# Bank Customer Churn Analysis Report

## Executive Summary

This report investigates customer churn factors using a dataset of 10,000 bank customers. The goal is to identify trends that help explain why customers leave the bank. Various key features such as age, balance, geography, and membership activity were analyzed to understand their influence on customer retention and churn.

## 1. Introduction

### 1.1 Objective

The purpose of this analysis is to determine the factors contributing to customer churn in a banking environment, so as to recommend strategies for improving customer retention. This analysis uses historical customer data to identify key patterns of churn behavior.

### 1.2 Dataset Overview

The dataset contains the following features for 10,000 customers:

- Customer Demographics: Age, Gender, Geography, Credit Score.
- Banking Information: Balance, Number of Products, IsActiveMember (active membership), Credit Card ownership.
- Churn Status: Indicated by the `Exited` column, where 1 represents a churned customer.

## 2. Exploratory Data Analysis (EDA)

### 2.1 General Overview

The dataset consists of 13 columns, with no missing values. Data types include integers, floats, and objects, enabling us to conduct a variety of numerical and categorical analyses.

- Number of rows: 10,000
- Number of columns: 13
- Churn Rate: 20.37%

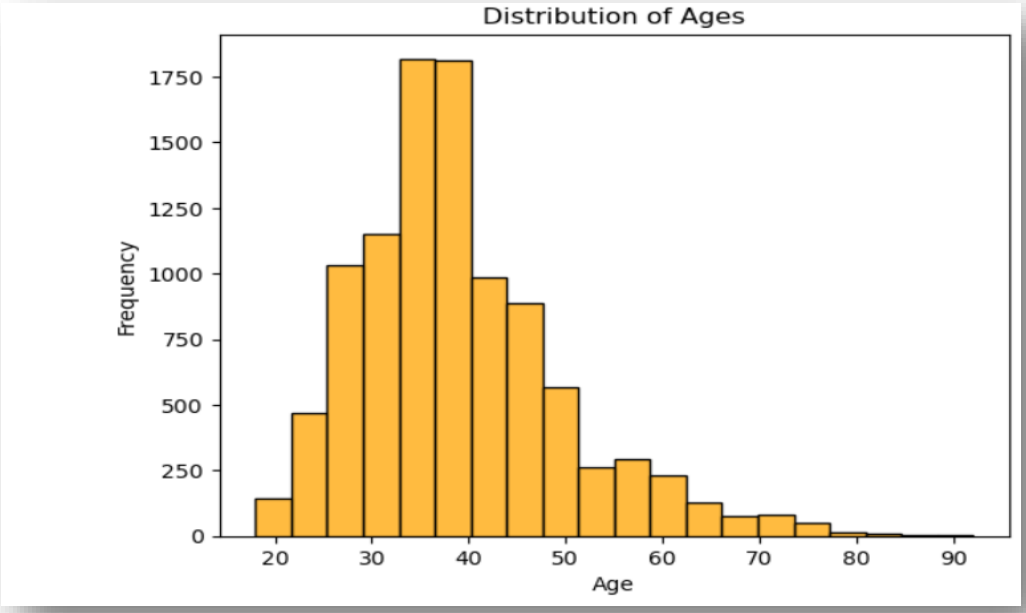
## 2.2 Summary Statistics

Key numerical features include:

| Feature | Mean | Min | Max | Std Dev |
|---|---|---|---|---|
| **Age** | 38.92 | 18 | 92 | 10.48 |
| **Balance** | 76,485.89 | 0 | 250,898 | 62,397.40 |
| **Credit Score** | 650.53 | 350 | 850 | 96.65 |
| **Number of Products** | 1.53 | 1 | 4 | 0.58 |

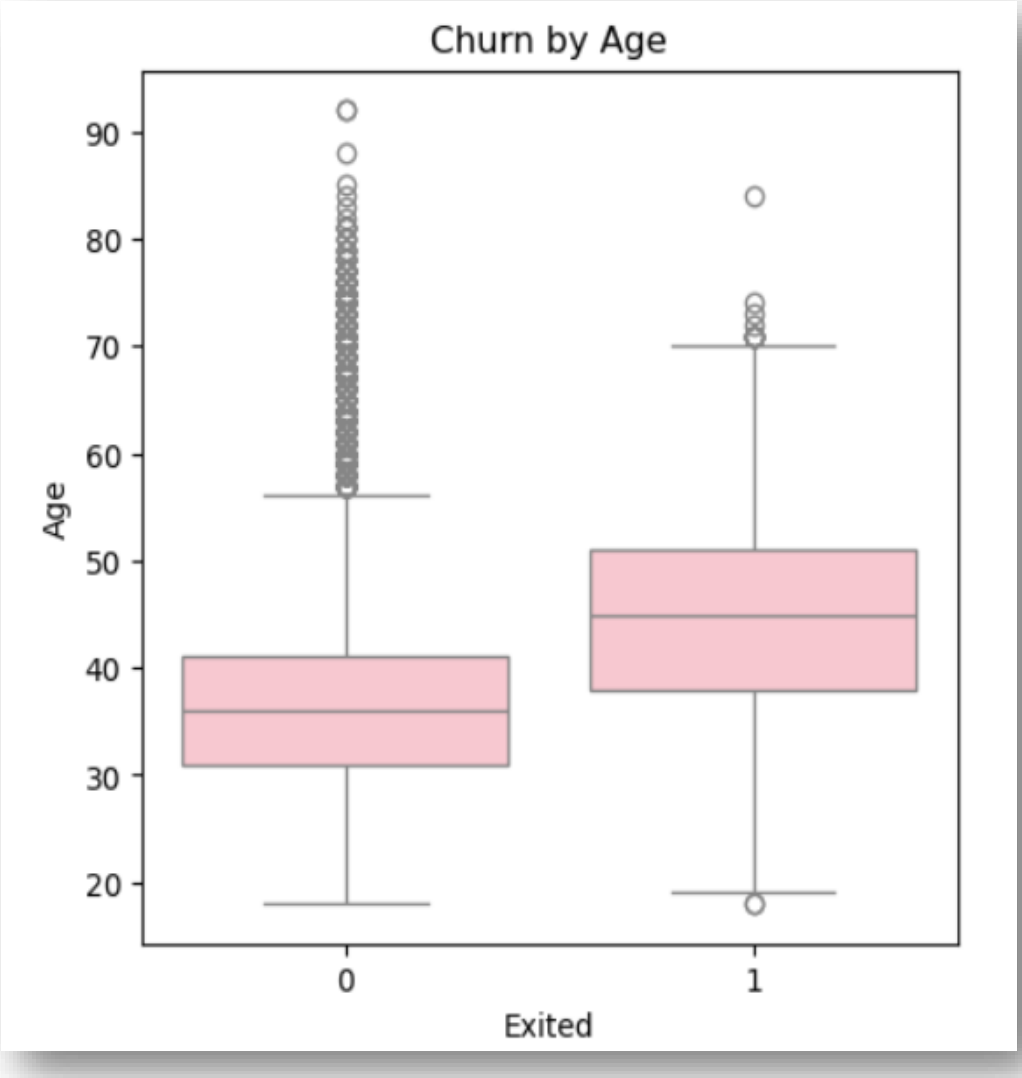
## 2.3 Distribution of Customer Ages

The age distribution indicates that the majority of customers are between 30 and 40 yrs.



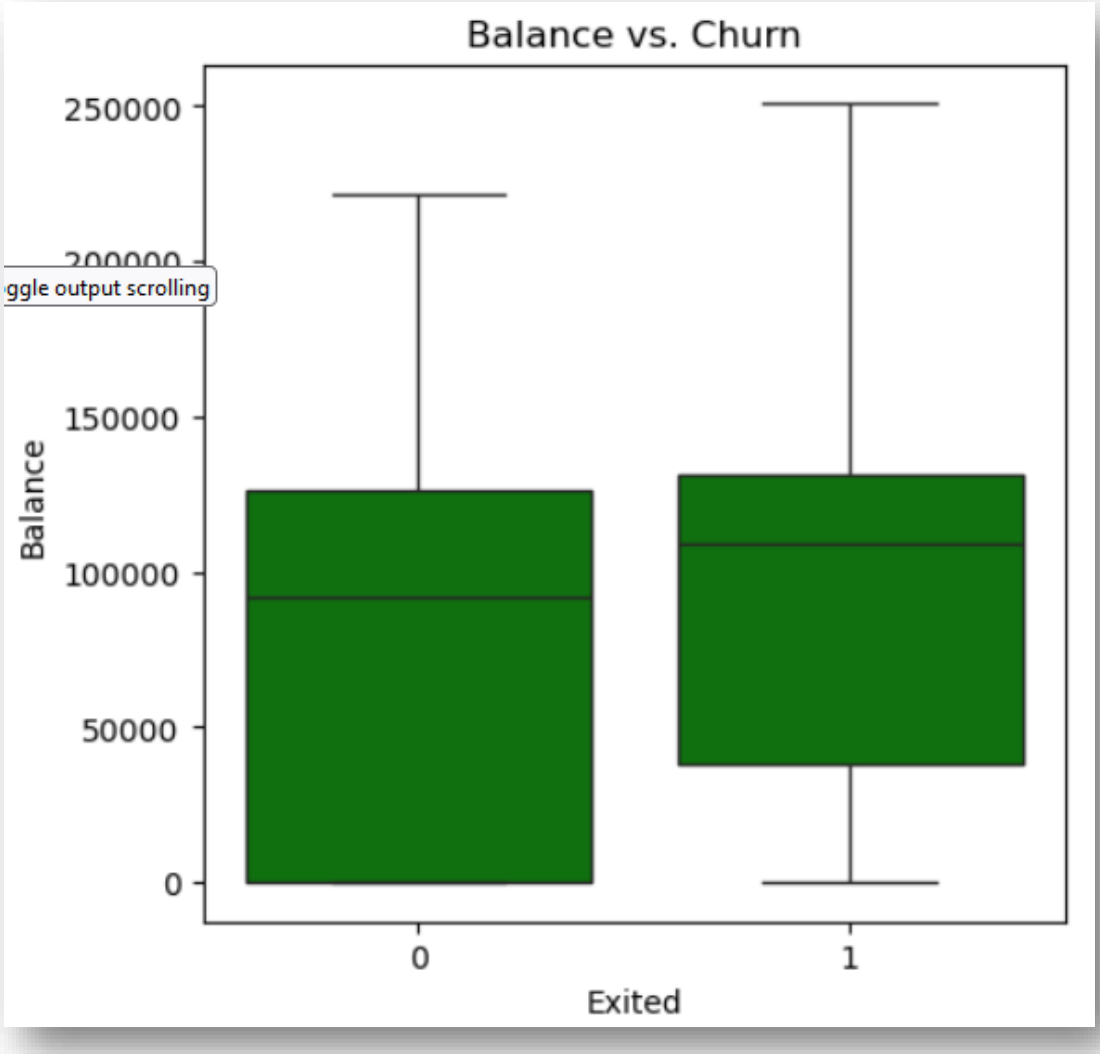
## 2.4 Churn vs Age

Older customers are more likely to churn, as seen from the boxplot that visualizes the age distribution between customers who churned and those who did not.



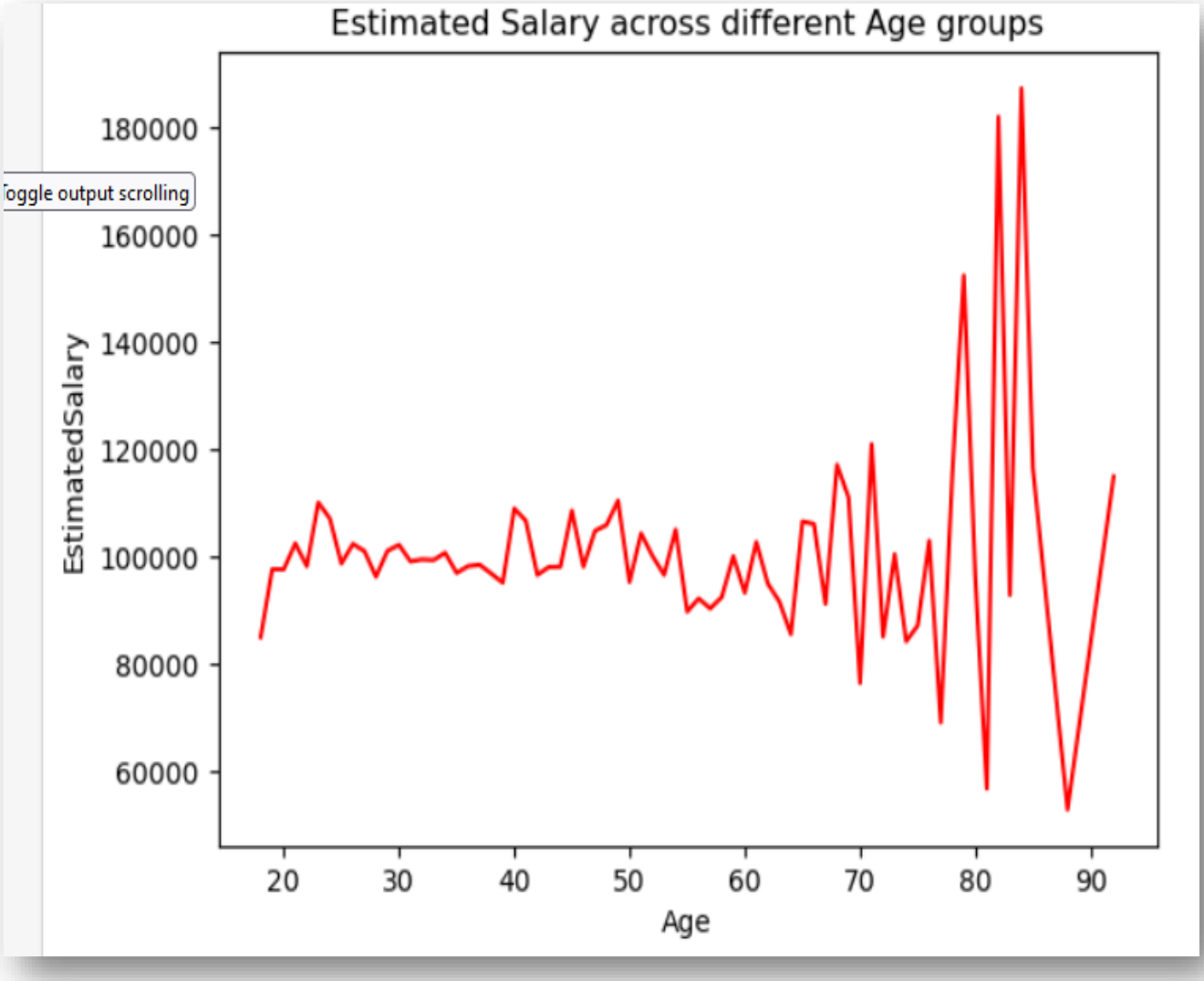
## 2.5 Churn vs Balance

Customers with higher balances tend to churn more. This could indicate that high-balance customers are less satisfied, possibly due to service or banking conditions



## 2.6 Estimated Salary Across Age Groups

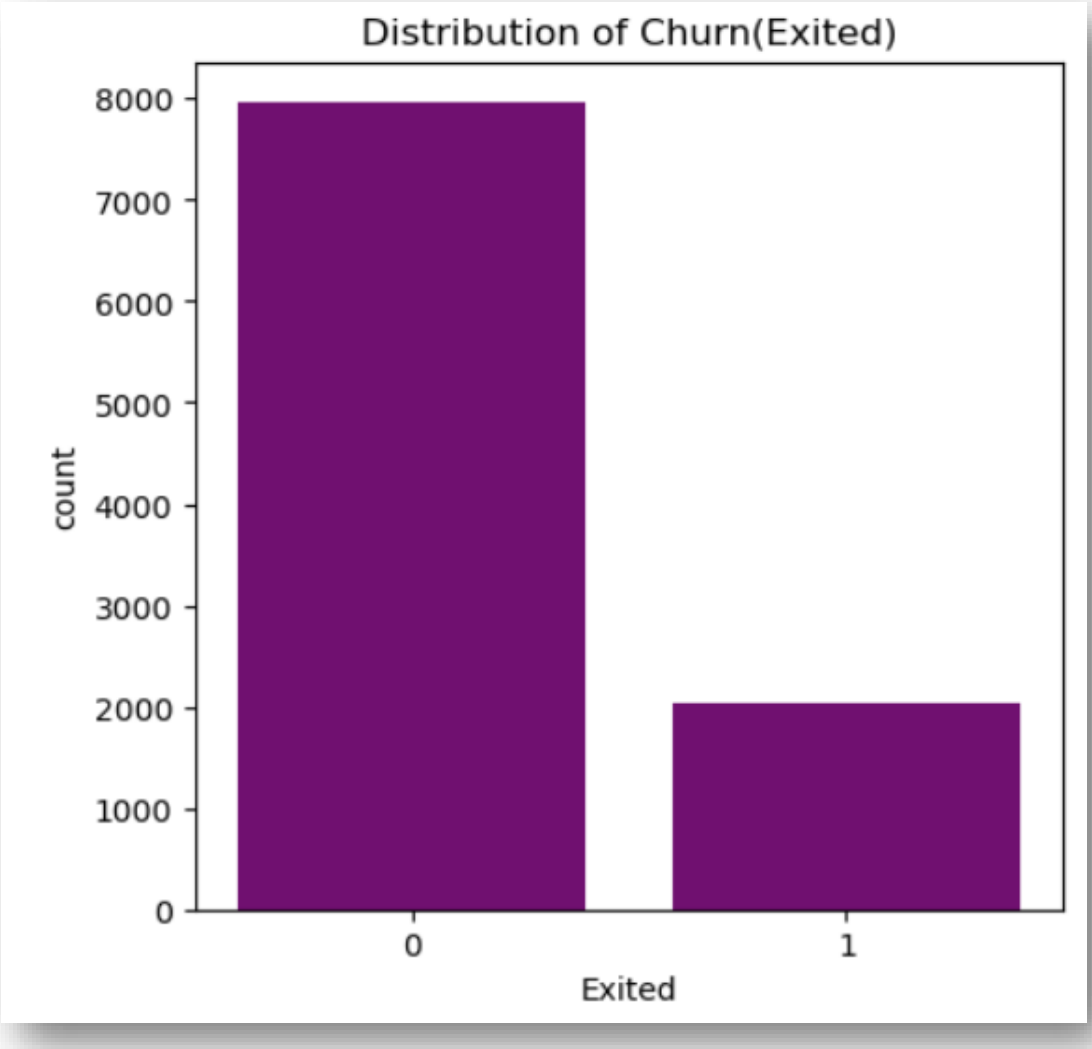
The estimated salary tends to remain relatively stable across different age groups, with minor fluctuations.



# 3. Churn Distribution and Key Metrics

## 3.1 Churn Distribution

A count plot reveals that around 20.37% of the customers have exited the bank.



### 3.2 Key Metrics

- **Churn Rate**: 20.37%
- **Customer Lifetime Value (CLV)**: On average, the CLV is calculated to be $529,179.33.
- **Customer Retention Rate**: 51.51% of the customers are active.
- **Product Penetration Rate**: The average number of products per customer is 1.53, or 153.02%.
- **Average Credit Score**: 650.53
- **Customer Satisfaction Index (CSI)**: 51.51%

## 4. Churn Analysis by Demographic Factors

### 4.1 Churn by Geography

The churn rate varies by geography, with Germany having the highest churn rate at 32.44%.

| Geography | Churn Rate |
|---|---|
| France | 16.15% |
| Germany | 32.44% |
| Spain | 16.67% |

### 4.2 Churn by Gender

Female customers churn at a higher rate than male customers, with churn rates of 25.07% and 16.46% respectively.

### 4.3 Churn by Active Membership

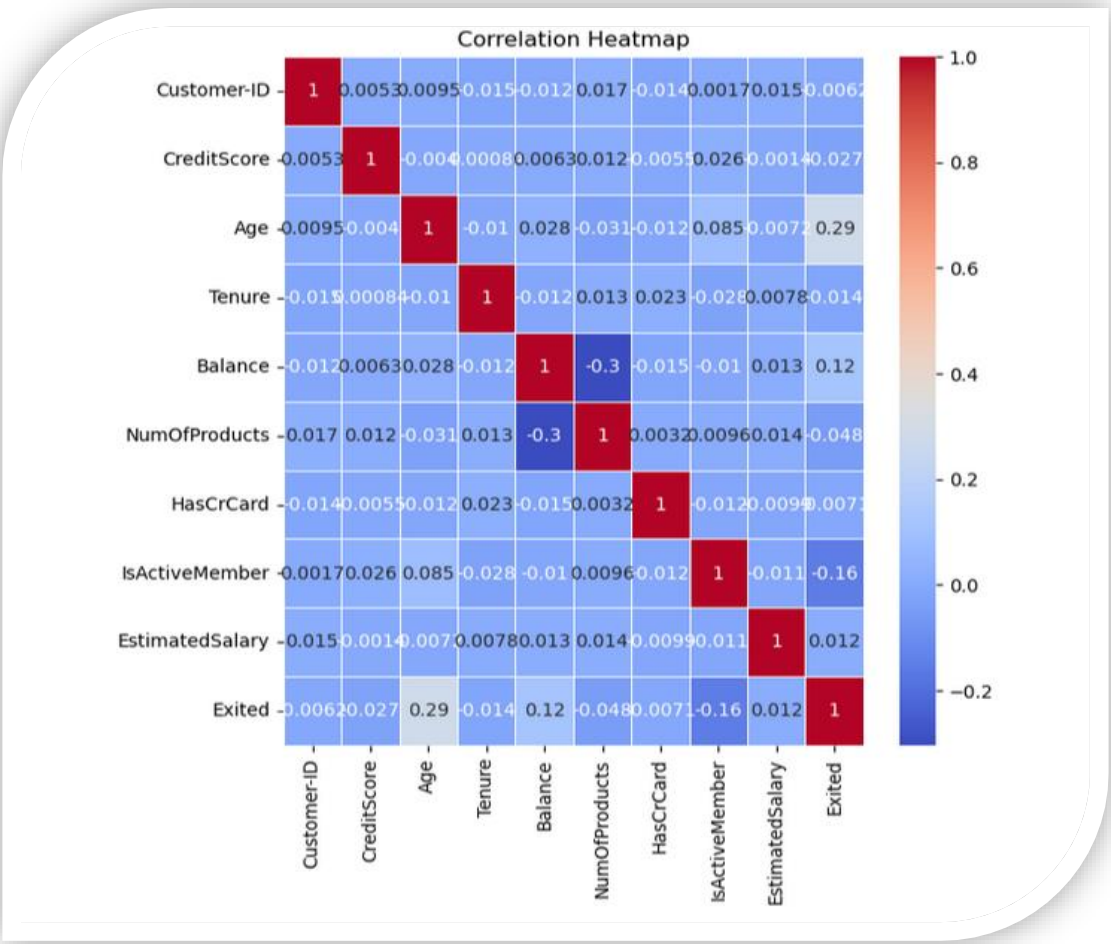
Active members are less likely to churn, with only 14.27% churning compared to 26.85% of inactive members.

# 5. Correlation Analysis

## 5.1 Correlation Heatmap

A heatmap was generated to display correlations between the numerical features. Some notable findings include:

- **Age** shows a positive correlation with churn (0.285), indicating older customers are more likely to leave.
- **Balance** also shows a positive correlation with churn (0.118), suggesting higher balances are associated with churn.
- **IsActiveMember** is negatively correlated with churn (-0.156), meaning active members are less likely to churn.



## 6. Conclusion and Recommendations

The analysis indicates that older customers, those with high balances, and inactive members are more likely to churn. Key recommendations include:

- Target High-Balance Customers: Introduce loyalty programs or exclusive services for high-balance customers.
- Engage Older Customers: Offer tailored services for older customers to increase retention.
- Boost Active Membership: Focus on increasing the number of active members through better engagement or benefits for remaining active.