Boosting Marketing Efficiency

Targeted Bank Campaign by Customer Subscription Behavior

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https://github.com/thishan1036/bank-deposit

The Business Problem & Project Goal

Business Problem

- Banks waste significant marketing budget on broad, untargeted campaigns, leading to inefficient budget spend and high customer acquisition costs.

Project Goal

- Develop a classification model and analyze the business trade-off between precision and recall - transforming marketing from a wide net into a precision spear.

The Process at a Glance

Data Cleaning & EDA

01

- Handle missing values using appropriate imputation techniques.

- Conduct a detailed EDA to understand key variables and their potential business impact.

Feature Engineering

02

- Remove data leakage features.

- Apply one-hot encoding to multi-class categorical variables.

- Handle imbalance data using SMOTE on the training set.

Modeling

03

- Train three models
  - Logistic Regression
  - Random Forest
  - XGBoost

- Apply hyperparameter tuning on selected best model.

Feature Importance & Scenario Analyses

04

- Identify and conduct deeper analysis on the most important predictors.

- Conduct scenario based analysis and yield business strategies.

Key Findings & Insights

Top 15 Most Important Features
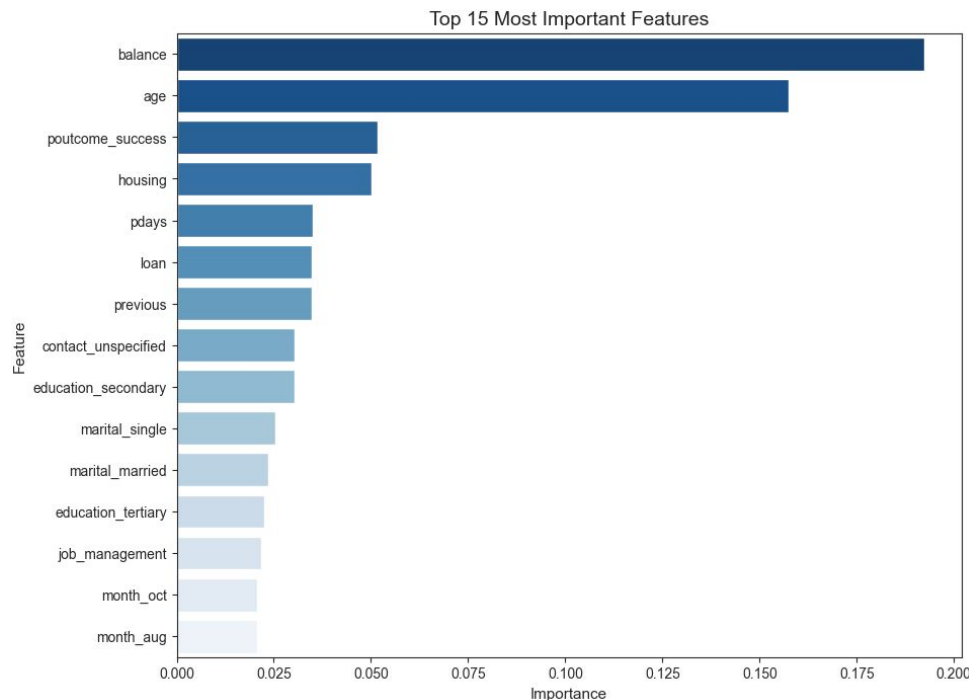
- Financial and demographic profiles were identified as the most dominant factors (account balance & client's age).

- Clients who subscribe to the term deposit tend to have a higher account balance than those who do not.

- On average, 'retired' clients and 'students' are the two most receptive groups with more than twice likely to subscribe.

- Successfully subscribed clients in the previous campaign was also identified as a strong influential predictor.

The Final Results: Strategic Scenarios

Strategy	Precision	Recall	Clients to Call	Subscribers Captured	Marketing Cost	Revenue	ROI
High-Precision	40.7%	10.6%	27	11	€135	€550	307.4%
High-Recall	16.1%	78.8%	508	82	€2,540	€4,100	61.4%
Balanced	30.5%	38.5%	131	40	€655	€2,000	205.3%

High-Precision: Demonstrates the highest marketing efficiency with the lowest total revenue.

High-Recall: Generates the highest total revenue with the lowest efficiency.

Balanced: Provides a promising marketing efficiency while capturing a healthy total revenue.

Recommendation: Balanced Strategy

For a general-purpose campaign that requires both profitable growth and effective market penetration, we recommend **the Balanced Strategy**. This approach provides the most robust and scalable path forward.

- Compared to the high-risk **High-Recall** strategy, our recommended approach delivers a **234% higher ROI** by being more targeted and **reducing marketing costs by over 74%.**

- Compared to the overly conservative **High-Precision** strategy, it generates **264% more revenue** by capturing over **3.5 times as many subscribers.**

Next Steps

Create more advanced features to capture more complex customer behavior.

Deploy the Balanced model in a live A/B test to measure its real-world impact.

Explore other algorithms like LightGBM to potentially improve the precision-recall frontier.