Customer Churn Prediction using Machine Learning

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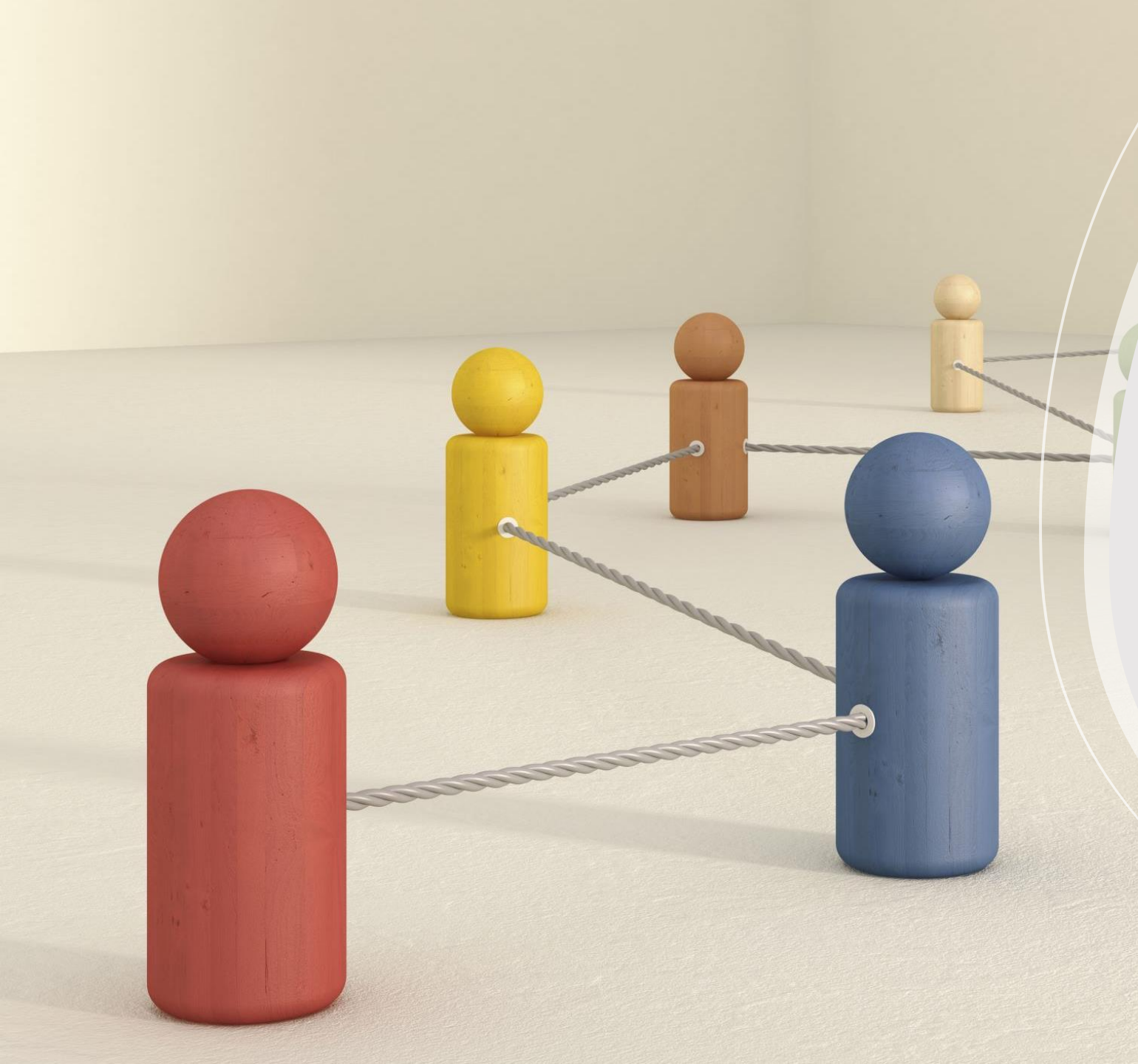


Outlines

- Introduction
- Problem statement
- Dataset
- Data processing
- Exploratory data analysis (EDA)
- Model development
- Model evaluation
- Deployment

Problem Statement

- In a service-oriented industry, retaining customers is as crucial as acquiring new ones.
- Customers churn out company service for many reasons.
- Analysis of customer churn prediction is a crucial point for the business growth of a company.
- Machine learning can predict customer churn based on customer information data.

Dataset

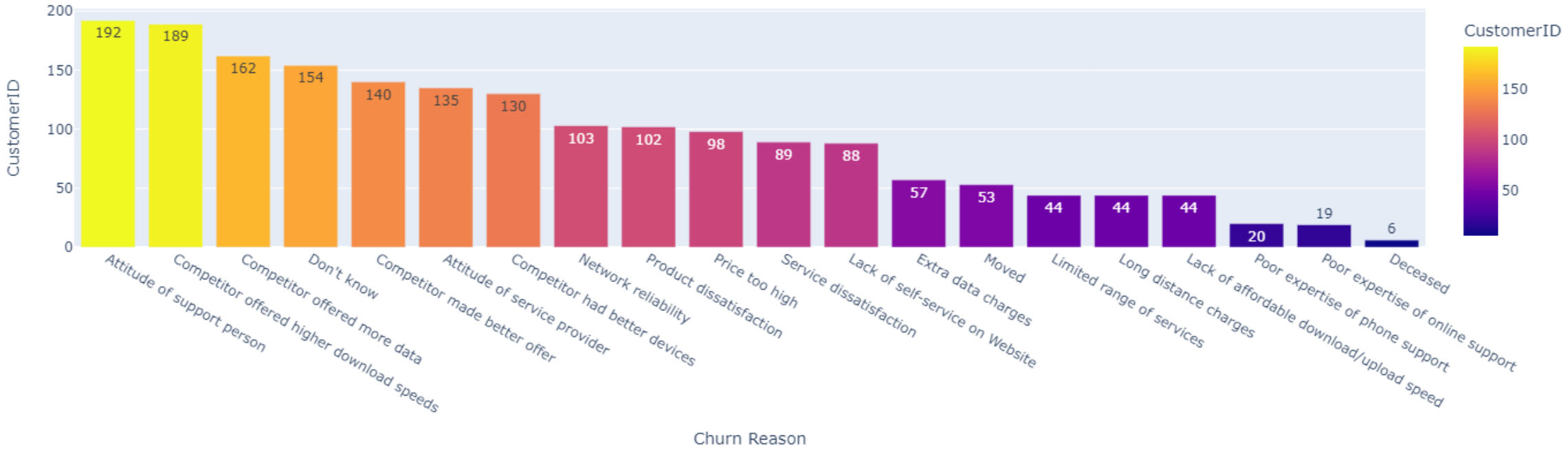
Dataset introduced by IBM about customer information

Dataset contain 7043 observation with 33 variables

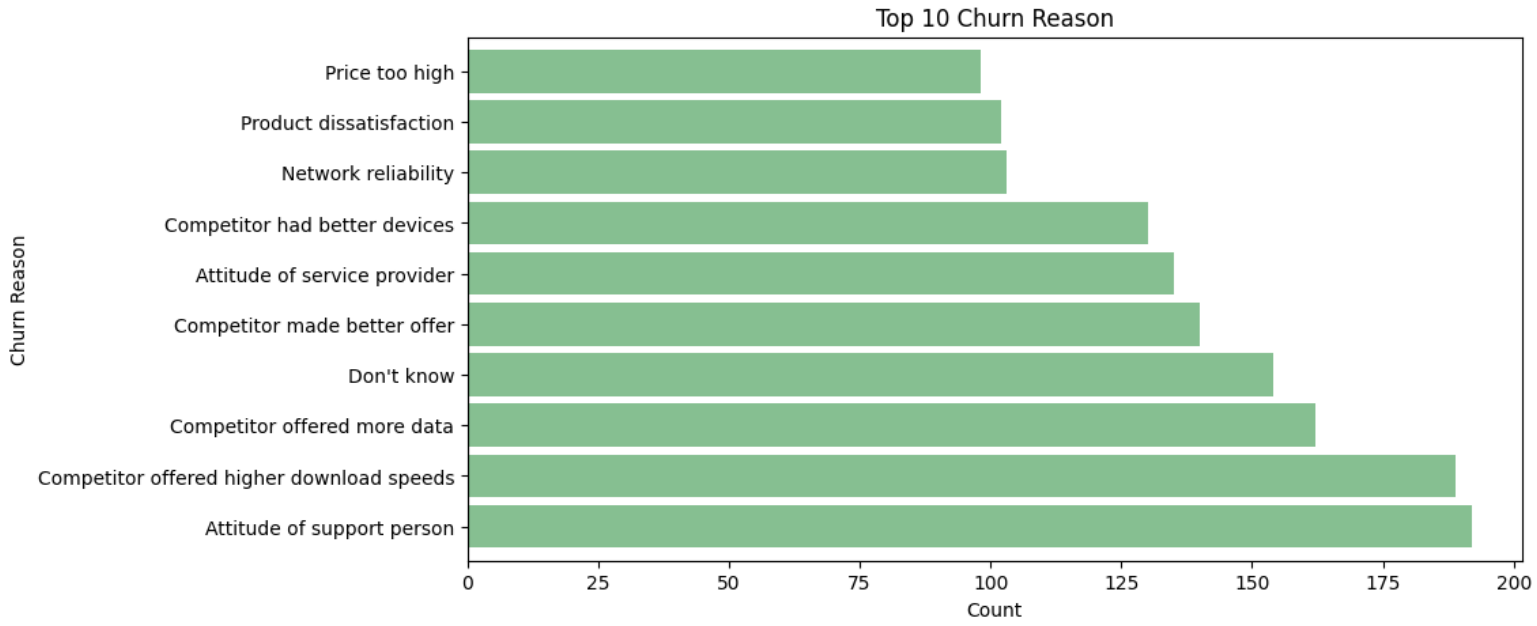
Most useful features

- Payment method
- Gender
- Location
- Monthly charge
- Tech support
- Internet service
- Reason to churn
- Churn label

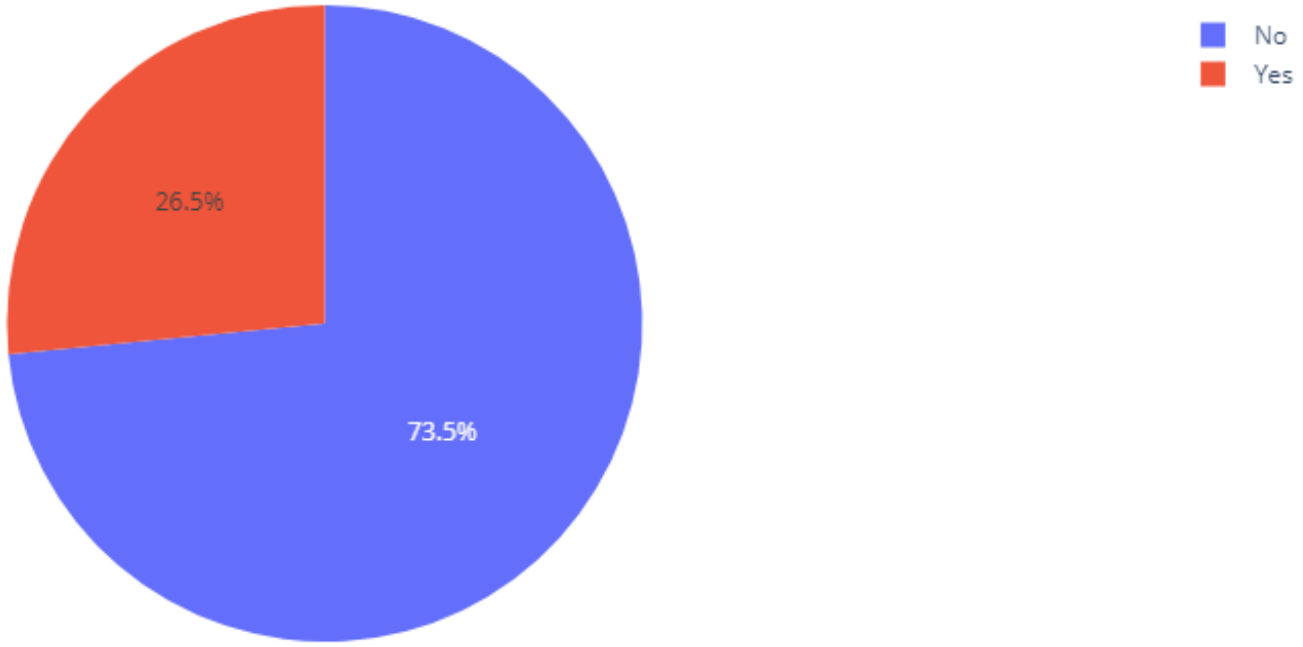
Why customer churn?



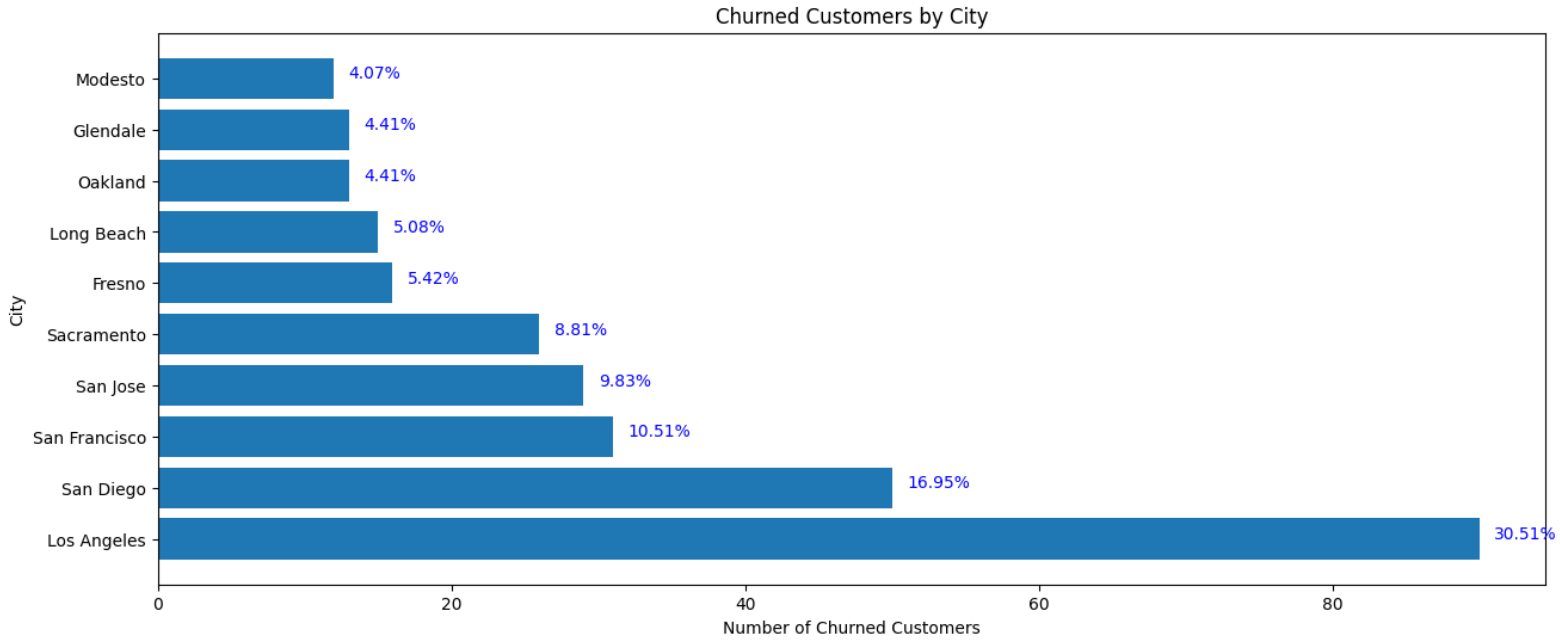
Top 10 reason for Customer Chrun



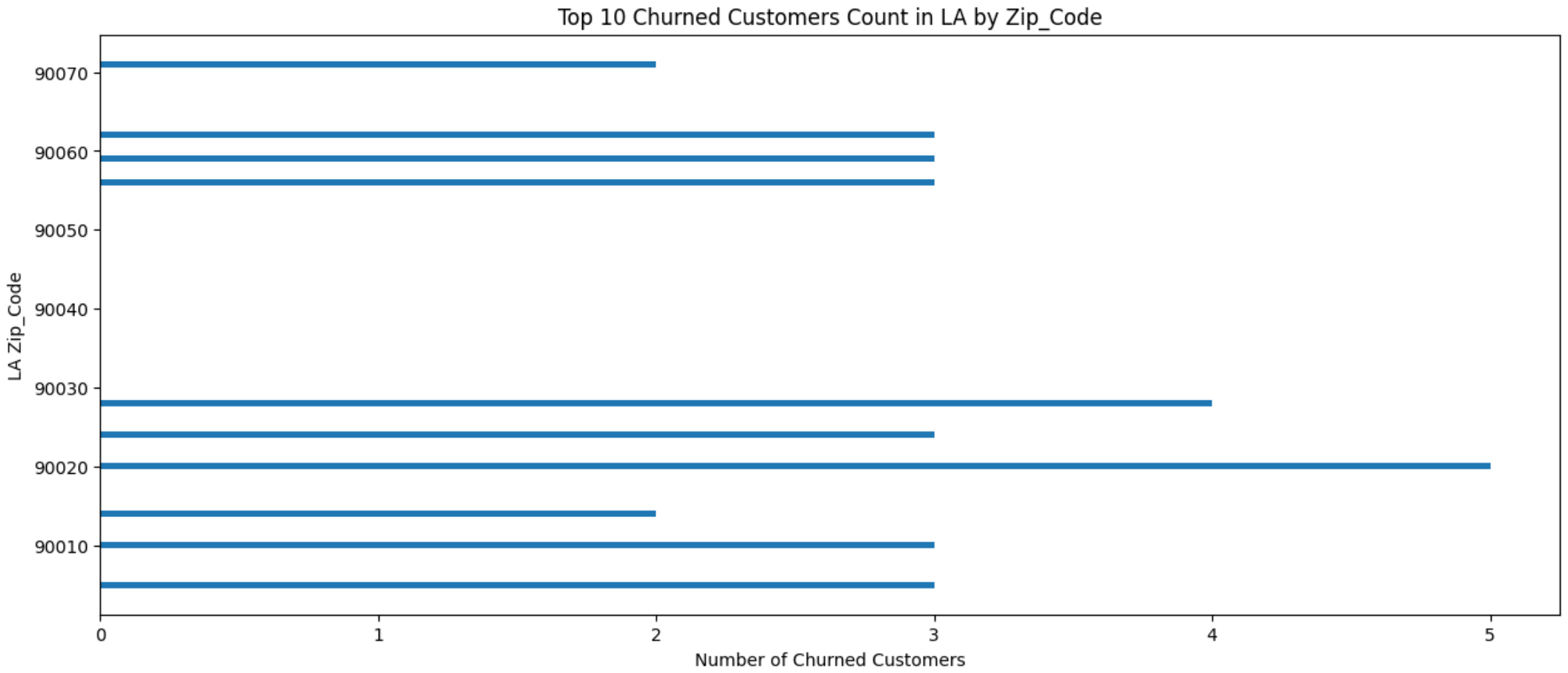
Customer churn rate in Q3, California, USA



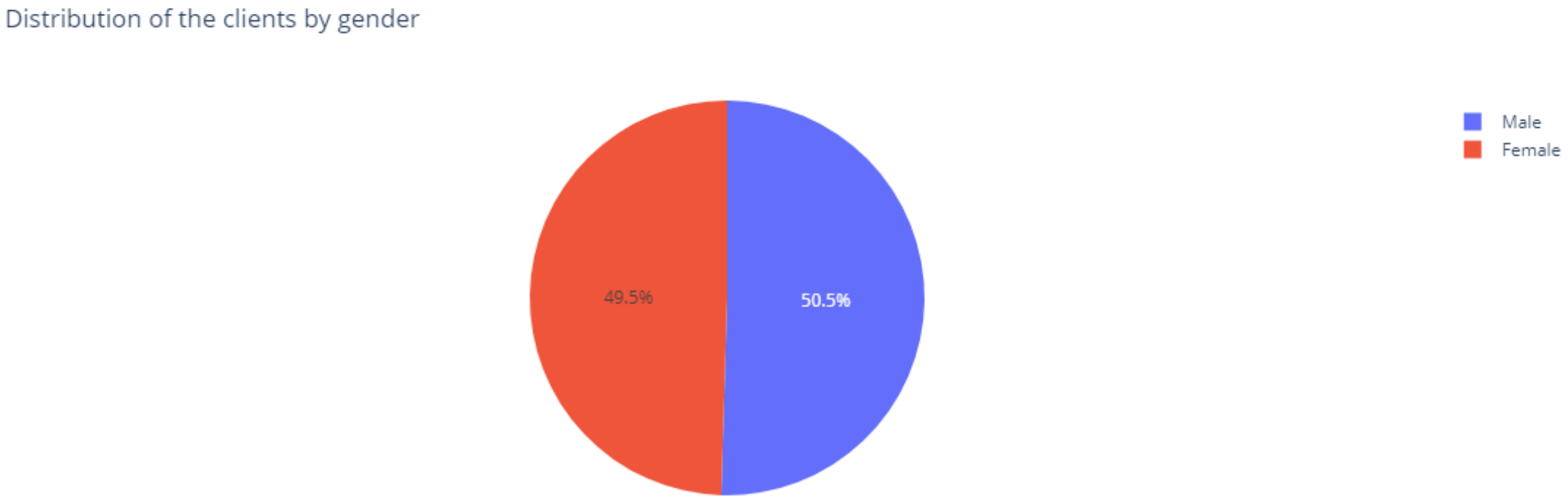
Top 10 cities for high churn rate



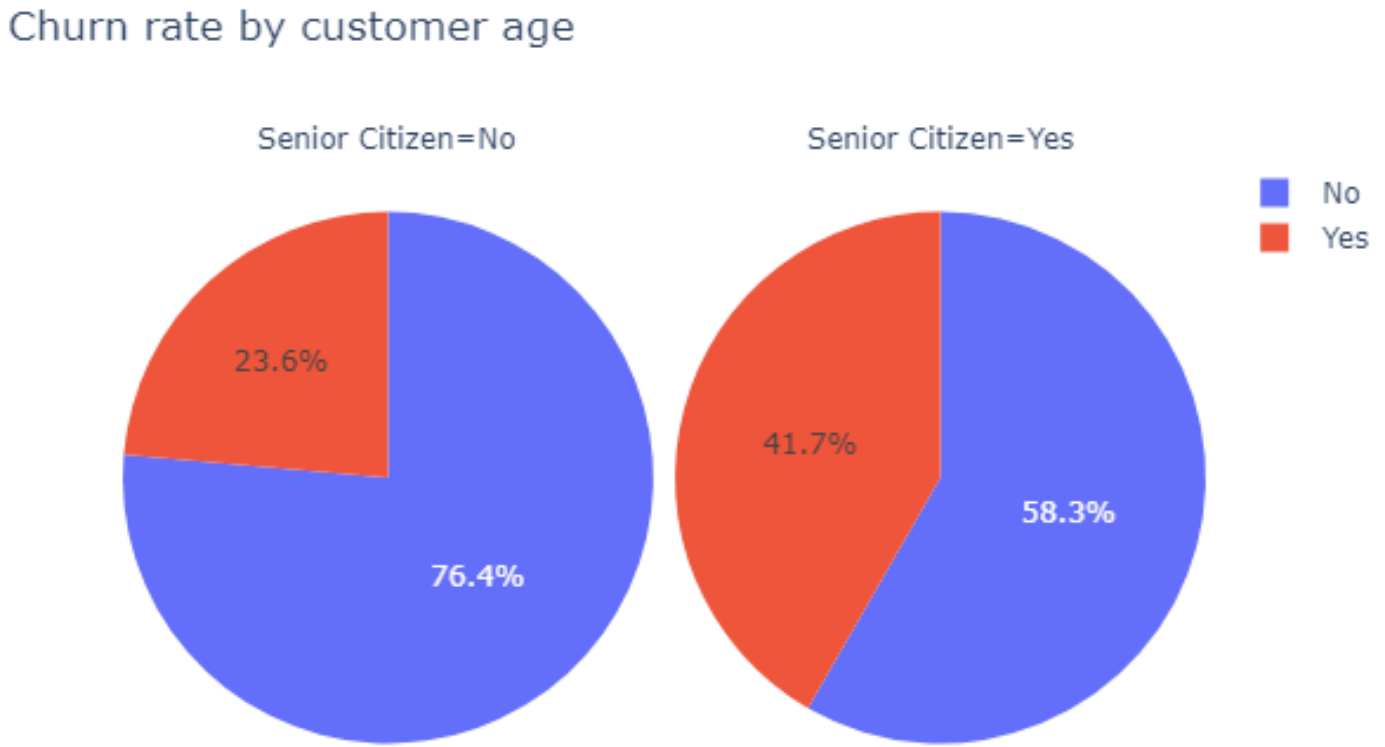
Churn rate by zip code in Los Angles



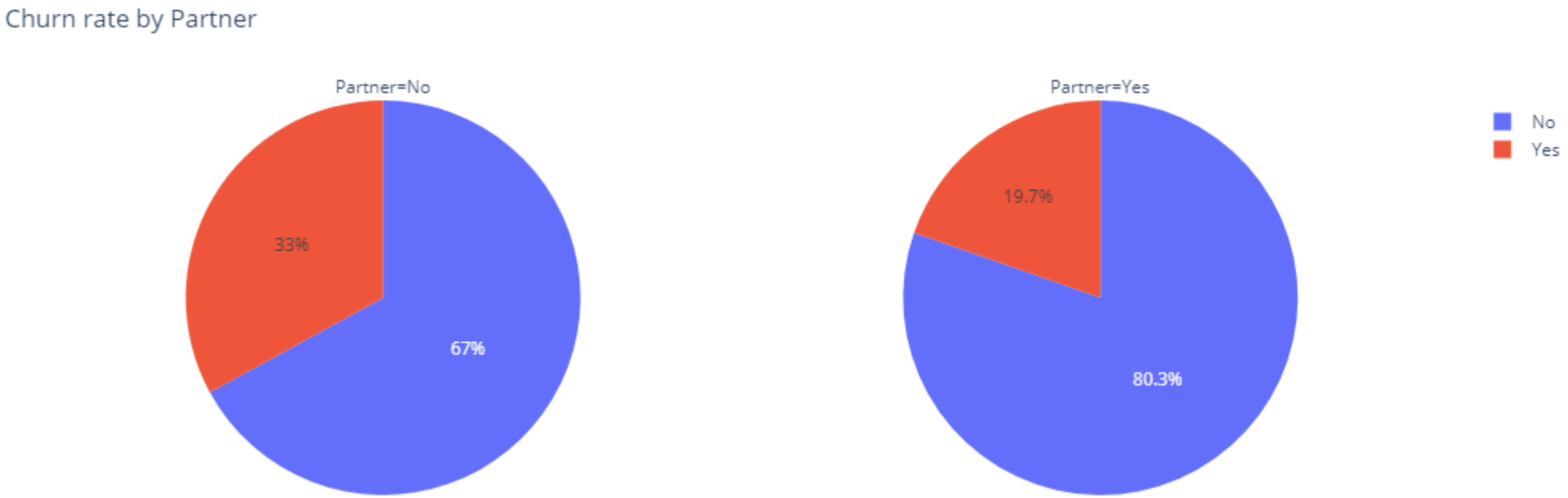
Is gender affecting churn rate?



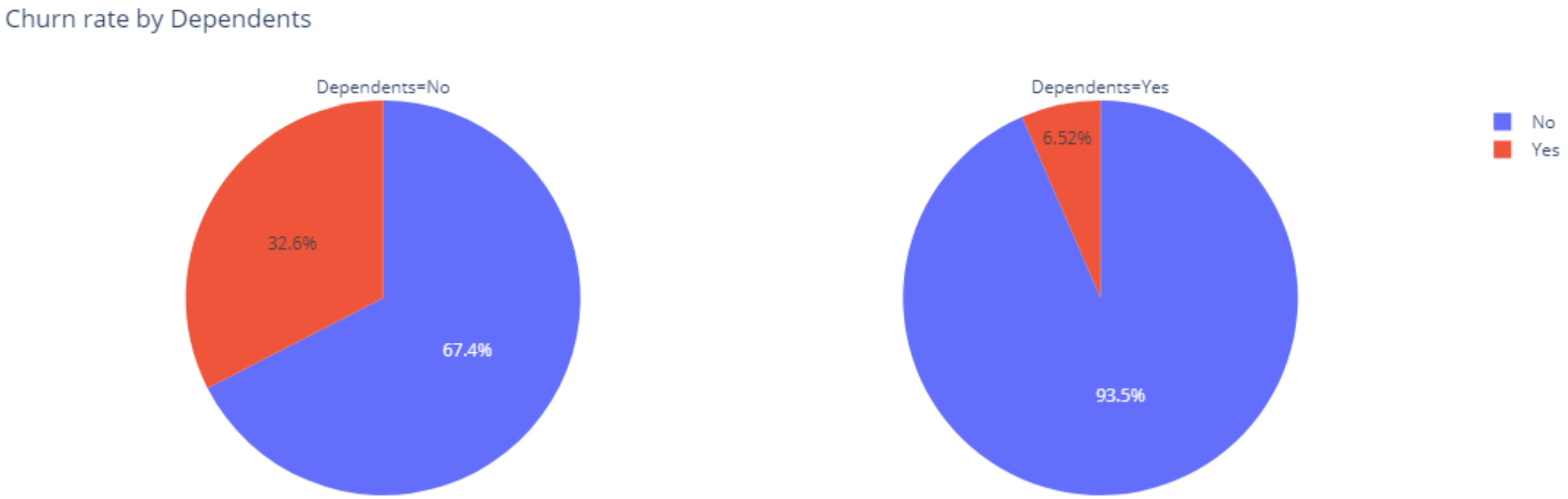
Is age a fact about churn rate?



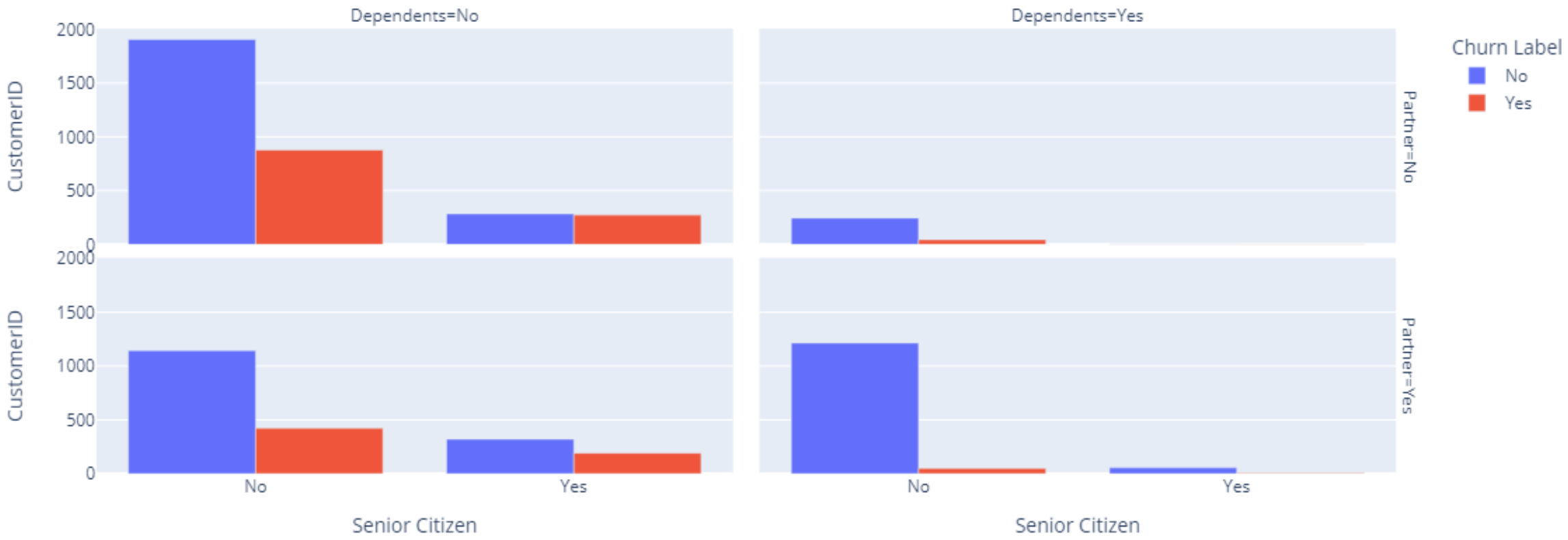
Does the partner of a customer have an impact on churn rate?



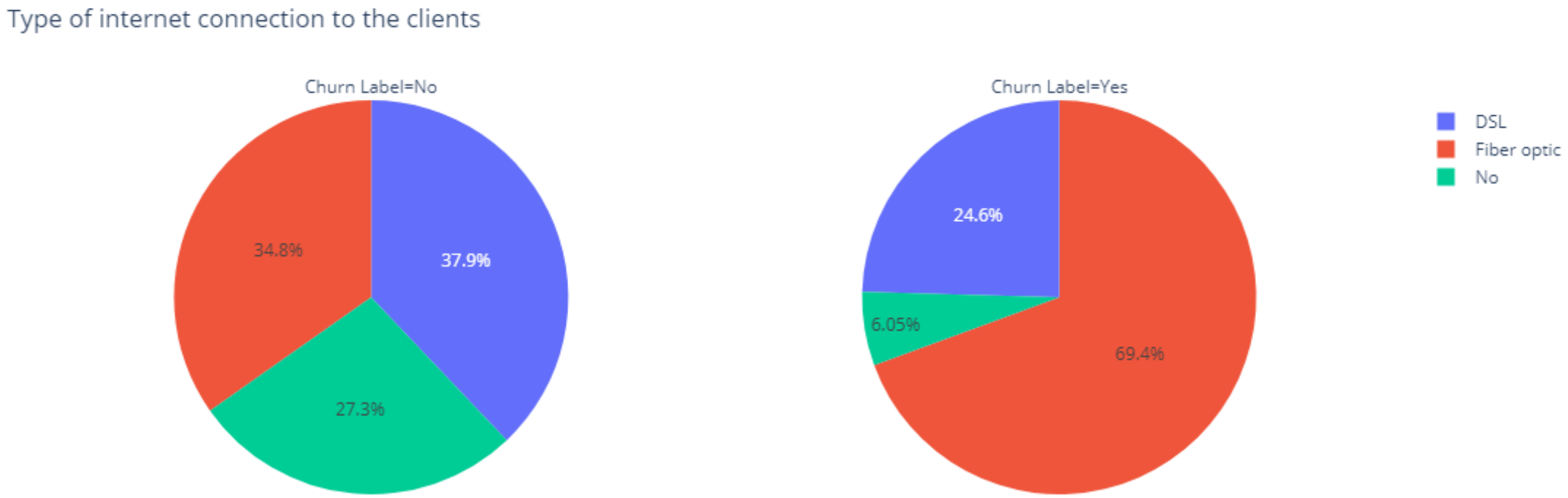
Does dependency have a big impact on the churn rate?



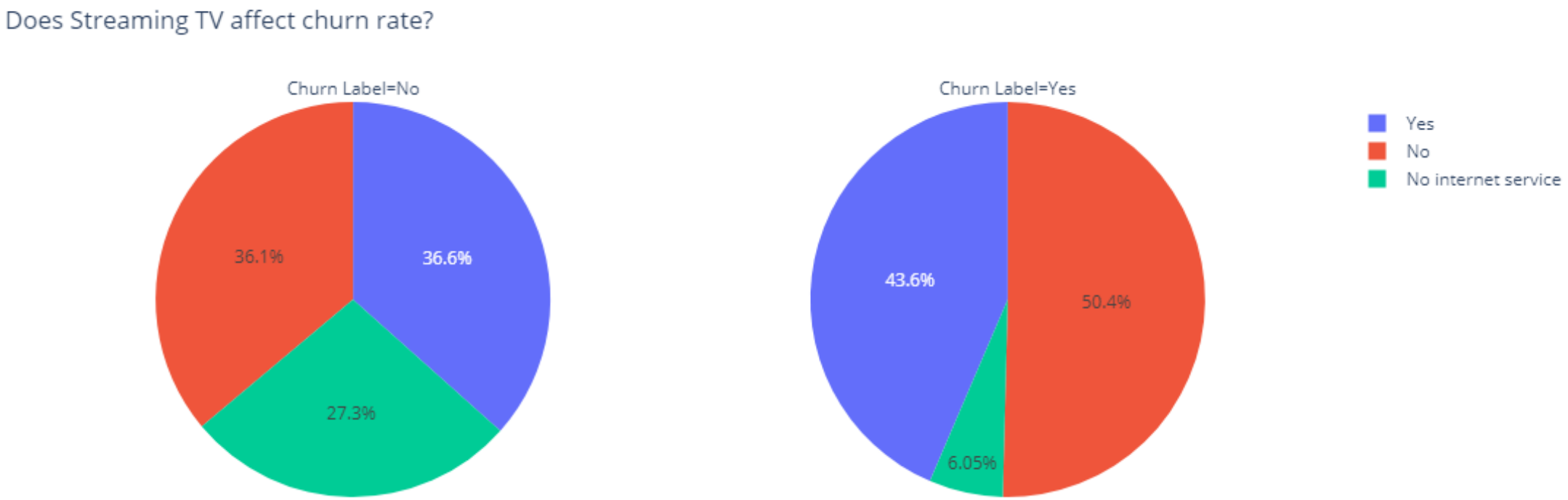
Senior citizen vs Dependents vs Partner



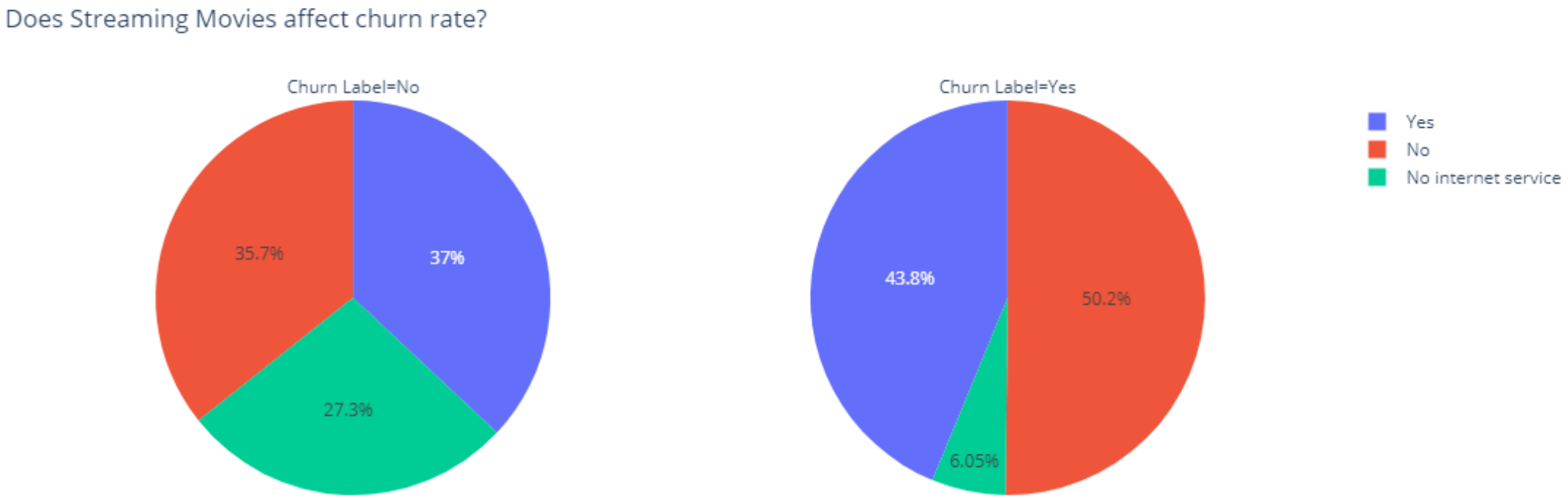
Optical fiber has a 69.4% impact on churn rate compared to DSL



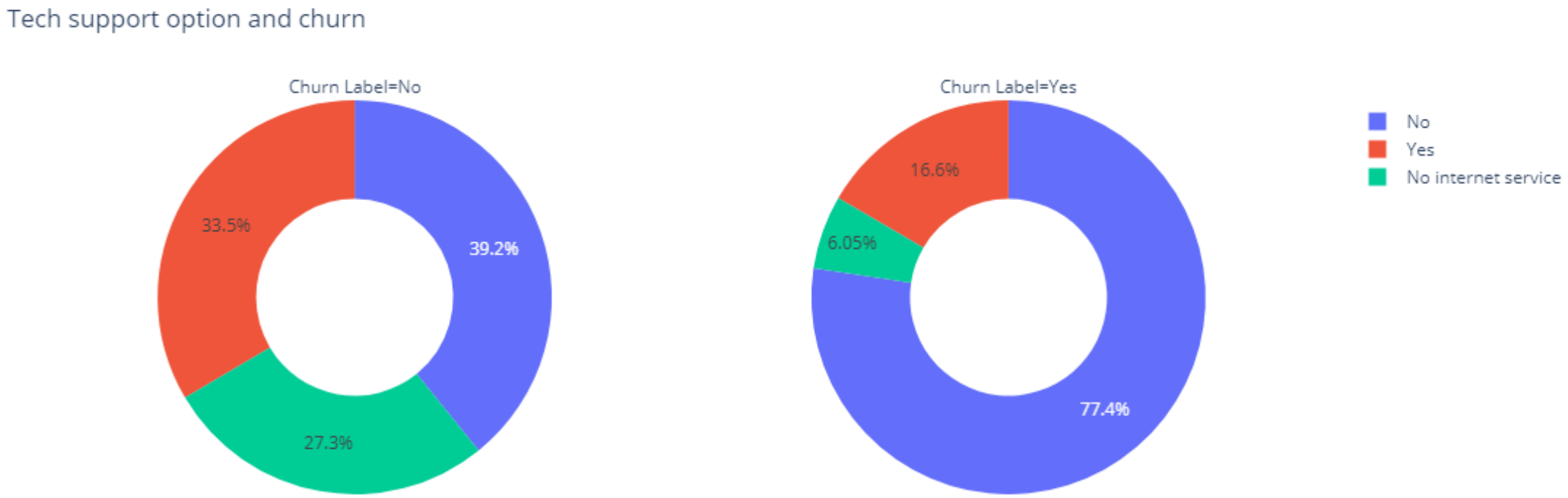
Streaming TV have impact on Churn rate



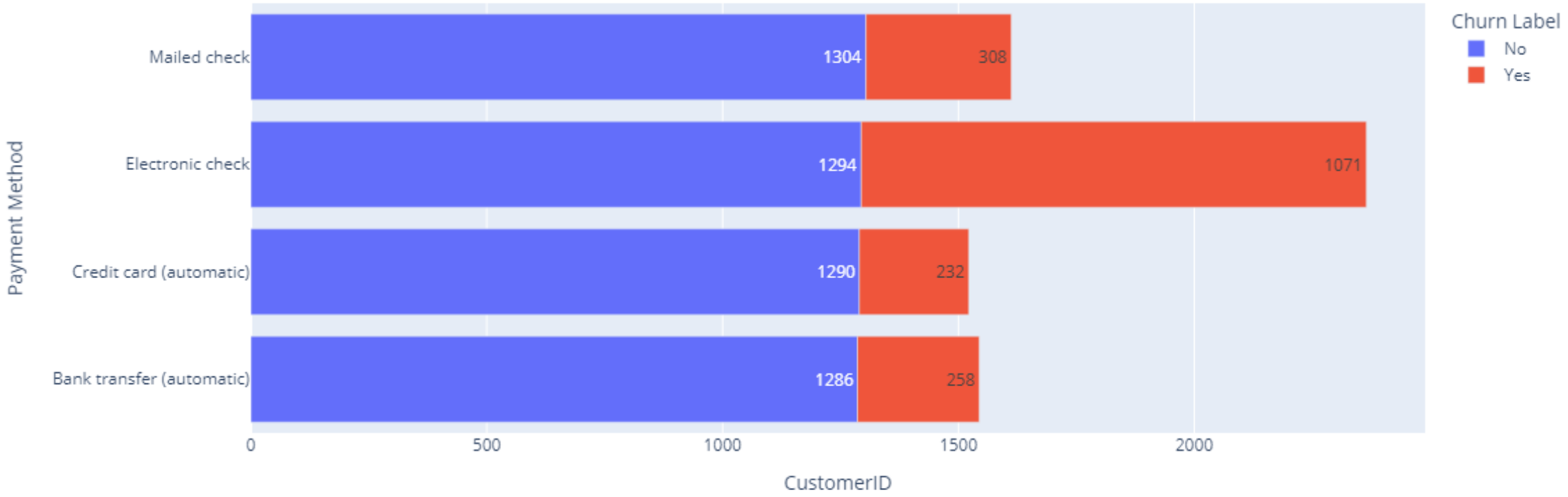
Streaming movies relates to telco churn?



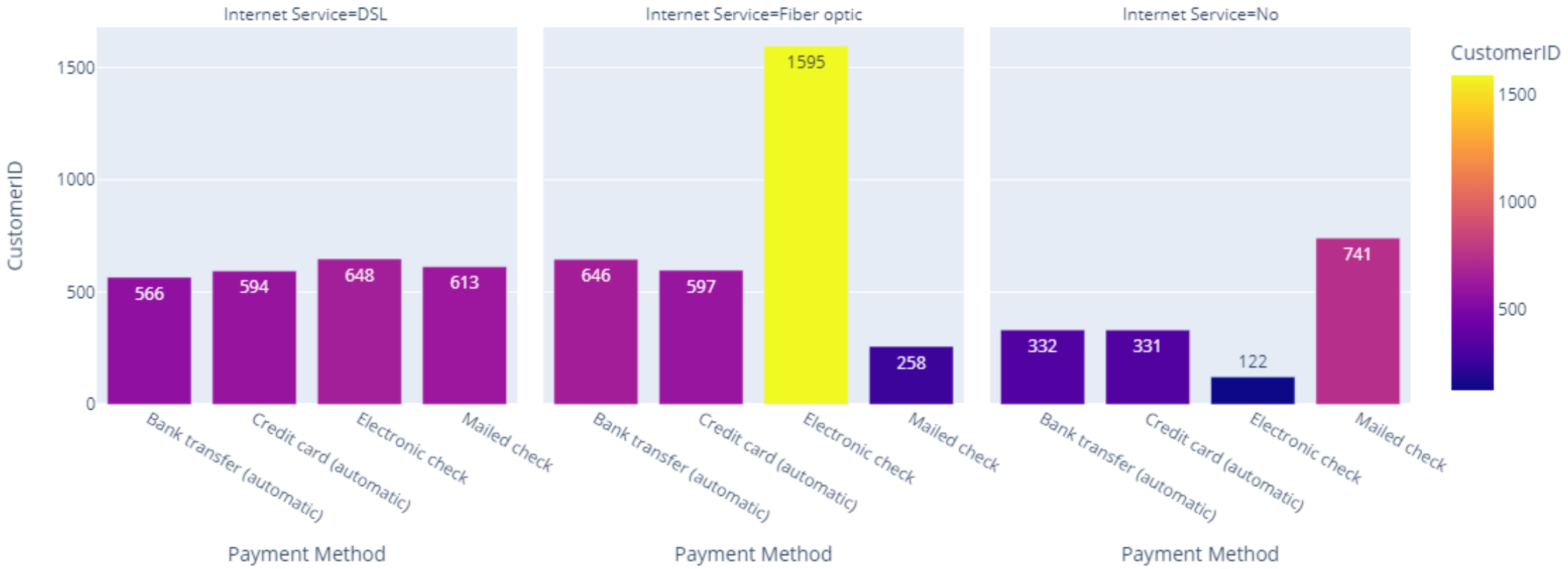
Without tech support, will the company lose a huge number of customers?



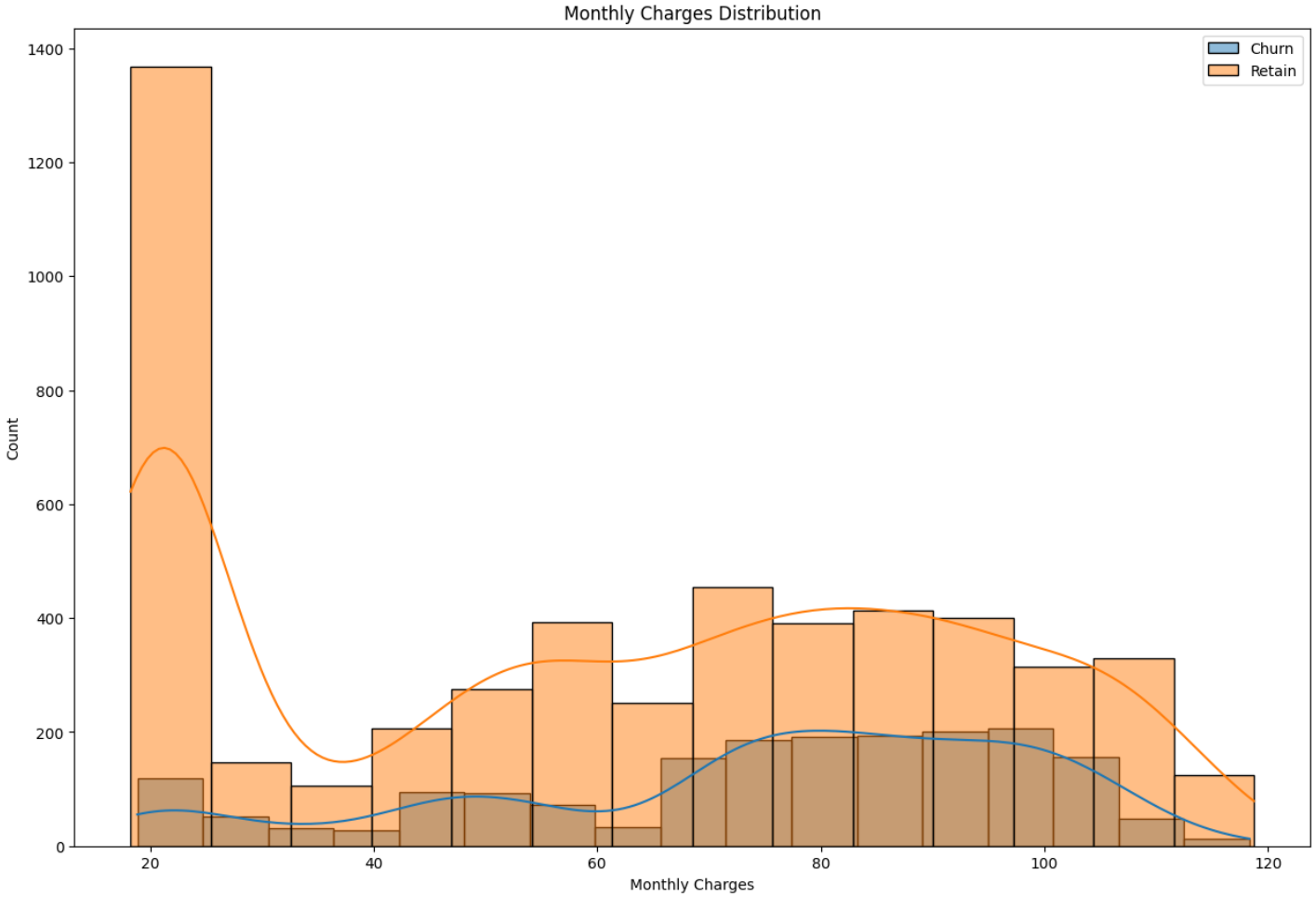
Does the company need to turn off the electronic check payment system?



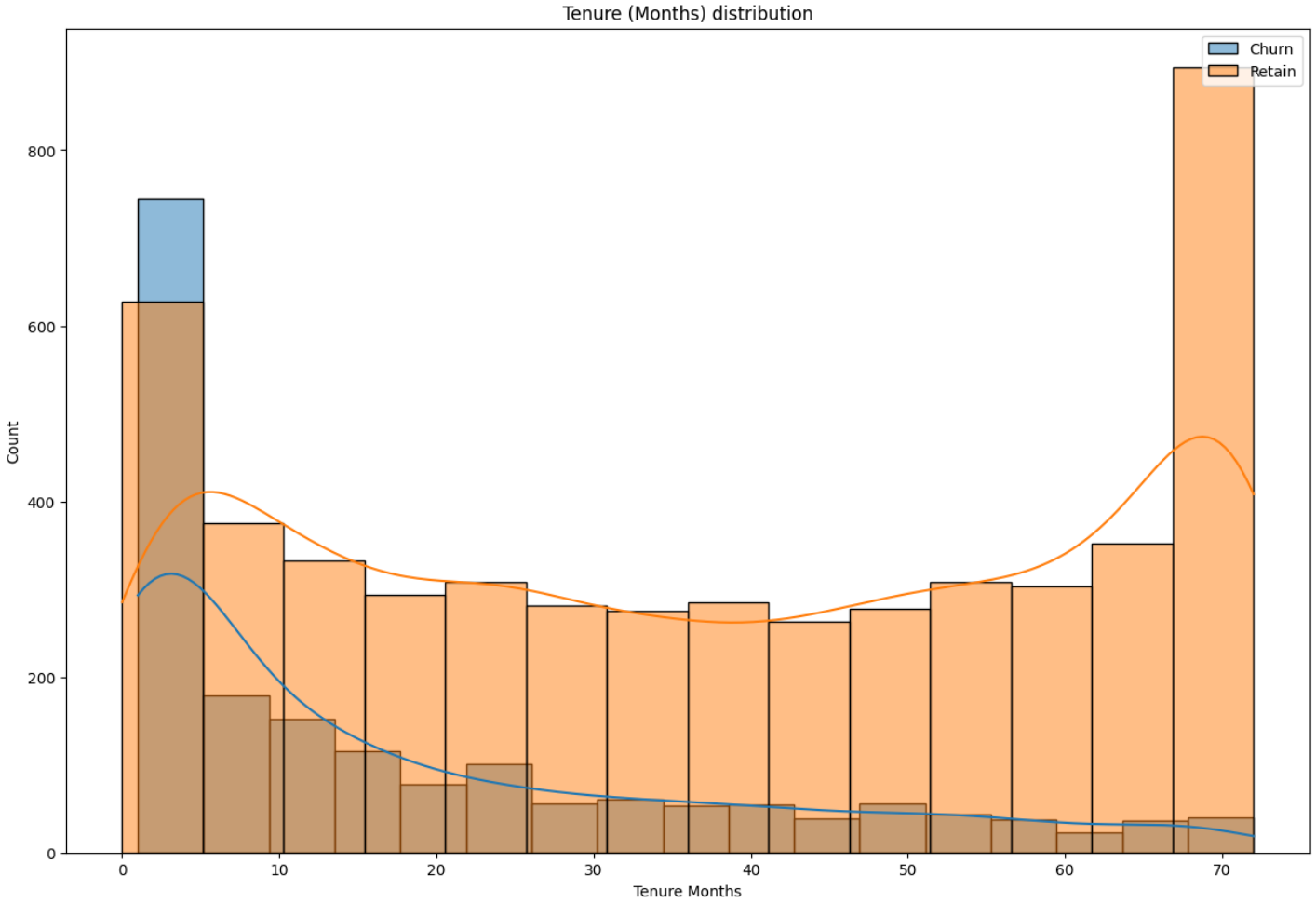
Is there a link between internet access and payment methods?



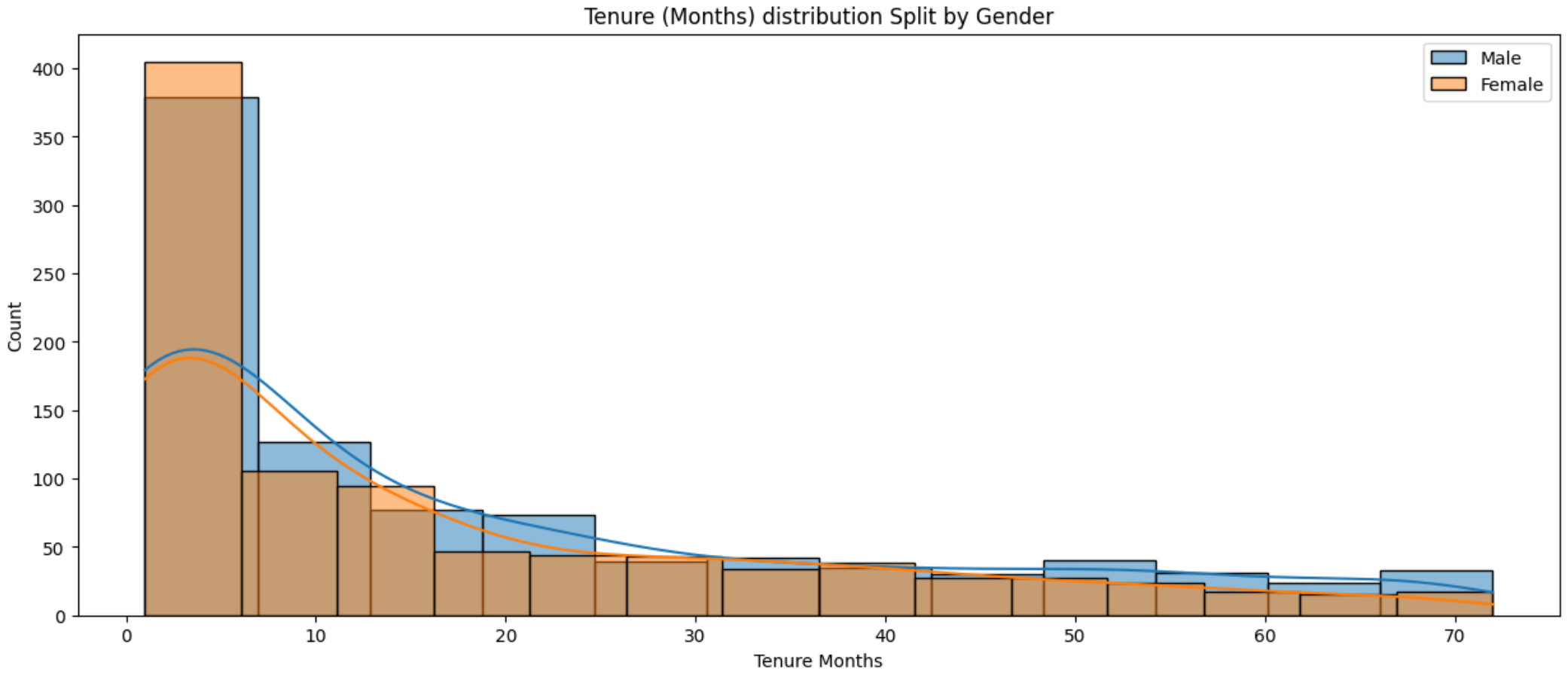
Does a charge of more than $60 disqualify a customer from using the service?

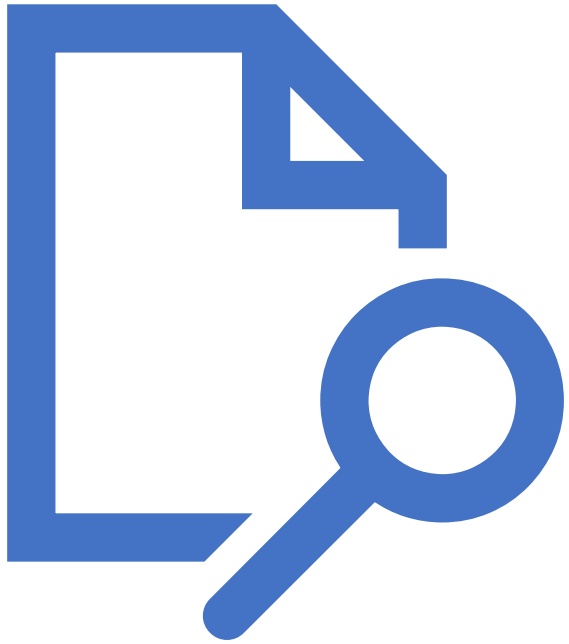


Can long-term customer engagement with a service reduce the churn rate?



Will female customers retain the service in the long term?



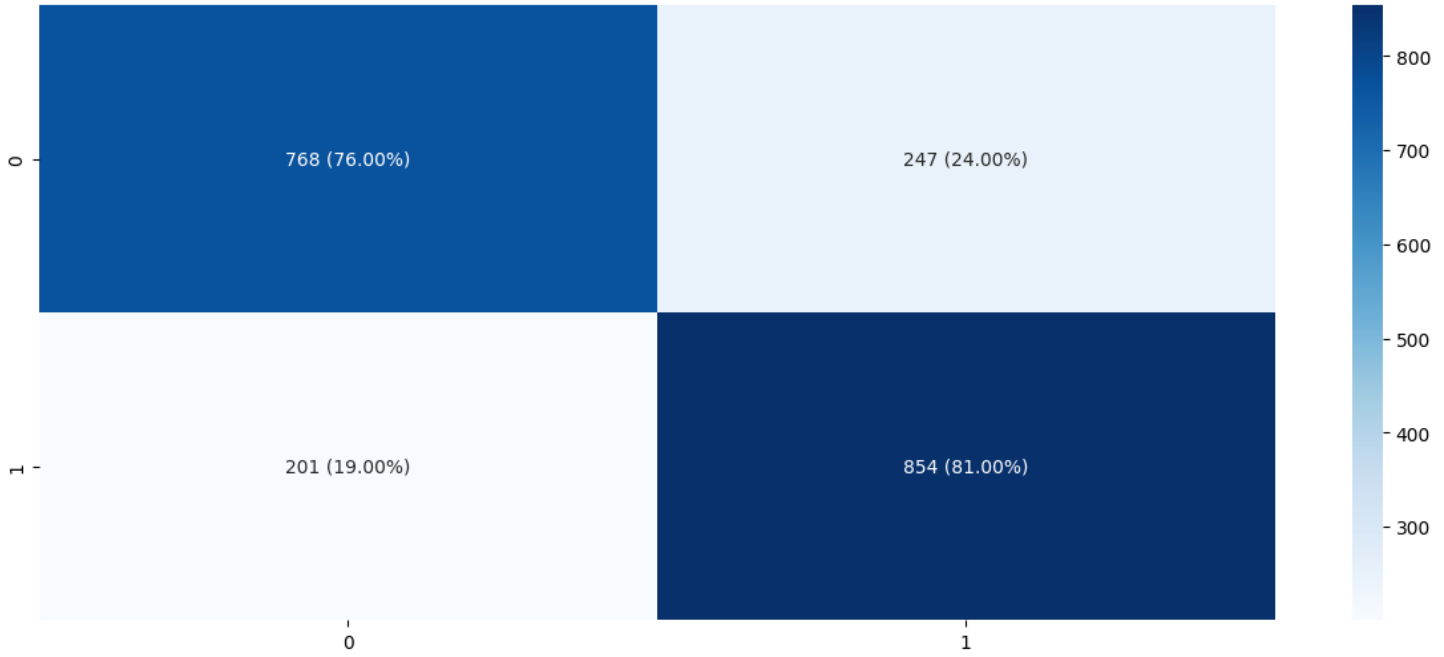


Model Performance metrics

- Precision
- Recall
- F1 score
- ROC AUC
- Model accuracy

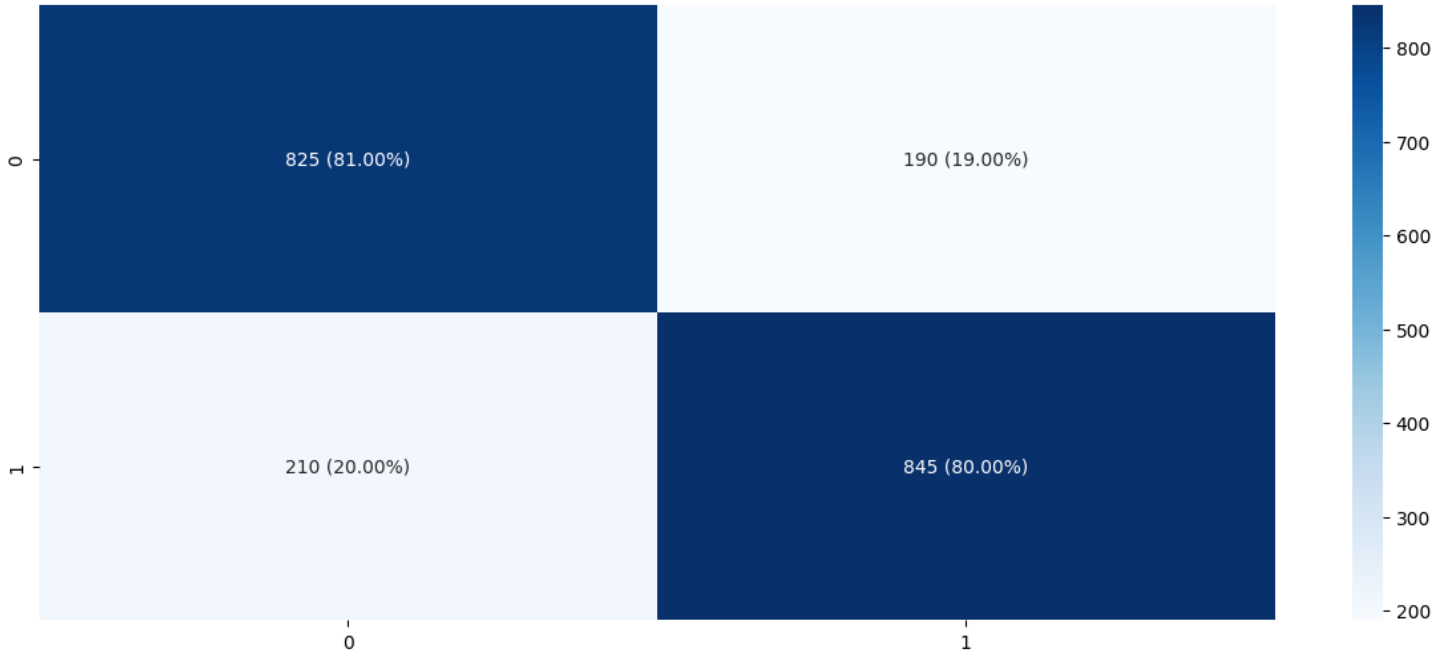
Confusion matrix: Logistic Regression

- Precision: 77%
- Recall: 77%
- F1 score: 77%
- ROC AUC: 77.41%
- Model accuracy: 77.44%



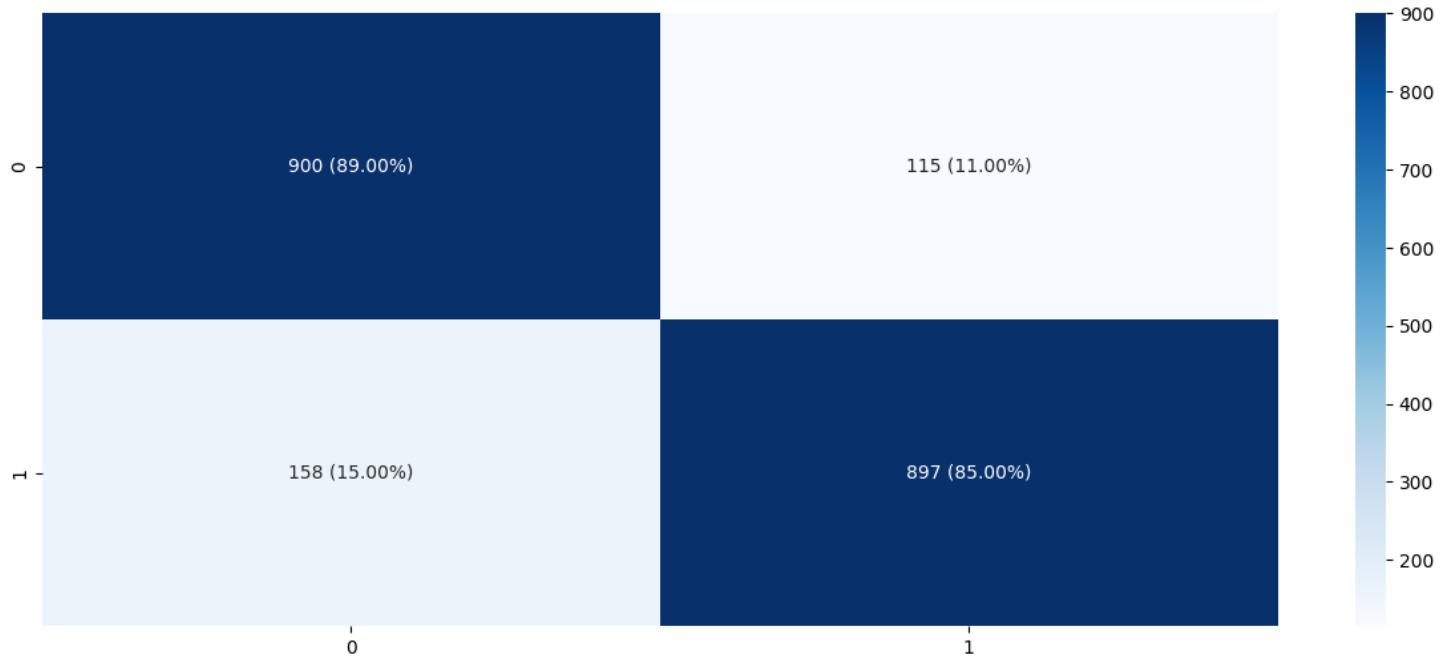
Confusion matrix: Decision tree

- Precision: 82%
- Recall: 82%
- F1 score: 82%
- ROC AUC: 81.69%
- Model accuracy: 81.69%



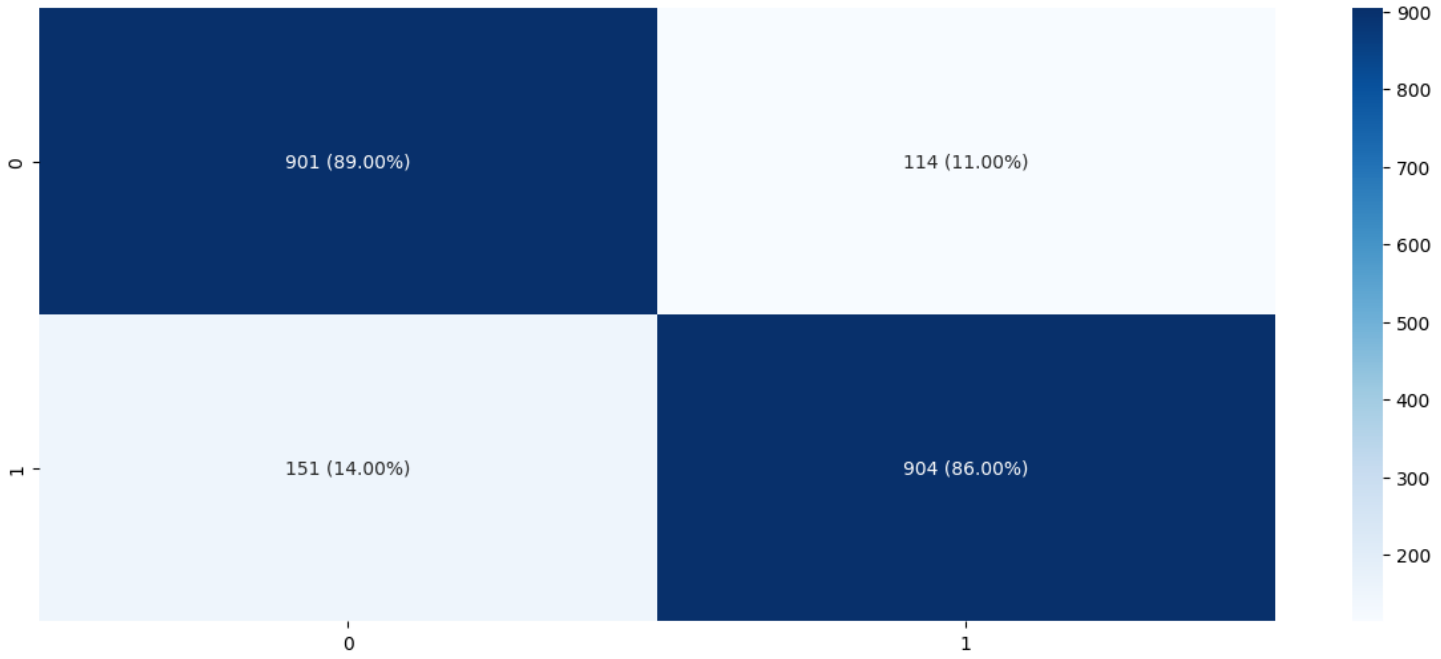
Confusion matrix: Random forest

- Precision: 87%
- Recall: 87%
- F1 score: 87%
- ROC AUC: 87.20%
- Model accuracy: 87.15%

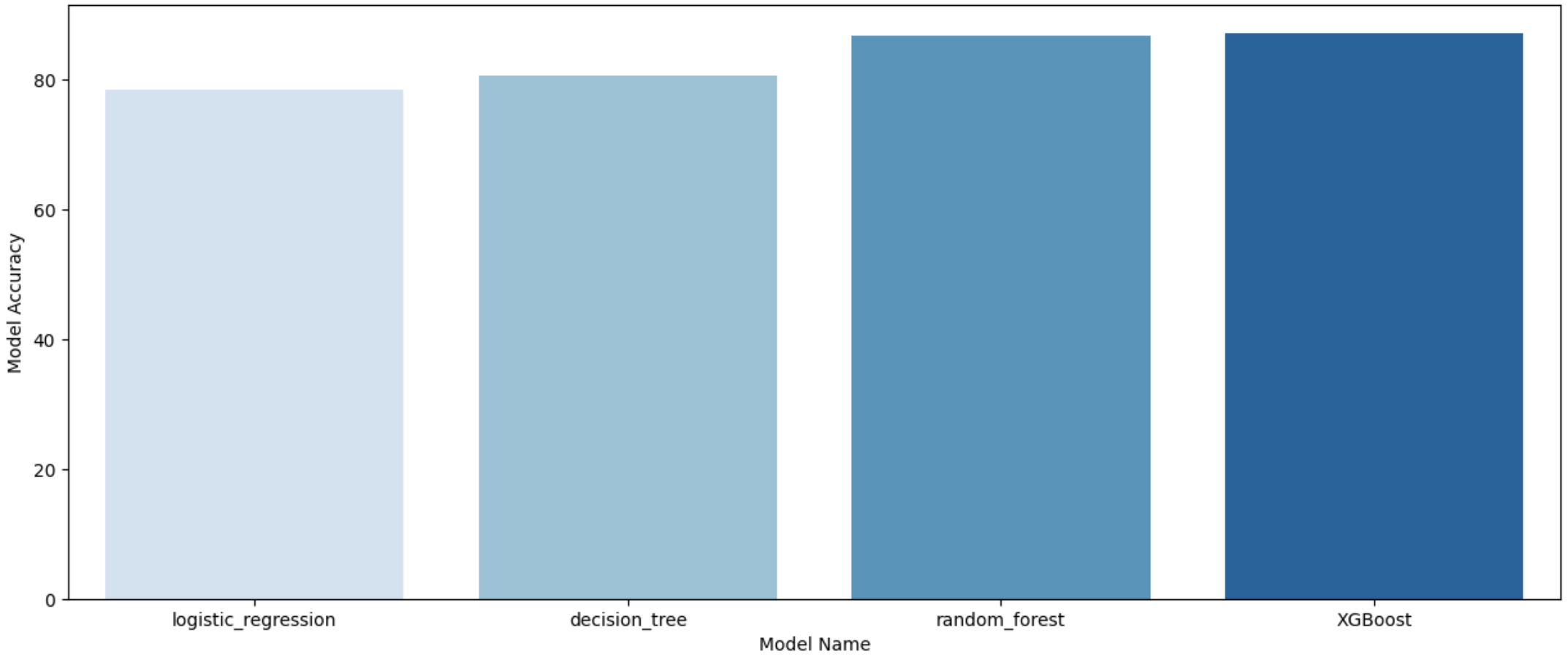


Confusion matrix: XGBoost classifier

- Precision: 87%
- Recall: 87%
- F1 score: 87%
- ROC AUC: 87.09%
- Model accuracy: 87.05%



Model comparison



Deployment ML Model in real word

Deployment option

- Django
- Flask
- Heroku

Steps for deploying models in production

Data preprocessing

Model development

Deployment

Monitoring and maintenance

Monitoring and maintain Over time

Performance monitoring

- Monitor model with actual customer churn

Feedback loop

- To find the customer insights and interaction in the system

Model update

- Periodically retrained the model with new customer data

Business impact analysis

- Analysis business growth based on customer monitoring

Cross functional collaboration

- Collaboration with business team, IT expert to expand the service

Conclusion

Analysis of customer churn is biggest challenging fact for a company growth

Customer information and reviews are need to be analyze deeply

Machine learning models can extract crucial information on churn customer prediction