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AN EFFICIENT APPROACH TO DETECT AUTISM IN CHILD USING MACHINE LEARNING AND DEEP LEARNING

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ABSTRACT

Autism spectrum disorder (ASD) is growing among children. Detecting of autism through screening test is very time consuming and cost effective. Unfortunately there is no proper method to heal autism. Autism spectrum disorders (ASD) are complex neuro-development disorders that include shortage in interaction with social, communication, and the existence of duplicative and restricted behaviours. The symptoms are generally identified in children's aging less than three years and have to be amid impairment in cognitive functioning, learning, attention, and sensory processing. Autism Spectrum Disorder (ASD) is a neuro-developmental disorder that has become one of the major health problems and for controlling the disease early diagnosis is very much important. The increase within the number of autoimmune influenza and ASD cases within the world reveals an urgent got to develop easily applied and effective screening methods. But if it is detected earlier, we can motivate them to move socially and decrease the level of autism in them. So, we detect autism using machine learning and deep learning techniques to find the symptom in earlier stages. A coherent iterative algorithm is designed and the proof of convergence is given.

Keywords: *Machine Learning, Autism Spectrum Disorder, Deep Learning.*

1. INTRODUCTION

Autism spectrum disorder (ASD) is growing among children. Detecting of autism through screening test is extremely tedious and price effective till now there's no remedy for autism. Autism Spectrum Disorder (ASD) is a

complaint related to neuro-developmental is one among the main health problems, and early diagnosis features a batch of important in reference to controlling the disease. The rise within the count of autoimmune influenza and ASD cases within the world reveals an urgent got to develop easily applied and effective screening methods. But if it's detected earlier, we will motivate them to makeover socially and reduce the extent of autism in them.

So, we detect autism using machine learning techniques that we will detect it earlier stages. Autism spectrum disorders (ASD) are complex neurodevelopment disorders that include deficits in social interaction, communication, and therefore the presence of repetitive and restricted behaviours. The symptoms are generally identified in children's aging less than three years and have to be amid impairment in cognitive functioning, learning, attention, and sensory processing.

Individuals with autism disorder have markedly different social and emotional actions and reactions than non-autistic individuals for instance; many autistic children don't seem to worry whether or not they get attention from their parents. The impact of ASD is also identified in the IQ level of children's. While 30% of people with autism have a mean or gifted IQ, 70% are considered people.

An efficient iterative algorithm is supposed and thus the proof of convergence is given. Extensive experiments supported both real health examination datasets and artificial datasets are performed to means the effectiveness and efficiency of our method. Huge amount of record is collected supported real health examination datasets to effectiveness and efficiency of our method.

By using data processing techniques to filter duplicate and filling the missing values with the mean of respective fields. Exploratory Data Analysis (EDA) to know to datasets and stored in html format for later understanding. Pre-processing the info for remove noisy and unwanted data for the algorithm. Splitting the info then building neural network with keras model (KNN). Eventually training, testing and displaying accuracy of the algorithm.

The fundamental challenge of learning a classification model for risk prediction lies within the labeled data that constitutes the majority of the collected datasets. During this paper, we propose a supervised learning algorithm called Logistic Regression, Naive Bayes, Random Tree Forest, Gradient Boosting, Support Vector Machine, K-Nearest Neighbor and Decision Tree Classifier for risk predictions to classify a progressively developing situation with the majority of the data labeled.

1.1 Data Mining and AI

Data mining can be the method companies are adopting to mark information as useful. Victim software systems, appearing in the massive deployment pattern of information, learn a lot not only about businesses, but also about their customers to develop sales methods to increase sales and lower prices. Data processing relies on effective data collection, storage and computer processing. Data mining processes are required to build machine learning models that power program skills and applications such as website recommendation programs.

Data mining has a way to discover patterns in a huge set of information that includes methods at the intersection of machine learning, statistics, and information systems. Data mining is a knowledge-based subfield of engineering and statistics for the overall goal of, which extracts data (in an intelligent way) from an information set and reconstructs the data into a clear structure for more use. Data mining is the “Database Knowledge Discovery" process or the KDD analysis phase.

Aside from the raw analysis step, it conjointly involves info and information management aspects, information pre-processing, model and illation concerns, attention-grabbing metrics, quality concerns, post-processing of discovered structures, visual image, and on-line change

The term 'data mining' can be a name because it aims to extract patterns and data from huge amounts of information instead of extraction (mining) of the information itself. This is also a bank, which applies to any type of large-scale information or IP (collection, extraction, relocation, analysis, statistics), but also PC phone networks, AI (machine learning, etc.), as well as any application in business Intellect.

This information mining: Using smart machine learning tools and Python techniques (which mainly covers machine learning materials) was originally supposed to be simply smart machine learning, and the term data processing was simply inserted to facilitate the reason. AI and machine learning are additionally accepted when it comes to information analysis and analysis, or practical methods, in general additional general terms (large scale).

The knowledge of AI offers PCs the possibility to be told while not being explicitly customized. Cubic centimetre is one among the principal invigorating advancements that one would have at any point happened upon. Since it is clear from the name, it offers the pc that makes it a ton of like people the adaptability to be told. AI is effectively being utilized these days, possibly in a bigger number of spots than one would anticipate.

The recharged revenue in AI is because of the very factors that made information handling and Bayesian examination more snazzy than any time in recent memory. The very cycle of putting away data that is less expensive, all the more impressive, and reasonable, with an expanding sum and assortment of data gave. These can possibly rapidly and precisely produce models that can investigate bigger and more perplexing extra data and really give quicker and more exact extra outcomes, even for a bigger scope. Furthermore, by building an exact model, organizations are bound to have their

own income openings or keep away from obscure dangers.

2. REQUIREMENTS

Hardware:

- Processor : Pentium dual core/Intel i3
- Hard Disk : 500 GB
- Monitor : 15" Colour Monitor
- RAM : 4GB

Software:

- OS : Windows XP/7/8.1
- Language : Python
- Tool : Anaconda, Jupyter Notebook

3. RELATED WORK

In this section we tend to review existing connected studies, specifically those on autism prediction and on classification with tagged information in aid applications.

Data mining and analytics techniques may be used for predicting ASD by utilizing historical patient's knowledge and identification records. Data processing and analytics are wide accustomed extract helpful data from information. Today, data processing has become a crucial field in care that's accustomed discover unknown data in care datasets and utilize analytics to predict diseases.

Considering autism spectrum disorder (ASD), we tend to use prophetic analytics models to forecast the diseased, supported its causes and develop models for its progression. 8 prophetic analytics models were used and compared. In, data processing classification techniques were accustomed predict autism. 8 strategies were used, provision Regression (LR), Decision Tree Classifier (DCT), Naive Bayes (NB), Random Tree Forest (RTF), Gradient Boosting (GB), Support Vector Machine (SVM), K-Nearest Neighbour (KNN) and Kera Neural Network.

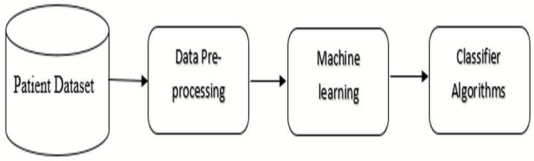

Figure 1: Related Work

4. PROBLEM DEFINITION

Autism is considered to be a high level neuro disorder behaviour characterized by impairment in reciprocal social interaction, impairment in communication, and therefore the presence of repetitive and stereotypic patterns of behaviours, interests and activities. Using clinical instruments for screening of autism takes too long process and price effective. against this, records are collected for normal surveillance and preventive purposes, covering a comprehensive set of general health measures, all collected at some extent in time during a systematic way.

Identifying participants in danger supported their current health record is vital for early warning and preventive intervention. By "risk", we mean unwanted outcomes like mortality and morbidity [2]. So, we use deep learning techniques to detect early and that we can give treatment from the first stages.

5. MODULES

5.1. Data collection

Prediction of autism we used data from UCI repository. It contains different attributes based on questions asked during the screening of the patients. Dataset contains age group of 4-11(child). dataset contains 10 questions which is questions will be based on communication, social interaction, attention to details, imagination, eye contact, without fear with others while interacting, grasping gestures of others etc., scoring will be for each correct answer 1 point will be added and total will be calculated. The dataset contains 292 instances and 21 attributes. 21 attributes contain numerical and categorical data like age, gender, ethnicity, and jaundice, family members with

autism, country of origin, result, age description, relation, and questions 1-10.

5.2. Data Pre-processing

Data which is collected will be many irrelevant features we have to remove unwanted data to develop prediction model. Unwanted data such as age, age desc will be dropped to get accurate results of prediction. Much of our data is reported using strings; as a result, we will convert our data to categorical labels. During our preprocessing, we will also split the dataset into X and Y datasets, where X has all of the attributes we want to use for prediction and Y has the class labels**.**

5.3. Exploratory Data Analysis

Exploratory Data Analysis (EDA) is a multi-technique data analysis method (most of its representations are in graphical form) to [3]

1. Take full advantage of insight into a dataset
2. Disclose the underlying structure
3. Extract imperative variables
4. Identify outliers and anomalies
5. Test essential assumptions
6. Develop tight-fisted models and
7. Conclude optimal factor settings.

5.4. Encoding

Encoding is that the transformation of variables accordingly to binary or numerical counterparts. An example is to treat ASD or not having as 1 or 0. Categorical variables must be encoded in many modelling methods.

5.5. Split the Dataset into Training and Testing Datasets

Prior to kick off training our neural network, the dataset necessarily to be categorized into training and testing datasets. Which will gives us clear picture how well it will generalize to new data. This step is incredibly easy when using the train test split () function provided by sklearn**.**

5.6. Supervised Machine Learning

The most of sensible machine learning uses supervised learning. Supervised learning is wherever you have got input variables (x) and Associate in output variable (Y) and you employ an algorithm being told that the mapping is an algorithm program that completes from input to output.

$$Y = f(X)$$

The goal is to make the mapping work properly, so once you have new information (input file) (X) that you just will predict the output variables (Y) for that data.

5.7. Classification Module

Using various predictive measures, the classification of patients who will not have and have autism spectrum disorder are identified and displayed as result.

5.8. Building the Network – Keras

In this paper, we are going to use Keras to build and train our network. This model will be relatively simple and will only use dense (also known as fully connected) layers. This is the wide used common neural network layer. The typical network will have one hidden layer, use an Adam optimizer, and a categorical cross entropy loss. We won't worry about optimizing parameters essentially learning rate, amount of neurons in individual layer, or activation functions while for testing. However, trying by, manually adjusting these parameters and observing the results is a better way to learn about their function

5.9. Training the Network

Once a network has been structured for a particular application, that network is ready to be trained. To commence this process the initial weights are taken randomly. Thereafter the training, or learning, begins.

5.10. Testing and Performance Metrics

Now that our model has been trained, we need to test its performance on the testing dataset. The model has never seen this information before; as a result, the testing dataset allows us to determine whether or not the model will be able to generalize to information that wasn't used during its

training phase. We will use some of the metrics provided by scikit-learn for this purpose.

6. ARCHITECTURE

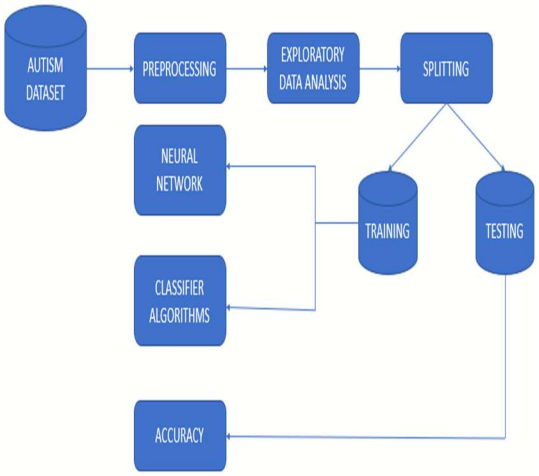

Figure 2: Architecture Diagram

7. CHILD AUTISM PREDICTION SYSTEM

To solve the matter of autism prediction supported autism spectrum disorder records with heterogeneousness and large untagged information problems, we have a tendency to gift a supervised learning known as Logistic regression, Random forest, Naive bayes, Gradient boosting, K-Nearest neighbour, Support vector machine and Decision tree classifier. These algorithms take autism spectrum disorder information a semi-supervised learning mechanism with label propagation for model coaching

7.1. Exploratory Data Analysis

EDA is not similar to applied mathematics graphics, as the two terms are used interchangeably. Applied mathematics graphics can be a collection of technologies that are almost diagrammatically based, and all technologies specialize in one knowledge characteristic aspect. EDA covers larger areas. EDA is a related approach to knowledge analysis that plays the standard home of the model that the information follows with additional direct access that allows the information itself to expose the basic structure and model.

The child autism dataset is pre-processed and redundancy is removed then visualizing however the information area unit associated with one another and to know the information terribly simply through this. The numbers of patients having ASD and not having ASD area are represented as chart.

7.2 Encoding

Encoding or continuation is the transformation of categorical variables to binary or numerical counterparts. The following fields are encoded ethnicity, jaundice, autism, country of residence, used app before, relation, class/ASD into binary counterparts.

7.3. Decision Tree Classifier

The principle of splitting criteria is behind the intelligence of any decision tree classifier. Decision trees are presented similar to a flow chart, with a tree structure where in instances are classified according to their values of screening scores, ethnicity, age, jaundice and class... etc. A node in a decision tree represents an instance, outcomes of the test represented by branch, and the leaf node epitomized the class label.

7.4. Logistic Regression

Logistic regression is another approach to derive multivariable composites to differentiate two or more groups. It doesn't have the restrictive statistical assumptions of DFA. Interpretation of the relative importance of individual predictors is simple in logistic regression. Analogous to ordinary method of least squares (OLS) multiple correlations for continuous dependent variables, coefficients are derived for every variable (or covariate) in logistic regression. We use screening scores, ethnicity, age, jaundice and sophistication from the dataset. And this algorithm gives an AUC of 0.977.

7.5. Naive Bayes

The simplest solution is usually the most robust solution, and a naive Bayesian might be the example. Despite advances in machine learning over the past few years, it has proven to be not only simple, but also fast, accurate and reliable. It works well for some purposes, but works especially well for tongue processing (NLP) issues. Naive Bayesian is a probabilistic machine learning algorithm that supports Bayes theorem, and is used for superior types of classification tasks. In this article, I understand the naive Bayesian algorithm and all the important concepts so that there is no

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doubt in my understanding. And this algorithm provides an AUC of 0.656. [4].

7.6. Support Vector Machine

Support vector machines (SVMs, also support-vector networks) are supervised learning models with associated learning algorithms that analyse data for classification and multivariate analysis. And this algorithm gives an AUC of 0.976.

7.7. K Nearest Neighbour

KNN algorithm is predicated on the principle that, the similar things or objects exist closer to every other. KNN is most ordinarily to classify the info points that are separated into several classes, so as to form prediction for brand spanking new sample data points. K-Nearest Neighbour may be a non-parametric learning algorithm. And this algorithm produces an AUC of 0.844.

7.8. Classification

Finally, the predicted results of the patient are classified into patients having autism spectrum disorder (ASD) and patient not having autism spectrum disorder (NOT ASD)..

8. EXISTING SYSTEM

Most existing classification methods on healthcare data don't consider the difficulty of labeled data. They either have expert defined low risk or control classes or just treat non-positive cases as negative. Methods that consider labeled data are generally supported Supervised Learning (SL) that learns from labeled data. Amongst these Supervised Learning methods, are capable to handle large and genuinely labeled health data.

However, unlike our scenario, both methods are designed for binary classification and have predefined negative cases. A closely related approach 1is optimistic and labeled learning which may be considered as a unique case of SL with only positive labels available. However, their method used a combined set of negative and labeled example, while in our case negative example isn't available. Using clinical instruments for screening of autism takes too long process and price effective.

9. PROPOSED SYSTEM

Our algorithms take the Autism dataset and perform data processing techniques to wash and pre-process the info for using neural network algorithms to forecast Autism Spectrum Disorder. The Exploratory Data Analysis is employed to know the historical data on ASD to know the causes and for later studies to develop. The classifier algorithms predict the person whom is having Autism Spectrum Disorder.

10. EVALUATION SYSTEM

```
import sys
import pandas as pd
from pandas_profiling import ProfileReport
import matplotlib.pyplot as plt
import pandas_profiling as pp
import sklearn
import keras

print(sys.version)
print (pd.__version__)
print (sklearn.__version__)
print (keras.__version__)


# Importing the Dataset
file = "C:\Autism-Child-Data.csv"
# read the csv
data = pd.read_table(file, sep = ',', index_col = None)
```

```
3.8.3 (default, Jul  2 2020, 17:30:36) [MSC v.1916 64 bit (AMD64)]
1.0.5
0.23.2
2.4.3
```

Figure 3: Import Dataset
Description: Importing The Dataset From The Autism File.

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```
# Data Preprocessing
data = data.drop(['result', 'age_desc'], axis=1)

data.loc[:10]
# create X and Y datasets for training
x = data.drop(['Class/ASD'], 1)
y = data['Class/ASD']

x.loc[:10]

# convert the data to categorical values - one-hot-encoded vectors
X = pd.get_dummies(x)

# print the new categorical column labels
X.columns.values

# example patient from the categorical data
X.loc[1]

# convert the class data to categorical values - one-hot-encoded vectors
Y = pd.get_dummies(y)

Y.iloc[:10]
```

	NO	YES
0	1	0
1	1	0
2	1	0

Figure 4: Dropping Unnecessary Column(S)

Description: Dropping unnecessary columns from data by using encoding

Figure 5: Overview Of Autism Dataset

Description: Overview of autism dataset using exploratory data analysis

	A1_Score	A2_Score	A3_Score	A4_Score	A5_Score	A6_Score	A7_Score	A8_Score	A9_Score	A10_Score	result
count	292.000000	292.000000	292.000000	292.000000	292.000000	292.000000	292.000000	292.000000	292.000000	292.000000	292.000000
mean	0.633562	0.534247	0.743151	0.551370	0.743151	0.712329	0.606164	0.486575	0.493151	0.726027	6.239726
std	0.482653	0.499682	0.437646	0.498208	0.437646	0.453454	0.489438	0.500847	0.500811	0.446761	2.284882
min	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	5.000000
50%	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	0.000000	0.000000	1.000000	6.000000
75%	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	8.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	10.000000

Figure 6: Displaying Mean, Min, Max

Description: Displaying mean, min and max of screening score and result

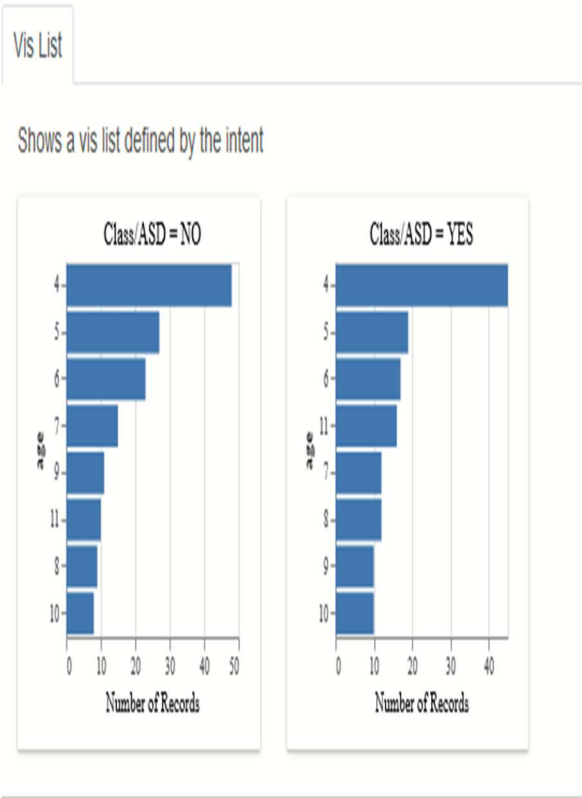

Figure 7: Displaying Number Of Persons With Autism

Description: Displaying number of persons with autism based on age using EDA

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```
# convert the data to categorical values - one-hot-encoded vectors
X = pd.get_dummies(x)

# print the new categorical column labels
X.columns.values

# print an example patient from the categorical data
X.loc[1]

# convert the class data to categorical values - one-hot-encoded vectors
Y = pd.get_dummies(y)

Y.iloc[:10]
```

	NO	YES
0	1	0
1	1	0
2	1	0
3	1	0
4	0	1
5	1	0
6	0	1
7	0	1
8	0	1
9	1	0

Figure 8: Converting Categorical Values Into Integer

Description: Converting categorical values into integer using one hot encoded vector

```
# 3. Split the Dataset into Training and Testing Datasets
# Before we can begin training our neural network, we need to split the dataset into training and t


from sklearn import model_selection
# split the X and Y data into training and testing datasets
X_train, X_test, Y_train, Y_test = model_selection.train_test_split(X, Y, test_size = 0.2)

print (X_train.shape)
print (X_test.shape)
print (Y_train.shape)
print (Y_test.shape)
```

```
(233, 96)
(59, 96)
(233, 2)
(59, 2)
```

Figure 9: Splitting The Dataset For Training And Testing Database

Description: Testing and training the data

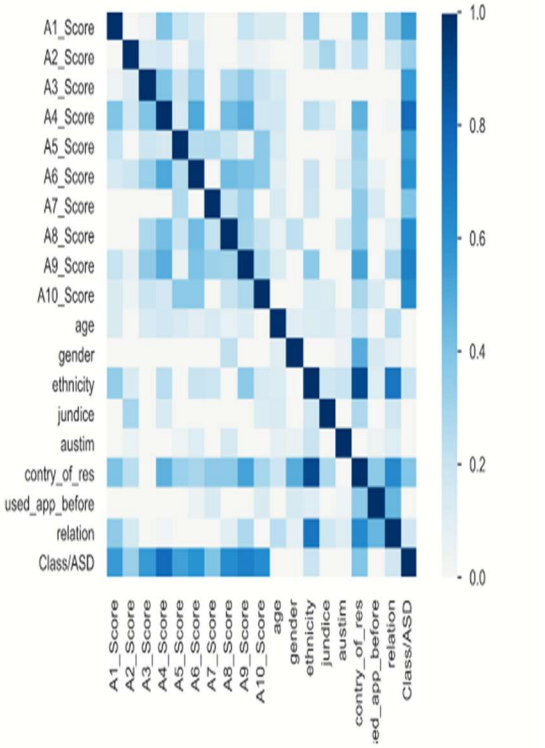

Figure 10: Correlation Diagram For Autism Dataset

Description: Correlation diagram for autism dataset

```
# 4. Building the Network - Keras
# In this project, we are going to use Keras to build and train our network. This model w
# build a neural network using Keras
from keras.models import Sequential
from keras.layers import Dense
from keras.optimizers import Adam

# define a function to build the keras model
def create_model():
    # create model
    model = Sequential()
    model.add(Dense(8, input_dim=96, kernel_initializer='normal', activation='relu'))
    model.add(Dense(4, kernel_initializer='normal', activation='relu'))
    model.add(Dense(2, activation='sigmoid'))

    # compile model
    adam = Adam(lr=0.001)
    model.compile(loss='categorical_crossentropy', optimizer=adam, metrics=['accuracy'])
    return model

model = create_model()
print(model.summary())
```

```
Model: "sequential"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
dense (Dense)                (None, 8)                 776
_________________________________________________________________
dense_1 (Dense)              (None, 4)                 36
_________________________________________________________________
dense_2 (Dense)              (None, 2)                 10
=================================================================
```

Figure 11: Building Neural Network

Description: Building neural network

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```
gb_clf = ensemble.GradientBoostingClassifier(n_estimators=40)
gb_clf.fit(X_train,Y_train)
gb_clf.score(X_test,Y_test)
```

```
0.8247863247863247
```

```
from sklearn.naive_bayes import GaussianNB
nb_clf = GaussianNB()
nb_clf.fit(X_train,Y_train)
nb_clf.score(X_test,Y_test)
```

```
0.6538461538461539
```

```
from sklearn.neighbors import KNeighborsClassifier
knn_clf = KNeighborsClassifier(n_neighbors=3)
knn_clf.fit(X_train,Y_train)
knn_clf.score(X_test,Y_test)
```

```
0.7564102564102564
```

```
from sklearn.svm import SVC
sv_clf = SVC(probability=True, kernel='linear')
sv_clf.fit(X_train,Y_train)
sv_clf.score(X_test,Y_test)
```

```
0.9188034188034188
```

Figure 12: Training Neural Network

Description: Training neural network

```
# 5. Training the Network
# Now it's time for the fun! Training a Keras model is as simple as calling model.fit().

# fit the model to the training data
model.fit(X_train, Y_train, epochs=50, batch_size=10, verbose = 1)
```

```
Epoch 1/50
 1/24 [>.....] - ETA: 0s - loss: 0.6927 - accuracy: 0.8000WARNING:tensorflo
rain_batch_end` is slow compared to the batch time (batch time: 0.0000s vs `on_train_batch_end` tim
callbacks.
24/24 [==============================] - 0s 3ms/step - loss: 0.6917 - accuracy: 0.5279
Epoch 2/50
24/24 [==============================] - 0s 2ms/step - loss: 0.6886 - accuracy: 0.5236
Epoch 3/50
24/24 [==============================] - 0s 1ms/step - loss: 0.6837 - accuracy: 0.5751
Epoch 4/50
24/24 [==============================] - 0s 2ms/step - loss: 0.6758 - accuracy: 0.6438
Epoch 5/50
24/24 [==============================] - 0s 2ms/step - loss: 0.6600 - accuracy: 0.7897
Epoch 6/50
24/24 [==============================] - 0s 2ms/step - loss: 0.6371 - accuracy: 0.7725
Epoch 7/50
24/24 [==============================] - 0s 2ms/step - loss: 0.6059 - accuracy: 0.7854
Epoch 8/50
24/24 [==============================] - 0s 2ms/step - loss: 0.5660 - accuracy: 0.8069
Epoch 9/50
24/24 [==============================] - 0s 2ms/step - loss: 0.5225 - accuracy: 0.8584
```

Figure 13: Testing And Performance Metrics

Description: Testing and performance metrics of keras neural network

```
# 6. Testing and Performance Metrics
# Now that our model has been trained, we need to test its performance on the testing dataset.
# generate classification report using predictions for categorical model
from sklearn.metrics import classification_report, accuracy_score


predictions = model.predict_classes(X_test)
predictions


# In[37]:
print('Results for Categorical Model')
print(accuracy_score(Y_test[['YES']], predictions))
print(classification_report(Y_test[['YES']], predictions))
```

Figure 14: Decision Tree Classifier, Logistic Regression, Random Forest Classifier

Description: Accuracy the algorithms are displayed

```
X=df.drop(columns='Classcat')
Y=df['Classcat']
X_train,X_test,Y_train,Y_test=train_test_split(X,Y,test_size=0.8)
dt_clf = DecisionTreeClassifier()
dt_clf.fit(X_train,Y_train)
y_pred=dt_clf.predict(X_test)
dt_clf.score(X_test,Y_test)
```

```
0.7008547008547008
```

```
from sklearn.linear_model import LogisticRegression
lr_clf = LogisticRegression()
lr_clf.fit(X_train,Y_train)
lr_clf.score(X_test,Y_test)
```

```
0.9188034188034188
```

```
from sklearn import ensemble
rf_clf = ensemble.RandomForestClassifier(n_estimators=100)
rf_clf.fit(X_train,Y_train)
rf_clf.score(X_test,Y_test)
```

```
0.9017094017094017
```

Figure 15: Gradient Boosting, K-Nearest Neighbour, Simple vector machine

Description: Accuracy of the above-mentioned algorithm

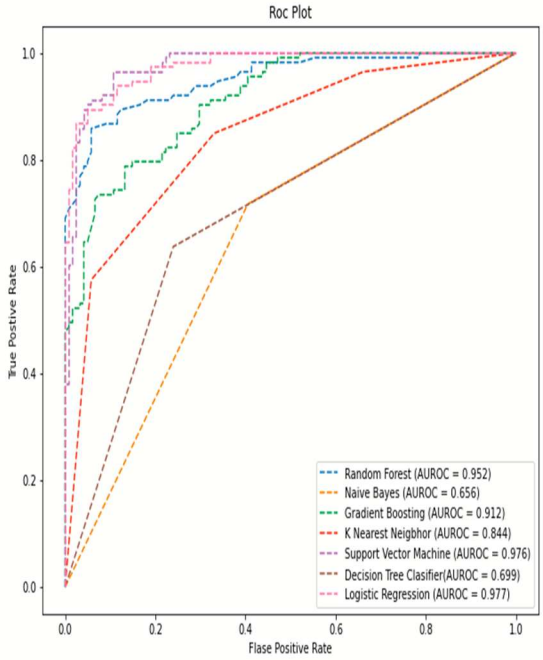

Figure 16: ROC Accuracy Plot Diagram

Description: Displaying all the accuracy of algorithm through plot as graph

11. CONCLUSION AND FUTURE ENHANCEMENT

In this, first the info set containing 292 samples from UCI repository data base and pre-processing was done to get rid of noisy and unreliable data. So as to try to do so, first missing value is filled via mean for nominal features and filled via mode for categorical features. Then, dataset has been normalized to possess a unit scale for all data.

This work examines the power to detect ASD using machine learning algorithms while considering the smallest amount number of tests or features. We approach this aim by applying machine learning classifiers: keras neural network, logistic regression, decision tree classifier, naive bayes, support vector machine and gradient boosting. So as to scale back the quantity of features and take away redundancy, the relationship between variables is studied. Our work shows a replacement way of predicting autism of patients based neural network on previous records of patient. Logistic regression gives more accuracy 0.977 than other classifiers.

Our future work will specialise in the accuracy of various algorithm to spot autism supported image processing. By developing neural network system, it'll train up the model and using various algorithms among them choosing the simplest one for prediction of autism.

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