



A Case Study on Term Deposit Subscriptions

A Data-Driven Approach to Optimizing Customer Outreach

Finlatics DSGOLD Experience Programme





Overview

This project analyzes a dataset from the telephonic marketing campaigns of a Portuguese banking institution, aimed at promoting term deposit subscriptions. Term deposits represent a key revenue stream for banks, but acquiring customers via phone calls is operationally expensive and resource-intensive.

In light of this, the objective is to:

- Explore client demographics and behavioral attributes
- Understand key factors influencing subscription decisions
- Identify patterns and trends across various customer segments
- Build predictive insights to support targeted marketing strategies





Problems to solve

1

High cost of phone-based campaigns.

2

Need to improve ROI by identifying potential customers before outreach.



Project objective

Use data to predict likelihood of
subscription and prioritize leads

Dataset Description

Client-Related Features :

- Age: Numeric, representing the client's age in years.
- Job: Categorical, profession of the client (e.g., admin., management, technician).
- Marital Status: Categorical, includes married, single, and divorced.
- Education: Categorical, such as primary, secondary, tertiary, or unknown.
- Default: Binary, indicates if the client has credit in default (yes/no).
- Housing Loan: Binary, whether the client has a housing loan.
- Personal Loan: Binary, whether the client has a personal loan.
- Balance: Numeric, average yearly balance in euros.

Campaign-Related Features :

- Contact Type: Categorical, method of communication (cellular, telephone, unknown).
- Last Contact Day: Numeric, day of the month when the last call was made.
- Last Contact Month: Categorical (e.g., may, nov).
- Call Duration: Numeric, duration of last contact in seconds.
- Campaign: Numeric, number of contacts performed during the current campaign.

Historical Campaign Information :

- Pdays: Numeric, days since the client was last contacted (-1 = never).
- Previous: Number of past contacts made before the current campaign.
- Poutcome: Outcome of the previous campaign (success, failure, other, unknown).

Data Preprocessing Highlights

To ensure clean, model-ready data, the following steps were applied:

Missing Value Handling:

- Replaced NaN values in poutcome with 'unknown'.

Feature Engineering:

- Created had_previous_campaign: 1 if previous outcome was success, 0 otherwise.

Encoding:

- Converted binary target variable y into y_binary (1 for 'yes', 0 for 'no').

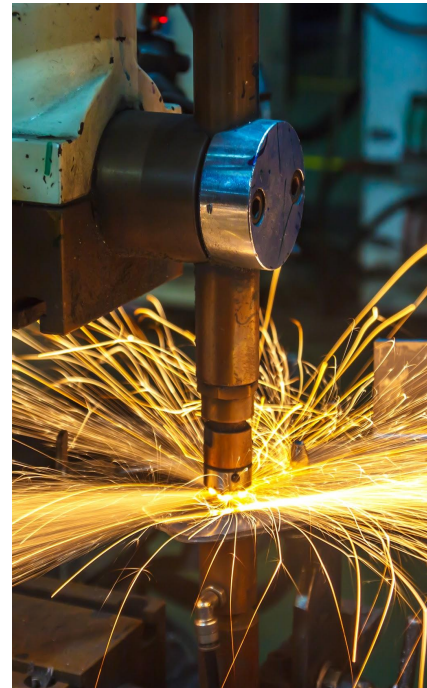
Data Cleaning:

- Dropped redundant columns like marital_status, day_month.

- Removed duplicate rows for accurate distribution analysis.

Reordering Columns:

- Adjusted the column order to improve readability and presentation.



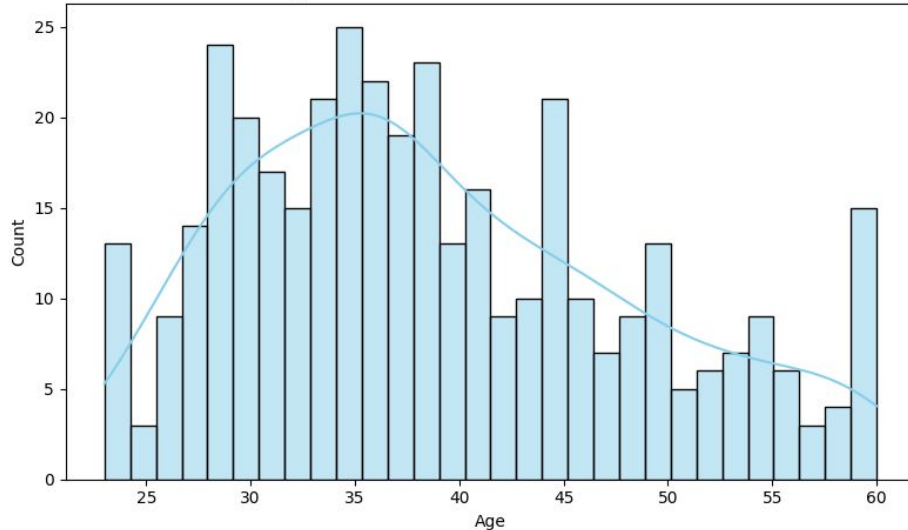


Exploratory Data Analysis

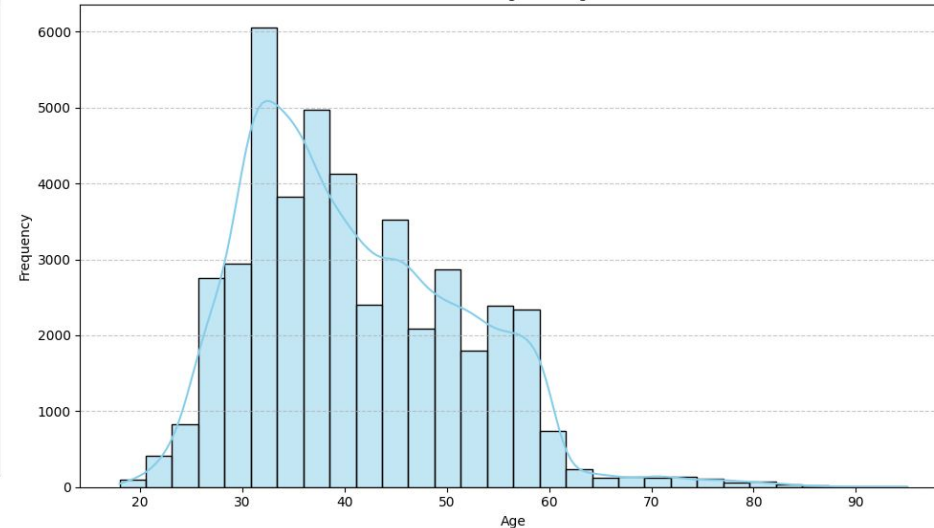
Age distribution

Most clients fall in the 30–40 age bracket. Younger clients (below 30) and older clients (above 60) are less represented. Marketing efforts could be concentrated in the 30–50 age segment, where volume is highest.

Age Distribution of Clients Who Subscribed

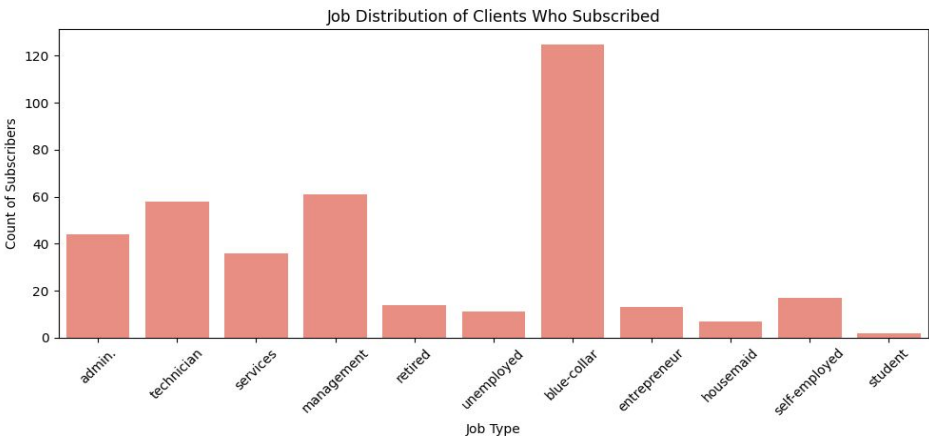
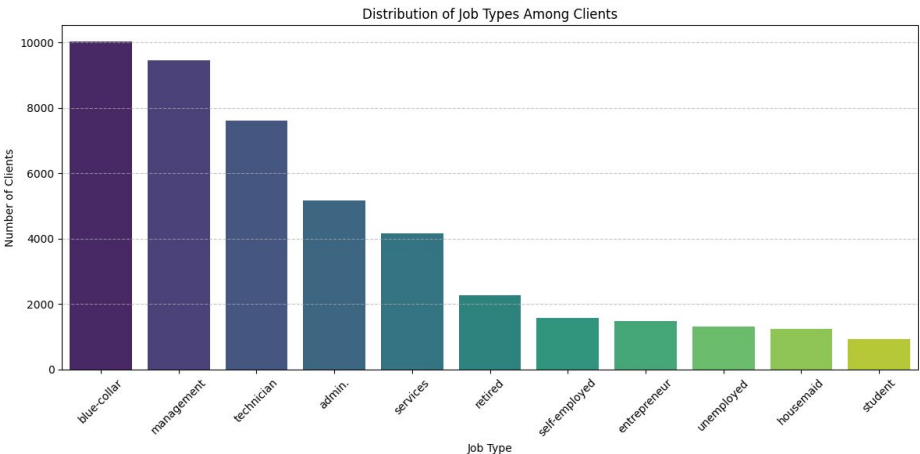
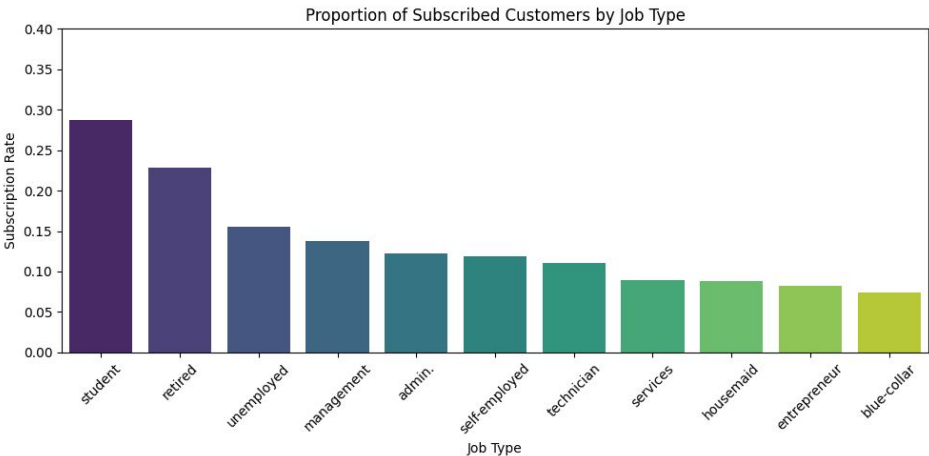


Distribution of Age Among Clients



Subscription Rate by Job

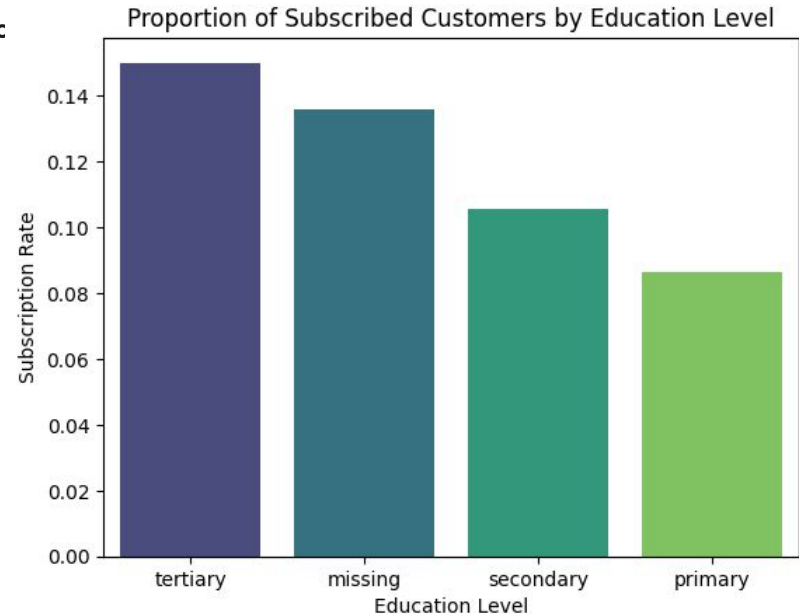
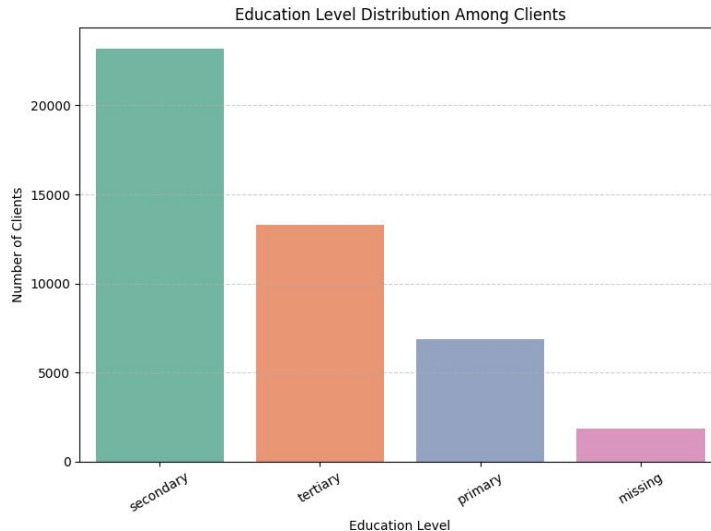
Proportion of subscribed customers among total clients are higher for students and retirees. This means more students and retirees should be targeted. Targeting blue collars should be reduced as they show low proportion among large number of clients.



Subscription Rate by Education

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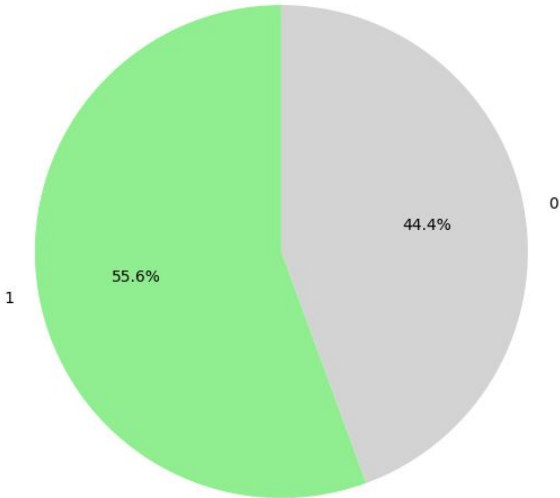
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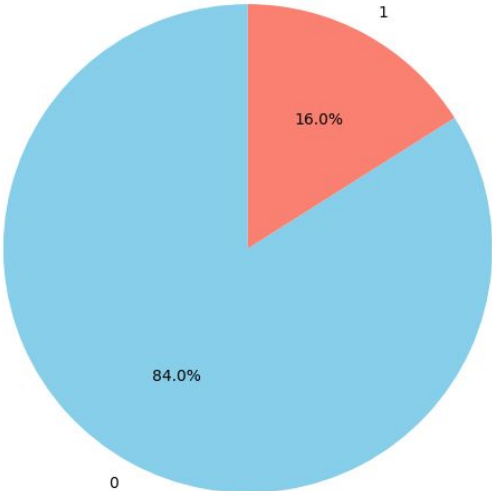
Housing & Personal Loans

Clients without loans are more likely to subscribe.
Those with housing loans show moderate conversion, but personal loans correlate negatively.

Housing Loan Status Among Clients

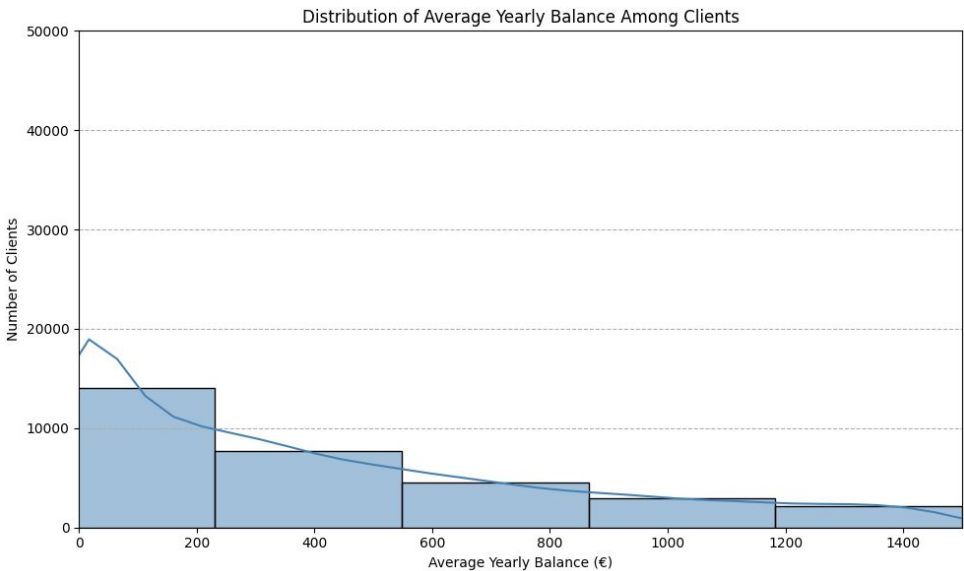


Personal Loan Status Among Clients



Balance Distribution

Majority of clients have balance below €2000.
Subscription probability increases with higher balances.





Thank you.

