1. Introduction

- **Context**

  customer retention is a key priority for banks seeking to maintain long-term profitability. This report focuses on customers of a bank, specifically a French geographic region, by analyzing and comparing two groups, those with open accounts and those who have closed their accounts.

- **Objective**

  with approximately 16% of customers leaving the bank, this report aims to analyze the characteristics of those who closed their accounts. The goal is to identify potential factors driving account closures, provide insights to refine the bank’s retention strategies, and reduce churn. Additionally, understanding the profiles of churned customers can reveal valuable insights to attract and retain future potential clients.

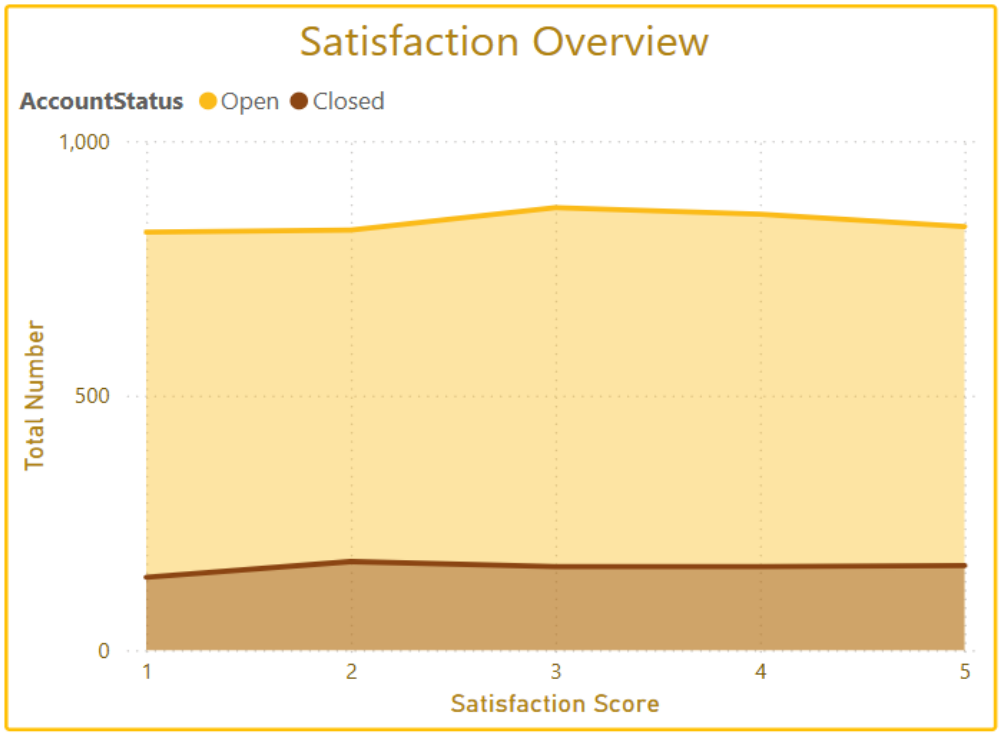
- **Data Overview**

  the dataset was sourced from the bank's most recent internal records and does not include timestamps or specific dates. It contains customer-level information such as ID, gender, geography, age, account status (open or closed), membership status, balance, annual estimated salary, credit score, membership duration, satisfaction score, and card type. All customers—both current and churned—are included. For churned customers, the data reflects their status prior to account closure.

- **Outline Of Analysis Approach**

  The analysis compares two customer groups—those with open accounts and those who have closed theirs. Levene’s test (Welch's version) was used to assess the homogeneity of variances. For ordinal and continuous variables, independent samples t-tests were conducted, while categorical variables were analyzed using Chi-square tests. Cohen’s d and Cramér’s V were calculated to measure effect sizes and determine the practical significance of observed differences between the two groups.

2.1 Satisfaction Score Factor

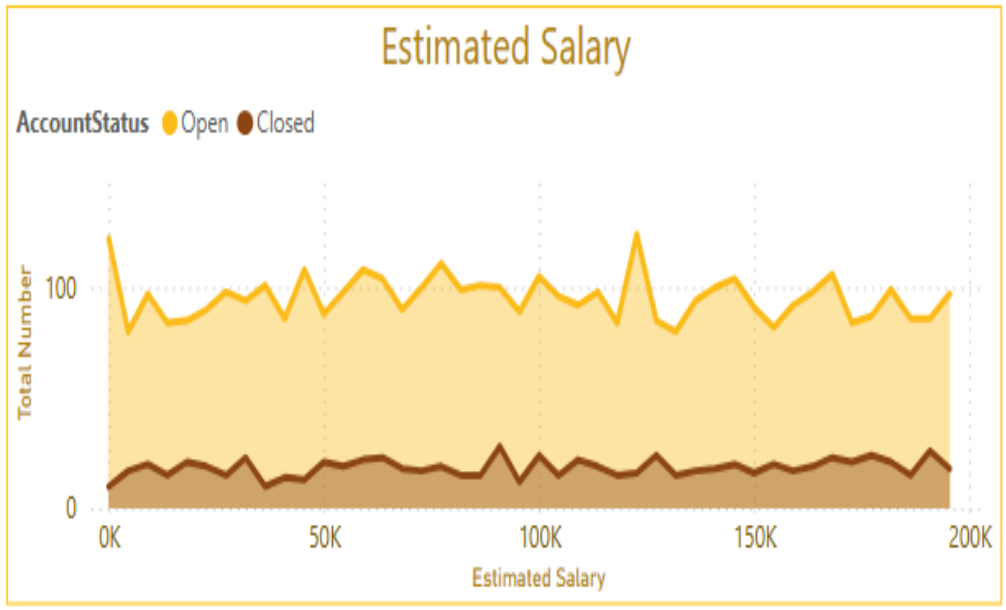


Method: compare satisfaction scores between customers with open and closed accounts using Levene's test to assess equality of variances, followed by an independent samples t-test to determine if the difference in average satisfaction scores is statistically significant.

Analysis: The results showed no significant difference in average satisfaction scores between the two groups (p-value = 0.55), indicating that customers who closed their accounts were, on average, just as satisfied as those who kept them open.

Conclusion: The analysis suggests that customer churn was not driven by dissatisfaction, as satisfaction levels were similar between open and closed accounts.

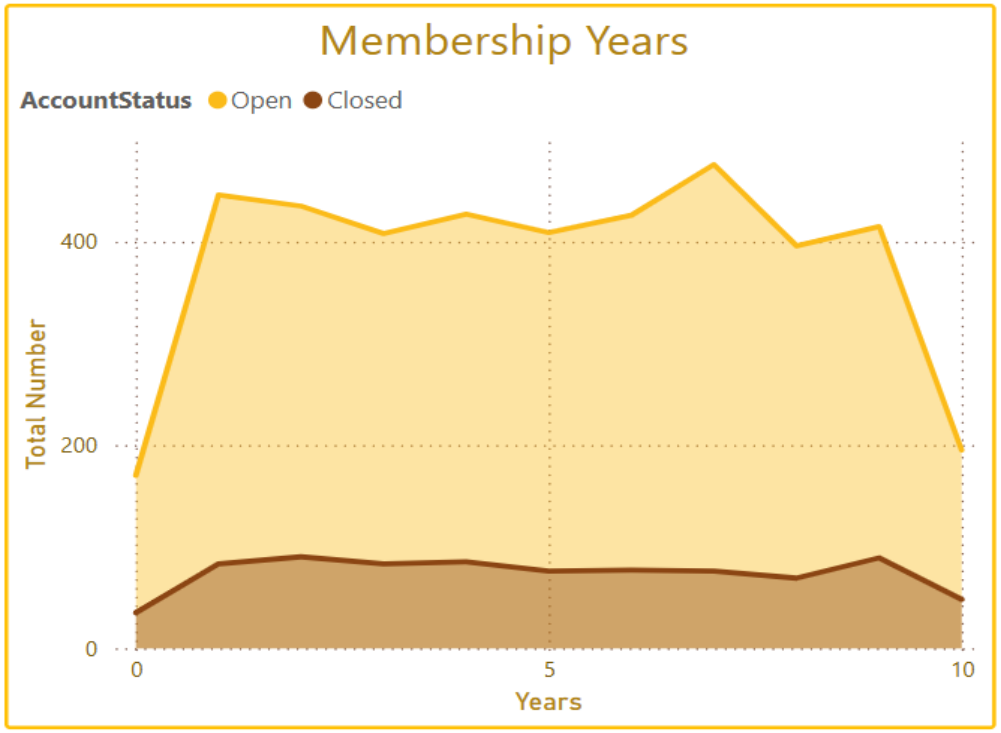
2.2 Estimated Salary Factor



- **Method:** compare estimated salary between customers with open and closed accounts using Levene's test to assess equality of variances, followed by an independent samples t-test to determine if the difference in average estimated salary is statistically significant.
- **Analysis:** The results showed a statistically significant difference in average estimated salary between the two groups ($p = 0.048$), with a negligible effect size (Cohen's $d = 0.07$). Customers who closed their accounts had an estimated salary higher by €43 to €8,862 (95% confidence interval).
- **Conclusion:** Although the difference is statistically significant, the negligible effect size suggests that the customer income is unlikely to be a primary factor influencing customers to close their accounts.

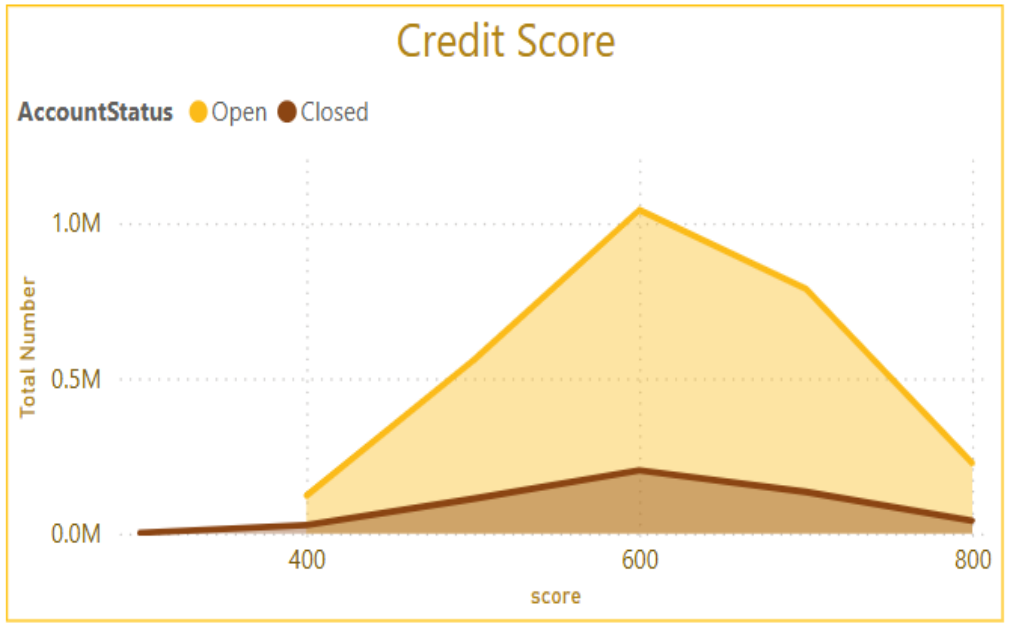
Note: Estimated salary represents the customer's **annual income** in euro as reported or inferred by the bank.

2.3 Membership Years Factor



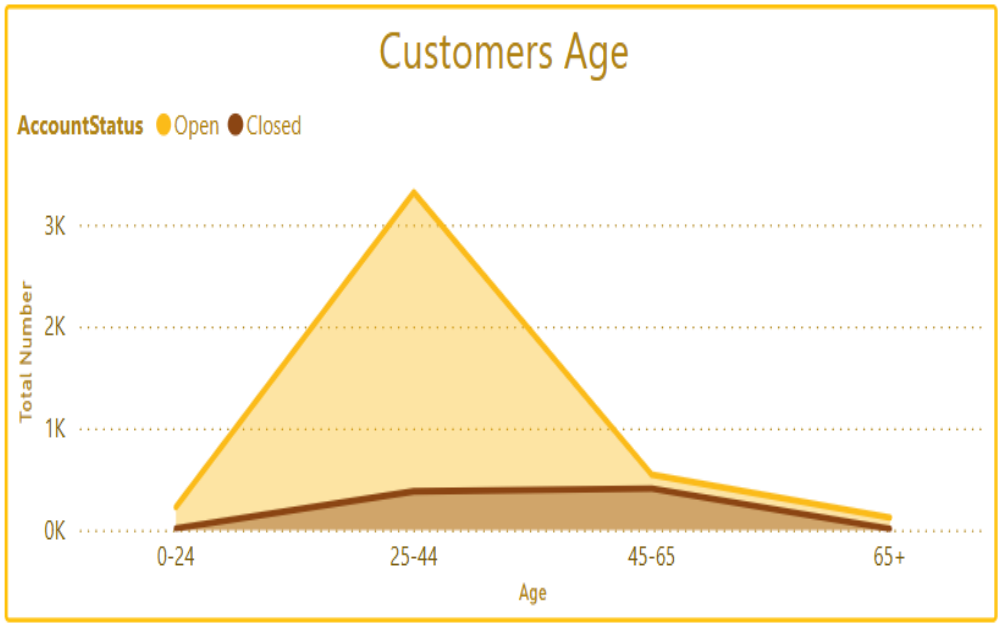
- **Method:** compare membership years between customers with open and closed accounts using Levene's test to assess equality of variances, followed by an independent samples t-test to determine if the difference in average membership years is statistically significant.
- **Analysis:** The results showed no significant difference in average membership years between the two groups (p-value = 0.997), indicating that customers who closed their accounts had been with the bank for about the same time as those who remained.
- **Conclusion:** The analysis suggests that customer churn was not driven by how long a customer has been with the bank, as tenure was nearly identical across open and closed accounts.

2.4 Credit Score Factor



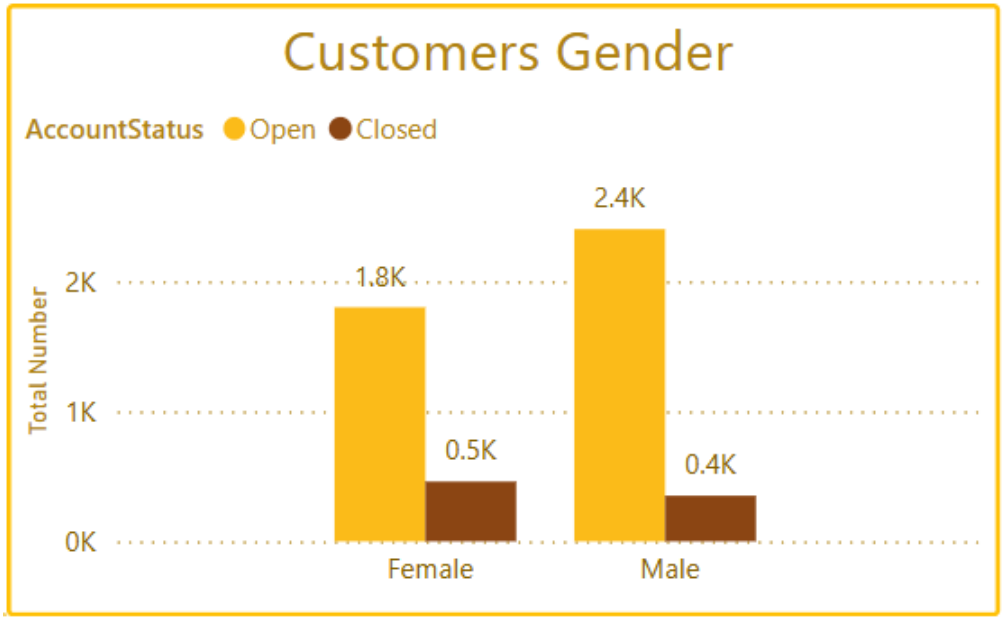
- **Method:** compare credit score between customers with open and closed accounts using Levene's test to assess equality of variances, followed by an independent samples t-test to determine if the difference in average credit score is statistically significant.
- **Analysis:** The results showed a statistically significant difference in average credit score between the two groups ($p = 0.015$), with a negligible effect size (Cohen's $d = 0.09$). Customers who closed their accounts had credit scores lower by 1 to 16 points (95% confidence interval), with an average score of 642 for the closed accounts group.
- **Conclusion:** Although the difference is statistically significant, a 16-point difference is minor by banking standards, and the negligible effect size suggests that credit score is unlikely to be a major factor influencing customers to close their accounts.

2.5 Customer Age Factor



- **Method:** compare age between customers with open and closed accounts using Levene's test to assess equality of variances, followed by an independent samples t-test to determine if the difference in average customer age is statistically significant.
- **Analysis:** The results showed a statistically significant difference in average age between the two groups (p-value < 2.2E-16), with a large effect size (Cohen's d = 0.78). Customers who closed their accounts are ager by 7 to 8.6 years (95% confidence interval), with an average age of 45 for the closed accounts group.
- **Conclusion:** The results suggest a clear relationship between age and account closure — older customers are more likely to close their accounts.

2.6 Customer Gender Factor



- **Method:** Examined the association between gender and account status using a Chi-square test of independence.
- **Analysis:** The test showed a statistically significant difference in gender distribution ($p = 4.859e-13$), with a small effect size (Cramer's $V = 0.1$). Female customers closed their accounts at a rate of 18% to 22%, compared to 11% to 14% for male customers (95% confidence interval).
- **Conclusion:** The results suggest that female customers are more likely to close their accounts than male customers.

3. The Conclusion

- **Key Insights:**
  the analysis found that older and female customers are more likely to close their accounts, with age demonstrating a strong effect and gender showing a small but statistically significant association. In contrast, estimated salary and credit score, although statistically significant, had negligible practical impact. Additionally, satisfaction scores did not show any significant difference association.

- **Interpretation:**
  these findings suggest that customer churn is not primarily driven by dissatisfaction or financial hardship. Instead, behavioral or demographic factors—particularly age and gender—appear to play a more influential role. It is possible that current banking strategies do not align with the evolving expectations or life stages of older customers, prompting them to seek alternatives, while younger customers are more inclined to maintain their accounts.

- **Business Implications:**
  retention strategies should be re-evaluated, with a specific focus on older customers—especially older women—to better understand and address the factors influencing their decision to leave. Enhancing satisfaction measures to capture elements that matter more to this customers specific class may help improve retention.

- **Further Recommendations:**
  consider tracking operational experiences such as the time it takes to complete key transactions (withdrawals, deposits, balance inquiries) to identify possible service friction points that could influence customer satisfaction and churn.