# TELCO CHURN BI ANALYTICS MODEL REPORT

(Business Intelligence)
(TM3426)
Sixth Semester
Thapar Institute of
Engineering &Technology, Patiala
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# Report Timeline

# Project Timeline

# Introduction.....


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FIGURE 1: TELCO CO

HTTPS://WWW.TELCOSENSORS.COM/STORAGE/APP/UPLOADS/PUBLIC/5EF/367/8FA/5EF3678FAEB1B565265541.JPG.

# A little bit about the project

This report aims to provide an overview of the Telco Churn Business Intelligence (BI) Model. Telco churn refers to the rate customers switch their telecommunication service provider. Understanding and predicting churn is crucial for telco companies as it directly impacts customer retention, revenue, and overall business performance.

The Telco Churn BI Model aims to leverage business intelligence techniques to analyze customer data and identify potential churners, allowing the telco company to retain customers and mitigate churn proactively. Through this model, the business seeks to increase efficiency by reducing resource use and unnecessary marketing expenses while focusing on customers who are leaving.

# Research Methodology.....

The field of Churning is well-known in the Business Intelligence field. Thus, previous work is available on churn management; the piece tells how to handle churn and how it will be helpful in the formulation of business strategy, enhancing strategic value (Samalia et al., 2014). Because of public policies and standardization, people can easily switch to other mobile communication competitors. Thus, mobile carriers now focus on customer retention rather than acquisition (Qureshi et al., 2014).

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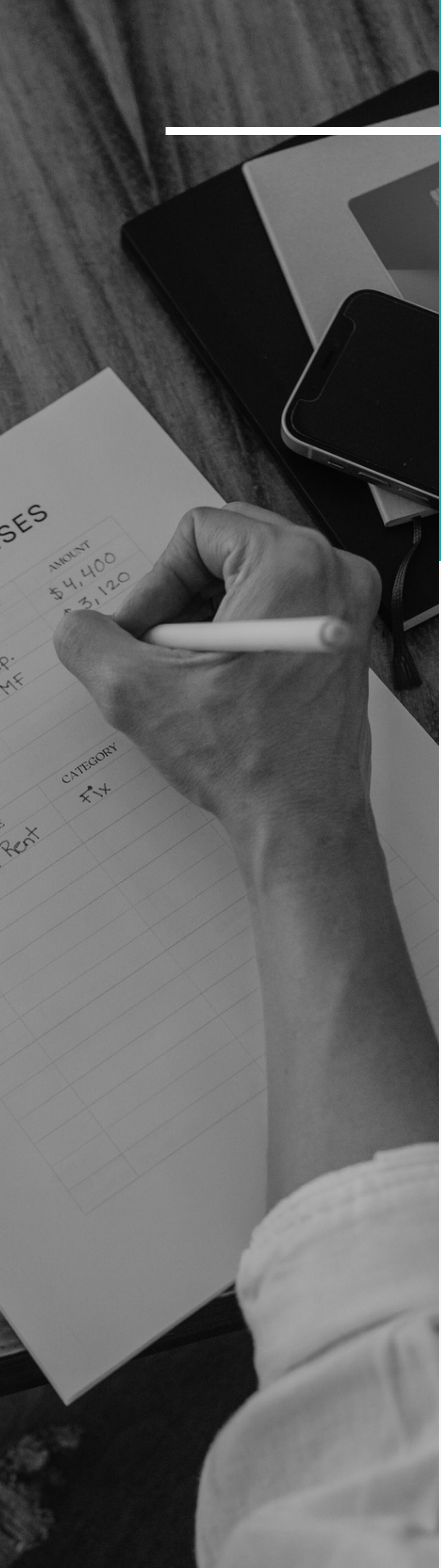

# OBJECTIVES....

The main objectives of the Telco Churn BI Model are as follows:

a. Identify Churn Patterns: Analyze historical customer data to identify patterns and indicators associated with churn. This involves exploring customer demographics, usage patterns, service plans, billing information, and other relevant data.

Figure 2: Identifying churn patterns

https://www.google.com/url?sa=i&url=https://www.flaticon.com/free-icons/churn&psig=AOvVaw0Ulq312zWDOkeknZ2u4kN9&ust=1684644699200000&source=images&cd=vfe&ved=0CBEQjRxqFwoTCMjx6feUg_8CFQAAAAAdAAAAABAD

b. Predict Churns: Develop a predictive model to forecast the likelihood of a customer churning within a specific timeframe. This involves applying machine learning algorithms to historical customer data and training the model to predict churn probabilities based on various independent variables.

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# OBJECTIVES

c. Customer Segmentation: Segment customers based on their churn probability and other relevant characteristics. This allows the telco company to prioritize retention efforts and tailor marketing strategies based on different customer segments' specific needs and preferences.

d. Actionable Insights: Provide actionable insights and recommendations to the telco company based on churn patterns and predictive model analysis. These insights can guide decision-making processes, such as implementing targeted marketing campaigns, improving customer service, or offering personalized incentives to reduce churn.


Figure 3: Targeting the mass in accordance with the churn prediction

# Methodology

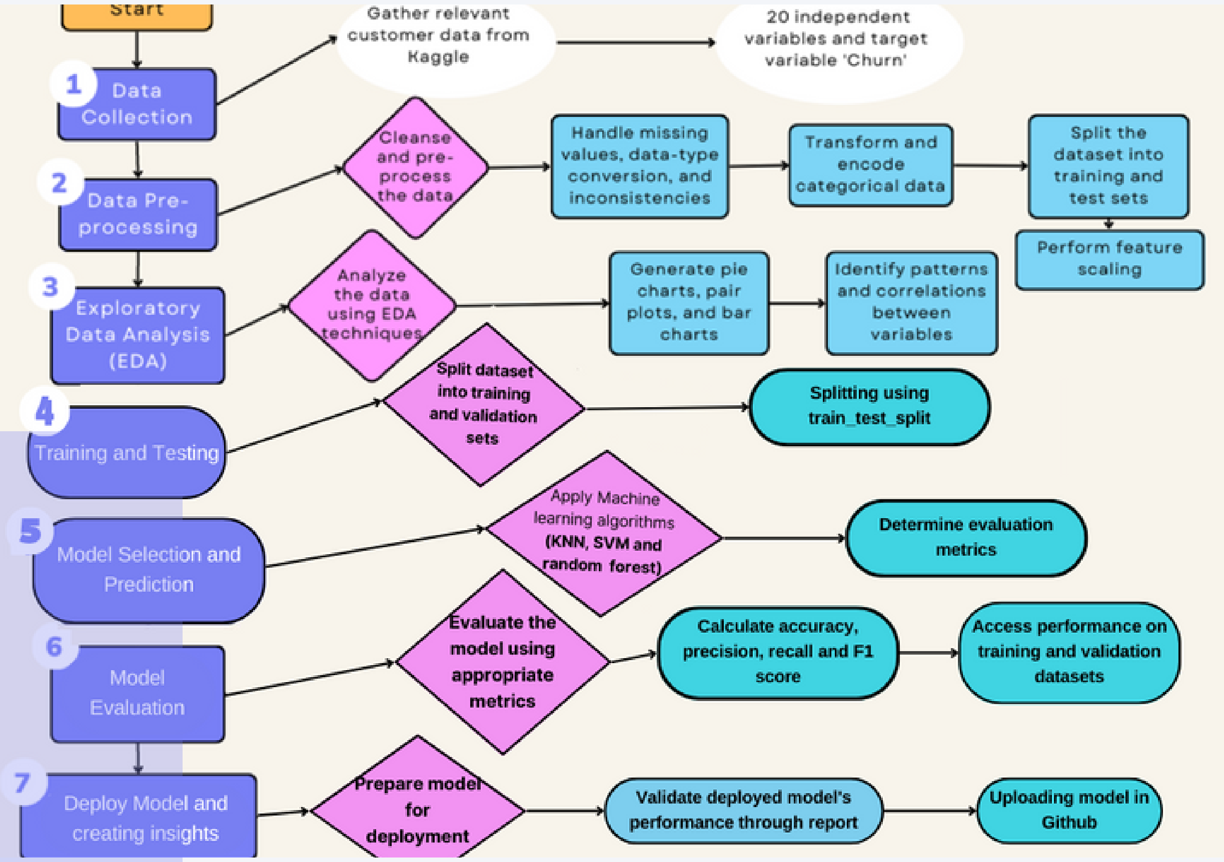


Figure 4: Methodology Flowchart

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The Telco Churn BI Model follows a systematic methodology to achieve its objective:

a. Data Collection: Gathered relevant customer data from Kaggle, the world's largest data science community. The data collected for the business model consisted of 20 independent variables such as customerID, Gender, SeniorCitizen, Partner, Dependents, tenure, PhoneService, MultipleLines, InternetService, OnlineSecurity, OnlineBackup, DeviceProtection, TechSupport, StreamingTV, StreamingMovies, Contract, PaperlessBilling, PaymentMethod, MonthlyCharges and TotalCharges, and a target variable that's churning value named as 'Churn.'

The data can clearly define that we will be making a supervised learning model as the data consists of the labeled set having variables with individual identities. It is a 'Classification' model having two groups of target variables; one group consists of people who are leaving the telco company, and the other are not leaving the company.

b. Data Pre-processing: Cleanse and pre-process the collected data by importing the data set to handle missing values, data-type conversion, and inconsistencies. Transform, and encode categorical data, splitting the data set into training and test set, and feature scaling as required for analysis.

I checked the missing values in the BI model, but they were not there in the data set as they were hidden in the ‘string’ data type. Thus, I removed those rows with blank space, converted their data type into ‘int,’ and dropped a column named ‘customerID’ as it was unnecessary. Inconsistencies were tackled by converting various groups into Boolean values and handling categorical data by doing ‘one-hot encoding.’

First, the data set was divided into two parts, ‘X’ consisting of independent variables and ‘Y’ consisting of dependent variables. It further got split into training and test set. The model also standardizes the value of the Independent variable using the ‘Normalization’ method.

c. Exploratory Data Analysis (EDA): Perform exploratory data analysis to gain insights into the data, identify patterns, and uncover correlations between variables using pie charts, pair plots, and bar charts. The above analytical techniques help in understanding the underlying factors contributing to churn.

d. Training and Testing: The data divided into parts of 'X' and 'Y' is further split into training and test data using sklearn.model_selection module.

e. Model Selection and Prediction: Apply appropriate machine learning algorithms such as KNN, Support Vector Machine, and random forests to train the churn prediction model. Thus, predictions are made by taking previous training data as the reference that helped to train the model.

f. Model Evaluation: Evaluate the trained model using appropriate evaluation metrics such as accuracy, precision, recall, and F1 score. Could you assess the model's performance on training and validation datasets to ensure reliability and generalization?

g. Deploying Model and creating Insights: Generating reports and visualization to present the findings and insights derived from the Telco Churn BI Model. And, thus, uploading the insights on a platform like Github.

Furthermore, the appendix includes sample code for the document's main body. I have made the model in Jupyter Notebook using Python.

# Benefits and Impacts

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LImplementing a Telco Churn BI Model can provide several benefits and have a significant impact on the telco company:

a. Improved Customer Retention: The telco company can proactively improve customer retention by identifying potential churners in advance. This may include targeted marketing campaigns, personalized offers, improved customer service, or loyalty programs designed to address customers' specific needs and concerns at risk of churn.

b. Increased Revenue: Retaining customers is more cost-effective than acquiring new ones. The telco company can stabilize its customer base and increase revenue by reducing churn rates. Additionally, identifying cross-selling or upselling opportunities for existing customers can contribute to revenue growth.

c. Enhanced Customer Experience: Understanding churn patterns and customer preferences allows the telco company to tailor its products and services to meet customer expectations better. By providing a personalized and seamless experience, customer satisfaction and loyalty can be significantly improved.

d. Competitive Advantage: A Telco Churn BI Model can provide a competitive edge in the highly competitive telecommunications industry. The ability to anticipate and prevent churn puts the telco company in a better position to retain customers and attract new ones, ultimately gaining an advantage over its competitors.

e. Data-Driven Decision Making: Implementing a Telco Churn BI Model establishes a data-driven approach to decision-making. The insights and recommendations derived from the model can guide strategic initiatives, marketing campaigns, and operational improvements, leading to more informed and effective decision-making across the organization.

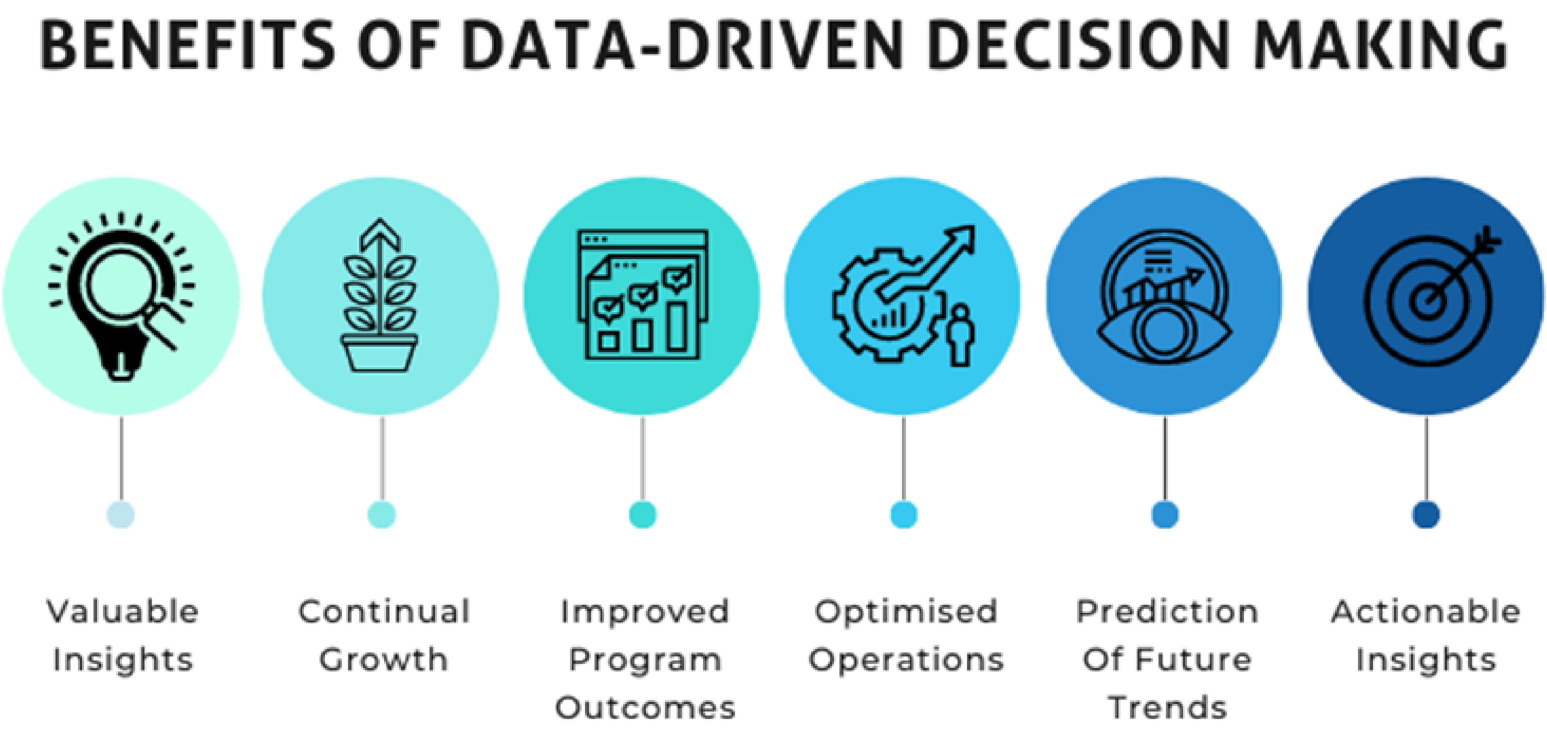


Figure 5: Data-Driven Decision Making
https://www.altisconsulting.com/au/wp-content/uploads/sites/4/2020/09/Jasons-Blog-Image.png

# Challenges and Considerations

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While the Telco Churn BI Model offers significant benefits, some specific challenges and considerations need to be addressed:

a. Data Quality and Availability: The model's success relies on high-quality and comprehensive customer data availability. Ensuring data accuracy, consistency, and completeness can be challenging, requiring data governance processes and integration across different systems. The data available on Kaggle can have a series of data accuracy issues.

b. Model Interpretability: While machine learning models can provide accurate predictions, they may need more interpretability. It is essential to strike a balance between model accuracy and the ability to explain the factors driving churn predictions. This can help gain the trust of stakeholders and facilitate the implementation of actionable recommendations.

c. Scalability: As the telco customer base grows, the model should be able to handle increasing volumes of data and adapt to changing customer dynamics. Scalability considerations should be considered during model development to ensure effectiveness as the business scales. The data-set that I took is having data of 7043 customers and measuring 20-21 variables is really difficult to analyse. Thus, model working issues when data-set scales up can be there.

Figure 6
https://upload.wikimedia.org/wikipedia/commons/7/7c/Kaggle_logo.png

# CONCLUSION

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> ***"Data-driven decisions driven by our BI analytics churn model reduce churn and fuel business growth." ns on this project.***

The Telco Churn Business Intelligence Model offers a powerful solution for telco companies to manage customer churn proactively. By leveraging data analytics and machine learning techniques, telcos can gain valuable insights into churn patterns, predict churn probability, segment customers, and take proactive measures to retain valuable customers. Implementing such a model can improve customer retention, increase revenue, enhance customer experience, and a competitive advantage in the telecommunications industry. However, addressing data quality, interpretability, scalability, and ethical considerations is crucial for successfully implementing and deploying the Telco Churn BI Model. And use the Support Vector Machine algorithm as it has the highest accuracy level, which is 80%. Thus, the model can be considered successful.


***"Data-driven decisions driven by our BI analytics churn model reduce churn and fuel business growth."***
***ns on this project.***

The code demonstrates the visualization of different attributes for churners and non-churners. The plotted details provide valuable insights into customer behavior and preferences. For example, comparing characteristics like partner status, dependents, and paperless billing can indicate the influence of personal relationships and billing preferences on churn rates. Thus, the visual comparison of attributes can inform business strategies to reduce churn rates.

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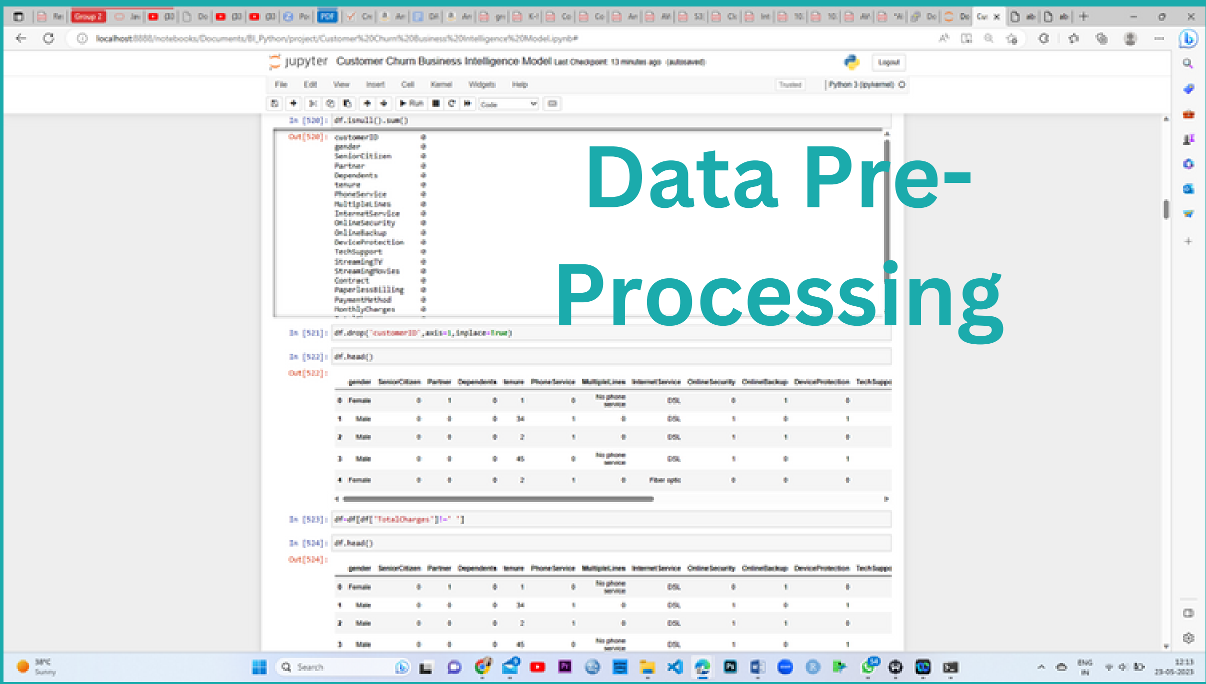
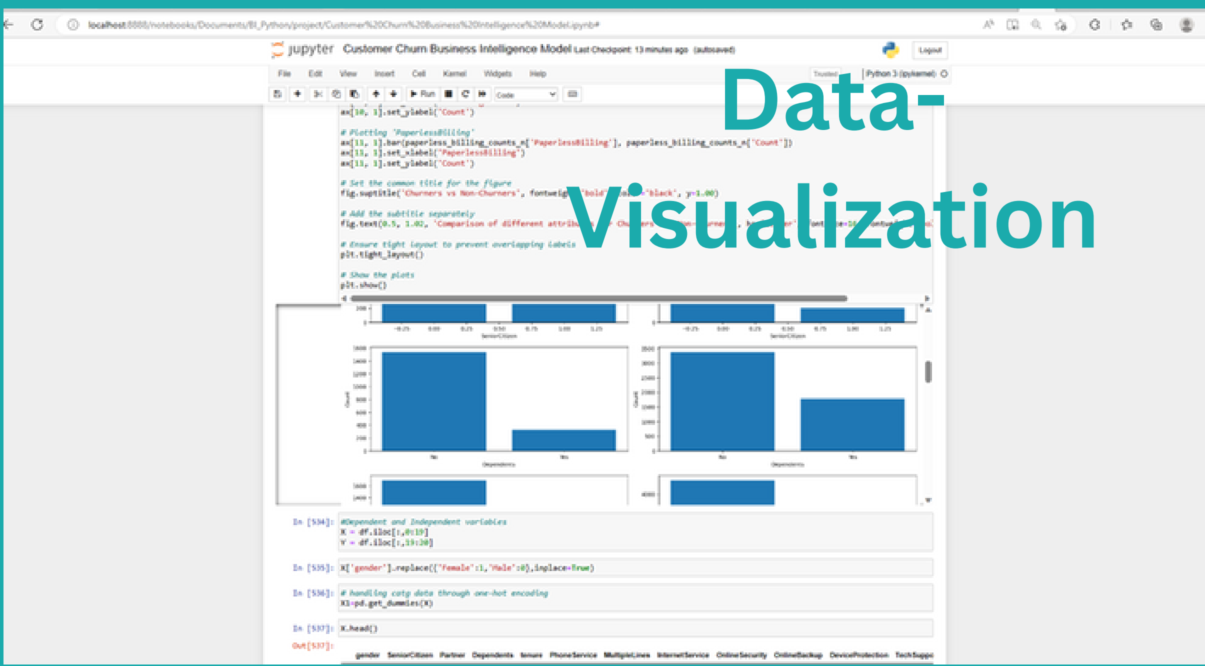
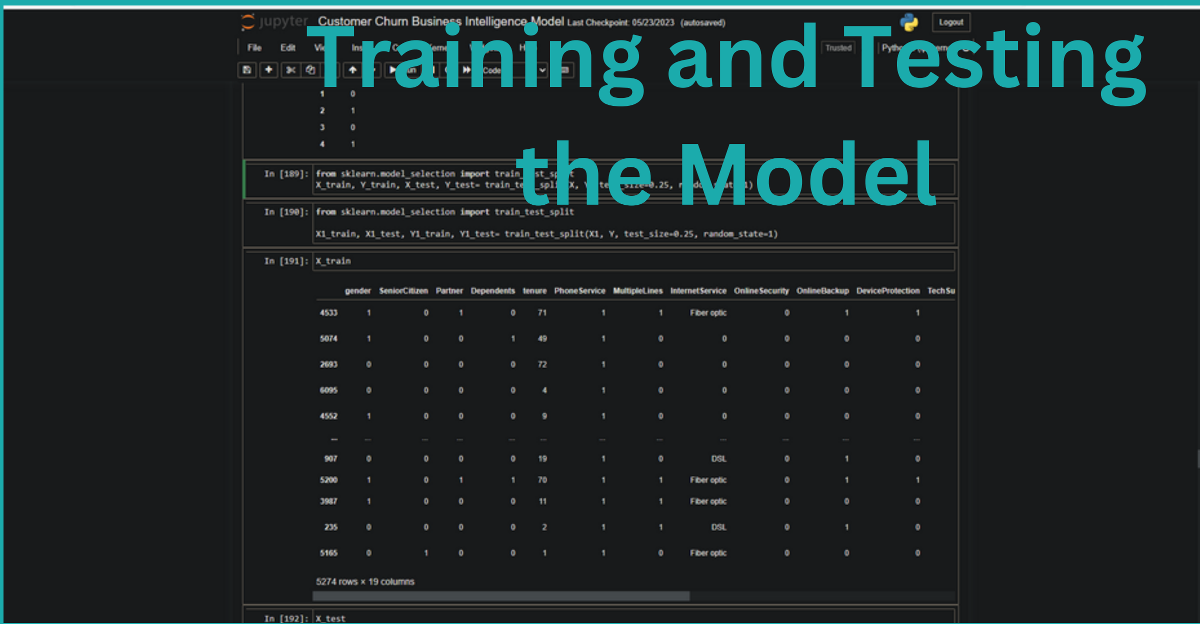
# APPENDIX 10

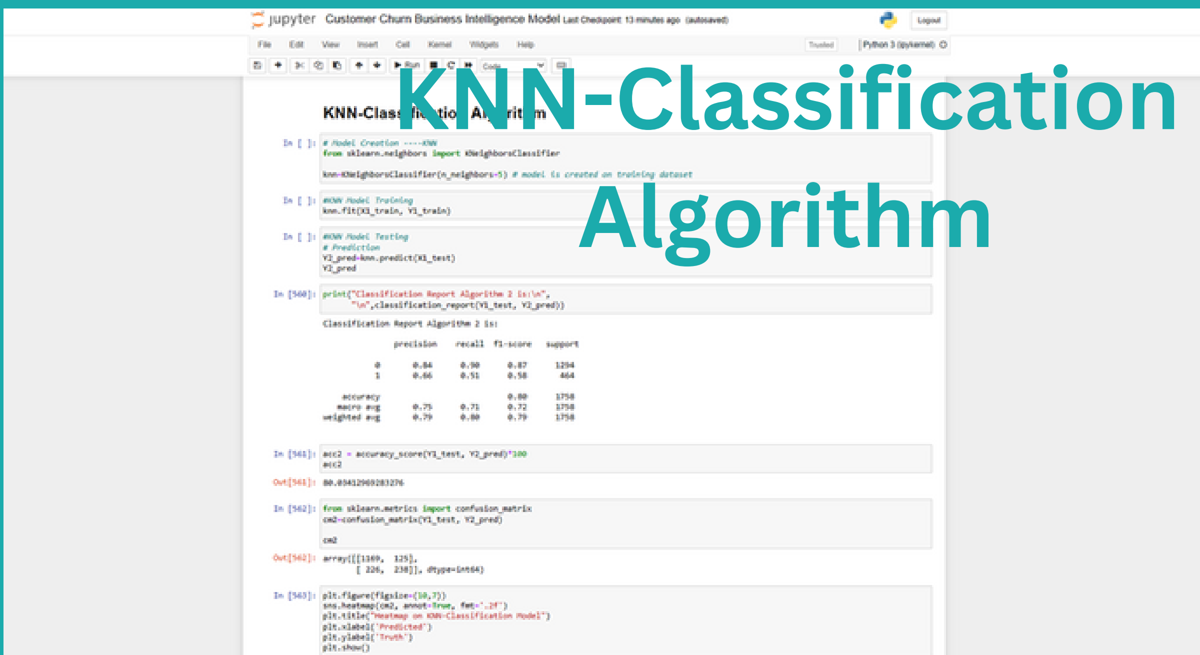


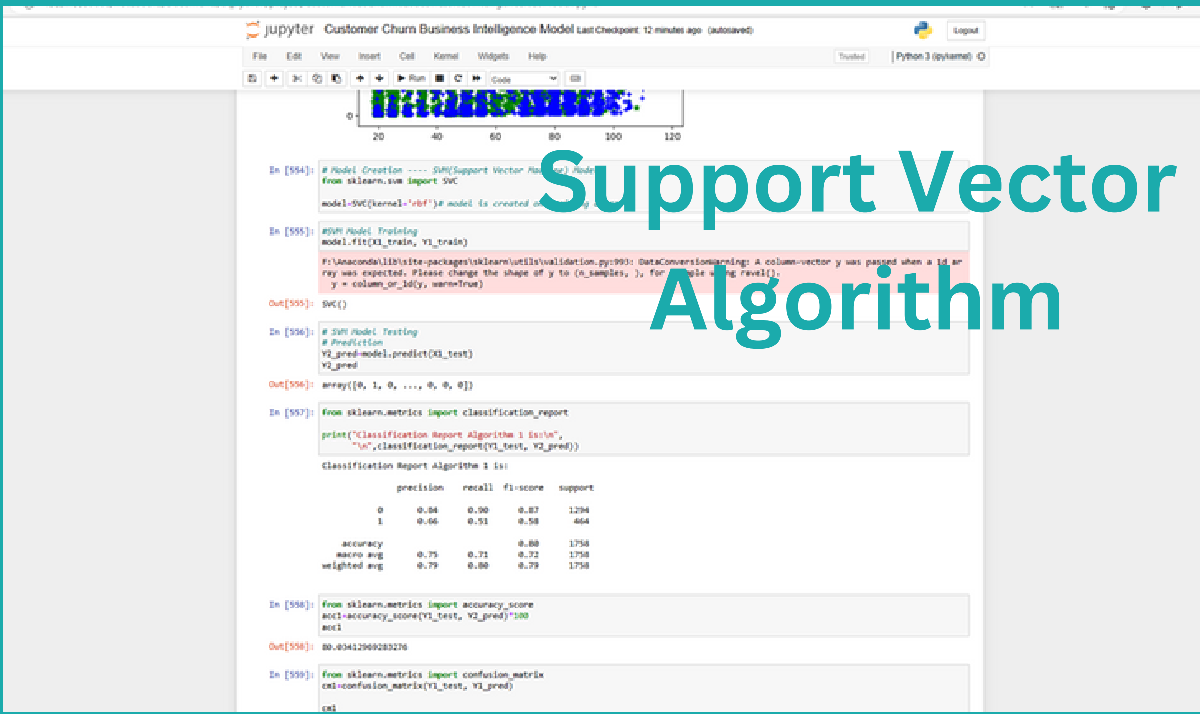
# Training and Testing the Model



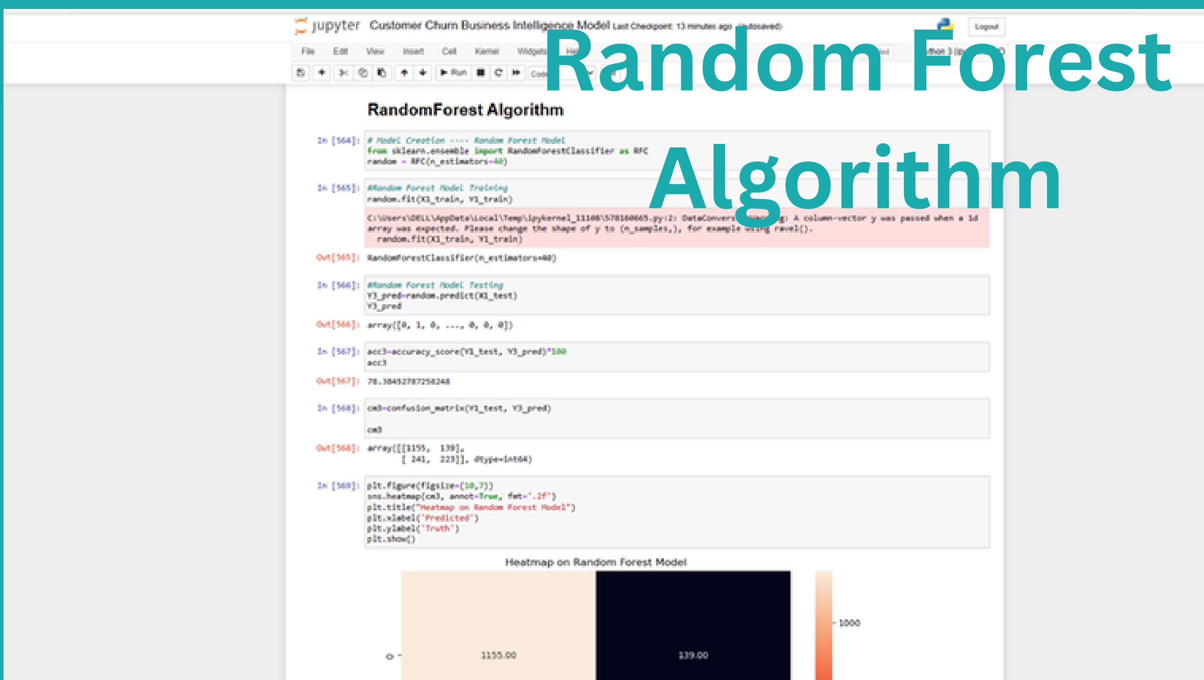

# KNN-Classification Algorithm

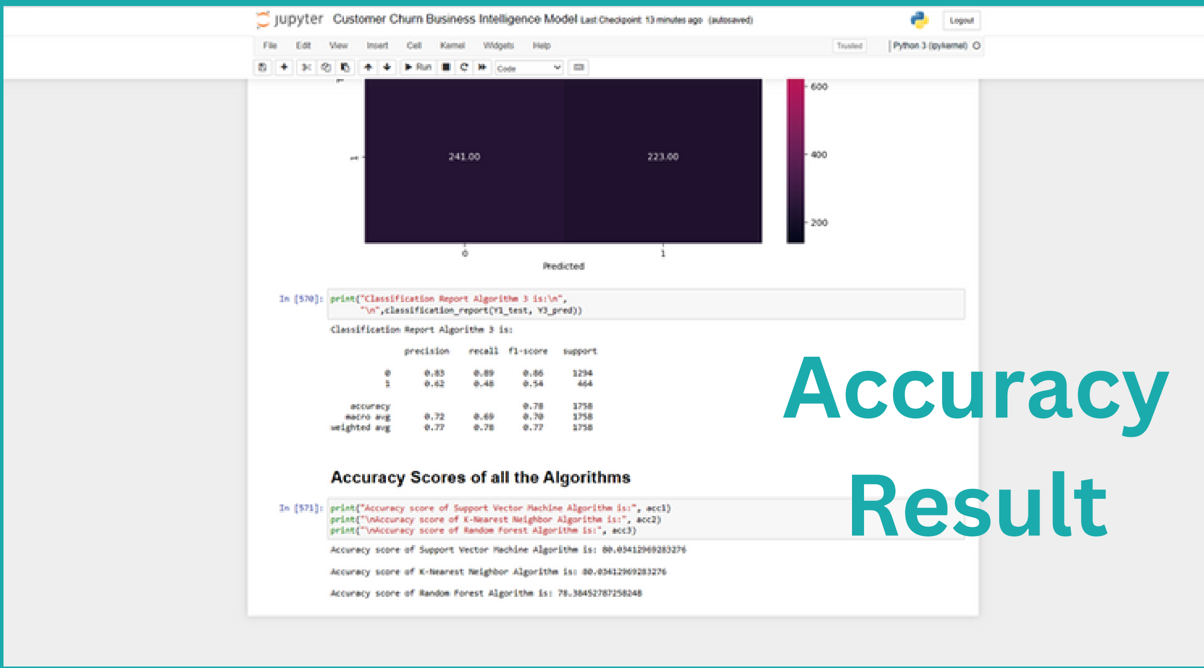


## Support Vector Algorithm




## Random Forest Algorithm






# Accuracy Result

# GitHub Repository: 10