Executive Summary

Thursday, 20.02.2025

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Detailed Summary Report

Objective

The objective of this project is to enhance the efficiency of direct marketing campaigns by leveraging machine learning to identify high-propensity customers. The goal is to maximize potential revenue by targeting the most suitable clients for specific financial products, including consumer loans, credit cards, and mutual funds.

Data Overview

The dataset used for this analysis consists of information on 1,615 clients and includes:

- ***Demographic Data**: Age, gender, and tenure with the bank.*
- ***Financial Product Ownership**: Types of accounts and investment products held, such as current accounts, savings accounts, mutual funds, overdrafts, credit cards, and consumer loans.*
- ***Transaction History**: Monthly average inflow/outflow on current accounts and aggregated card turnover over the last three months.*
- ***Sales and Revenue Data**: Historical purchase and revenue details for 60% of the clients, used to train the models.*

Methodology

The analysis involved several key steps:

1. ***Data Preprocessing***

    - *Missing values were examined and imputed where necessary.*
    - *Data inconsistencies were resolved to ensure accuracy.*
    - *Feature engineering was performed to create meaningful predictors.*
2. ***Exploratory Data Analysis (EDA)***

    - *Trends and correlations among demographic, financial, and transactional data were explored.*
    - *Insights from EDA guided feature selection for the predictive models.*

3. *Model Development*

- *Classification Models*: Random Forest classifiers were trained to predict the likelihood of a client purchasing a consumer loan, credit card, or mutual fund.
- *Regression Models*: Random Forest regressors were used to estimate the revenue generated from each product purchase.
- Feature importance analysis was conducted using permutation importance and partial dependence plots to interpret model decisions.

4. *Model Validation and Evaluation*

- Performance metrics such as accuracy, precision, recall, and ROC-AUC were used to assess the effectiveness of the classification models.
- Regression models were evaluated using RMSE and R-squared values to measure the accuracy of revenue predictions.

Key Findings

The models uncovered critical insights into customer behaviors:

- *Consumer Loans*:

  - Young clients or long-term retired customers with low savings and frequent small cashless transactions are more likely to purchase a consumer loan.
  - Highly profitable customers tend to have more money in their current accounts and make frequent card transactions.
- *Credit Cards*:

  - Older clients with higher current account balances are more inclined to purchase a credit card.
  - Profitability is linked to frequent debit card transactions and a longer tenure with the bank.
- *Mutual Funds*:

  - Clients aged 30-60 with lower debit turnover but higher credit turnover in their accounts are most likely to invest.
  - Profitable clients exhibit a smaller volume of debit transactions but maintain substantial credit transactions.

Campaign Recommendations

Based on the analysis, the top clients were identified as ideal candidates for the direct marketing campaign, with an estimated total revenue of **647.67 EUR**.