TILE UNVELING CHURN DRIVERS:

A STUDY OF TELECOCUSTOMER CHURNS

R.Sanjay
2111CS020481
School of Engineering
Malla Reddy University

B.Sanjay Ram
2111CS020482
School of Engineering
Malla Reddy University

B.Sanjay
2111CS020483
School of Engineering
Malla Reddy University

T.Sanjay
2111CS020484
School of Engineering
Malla Reddy University

K.Sanjay
2111CS020485
School of Engineering
Malla Reddy University

M.Sanjay
2111CS020486
School of Engineering
Malla Reddy University

Prof.D. Manikannan
Professor, Department of AIML
School of Engineering
Malla Reddy University

1. Abstract----

1.1 Machine learning :

In this project, we investigate customer churn within the telecommunications (Telco) industry. The objective is to analyze patterns and factors that contribute to customer attrition, and subsequently develop predictive models to identify potential churners. By leveraging historical customer data, Through machine learning techniques, we strive to provide Telco providers with actionable recommendations to mitigate churn and enhance customer loyalty, ultimately contributing to sustainable business growth. The research likely reveals insights such as the influence of factors like contract duration, service quality, pricing plans, and customer support satisfaction on churn rates . Additionally, the study could shed light on the significance of customer engagement and loyalty programs in reducing churn. By understanding these drivers, telcos can strategically address customer attrition. This might involve improving service quality, optimizing pricing structures, enhancing customer service interactions, and tailoring marketing efforts to specific customer segments. Ultimately, the study's findings contribute to informed decision- making within the telecommunications industry, potentially aiding in the development of effective retention strategies and bolstering customer satisfaction.

2. Introduction:

2.1 Machine learning:

The Telco Customer Churn Prediction project is a data-driven initiative that harnesses the power of advanced analytics and machine learning to anticipate and mitigate customer attrition. By analyzing historical data encompassing diverse customer interactions, service usage patterns, and demographic information, this project aims to unveil insights into the factors influencing customer churn. The primary objective is to develop predictive models that enable proactive identification of customers at risk of churning, empowering telecom companies to implement targeted retention strategies.Key components of the project include data preprocessing, exploratory data analysis, machine learning model development, and the deployment of predictive models into operational systems. The iterative nature of the project allows for continuous refinement based on real-world feedback and changing customer behaviors.As

the telecommunications industry continues to evolve, characterized by fierce competition and rapidly advancing technologies, the Telco Customer Churn Prediction project emerges as a strategic initiative to foster customer loyalty, drive business sustainability, and maintain a competitive edge in an ever-shifting market. Through the lens of data- driven insights, this project serves as a beacon guiding telecom companies toward more informed decision-making and the cultivation of enduring customer relationships.

3. ITERRATURE REVIEW

3.1 Machine learning:

Customer churn in the telecommunications industry has been a widely studied phenomenon in the literature. Researchers have explored various factors contributing to telco customer churn, aiming to develop effective strategies for customer retention.

1. Service Quality: Numerous studies emphasize the significance of service quality as a determinant of customer churn. Issues such as call drops, network coverage, and service reliability play a crucial role in influencing customer satisfaction and loyalty.

2. Customer Satisfaction: High levels of customer satisfaction are inversely correlated with churn rates. Studies often highlight the importance of understanding customer needs, preferences, and expectations to enhance overall satisfaction.

3. Price Sensitivity: Pricing strategies and perceived value for money are pivotal factors affecting customer decisions to switch telecom providers. Competitive pricing and transparent billing practices contribute to customer loyalty.

4. Customer Relationship Management (CRM): Effective implementation of CRM practices has been identified as a key element in reducing churn. Personalized communication, targeted promotions, and proactive issue resolution contribute to building stronger customer relationships.

5. Technological Advances: The rapid evolution of technology, including the advent of 5G, IoT, and AI, has implications for customer churn. Customers may be more likely to switch providers if a competitor offers superior and cutting-edge services.

6. Social Influence: Social factors, such as recommendations from friends or family, online reviews, and social media interactions, can significantly impact customer decisions to stay or leave a telecom provider.

7. Contractual Commitments: The nature of contractual agreements, including contract length and flexibility, influences customer loyalty. Long-term contracts may deter churn, but flexibility in subscription plans can also contribute to customer satisfaction.

8. Customer Demographics: Variations in customer demographics, including age, income, and location, can affect churn rates. Understanding the specific needs of different customer segments is crucial for targeted retention efforts.

9. Data Analytics and Predictive Modeling: The use of data analytics and predictive modeling techniques has gained prominence in identifying early signs of churn. Analyzing customer behavior patterns helps telcos take proactive measures to retain customers.

10. Regulatory Environment: Regulatory changes and compliance issues may impact the telecommunications industry, influencing customer perceptions and decisions to switch providers. As the telecom landscape continues to

evolve, ongoing research explores new dimensions of customer churn, incorporating emerging technologies and market dynamics to develop effective strategies for customer retention.

4. PROBLEM STATEMENT

4.1 Machine learning :

"Telecommunication companies (Telcos) face the challenge of retaining their customers in a highly competitive market. Imagine you have a phone plan, and suddenly you decide to switch to another company. That's what we call customer churn. The goal is to figure out what makes people leave, like high prices or bad service, so that companies can improve and keep their customers happy. By studying this, we can create strategies to stop people from leaving, ensuring that more people stay with their current phone or internet provider. Ultimately, it's about making the service better for everyone and keeping customers satisfied.

5. METHODOLOGY:

5.1 Machine learning:

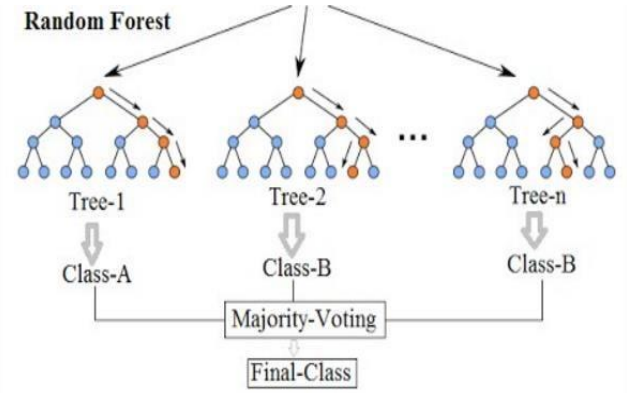
Data Preprocessing Techniques

- Removing unnecessary columns from the dataset.(data cleaning)
- Checking null values.
- Checking for duplicates.
- Removing duplicates.
- Checking datatypes of columns.
- Changing the datatype to required datatype .
- Checking the accuracy of training models.
- Selecting model based on scores.

Model Selection–Model Development

- **ML algorithm used:**

Random forest algorithm used to train the dataset. A Random Forest is like a team of decision trees working together to make a decision. Imagine you have a complex problem, and instead of relying on one expert (a single decision tree), you consult a group of diverse experts. Each expert (decision tree) in the group has its own opinion, and they vote to make a decision.



MODEL EALUATION:

Model training and testing :

- In this project we have used random forest classifier based on their decision trees . • So in this we have taken X _ Variables (independent variables)
- And Y _ Variable (dependent variable)as churn.
- x _ train , x _ test, y _ train , y _ test

= train _ test _ split(x , y , test _ size=0.2)

- In the above we have divided our data into train and in size of 0.2.
- 0.2 refers to (if a dataset consist of 8000 then the data is divided

Confusion matrix(Model Evaluation Metrics):

Actual Positive Actual Negative

• Predicted Positive TP FN

• Predicted Negative FP TN

• TP: True positive (if predicted 1 and actual 1)

• TN: False Negative (if predicted 0 and actual 0)

• FP: False Positive (if predicted 1 and actual 0)

• FN: False Negative (if predicted 0 and actual 1)

Model Evaluation Metrics:

• In telco customer churn prediction, it's important to use appropriate model evaluation metrics to assess the performance of your predictive model.

• Accuracy:

• Formula: (TP + TN) / (TP + TN + FP + FN)

• Precision:

• Formula: TP / (TP + FP)

• Recall (Sensitivity or True Positive Rate):

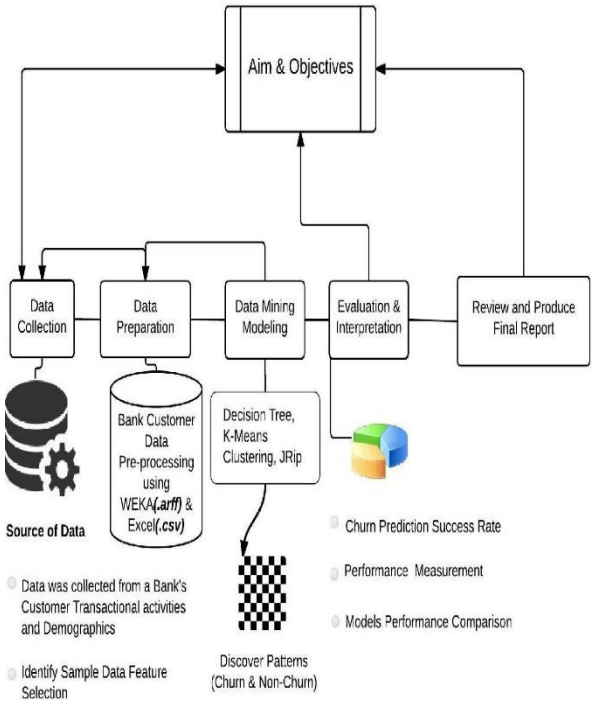
• Formula: TP / (TP + FN)

• F1 Score:

• Formula: 2 * (Precision * Recall) / (Precision + Recall)

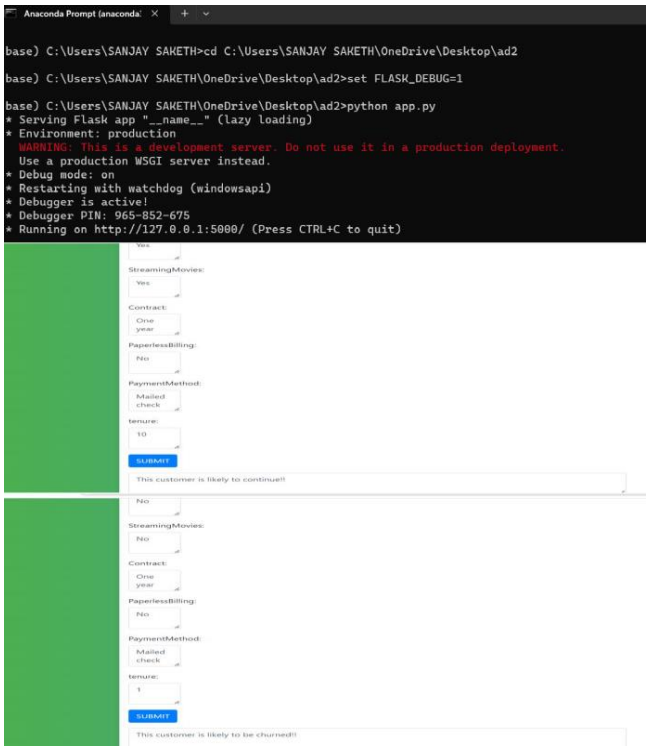
• The F1 score is the harmonic mean of precision and recall. It provides a balance between precision and recall and is particularly useful when there is an uneven class distribution.

ARCHITECTURE :



6. EXPERIMENTAL RESULTS

6.1 Machine learning:



7. CONCLUSION:

7.1 Machine learning:

In conclusion, telco customer churn prediction is a critical task for telecommunications companies aiming to retain customers and enhance business sustainability. Developing an effective churn prediction model involves leveraging machine learning algorithms, such as Random Forest, based on the specific characteristics and requirements of the dataset.

Our model helps in predicting weather the customer will continue or going to be churned . which helps Telcom industries...

8. FUTURE ENHANCEMENT

8.1 Machine learning:

Furtherly this project can be implemented in all the applications as a built in software Certainly! Here are some additional future enhancements:

•Customer Lifetime Value (CLV) Prediction:

Extend the project to predict not only churn but also the potential lifetime value of customers. This can aid in prioritizing efforts towards high-value customers.

- **Dynamic Pricing Strategies:**

Investigate the implementation of dynamic pricing strategies for customer retention. Analyze the impact of personalized pricing models on customer churn.

- **Incremental Learning:**

Implement incremental learning techniques to continuously update the model with new data, allowing the model to adapt to evolving customer behavior.

- **Feedback Loop Integration:**

Establish a closed-loop feedback system to continuously improve the model based on the outcomes of implemented retention strategies.

9. REFERENCES

9.1 Machine learning: REFERENCES

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