vulnerable risk producing cannabis is found that the personality traits can be projected through self-extracted data collection. Through the drug consumption dataset, the training and testing were performed to conclude a best performing NN model. It is observed that among the three of the FFNN, CFNN and RNN models the RNN Hold-out cross validation method provide the best CUD classification results. It is observed that the young male adults were more vulnerable at risk of being addicted to the cannabis drug and all females are occasional users. According to the built model, main features influencing CUD are age, country and sensation seeking. One of the important factors that physiologist consider is that the drug addiction habit is for some level can be identified through the growth of population and personal aspects [29]. By considering this point it is observed that some other reasons can also play important role in achieving the prediction. People who have been using cannabis heavily for long duration are more suspect to intellectual complications. This will be continued certain limited duration. So, they should be conscious about their pre-existing intellectual complications while begin to use the cannabis. The executive process of working, deciding, making solution to several issues and getting animated in certain process maylead to heavy and problematic CUD. This will root to increased risk andemergingneedtowards CUD.

Future Work and Limitations

Few limitations exist in the proposed work. Initially the proposed work does not bring into consideration about the drug consumption period into account. The consequence among high- risk and low- risk CUD can be identified. In the cannabis abuse habit, the regularity is naturally weighed. This brings major difficulty in investigating the risks as well as assistances of CUD to weight the properties of treatment outcomes. There are few other modifications available to improve the prediction of Drug-Use vulnerability risk. In future the drug addiction may be analysed through ranking by drug consuming from analysing the harmfulness of the particular drug. Probably work direction may be redefined towards the direction of some other useful analytical modelling method through extending the dimensionality of the current collected data. The age group of the drug
consuming persons is also not taken to consideration in this research work. These limitations may be rectified in future.

References


