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Customer Stress Prediction in Telecom Industries using Machine Learning

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ABSTRACT- In today's highly competitive marketplace, especially for businesses, retaining loyal customers is becoming increasingly challenging.In one scenario, losing a customer results in a loss of profits for the telecom industry's expansion, while in another, the cost of acquiring new customers is significantly higher than the cost of maintaining existing ones; in this critical scenario, the telecom industry ought to concentrate on maintaining existing customers.This project will use supervised machine learning algorithms, primarily Linear Discriminant Analysis, Support Vector Machine, K Nearest Neighbor, and Random Forest, to analyze the open dataset of customer data and predict customer stress.

KEYWORDS- Support Vector Machine, K-Nearest Neighbor, Linear Discriminant Analysis, One Hot Encoding.

I. INTRODUCTION

It's not easy to run a telecom industry.Information and communication services, such as telephone services, Internet services, television, and so on, make up the majority of the telecom industry.By offering all of the services to thousands of customers, stress could be caused among the services.The stress could be brought on by industry or other climate changes, among other things.If the stress moves to another industry, it might lose customers.Because the cost of acquiring new customers is greater than the cost of retaining existing customers, the telecom industry must and should keep its existing customers because customer stress will cause the market to collapse and result in significant losses.The accurate percentage value of customer stress can be predicted with the assistance of machine learning algorithms.To begin the process, we must first work together with customers to collect data into an open dataset.

II. LITERATURE ANALYSIS

Nowadays, a lot of businesses work with customers to find out what's causing them stress, gather customer feedback, and launch new services that are better than the ones offered by the old telecom industry.[1] They also advertise to get customers, which costs other telecom industries a lot of money.Customer Relationship Management, which has the potential to influence stress rates throughout the telecom industry, was developed in 1990 by Reichheld and Sasser[2] after they noticed this issue.A customer stress model has been created by combining multiple types of predictors from several studies.Demographic characteristics, changes in the environment, and other factors can all be taken into account by this model.[3]

III. RELATED WORK

Abbas Keramati started the customer stress prediction process in 2014, using binomial logistic and regression models to look at demographics, usage patterns, and customer service.In 2016,[4] Ismail Mohammad used neural network and regression models to predict customer stress by using demographic billing data, usage patterns, and customer relationships.In 2019[7], Chih Fong Tsai and Yu Hsin Lu used hybrid neural networks to predict customer satress.This project focuses primarily on:

- Linear discriminantanalysis(LDA):The supervised classification problem and dimensionality reduction are the primary topics covered in this algorithm.It will shift from higher dimensions to lower dimensions.[5]
- Support Vector Machine(SVM):In order to classify the data and perform regression analysis, this algorithm will construct a hyperplane that leads to the optimal hyperplane in a nonlinear fashion[11].
- K-Nearest Neighbor(KNN):By calculating the distance between the similar data points, this algorithm will capture them[6].

IV. EXISTING SYSTEM

The authors used hybrid neural networks in the past for customer stress prediction, which resulted in back propagation and a low accuracy value for the models. The confusion matrix will [8]result in errors I and II, and the clustering process was the primary cause of missing data, so accuracy was lower[9].

V. PROPOSED SYSTEM

In this project, supervised machine learning algorithms, primarily Linear Discriminant Analysis (LDA), Support Vector Machine (SVM), and K-Nearest Neighbor (KNN), were used to predict customer stress. The

accuracy value will be determined by comparing the best accuracy values of each accuracy value(see figure 1).

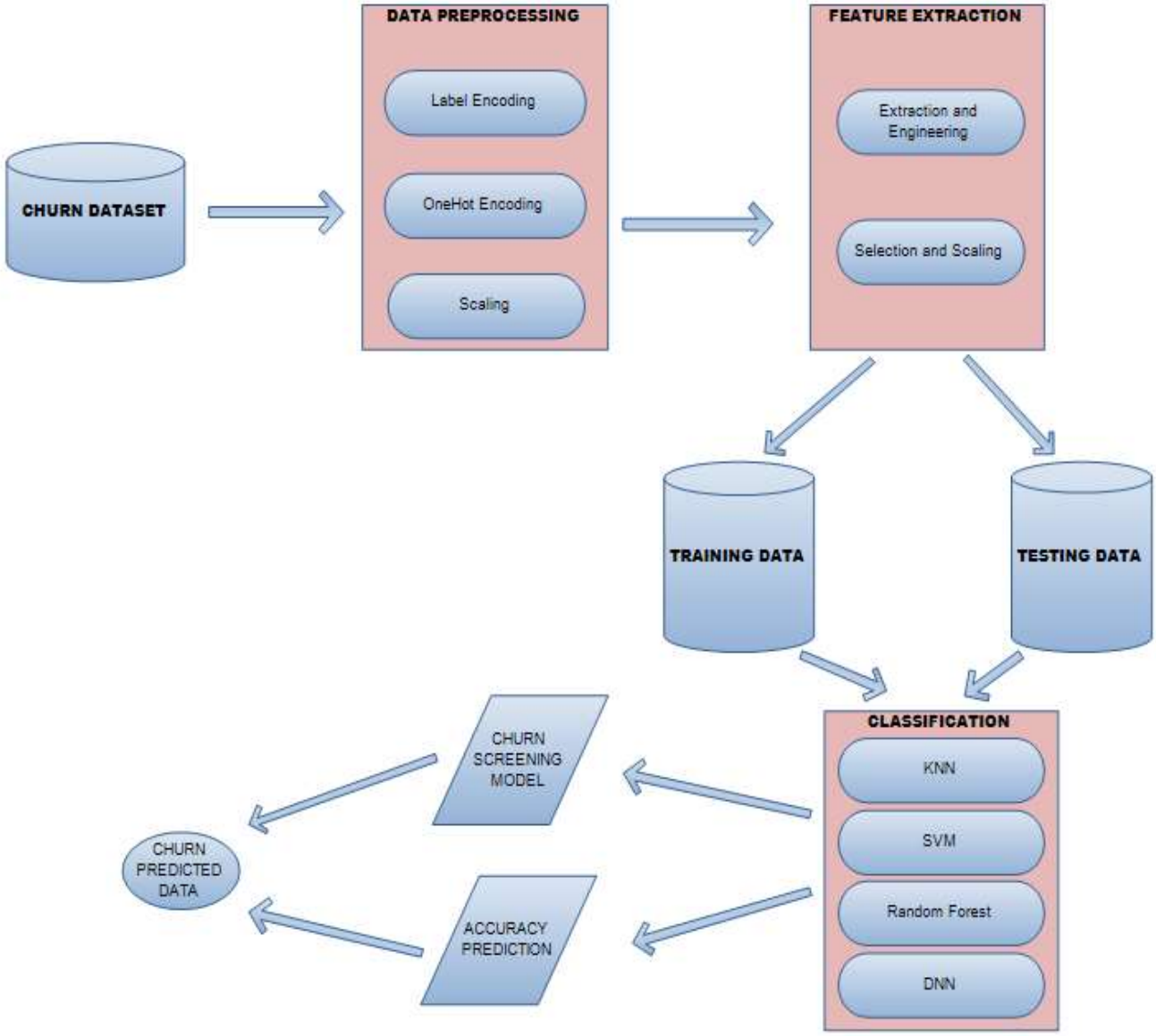

Figure1: Proposed Method of LDA

A) Algorithm

Various attributes, including customer stress, are used to collect the datasets from customers.Test data and train data will be separated from the datasets.80% of datasets will be split for training, and 20% will be split for testing.The data were preprocessed following the testing and training phases.The conditions ought to be used to classify the data.After the data has been classified, it is sent to three different algorithms, each of which will check the accuracy of the data up to a hundred times.The best accuracy value for predicting customer stress was determined by comparing the last accuracy values of each algorithm(see figure 2 and 3).

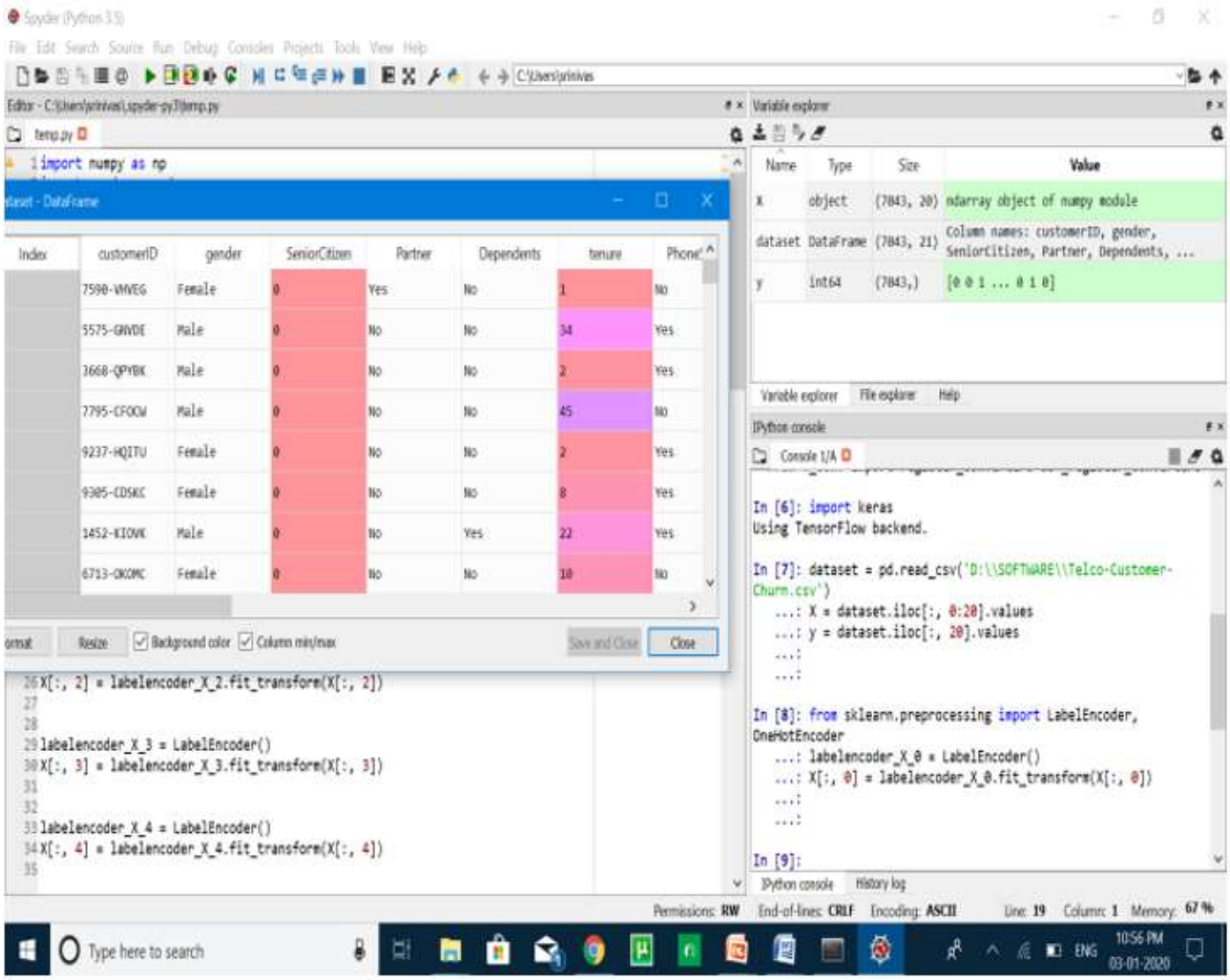

Figure 2: Customer data

In the above figure 2 shows that the data was collected from the customers.

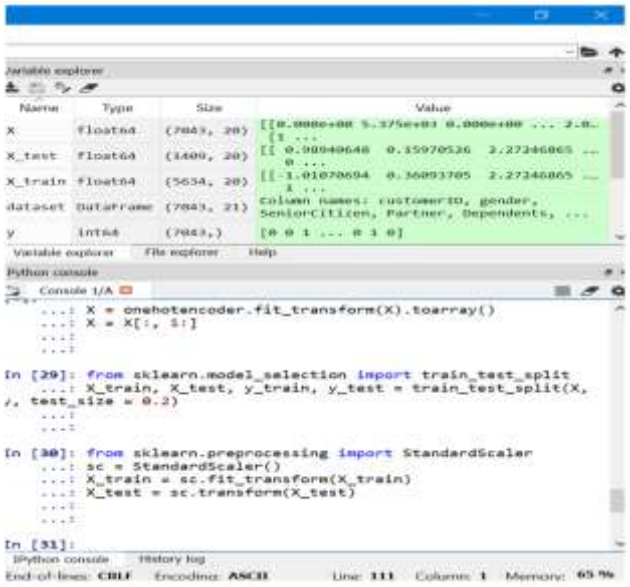

Figure 3: Data was split into training and testing

Data was split into training and testing In the above figure 3.

VI. RESULTS AND DISCUSSIONS

The confusion matrix that is used to determine the stress prediction accuracy value is depicted in the below figure 4. In the this figure, we shows the confusion matrix which is used to calculate the accuracy value of stress prediction.

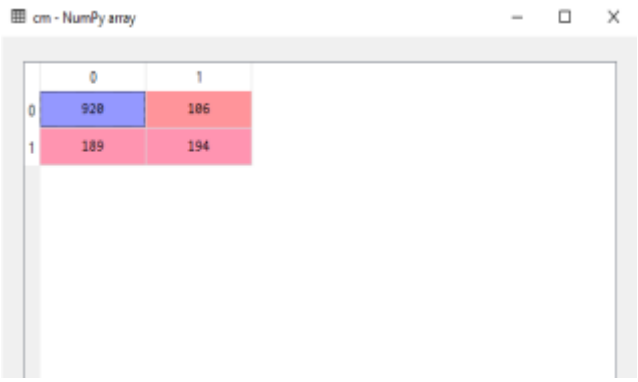

Figure 4: Confusion matrix

VII. CONCLUSION

Based on the accuracy values provided by these algorithms, we considered the Support Vector Machine, K-Nearest Neighbor, and Linear Discriminant Analysis algorithms as the best for the project.

The most noteworthy percentile among three calculations shows the greatest clients influencing on their particular administrations which they were in the enduring relationship to the business.Finally, utilizing the stress prediction, the telecom industry must satisfy existing clients without interfering with services.

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