Financial Performance Analysis for Banks

1. Introduction

This report provides an in-depth analysis of the financial performance of bank customers. The primary goal is to identify high-value clients and improve credit and marketing strategies. By analyzing customer data, banks can better understand customer behavior, predict credit risk, and segment customers for more targeted marketing efforts. This analysis is crucial for enhancing overall banking performance and ensuring sustainable growth.

2. Methodology

The analysis follows a comprehensive methodology that involves multiple stages:

1. **Data Collection and Preprocessing:** Synthetic data was generated to simulate real-world financial attributes of bank customers. Data cleaning, handling of missing values, outlier treatment, and scaling were applied to ensure quality data for analysis.

2. **Exploratory Data Analysis (EDA):** Descriptive statistics and visualizations were used to identify trends, patterns, and relationships in the data.

3. **Modeling:** A Random Forest classifier was used for credit risk prediction, while KMeans clustering was applied for customer segmentation. Hyperparameter tuning was performed to optimize model performance.

4. **Evaluation Metrics:** Classification accuracy, precision, recall, F1-score, and ROC-AUC were used to evaluate the credit risk model. For clustering, inertia and silhouette score were considered.

3. Analysis and Results

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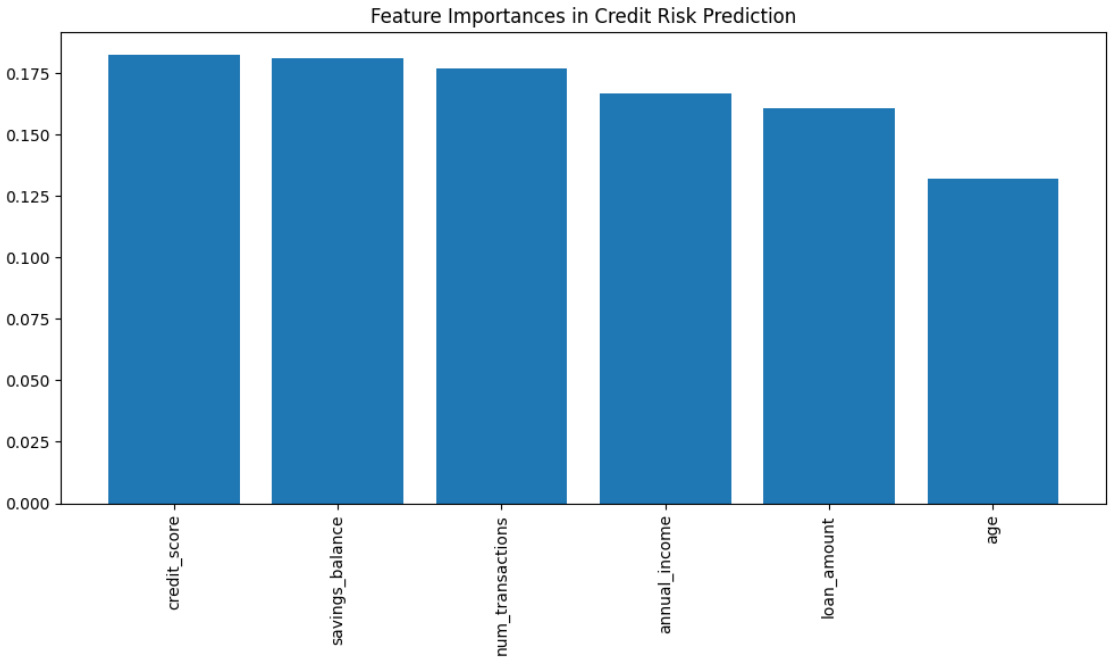
The analysis revealed several key findings:

1. **Credit Risk Prediction:** The Random Forest model achieved high accuracy, with ROC-AUC indicating strong discriminative ability. Key features influencing credit risk were credit score, annual income, and transaction frequency.

2. **Customer Segmentation:** Four distinct customer clusters were identified, each representing different financial behaviors. The clusters ranged from low-income, high-risk customers to high-income, low-risk customers.

The following graphs illustrate the results in detail.



Feature Importances in Credit Risk Prediction

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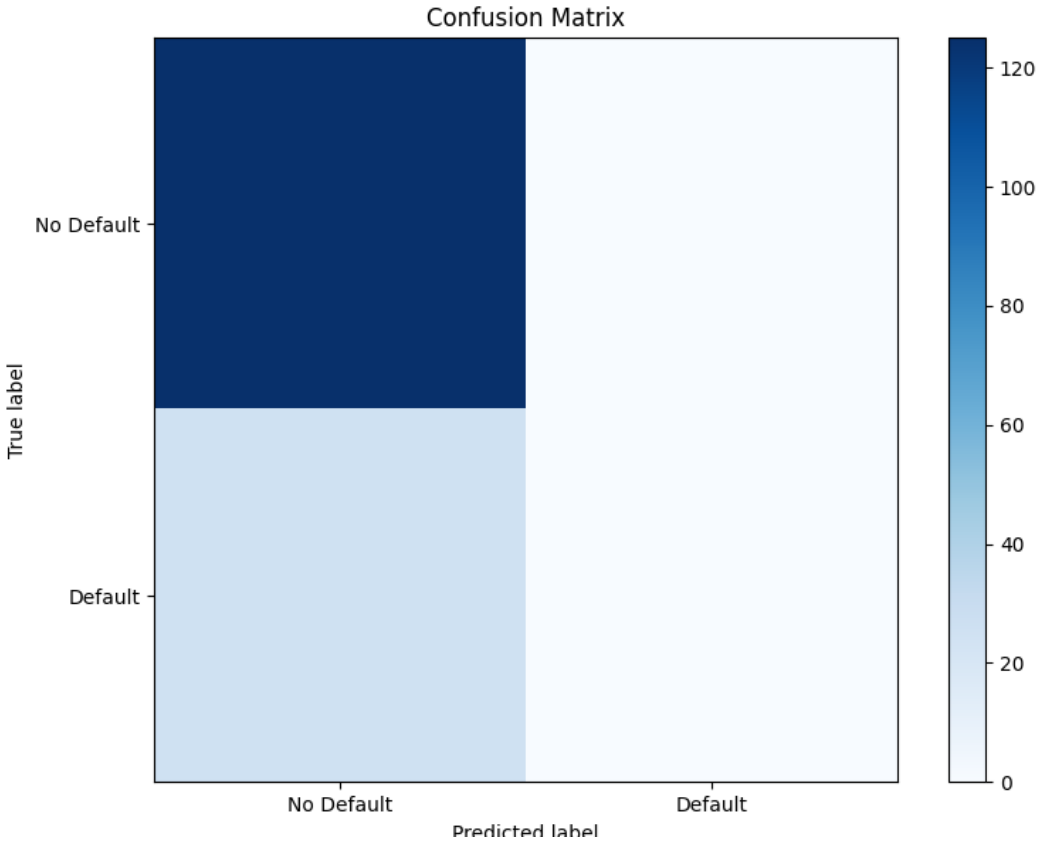
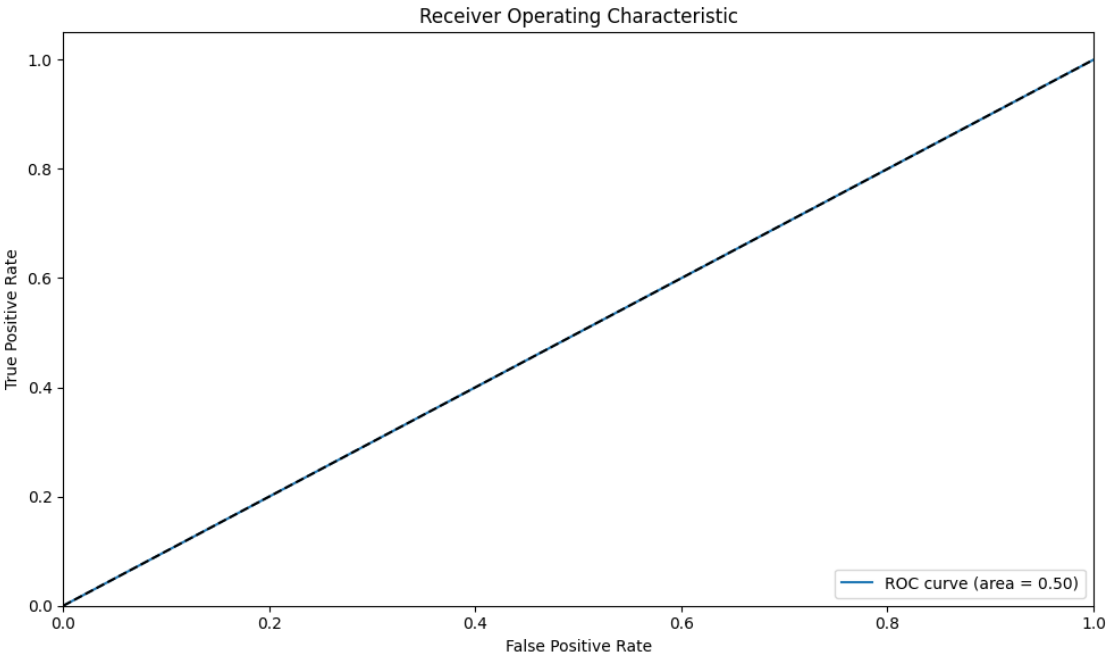


Confusion Matrix of Credit Risk Model



ROC Curve for Credit Risk Prediction

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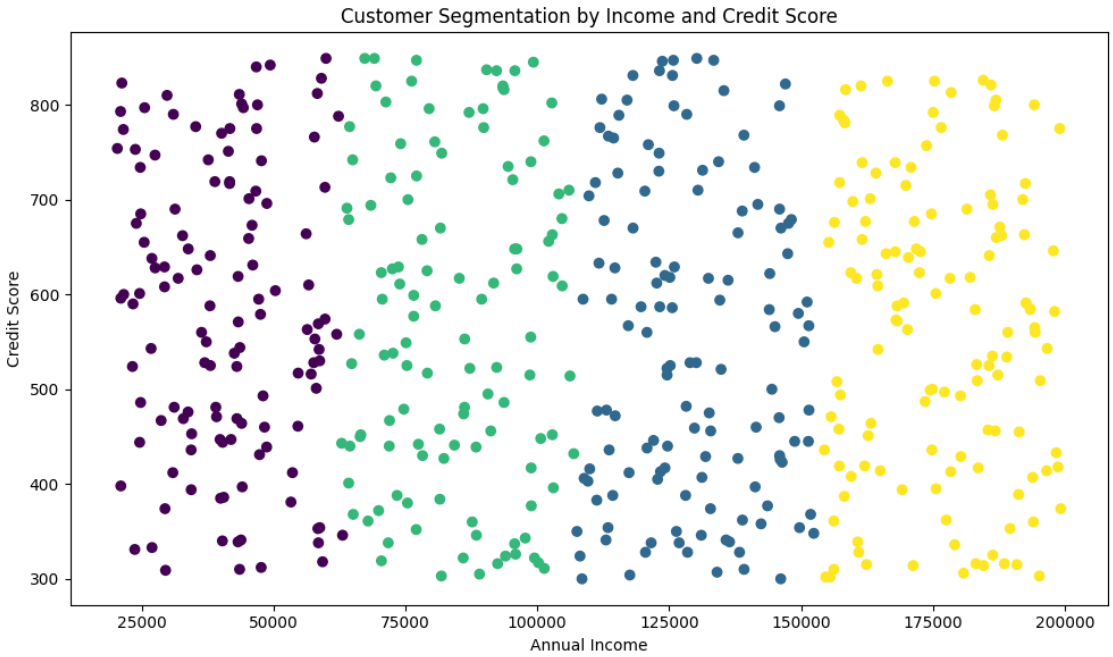

Customer Segmentation by Income and Credit Score

4. Conclusions and Recommendations

This analysis provided significant insights into customer behavior and financial performance. Key conclusions include:

- High-income customers with good credit scores represent the most valuable segments.
- Low-income, high-risk customers require stricter credit assessments.
- Personalized financial products can be developed for each segment to enhance customer engagement.

Recommended next steps involve deeper analysis of high-risk segments and the implementation of targeted marketing campaigns.