Data Analysis and Insights Extraction from Bank Churners

Objective
The goal of this analysis is to explore, analyze, and extract meaningful insights from a dataset containing information about bank customers. The focus is on identifying patterns, trends, and factors that influence customer churn.

Dataset Overview
The dataset contains various features related to bank customers, including demographic information, account details, and transaction history. The primary objective is to understand the characteristics of customers who are likely to churn and identify factors influencing their decision.

Data Exploration

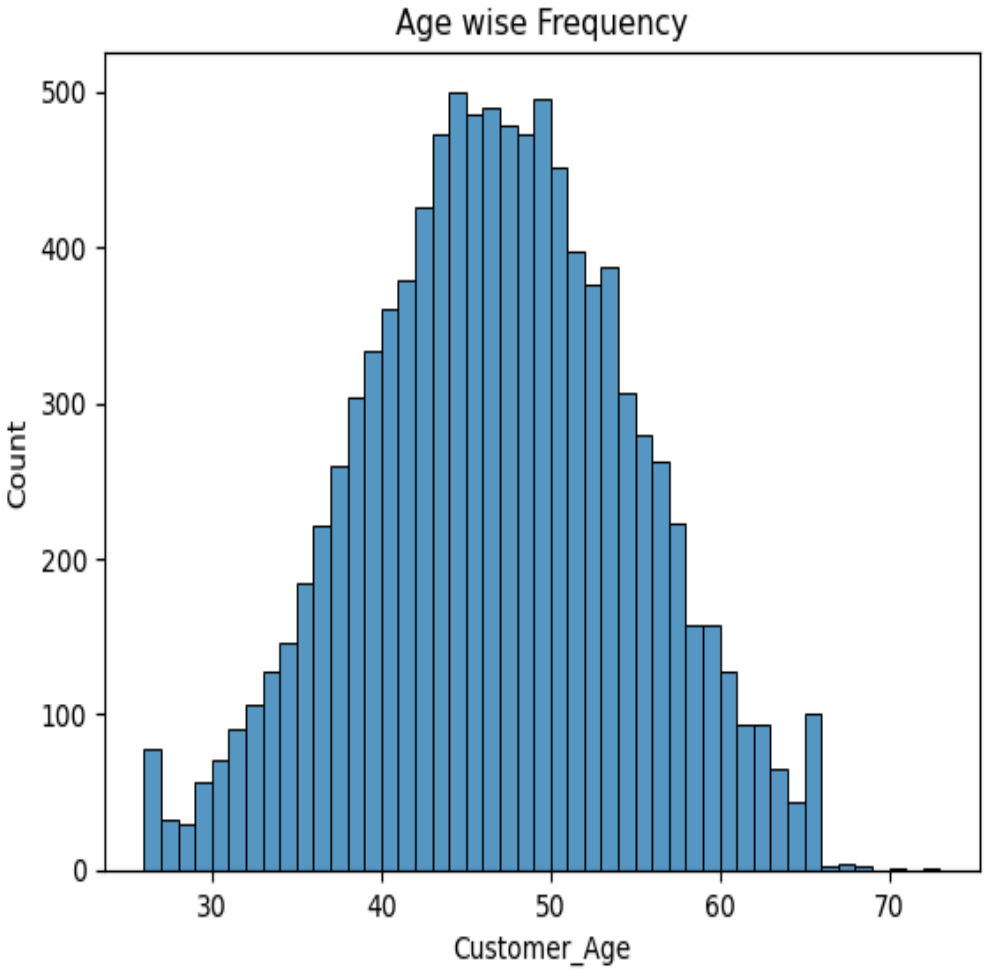
- **Initial Exploration:**
    - The dataset consists of multiple columns, including customer demographics, account information, and transaction details.
    - The data types include integers, floats, and categorical variables.
    - No significant missing values were found, ensuring a clean dataset for analysis.

- **Data Structure:**
    - Number of rows:10,127
    - Number of columns:21
    - Key features:
        - Customer_Age
        - Gender
        - Dependent_count
        - Education_Level
        - Marital_Status
        - Income_Category
        - Card_Category
        - Months_on_book
        - Total_Relationship_Count
        - Months_Inactive_12_mon
        - Contacts_Count_12_mon
        - Credit_Limit

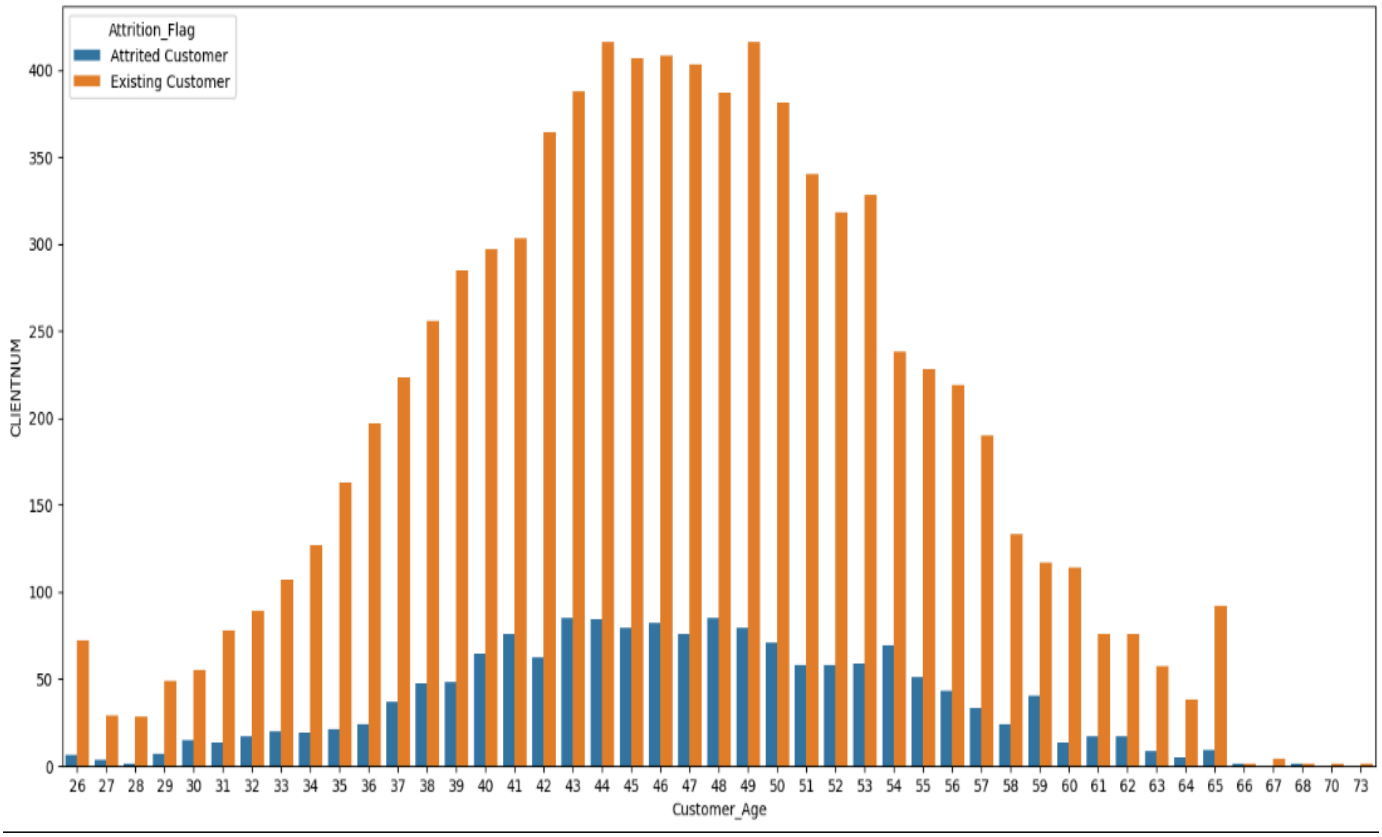
        - Total_Revolving_Bal
        - Avg_Open_To_Buy
        - Total_Amt_Chng_Q4_Q1
        - Total_Trans_Amt
        - Total_Trans_Ct
        - Total_Ct_Chng_Q4_Q1
        - Avg_Utilization_Ratio
        - Attrition_Flag
    -

Data Visualization

1. Distribution of Customer Ages:
    - The histogram shows a normal distribution of customer ages, with the majority of customers aged between 30 and 50 years.



2. Customer Churn Status:
    - The bar chart indicates that a smaller proportion of customers have churned compared to those who have not.



3. Correlation Heatmap:
    - The heatmap reveals strong correlations between certain features, such as Total_Trans_Amt and Total_Trans_Ct, indicating that higher transaction amounts are associated with a higher number of transactions.

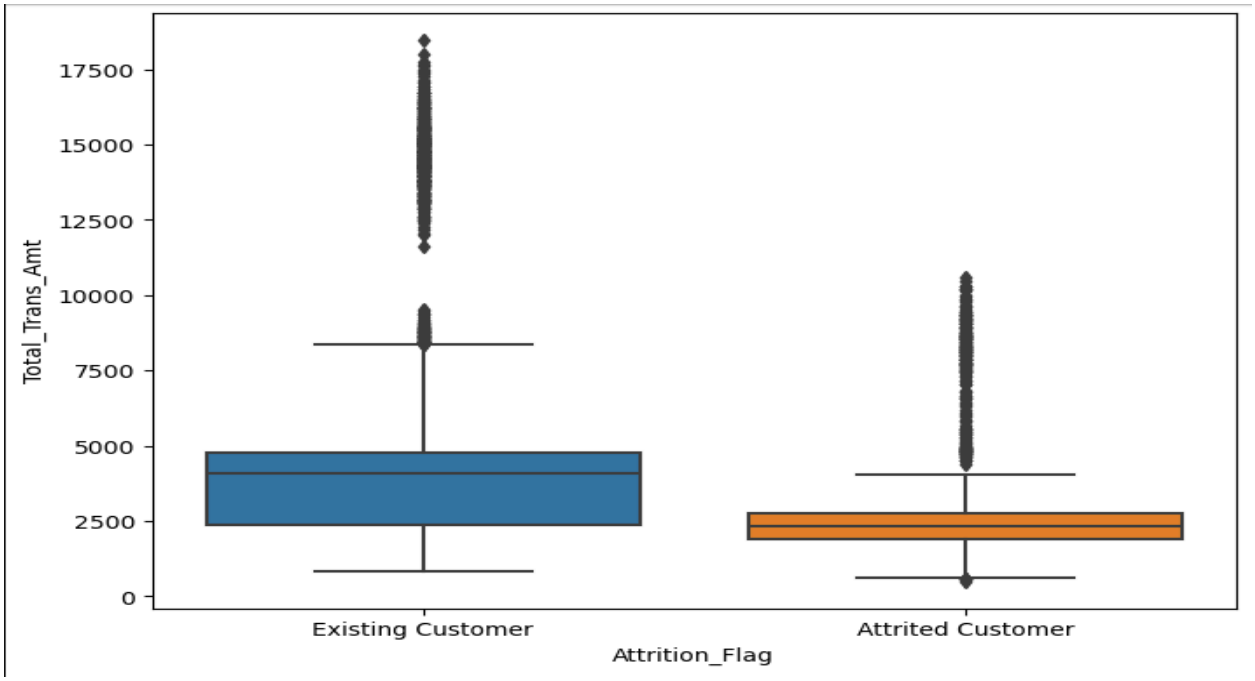
Statistical Analysis

1. Basic Statistical Measures:
    - Mean, median, mode, and standard deviation were computed for relevant features.
    - For example, the average customer age is approximately 46 years, with a standard deviation of 8 years.

```
age_mean=df['Customer_Age'].mean()
age_median=df['Customer_Age'].median()
age_mode=df['Customer_Age'].mode()[0]
age_std=df['Customer_Age'].std()
print(f'Age-Mean:{age_mean},Median:{age_median},Mode:{age_mode},Std Dev:{age_std}')
```

```
Age-Mean:46.32596030413745,Median:46.0,Mode:44,Std Dev:8.016814032549084
```

2. Outliers:
    - Boxplots identified outliers in features such as Credit_Limit and Total_Revolving_Bal.
    - These outliers were further analyzed to understand their impact on customer churn.



Insight Generation

1. Characteristics of Customers Likely to Churn:
    - Customers with higher average utilization ratios are more likely to churn.
    - Older customers tend to have a higher churn rate.
    - Customers with fewer total relationships with the bank are more likely to churn.
2. Patterns Based on Customer Demographics:
    - Female customers have a slightly higher churn rate compared to male customers.
    - Customers with lower education levels (e.g., high school) are more likely to churn.
    - Married customers are less likely to churn compared to single or divorced customers.
3. Factors Influencing Customer Churn:
    - Credit limit and total transaction amount are significant factors influencing churn.
    - Customers with fewer total relationships with the bank are more likely to churn.
    - Higher transaction amounts and counts are associated with lower churn rates.

Conclusion

The analysis of the Bank Churners dataset provides valuable insights into the characteristics and behaviors of customers who are likely to churn. By understanding these patterns, the bank can develop targeted strategies to retain customers and reduce churn rates. Key factors such as credit limit, transaction amounts, and customer demographics play a crucial role in influencing customer churn.

Recommendations

1. **Targeted Retention Strategies:**
    a. Focus on customers with high utilization ratios and offer personalized financial advice to manage their credit better.
    b. Develop loyalty programs for older customers to enhance their engagement with the bank.
2. **Enhanced Customer Relationships:**
    a. Increase the number of touchpoints with customers to build stronger relationships and reduce churn.
    b. Offer educational resources and financial planning services to customers with lower education levels.
3. **Personalized Product Offerings:**
    a. Introduce personalized banking products for customers based on their financial behavior, such as tailored savings plans or credit products, to enhance satisfaction and reduce churn.
    b. Develop exclusive benefits for customers using multiple bank products (e.g., credit cards, savings, loans) to encourage deeper financial engagement

4. **Monitoring and Intervention:**
    a. Regularly monitor transaction patterns and identify customers at risk of churning.
    b. Implement proactive measures such as personalized offers and incentives to retain high-risk customers