Enhancing Customer Engagement and Reducing Churn:

Data-Driven Solutions and Prediction for Telecommunication Success

by Aruci Team

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Background

The telecommunications industry plays a pivotal role in modern society, connecting people, enabling communication, and providing access to a multitude of services. As technological advancements continue, the importance of telecommunications companies in our daily lives has only increased.

Challenges

Churn Rate

The rate at which customers leave the company is alarmingly high.

Engagement

Some customers are not actively using additional services, impacting revenue and customer experience

Customer Spending

The fluctuation in customer spending per month makes it challenging to predict revenue and allocate resources effectively.

Call Center Utilization

The limited utilization of call center services might be a sign of unaddressed customer issues.

Customer Behavior

It's crucial to understand what drives customer retention and engagement to tailor services accordingly.

Importances

Risk Management

The urgency of addressing these issues cannot be overstated. Failure to do so can result in severe financial losses, a damaged reputation, and ultimately, the inability to compete in a highly competitive industry.

Profitability Focus

. The importance of optimizing customer engagement and reducing churn rate is evident. It directly impacts a company's bottom line and its ability to thrive in a rapidly evolving market.
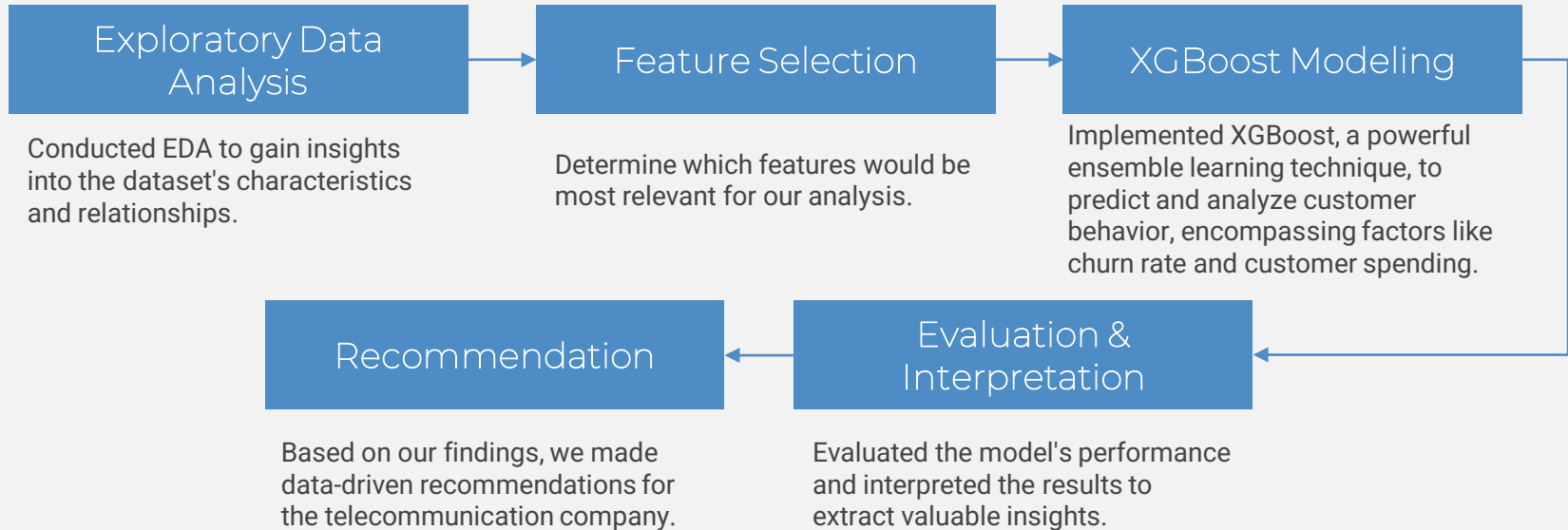
Data-Driven Approach

In an age of data and analytics, companies have the opportunity to leverage insights from their data to tackle these challenges head-on, ultimately improving customer satisfaction and their own long-term sustainability.

Data & Methodology

The dataset shows the usage of telecommunication services in Q3 of a particular year adapted from a Kaggle public dataset with several modifications. There are several columns provided in the dataset:

Customer ID	A unique customer identifier
Tenure Months	How long the customer has been with the company by the end of the quarter specified above
Location	Customer's residence - City
Device Class	Device classification
Games Product	Whether the customer uses the internet service for games product
Music Product	Whether the customer uses the internet service for music product
Education Product	Whether the customer uses the internet service for education product
Call Center	Whether the customer uses the call center service
Video Product	Whether the customer uses video product service
Use MyApp	Whether the customer uses MyApp service
Payment Method	The method used for paying the bill
Monthly Purchase	Total customer's monthly spent for all services with the unit of thousands of IDR
Churn Label	Whether the customer left the company in this quarter
Longitude	Customer's residence - Longitude
Latitude	Customer's residence - Latitude
CLTV	Customer Lifetime Value with the unit of thousands of IDR - Calculated using company's formulas

Data & Methodology

Exploratory Data Analysis

Conducted EDA to gain insights into the dataset's characteristics and relationships.

Feature Selection

Determine which features would be most relevant for our analysis.

XGBoost Modeling

Implemented XGBoost, a powerful ensemble learning technique, to predict and analyze customer behavior, encompassing factors like churn rate and customer spending.

Recommendation

Based on our findings, we made data-driven recommendations for the telecommunication company.

Evaluation & Interpretation

Evaluated the model's performance and interpreted the results to extract valuable insights.

Data & Methodology :
Data Exploratory

Checking Missing Values

Examine the dataset to identify any missing values in columns.

Checking Duplicates

Inspect the dataset for duplicate rows and take appropriate action, such as removing duplicates, to maintain data integrity

Checking Outliers

Analyze the dataset for the presence of outliers in numerical variables. Determine whether to address outliers through transformations, imputation, or removal, depending on the nature of the data.

Changing Categorical Variables to Numeric

Convert categorical variables into a numeric format suitable for modeling. This may involve techniques such as one-hot encoding, label encoding, or using techniques specific to the algorithm being used.

Data & Methodology :
Data Exploratory

Counting Rows & Columns — Count the number of rows and columns in the dataset.

Checking Structure — Examine the structure of the dataset to review data types and identify any data errors.

Checking Unique Value — Inspect the unique values in each column to understand the diversity of the data.

Data Visualization

- General Churn Visualization
- Customer Distribution Visualization
- Customer-to-Churn Distribution Visualization
- Customer Lifetime in Service to Churn Visualization
- Monthly Charges to Churn Visualization
- Payment Method to Churn Visualization
- Correlation between variables
- etc.

Data & Methodology :
Feature Selection

Correlation analysis

Perform correlation analysis to identify highly correlated features and mitigate multicollinearity. High correlation between features can affect the performance of certain models, including linear models. Consider removing one of the highly correlated features to improve model interpretability and stability.

Dropping columns

Remove unnecessary columns from the dataset:
- Customer ID
- Latitude
- Longitude
- Location
- CLTV

Data & Methodology :
XGBoost Modeling

Data Splitting	Divide the dataset into training and testing sets into 80-20 ratio.
Feature Scaling	Standardize or normalize the numerical features in the dataset.
Data Balancing	Assess and address class imbalance in the target variable (churn). If there is a significant imbalance between the number of churn and non-churn instances.
Validation Model	Implement a validation strategy to fine-tune hyperparameters and assess model performance:

Tools Used
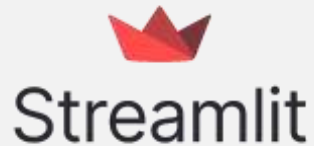
Result

Churn Rate Insights
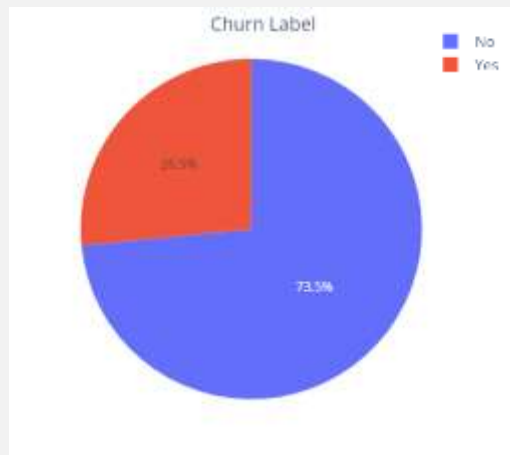
A total of 1869 customers churned and 5174 did not churn.

Result

Churn Rate Insights by location

Piechart Location — Jakarta / Bandung — 28.6%, 71.4%

Piechart Churn Customer by location — Jakarta / Bandung — 29.2%, 70.8%

Most customers come from the Jakarta area with the number of customers = 5031 (71.4%) While in Bandung, the number of customers amounted to = 2012 (28.6%)

Most customers who churn are in the Jakarta location as many as 1323 customers and the rest in Bandung as many as 546 customers.

Result

Churn Rate Insights based on Customer Tenure
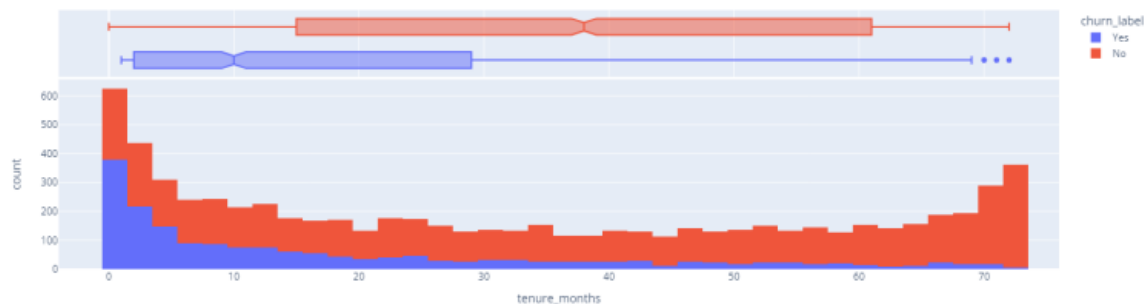
We identified that customer tenure (the length of time a customer has been with the company) has a significant impact on churn rate. Longer-tenured customers are less likely to churn, highlighting the importance of customer retention efforts.

Result

Service Usage
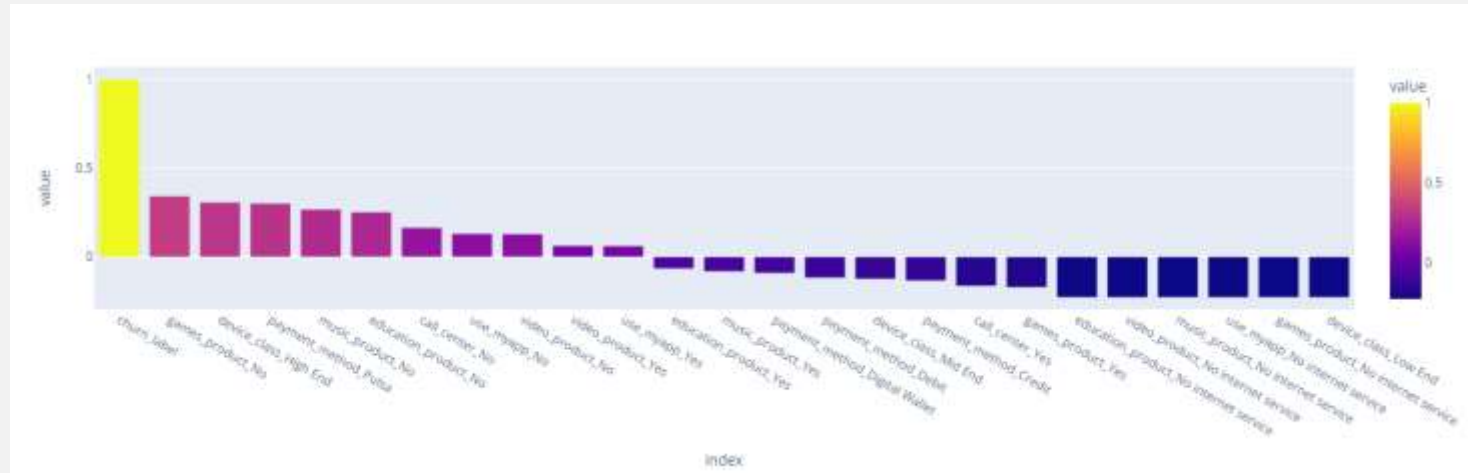
Customers who use services such as Call center, myApps, Games, Music, Education, and Video Products are more likely to stay with the company. This suggests that these services play a vital role in retaining customers.

Result

User Device Classes

Customers who use high-end device are more likely to churn from the company.

Result

Product Heatmap Correlation
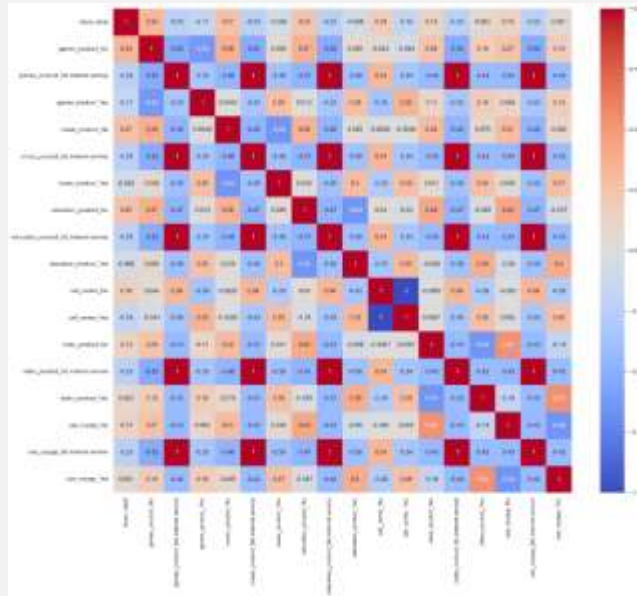
Customer churn is mostly related to customer who didn't use games product service.

Result

Call Center Engagement
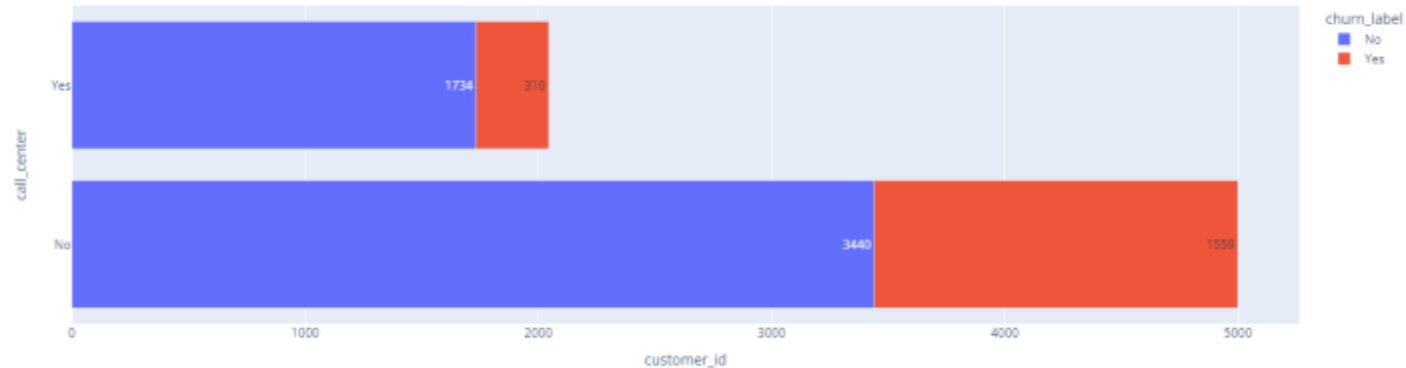
An increase in the utilization of call center services is linked to higher customer retention, emphasizing the importance of providing effective customer support.

Result

Monthly Spending
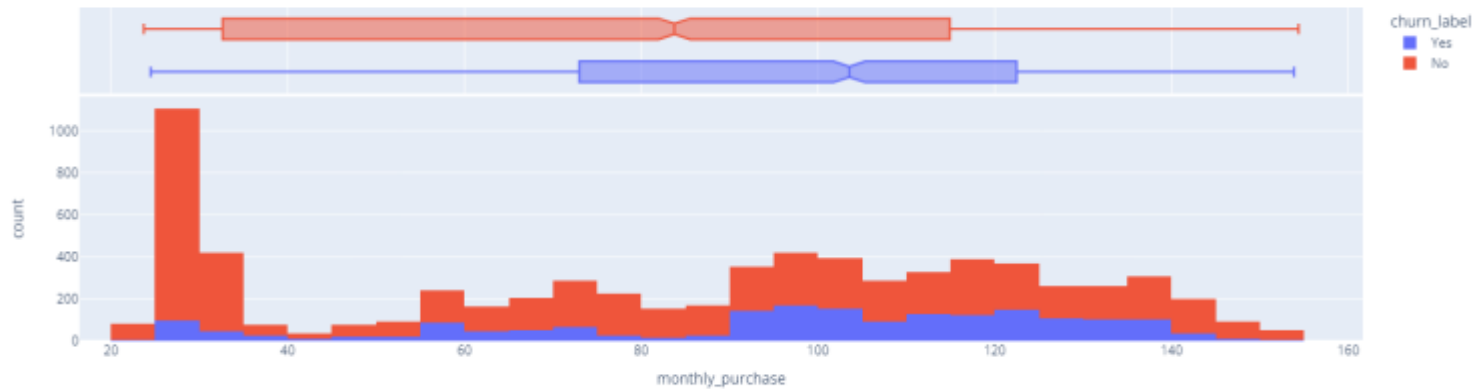
Monthly spending by customers varies, impacting revenue. Those with higher spending are less likely to churn.

Result

Customer Payment Method
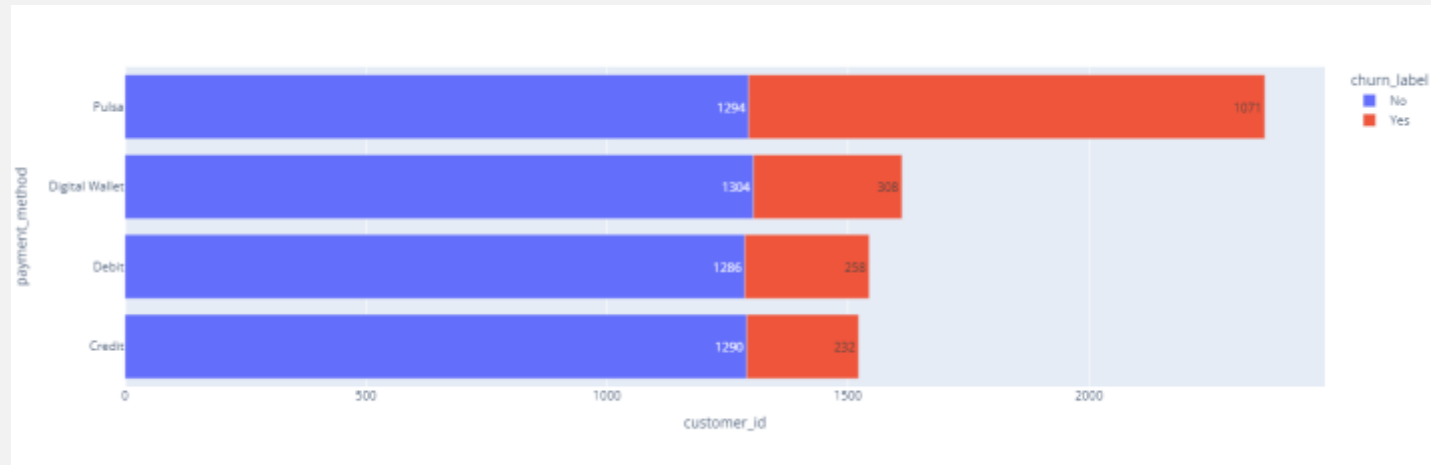
Most customers who churn are customers who use the credit payment method.

Result

XGBoost Model Evaluation
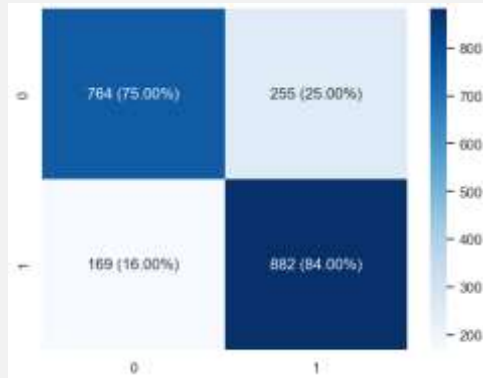
In summary, the model shows reasonably good performance with balanced precision and recall for both classes.

Business Interpretation: Each factor contributes to the prediction of churn and whether the model aligns with business intuition. Certain behaviour, products, or services (games_product, music_product, video_product, etc.) have a higher impact on churn, it may inform targeted retention strategies.

General Conclusion

- The findings from our analysis have provided valuable insights into customer behavior within the telecommunications industry.

- By understanding the key drivers of customer retention and engagement, the company can make informed decisions to optimize its strategies.

- We recommend that the company focus on customer retention efforts, enhance customer support, and further develop its services to increase customer engagement.
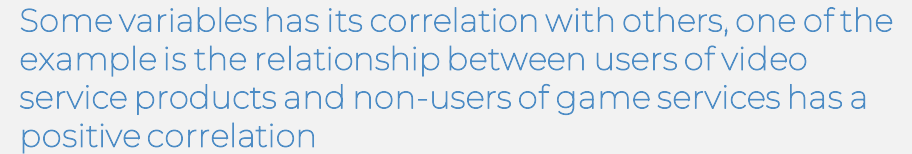
Conclusion & Solution
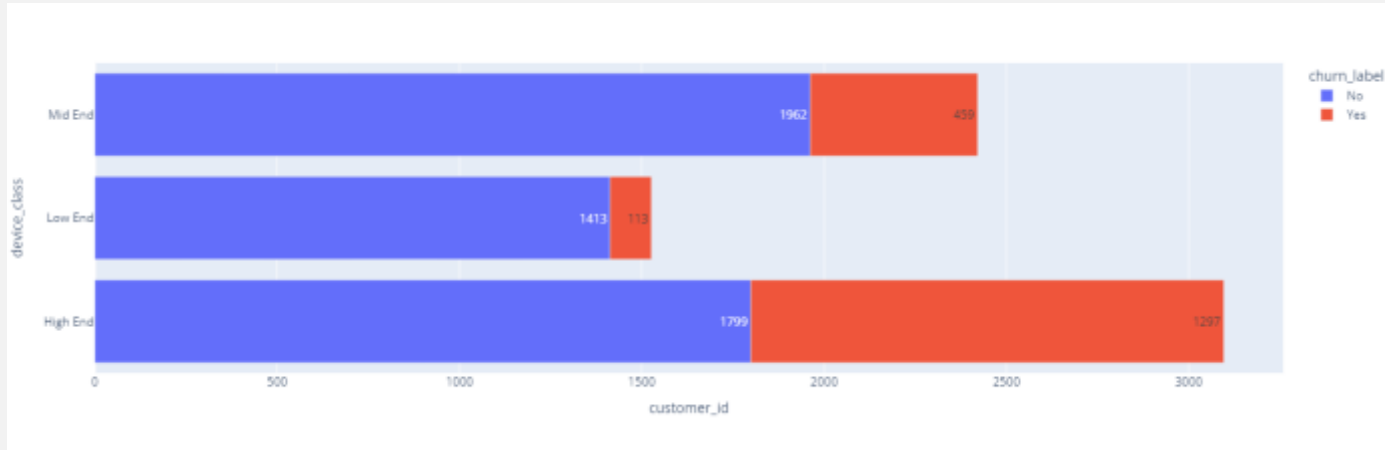
Based on device class, high-end devices have more potential to leave the company.
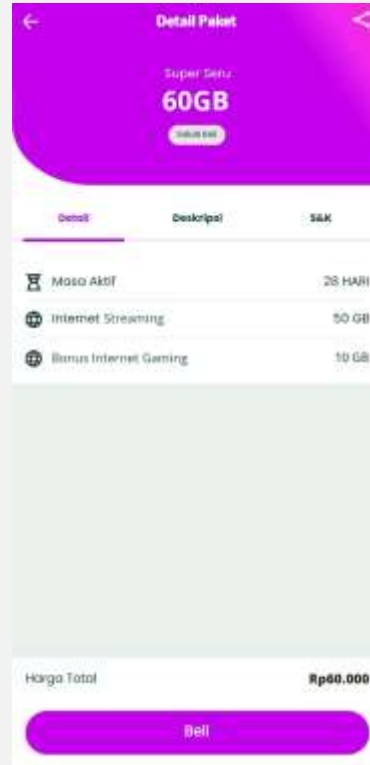
Solution
The company is advised to provide more attractive offers to high-end deivce users

Conclusion & Solution

Some variables has its correlation with others, one of the example is the relationship between users of video service products and non-users of game services has a positive correlation

But, users of video service does have high correlation to video product

Solution
Provides bundling packages for video service users with additional gaming packages

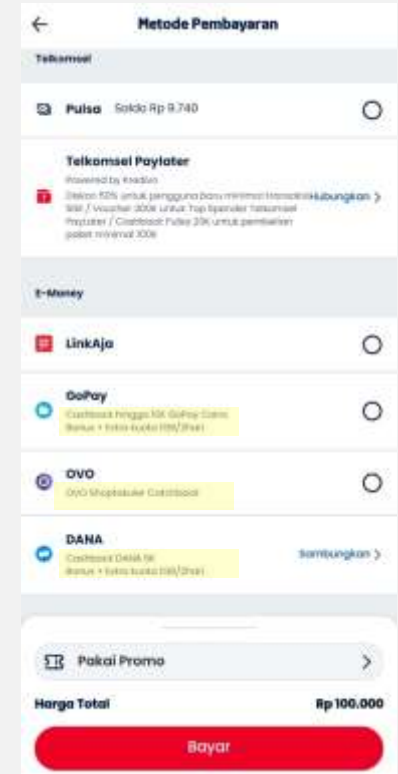# Conclusion & Solution

Example of a package bundling promotion
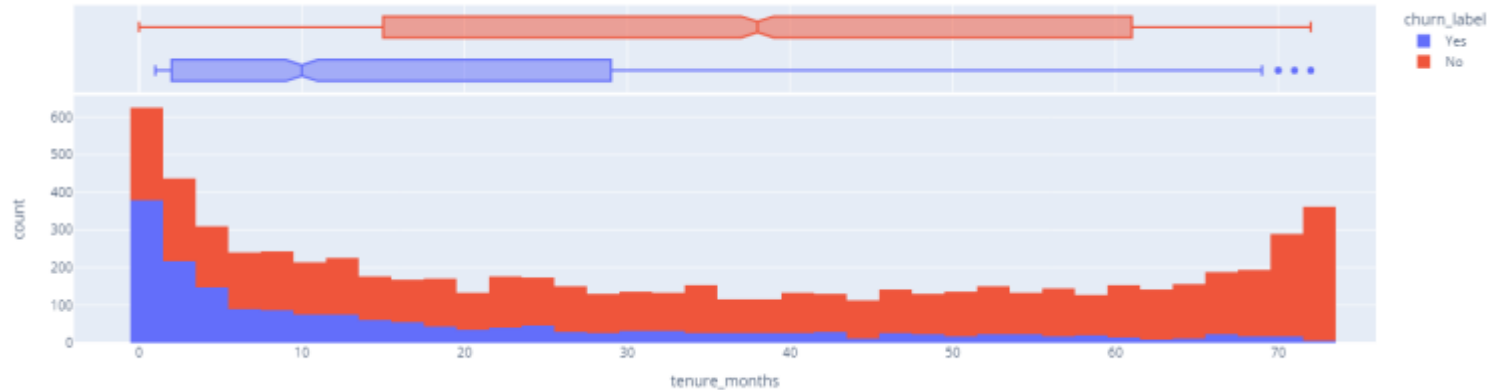
Conclusion & Solution
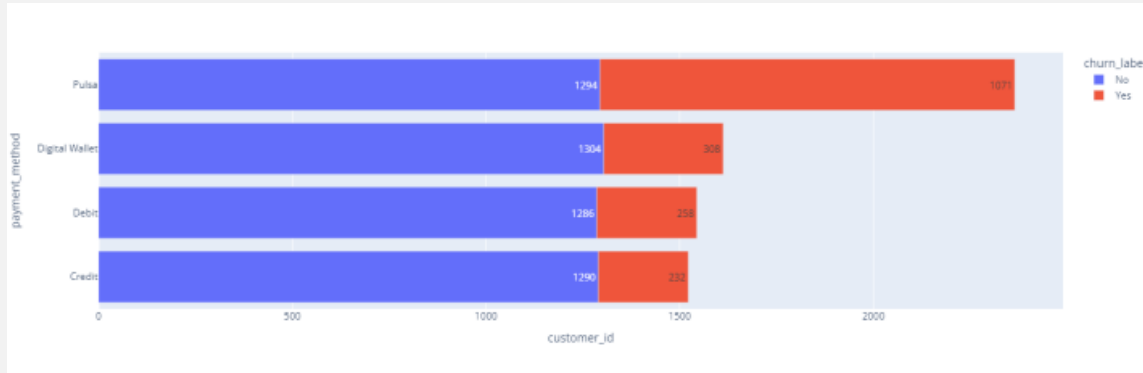
Payment with pulsa are not efficient for payment because of the flexibility. Pulsa usually only used for payment in the telecommunication company, so the user is reluctant to top up their balance and auto-monthly payment aren't sustained.

Solution
Provide advantages for users to switch from pulsa payment to digital wallet, debit, or credit.
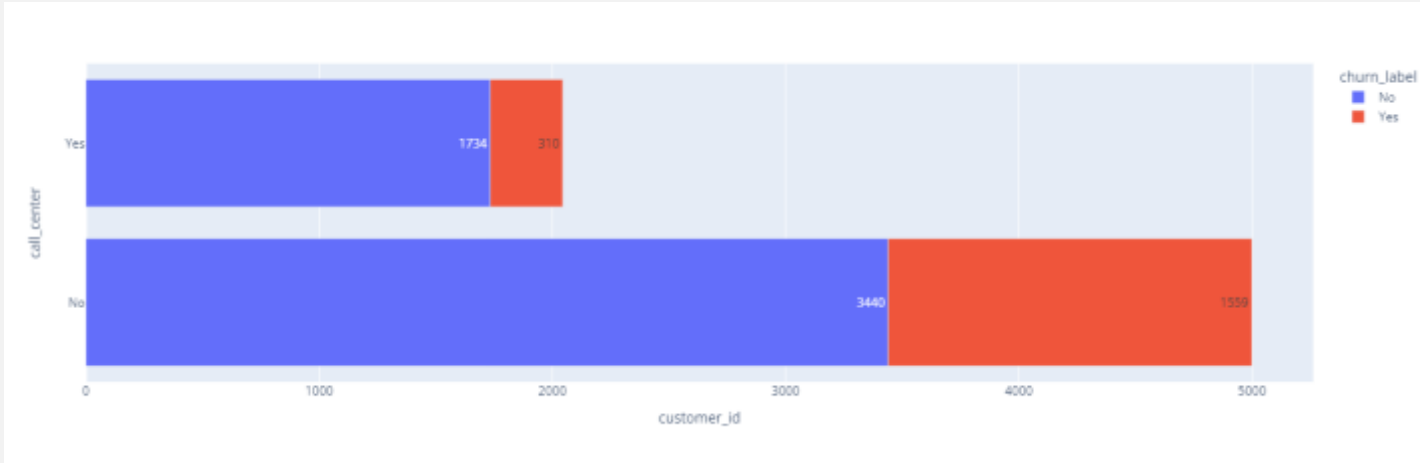
Conclusion & Solution

New customers are likely to leave due to their behavior of testing the service against their convenience.

Solution
Provide more advantages for new user below 5 month of tenure.
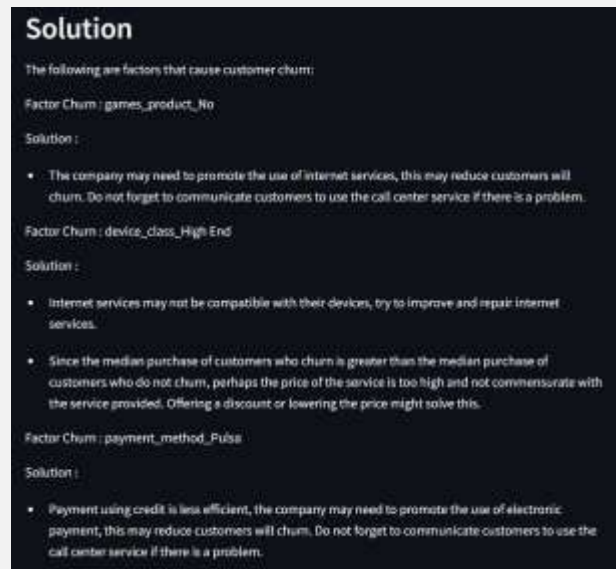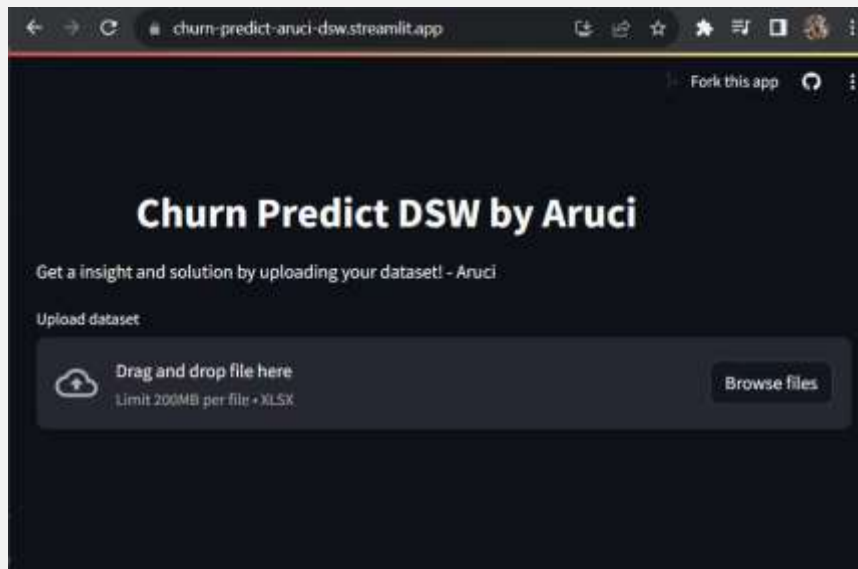
Conclusion & Solution

The churn rate for customers who use a call center is smaller than those who don't use a call center.

Solution
Providing offers through the call center to customers so that customers are more accustomed and not stiff when consulting with the call center

Conclusion & Solution

Based on Machine learning that have been made, it could be implemented as prediction model for company to predict new customer churn potential

Explore the power of our churn prediction model by visiting our dynamic website at https://churn-predict-aruci-dsw.streamlit.app/ (use Telco_customer_churn_adapted_v2 dataset)

Thankyou