

# Churn for Bank Customers

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# Dataset

## Churn for Bank Customers - from OpenML

*As we know, it is much more expensive to sign in a new client than keeping an existing one. For banks, knowing what makes a customer decide to leave is important. Preventing churn helps businesses create loyalty programs and retention strategies to keep as many customers as possible.*



# Project overview



## Exploratory Data Analysis

- Check shape, null values and type
- Drop unnecessary columns
- Visualization



## Data Preprocessing

- Feature Engineering: encoding categorical columns
- Scaling



## KPIs

- Business Questions



## Hypothesis testing & analysis

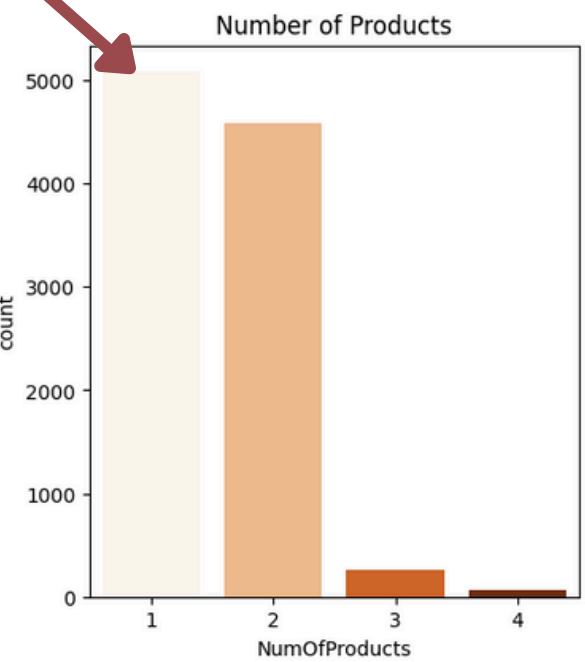
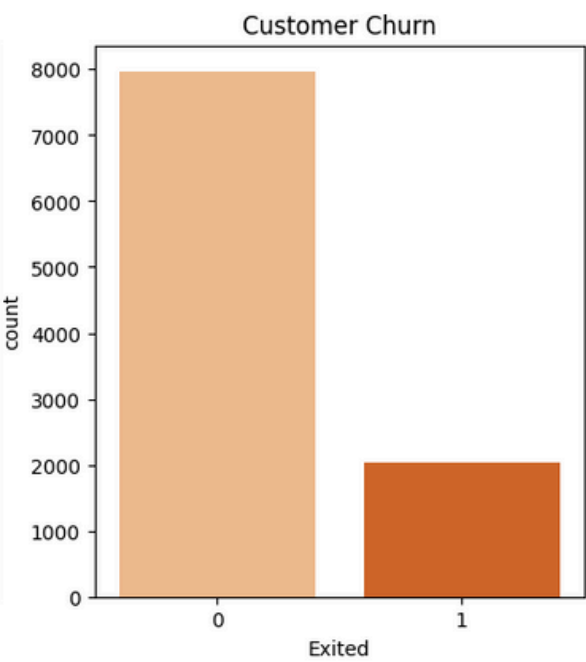
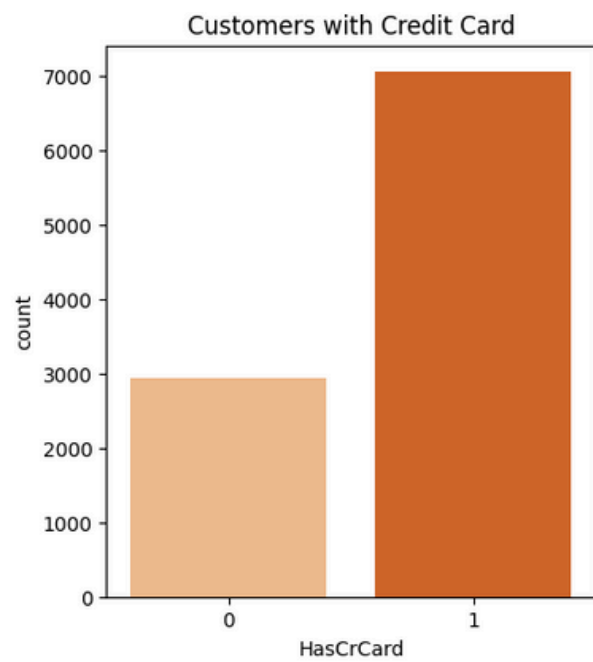
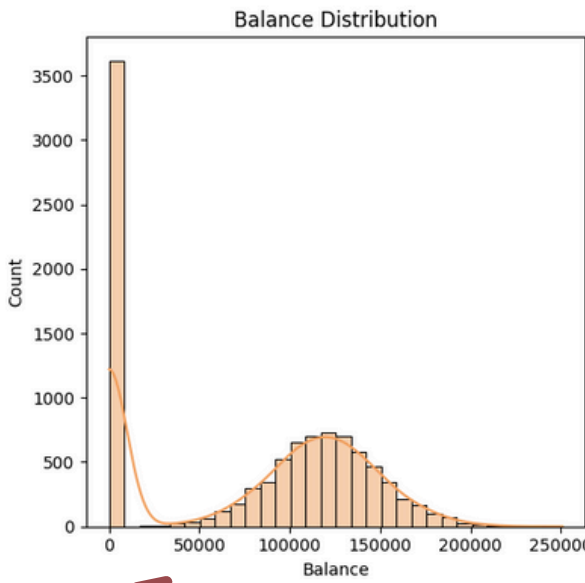
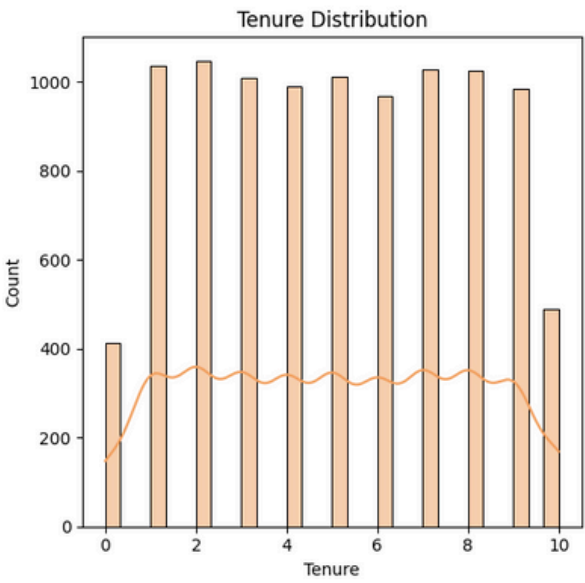
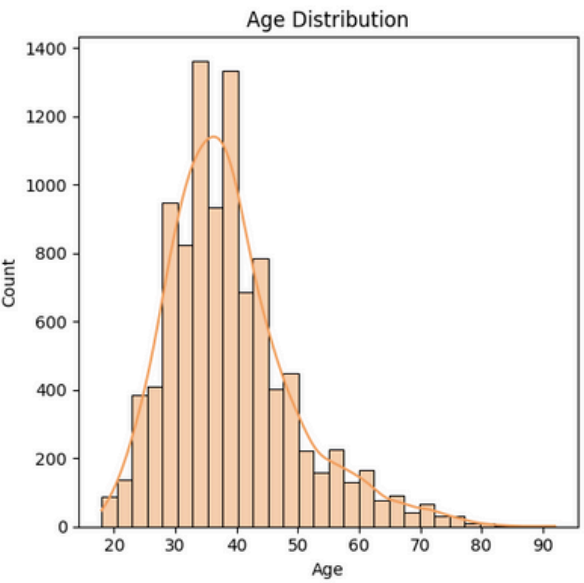
- Explore Hypothesis
- Experiment Evaluation



## Machine Learning

- Ensemble methods
- Tuning

# EDA

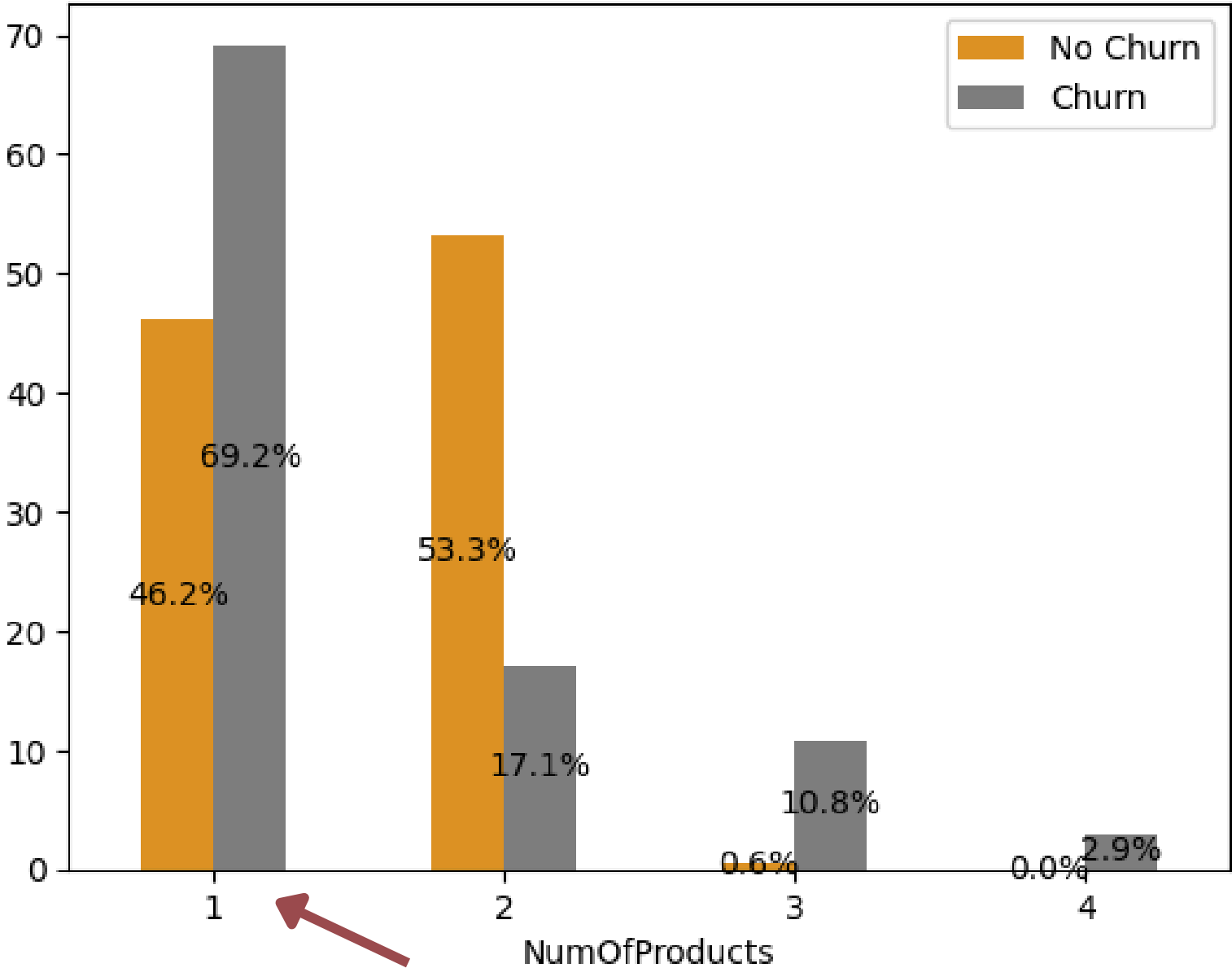


RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary	Exited
1	15634602	Hargrave	619	France	Female	42	2	0.00	1	1	1	101348.88	1
2	15647311	Hill	608	Spain	Female	41	1	83807.86	1	0	1	112542.58	0
3	15619304	Onio	502	France	Female	42	8	159660.80	3	1	0	113931.57	1
4	15701354	Boni	699	France	Female	39	1	0.00	2	0	0	93826.63	0
5	15737888	Mitchell	850	Spain	Female	43	2	125510.82	1	1	1	79084.10	0

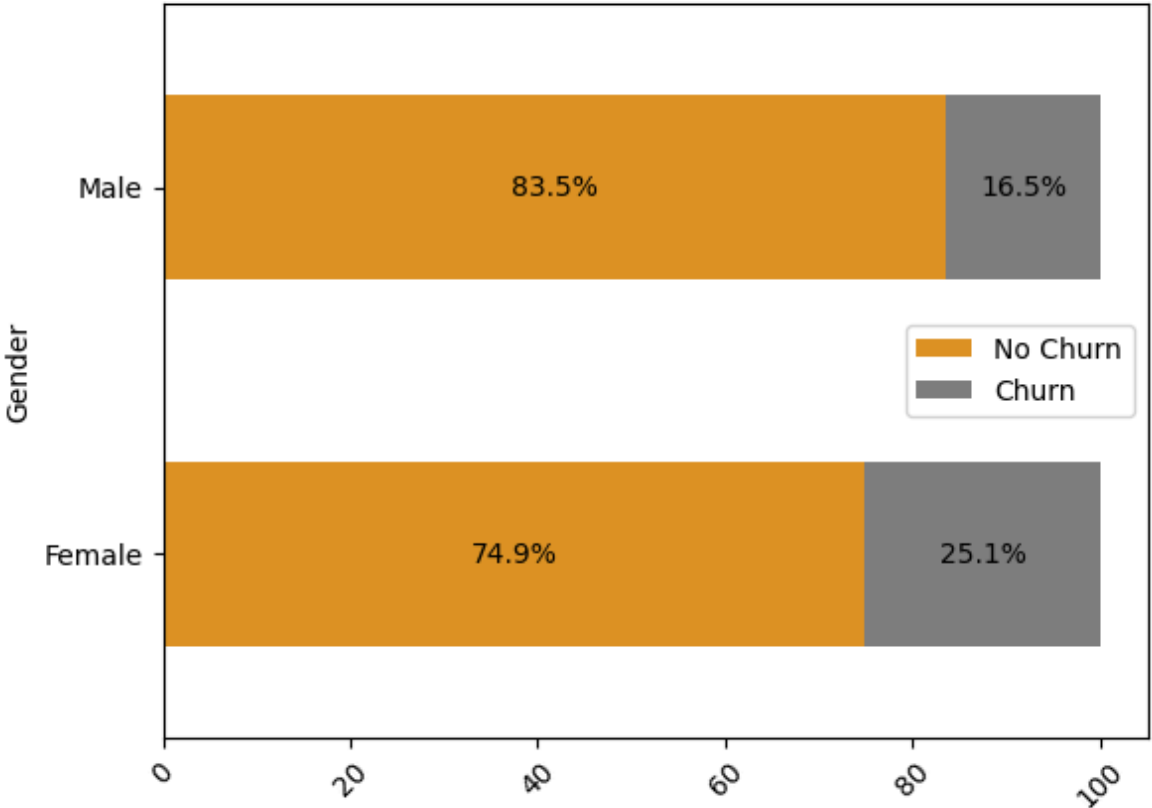
# EDA



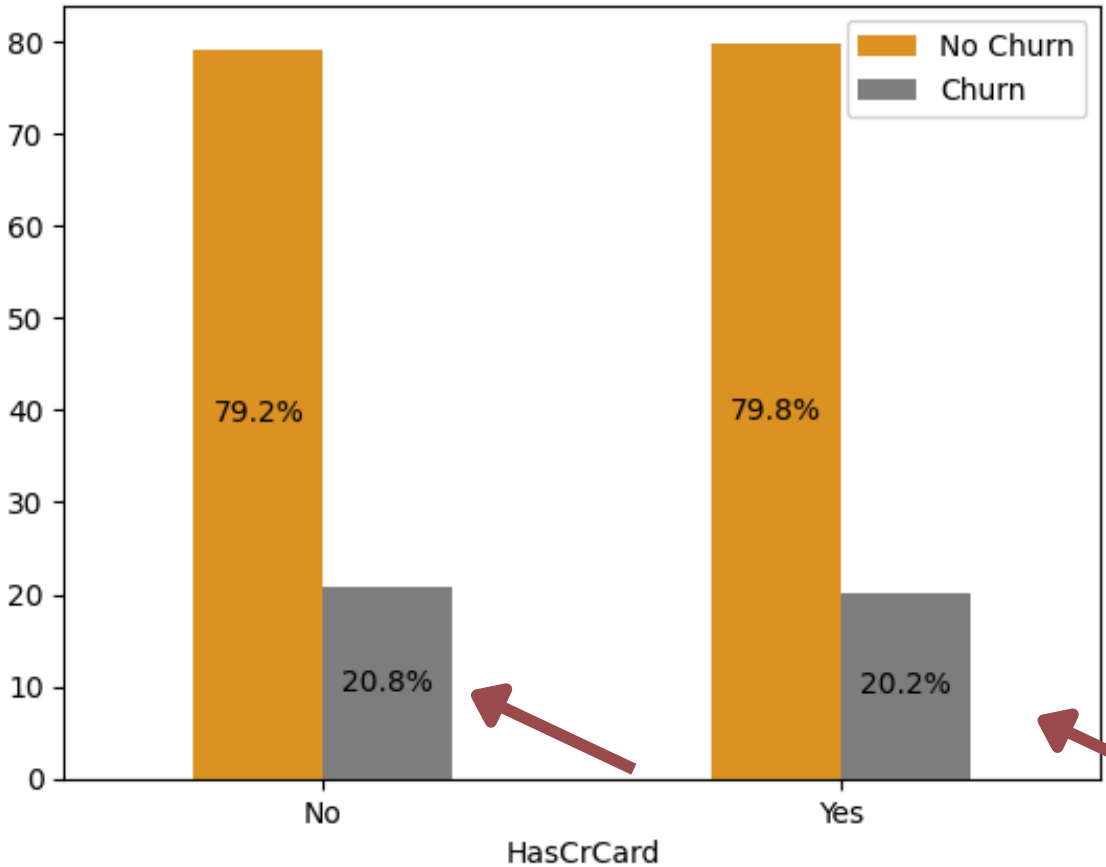
Comparison of Churn Status by Number of Products



Comparison of Churn Status by Gender



Comparison of Churn Status by Credit Card Ownership



HasCrCard



# Business Questions & Hypothesis Testing



## 1. How does customer engagement (being an active member) impact churn rates?

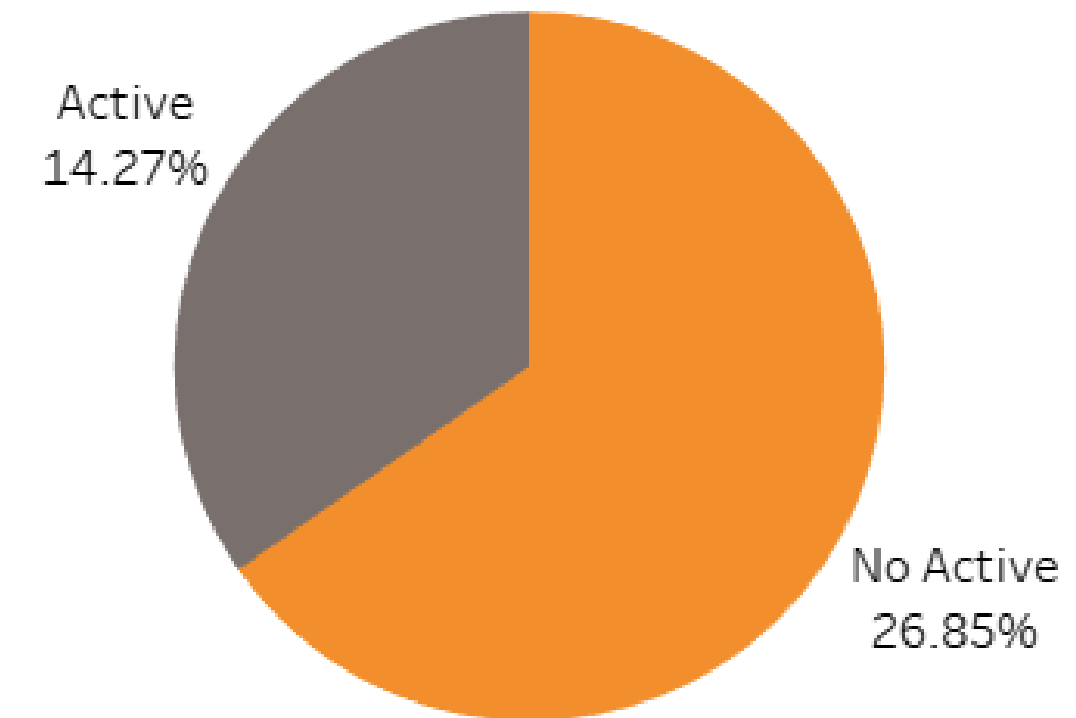


*Hypothesis: Active members are equally or more likely to churn compared to inactive members.*

**z-statistic:** 15.61

**p-value:** 2.98e-55

**Reject H0.** Active members are significantly less likely to churn than inactive members.



# Business Questions & Hypothesis Testing

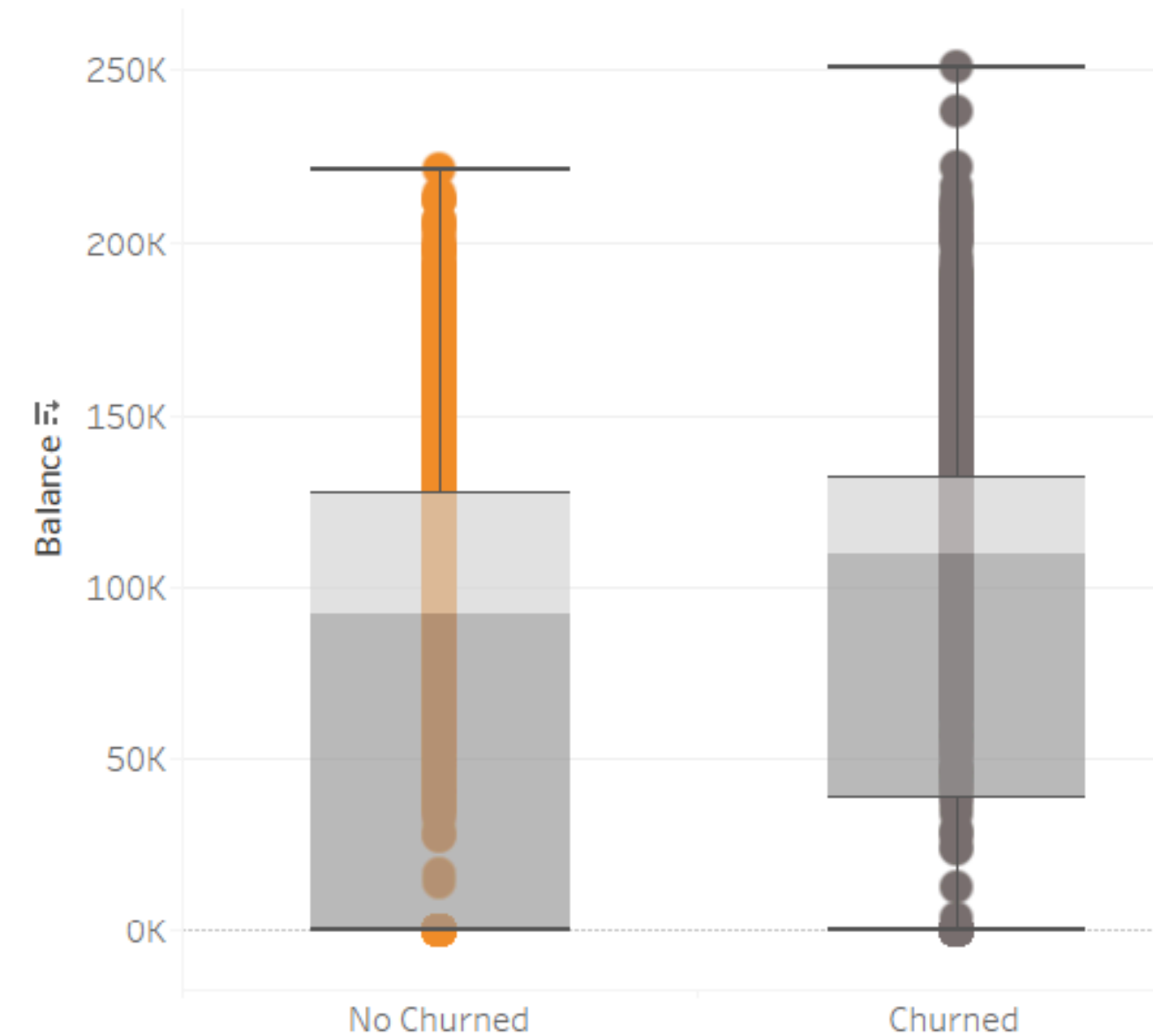
## 2. Do customers with higher account balances churn less often than those with lower balances?

*Hypothesis: Customers with lower balances are more likely to churn as those with higher balances.*

**t-statistic:** 12.47

**p-value:** 3.16e-35

**Reject H0.** Customers with higher balances are more likely to churn compared to those with lower balances.



# Business Questions & Hypothesis Testing



## 3. Are older customers more likely to churn than younger customers?

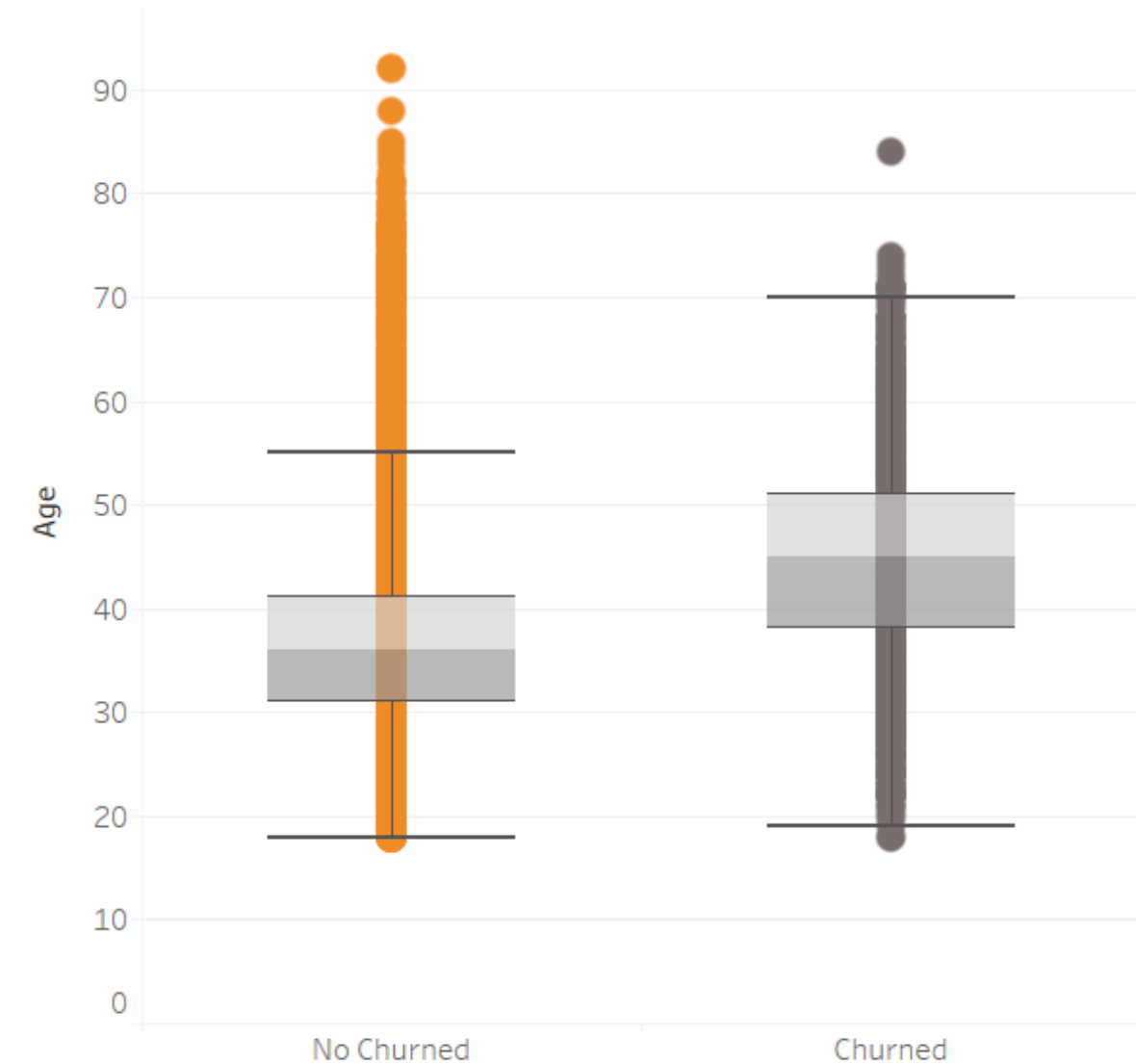


*Hypothesis: Older customers are equally or less likely to churn compared to younger customers.*

**t-statistic:** 30.42

**p-value:** 2.36e-179

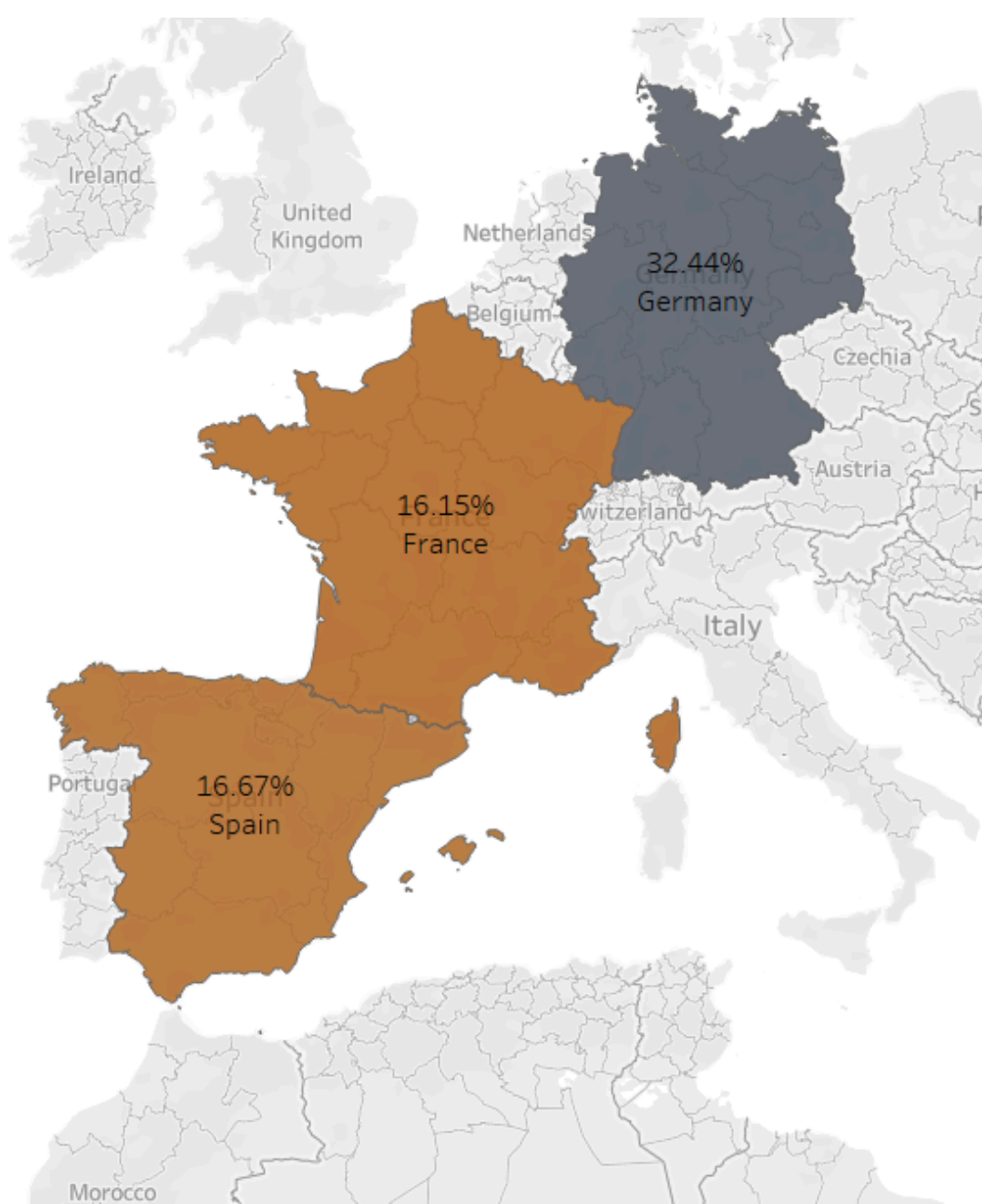
**Reject H0.** Older customers are significantly more likely to churn.







# Geographic

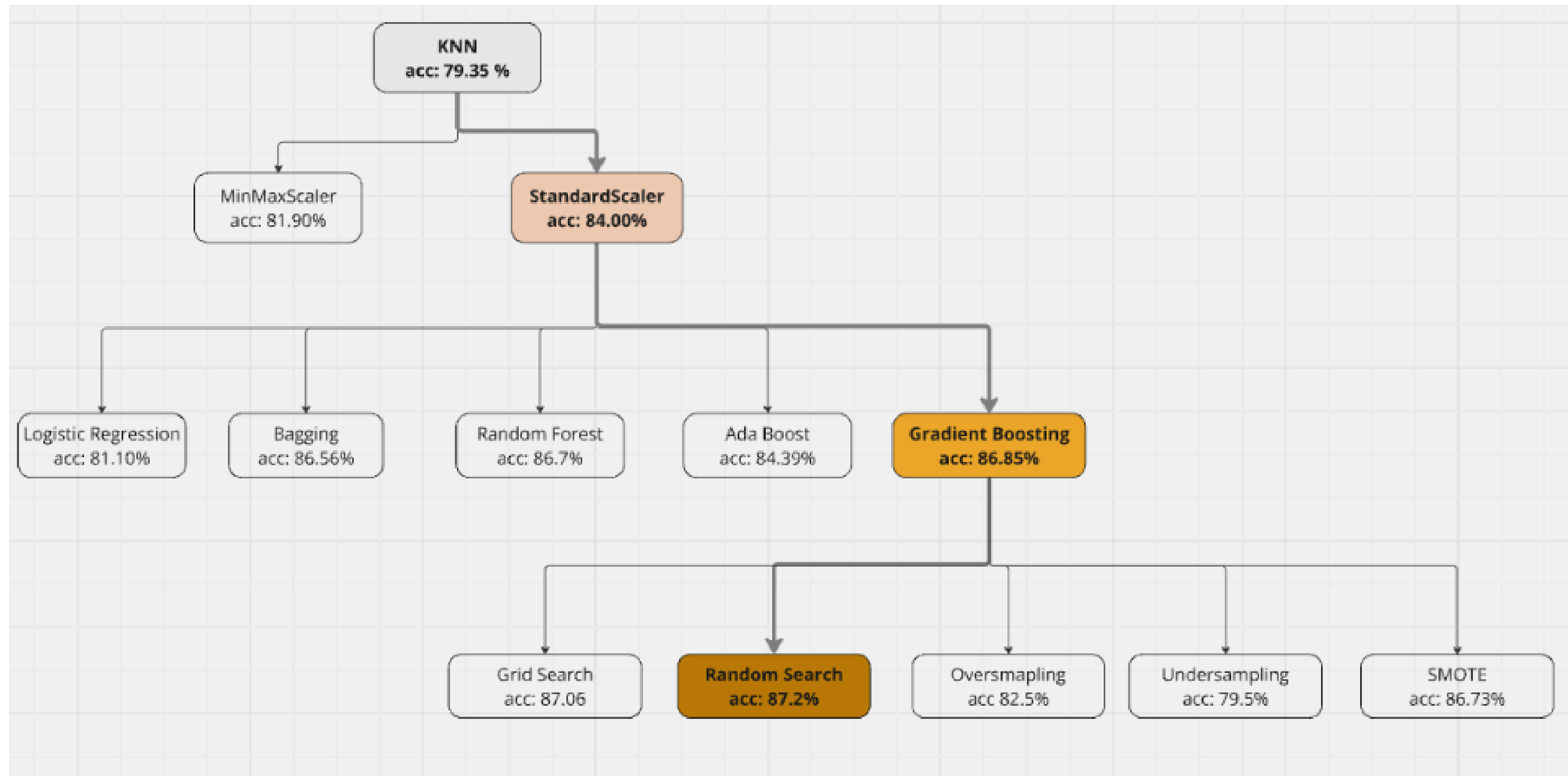


Attribute	Non-Churned (0)	Churned (1)
Average Age	37.311504	44.894349
Average Balance	119427.106696	120361.075590
Average Number of Products	1.551032	1.454545
Activity (IsActiveMember)	0.561652	0.363636

**Customer Service and Support:** German customers, especially older and female customers, might feel that the bank is not providing sufficient support or attention to their needs.

**Technology Barriers:** The bank’s online and mobile banking platforms may not be user-friendly, particularly for older customers, leading to frustration and disengagement.

# Machine Learning





# Gradient Boosting Tuning Classifier

Accuracy: 87.2%

The model's accuracy is good, but its recall for predicting churn is lower.



	Precision	Recall	F1 - score
0 (No Churned)	0.88	0.97	0.92
1 (Churned)	0.78	0.47	0.59
Accuracy			0.87



Confusion Matrix

Positive	2340	76
Negative	308	276
	Positive	Negative



# Challenges & Learnings



## Machine Learning Models

- Identify the most important features
- Long training times
- More than 5 hours tuning

## Hypothesis testing

- Choose the right test
- The results didn't support the Hypothesis
- Interpretation



## Technical Assistance

- Feedback
- Business Insights
- Proactive request for support

# Conclusion

1

**Older customers** may have distinct financial needs and expectations compared to younger ones. They might feel that the bank's products or services are not suited to their life stage or be less satisfied with technology-driven services.

2

**Inactive members** are far more likely to churn than active members. Active members, who likely engage more with the bank's services, show higher retention rates, highlighting the importance of customer engagement.

3

Surprisingly, customers with **higher balances** tend to churn more, possibly seeking better offers elsewhere. Banks could counter this by providing personalized financial advice or exclusive products.

# Recommendations

1

Customer Research

2

Personalized Services

3

Customer Engagement Campaigns

4

Customer Service Improvements



# Thanks!

Any questions?

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