



Customer Tech Behaviour Insights

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ABSTRACT —

“The Customer churn analysis is an essential process for businesses that want to maintain a loyal customer base and avoid losing revenue. This abstract will provide insights into customer churn analysis, including key methods and tools used to identify churn, as well as strategies businesses can implement to reduce churn and improve customer retention. One of the primary methods used to identify customer churn is through the use of predictive analytics. By analyzing customer data, businesses can identify patterns and trends that may indicate increased likelihood of churn. Predictive analytics involves analyzing large amounts of data to identify patterns and trends that can be used to make predictions about future behavior. By analyzing customer data, businesses can take proactive measures to retain customers before they leave. Another tool that can be used for customer churn analysis is customer feedback. Feedback from customers who have recently left a business can provide valuable insights into why they chose to leave, as well as what could have been done to retain them. By analyzing this feedback, businesses can identify common themes and develop strategies to address these issues and prevent future churn. Customer segmentation is another key tool that businesses can use to identify customers who are at risk of churn. By segmenting customers based on factors such as demographics, behavior, and purchase history, businesses can identify patterns and trends that may indicate increased likelihood of churn. This allows businesses to target these customers with specific retention strategies, such as personalized offers or targeted communication.”

Keywords: customer churn analysis, predictive analytics, customer feedback, customer segmentation, customer retention, customer service, loyalty programs, incentives, targeted marketing campaigns etc.”

I. Introduction

“The telecommunications industry has undergone rapid digital transformation, and businesses must adapt to stay competitive. A critical part of success in a subscription-based business model is minimizing the rate of customers ending their subscriptions or, in other words, reducing churn. Customer churn occurs when customers choose to abandon their service provider. Customer churn analysis is a crucial area of research in the telecom industry as it enables companies to identify and retain customers who are likely to leave their services. The telecom industry collects vast amounts of customer data, including call usage patterns, billing and payment history, network coverage, and customer demographics. This data can be analyzed using machine learning techniques such as logistic regression, decision trees, random forests, and neural networks to predict churn. The development of effective churn prediction models involves a churn management approach, which includes feature selection, data preprocessing, and model selection. Studies have proposed various models and frameworks for predicting churn, including customer segmentation and targeting to improve retention rates. Churn analysis enables telecom companies to identify factors that contribute to churn, such as poor network coverage, billing issues, lack of personalized service, and high pricing. Companies can take proactive measures to address these factors and improve customer satisfaction and retention rates. By using churn analysis, telecom companies can reduce customer churn, increase profitability, and improve customer satisfaction. Effective churn prediction models and targeted retention strategies can be developed using machine learning techniques and customer data. Customer churn analysis is a critical component of customer relationship management strategy, and it has become increasingly important in a competitive telecom industry.

The growth of the digital age has revolutionized the way companies do business, and it has become increasingly important for companies to minimize customer churn in subscription-based business models. Customer churn refers to the loss of customers who have previously had a business relationship with the company, and it can significantly impact a company's revenue and profitability. In the telecommunication industry, churn analysis is a critical component of customer relationship management strategy, and it involves analyzing customer data to identify factors that contribute to churn, predicting which customers are at risk of leaving, and taking proactive measures to retain them. Telecom companies have access to vast amounts of customer data, including call usage patterns, billing and payment history, network coverage, and demographics. Machine learning techniques such as logistic regression, decision trees, random forests, and neural networks are commonly used to analyze this data and predict churn. Several studies have been conducted to analyze customer churn in the telecom industry, and they have proposed various models and frameworks for predicting churn, including feature selection, data preprocessing, and model selection. Customer segmentation and targeting are essential components of customer churn analysis. By segmenting

customers based on their characteristics and behavior, telecom companies can develop targeted retention strategies that are tailored to the needs of specific customer segments. This approach can improve retention rates and reduce customer churn. Additionally, churn analysis can help telecom companies to identify factors that contribute to churn, such as poor network coverage, billing issues, lack of personalized service, and high pricing. By addressing these factors, telecom companies can improve customer satisfaction and retention rates.”

II. Problem Statement

“The problem statement for customer churn analysis is to predict which customers are likely to churn and identify the key drivers of churn to develop strategies to reduce churn rate and improve customer retention.”

III. Methodology

“To forecast the customer churn study in this case, we are employing machine learning approaches. All machine learning algorithms follow a similar set of steps, as indicated in the block diagram

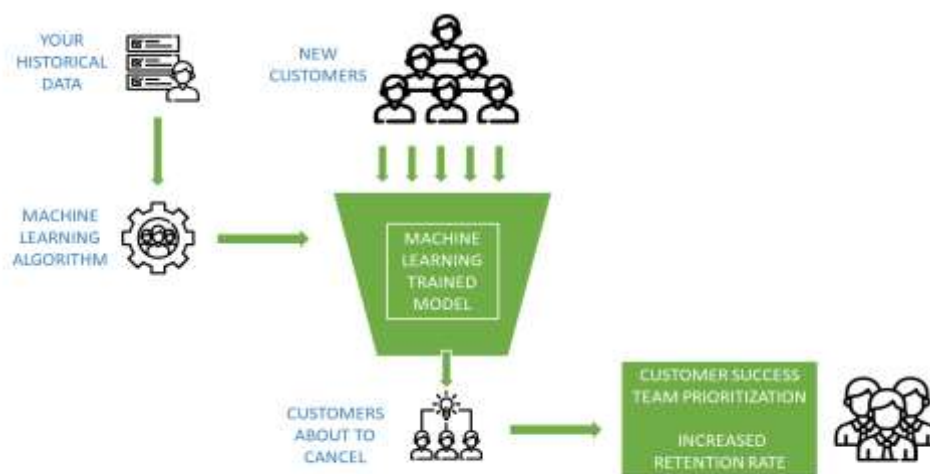


Fig III.1: Proposed Architectural Diagram

Identifying, analyzing, and predicting customer turnover are commonly done through a sequence of phases in the methodology for customer churn analysis. The methodology's broad overview is shown below:

Data Gathering Obtain pertinent information about client behavior, demographics, purchases, interactions, and any other data points that could hint to churn. Numerous sources, including customer databases, CRM programmers', consumer surveys, and internet platforms, can provide this information.

Data preprocessing: Make the data obtained clean and ready for analysis. In doing so, it could be necessary to handle missing values, eliminate duplicates, standardize formats, and convert variables. In order to guarantee the accuracy and consistency of the data, preprocessing is crucial.

Define turnover: For your particular business or sector, provide a precise description of what constitutes customer turnover. Churn may be characterized in a variety of ways, such as customers who have cancelled their subscription or accounts or those who haven't made a purchase in a predetermined amount of time.

Engineering Features Find and generate pertinent characteristics or factors that might aid in churn prediction. Customer demographics, purchase history, engagement metrics, customer service interactions, and any other pertinent information that could offer insights into consumer behavior are examples of these features.

Using exploratory data analysis (EDA), you may learn more about the data and find patterns or trends connected to churn. The links between factors and churn may be understood via visualizations, statistical summaries, and correlation analyses. Churn rate is low across the board in the dataset due to data imbalance. Analysis of certain crucial feature columns, including age on network (AON), call volume, call volume by operator, call volume by recharge amount and count, average revenue per user, and 2G and 3G, is done in order to address the problem. The top percentile of these columns appears to include outliers, which are handled according to the outliers treatment. The outlier treatment involves capping outliers for the above-mentioned features column, which derives some necessary traits, at the 99th percentile. Take out the date columns to perform

an example of logistic regression using the data at hand.

Step 1: Perform for each of the following: AON, ic, og, odu, rech amt, rech count, and arpu. Do step two from June through August.

Step 3: Plot columns with a churn label and merge a column with a churn column.

Step 4: Finish for

Step 5: Finish for

Step 6: Make sure the column list does not finish.

Step 7: Use the 99th percentile and 1 percentile to cap the numbers.

Step 8: Use the percentile to compare data.

Step 9: the conclusion of Remove the outliers for certain columns, such as roam og mou 8, arpu 7, loc og mou 8, loc ic mou 7, and standard og mou 7.

Model Selection: For churn prediction, select an appropriate machine learning method or ensemble of algorithms. Logistic regression, decision trees, random forests, gradient boosting, and neural networks are examples of frequently used models. The dataset, problem complexity, required interpretability, and computational resources all play a role in the model selection process.

Education and Assessment: Create training and testing sets from the dataset. The chosen model should be trained on the training set, and its performance should be assessed on the testing set. Accuracy, precision, recall, F1 score, and area under the receiver operating characteristic curve (AUC-ROC) are common assessment measures for churn analysis.

Using the right assessment measures, such as accuracy, precision, and recall, is crucial to effectively identifying churners as opposed to non-churners. Create a ROC graph, a confusion matrix, and a classification report for the best-performing Random Forest model. Obtain the number of records that were properly predicted and incorrectly forecasted using the random forest mode.

Validation and Model Tuning: To improve the model's performance, tweak hyperparameters like learning rates or regularization parameters. Additionally, evaluate the model's generalizability and make sure it doesn't overfit the training data by using cross-validation or validation sets.

Applying newly acquired client data to the trained and verified model will allow you to foresee churn. This may be done in batch mode for historical data analysis or in real-time for current churn monitoring.

Interpretation and Action: Examine the model's forecasts and deduce the major churn-influencing variables. Develop methods to reduce churn, such as focused marketing efforts, individualized retention offers, or better customer experiences, by identifying actionable information.”

IV. Final Result:

The Final Result of customer Churn Analysis is shown below

The screenshot displays a web-based form for customer churn prediction. The form is titled "CUSTOMER CHURN PREDICTION" and contains several input fields, each with a label and a corresponding value or placeholder. The fields are: Name (with a dropdown arrow), Phone Number (with a dropdown arrow), Home Address (with a dropdown arrow), Time of Processing (with a dropdown arrow), Subscription (with a dropdown arrow), Gender (with a dropdown arrow), Monthly Salary (with a dropdown arrow), Expense Bill (with a dropdown arrow), Monthly Charges (with a dropdown arrow), and Time & Service (with a dropdown arrow). A red "PREDICT" button is located at the bottom right of the form.

Fig IV.1:- Filling the Fields

The Data Should be Enter in respective Fields to get final

Final Outcome. In Final Outcome We will get the accuracy of the customer Churn Analysis

