

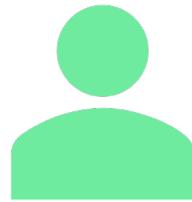


# Customer Churn Prediction

End-to-End Machine Learning Modeling Project

453 Application Domains  
Individual Assignment  
Shaolong (Fred) Xue

# Business Questions



What are the main factors contributing to customer churn?



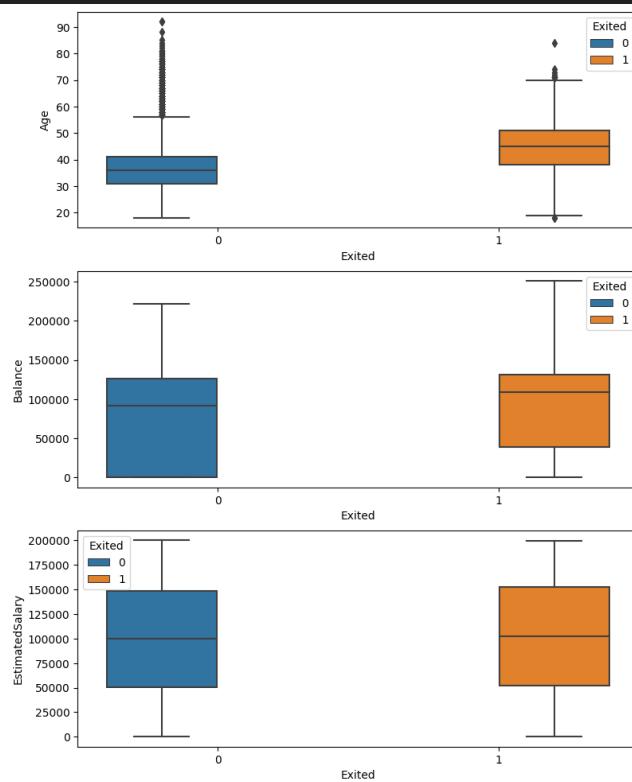
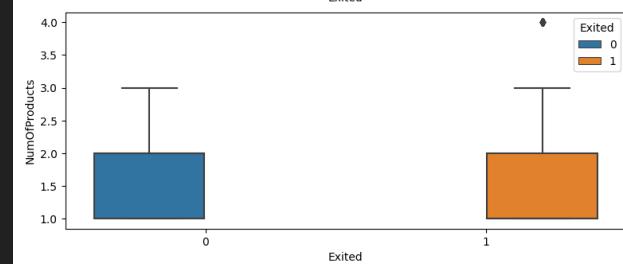
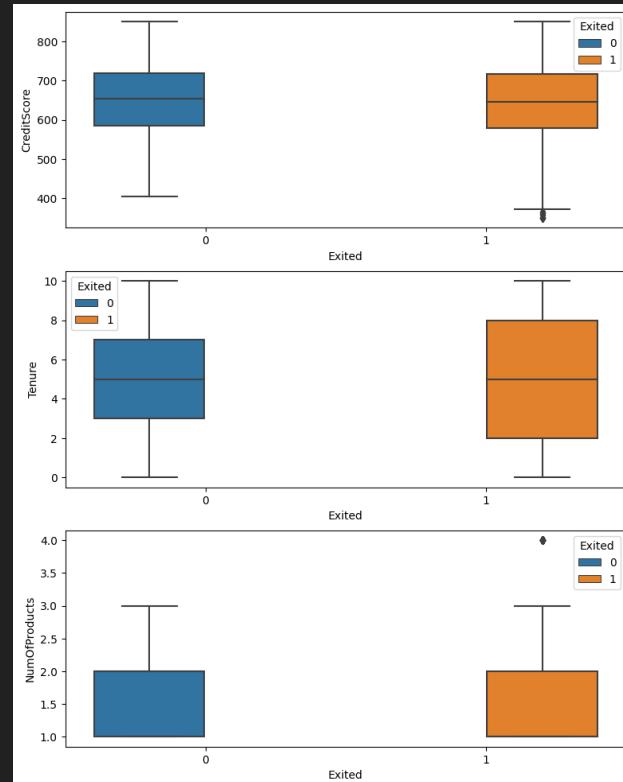
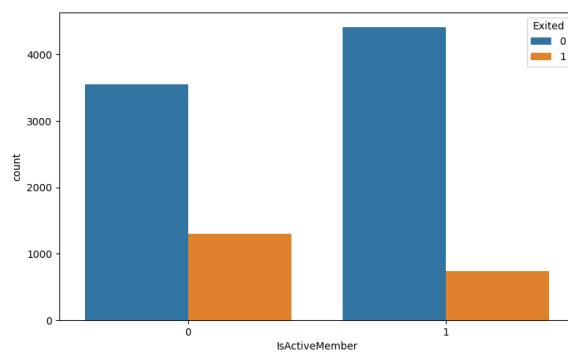
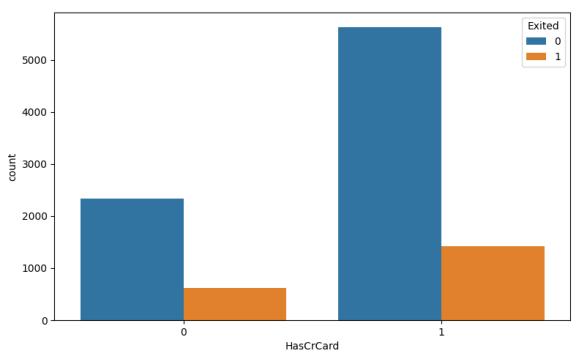
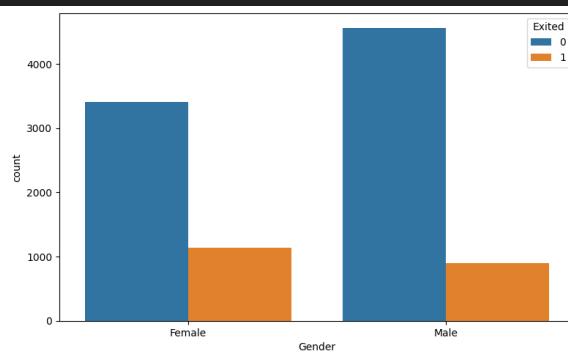
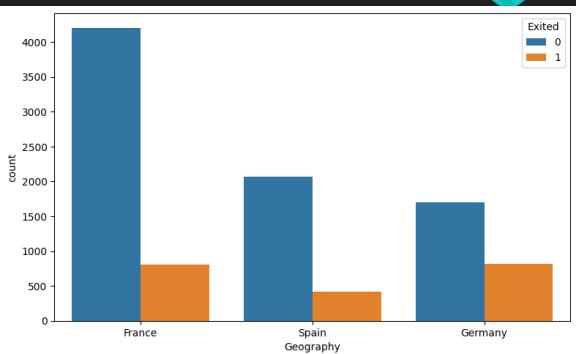
How do we predict churn for existing customers?



How should we intervene with the most effective retention strategies?

# Data and EDA

- Bank Customer Churn Data:
  - <https://www.kaggle.com/code/linastianbao/bank-churn-prediction/input>
- 10000 x 14
- 20.37% churned. 79.63% not churned



Categorical Variables

Continuous Variables

# Modeling Insights

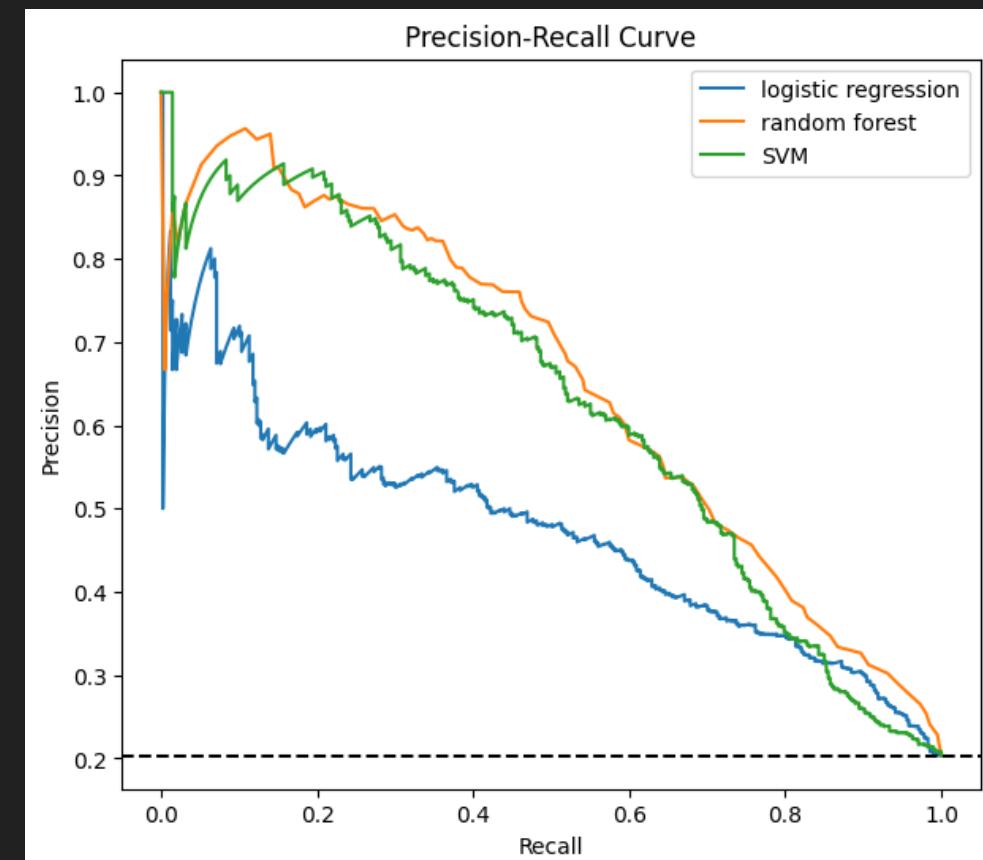
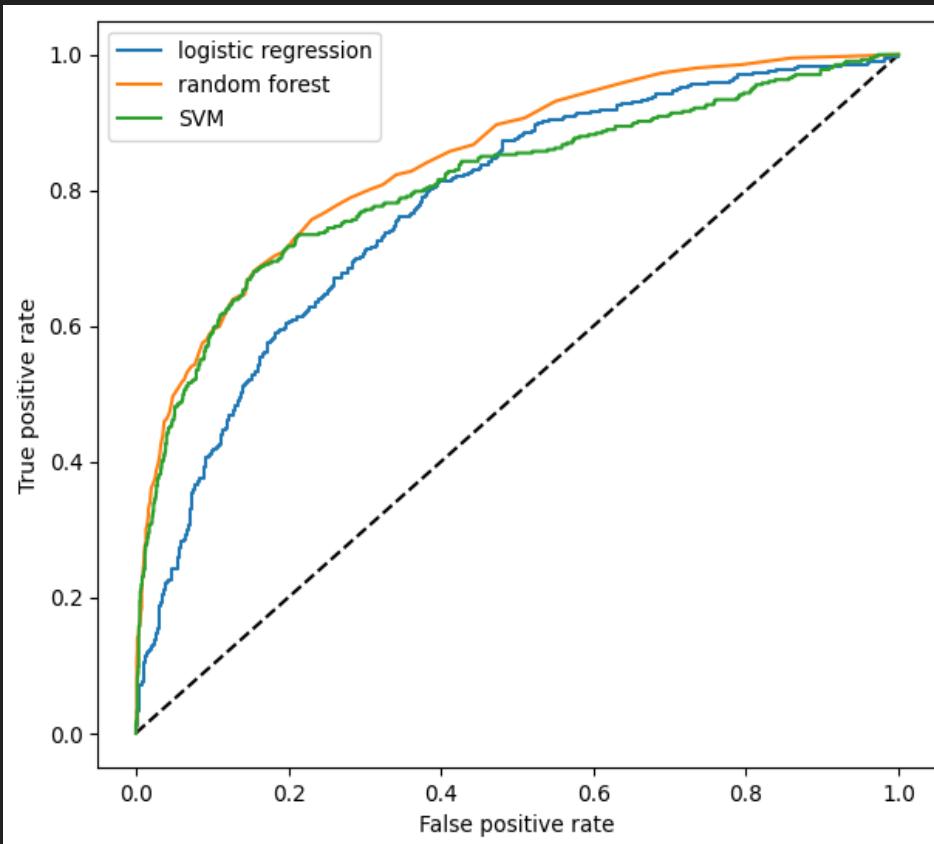
- ④ Fitted three models:
  - Logistic Regression
  - **Random Forest (Best)**
  - SVM

## RF Performance

- Accuracy = 0.86
- Recall = 0.46
- ROC = 0.84
- AUC = 0.65

## Top 5 Importance Features:

1. Age
2. Credit Score by Age
3. Number of Products
4. Credit Score
5. Balance



# Business Actions

## Retention Campaign

- A targeted retention campaign aimed at customers who are identified as being at high risk of churning by the model.
- Offer incentives such as personalized discounts, loyalty rewards, or additional services to encourage these customers to stay.

## Customer Segmentation

- The bank could use the prediction to segment their customer base into high-risk and low-risk groups. This allows the bank to focus their retention efforts on the customers who are most likely to churn and prioritize their resources accordingly.

## Improved Data Collection

- Model performance can be improved by collecting additional data on customer behavior and preference, such as transaction history, customer service interactions, and demographics. This could improve the mode's predictive ability and identify additional factors that contribute to customer churn.

## Cost Benefit Analysis

- Perform a cost-benefit analysis to determine the potential financial impact of customer churn and the cost of retention effort
- Help the bank make informed decisions about how much to invest in the retention efforts and which customers to target

# Business Outcome



## Retention Campaign

Improved Retention  
Higher revenue



## Customer Segmentation

Effective Targeting and  
Prioritization



## Improved Data Collection

Complete and  
Comprehensive Customer  
Data  
Higher Predictive Power



## Cost Benefit Analysis

Cost-effective campaigns  
Cost Reduction

# Conclusion

Overall, the bank can use the model's predictions to identify customers who are at risk of churning, and take targeted actions to retain them.

By doing so, the bank can reduce the number of customers who churn and increase customer loyalty and profitability.