Term Deposit Campaign

Data science case study

07/2024

Input

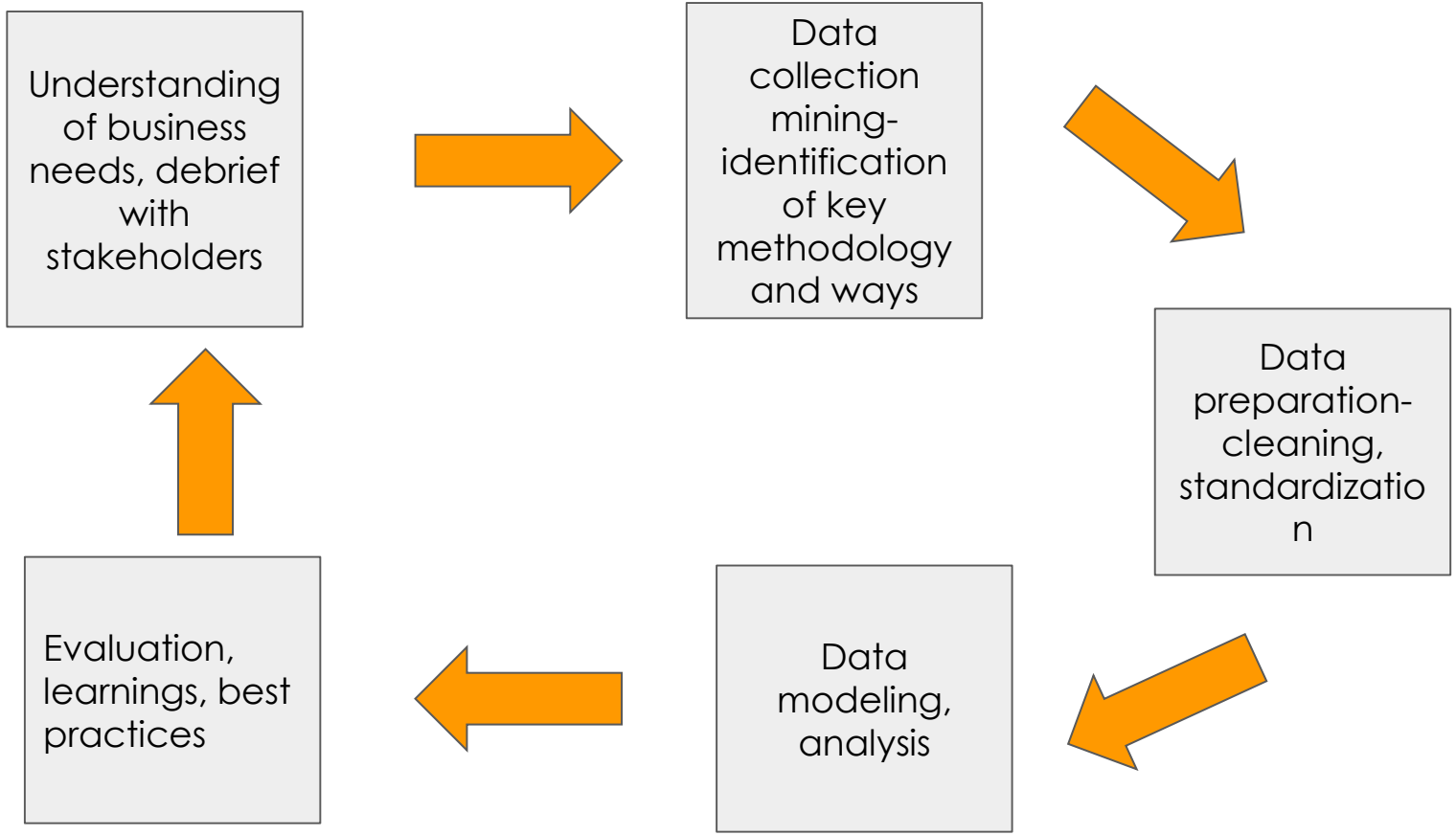
- **Telephonic Marketing Campaign advertising Term Deposit**
- **Objectives:**
  - to target additional clients in the second round of the campaign, understand their characteristics and select the most likely ones to subscribe to a term deposit
- **Goal**:
  - to find the optimal set of clients
  - trade-off between the costs and the expected amount of money these clients might bring us

Budget	€10,000
Budget per client/call	€2
Dataset	45,000+ clients

Product

Product	Term Deposit (without revolving)
Min. deposit	€ 200
Avg. deposit	Monthly salary of each client
Annual interest	4.5 %
Establishment fees	Free
Account maintenance fees	Free
Deposit length	1 year
Margin	10 %

Project phases



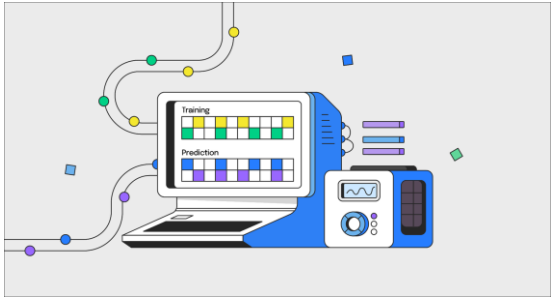
Methodology

- Cleaning and normalizing data

- Objective setting and market segmentation

- Data model A/B testing

- Training model with normalized dataset



Cleaning and normalizing data

- At the beginning we had a dataset of 45211 clients with mixed data types.
- These data were supposed to be cleaned and normalized so we can train our data models.
- Our normalization was based on specific criteria on which we want to train our data model on.

	id	client_id	in_default	balance	housing	loan	contact	id.1	account_id	day
0	12658	4700292	no	35.0	no	no	cellular	12658	12658	4
1	12659	5760899	no	466.0	no	no	cellular	12659	12659	4
2	12660	6362429	no	105.0	no	yes	cellular	12660	12660	4
3	12661	8554385	no	19.0	no	no	telephone	12661	12661	4
4	12662	8049096	no	126.0	yes	yes	cellular	12662	12662	4

Normalization and Standardization

- One Hot Encoder and Synthetic Minority Over-Sampling Technique (SMOTE)

	balance	age	housing_yes	loan_yes	job_admin.	job_blue-collar	job_entrepreneur	job_housemaid	job_mana
0	246.0	50	1	0	0	0	0	0	
1	1415.0	45	1	0	0	0	0	0	
2	8106.0	48	0	0	0	0	0	0	
3	46.0	46	0	1	0	0	0	0	
4	634.0	43	1	0	0	0	0	0	

Objective setting and market segmentation

- Based on newly generated datasets, we aim to identify top 5,000 candidates.

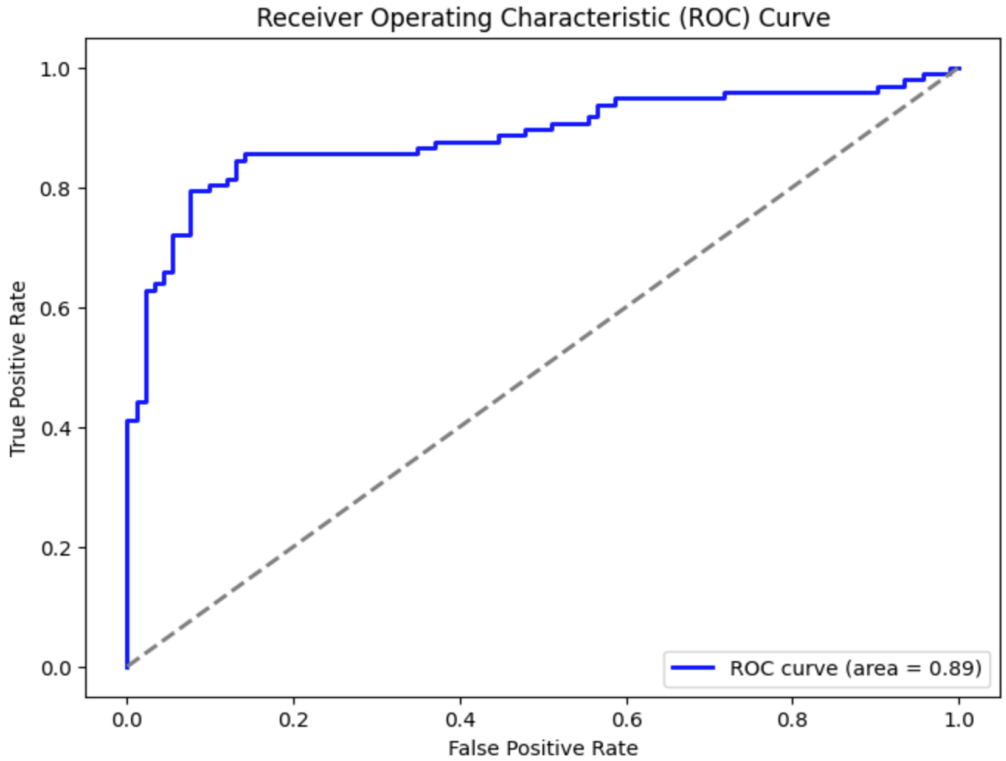
- To optimize selection, we propose a split test between two groups: Group 1, characterized by high expected revenue (at least 0.3 probability), and Group 2, composed of candidates with the highest overall probability.

- Analysis indicates that Group 2 alone outperforms any combination with Group 1 in terms of our key performance indicator (KPI).

ML models

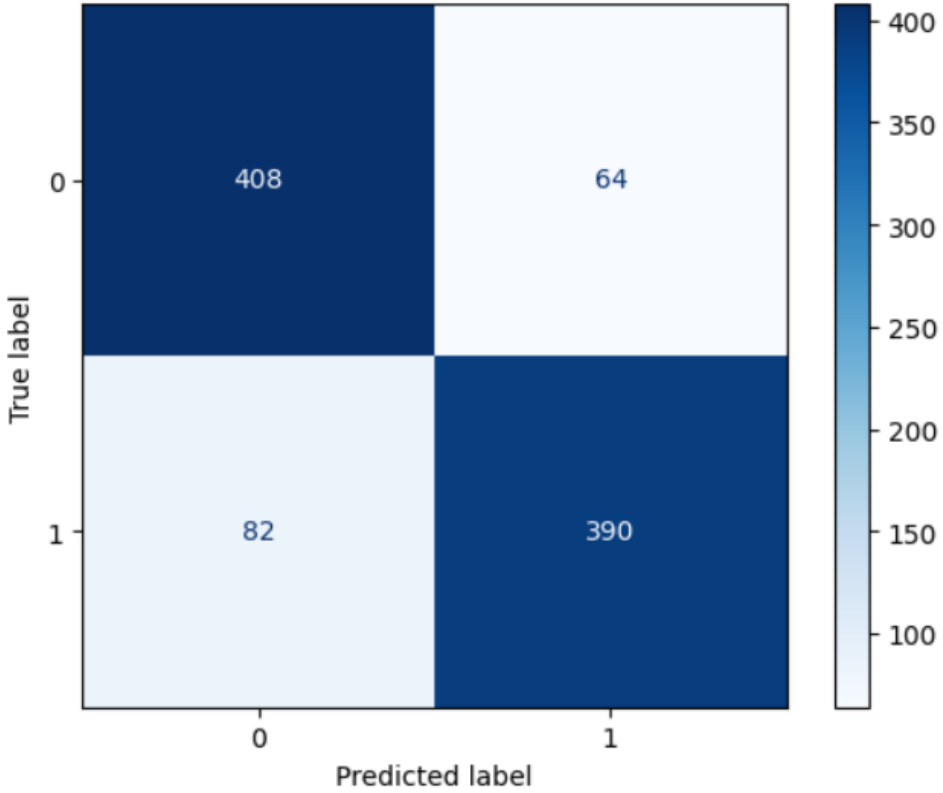
- Logistic regression - Accuracy of 86 %
- Random Forest with using GridSearchCV *with 5-fold cross-validation-* Accuracy of 81 %
- SVM with using *GridSearchCV with 10-fold cross-validation-* Accuracy of 85 %
- NN- Accuracy of 84 %
- **Random Forest- Accuracy of 87 %, our final model**

ROC CURVE



Example from our SVM Model

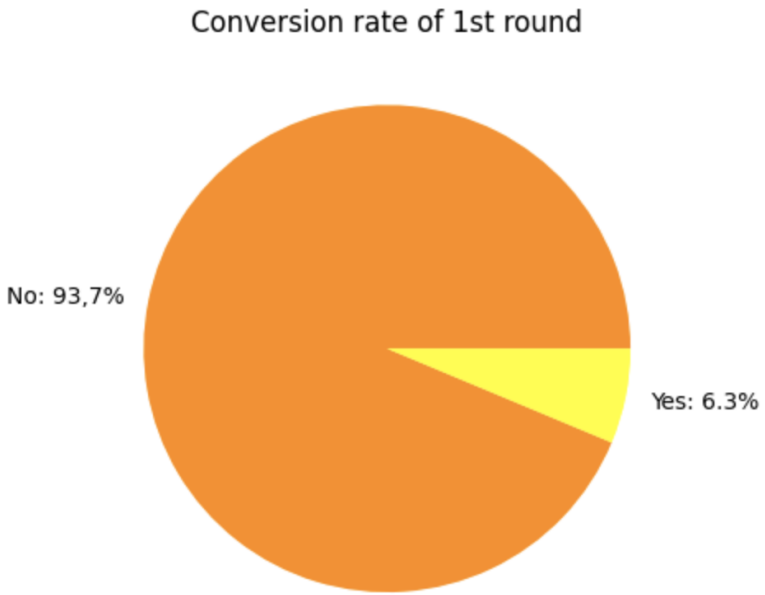
Confusion matrix of Random Forest



Evaluation of the 1st Campaign

- In financial industry the conversion rate typically ranges between **2 % to 5 %**
- The average conversion rate is 4.3 %

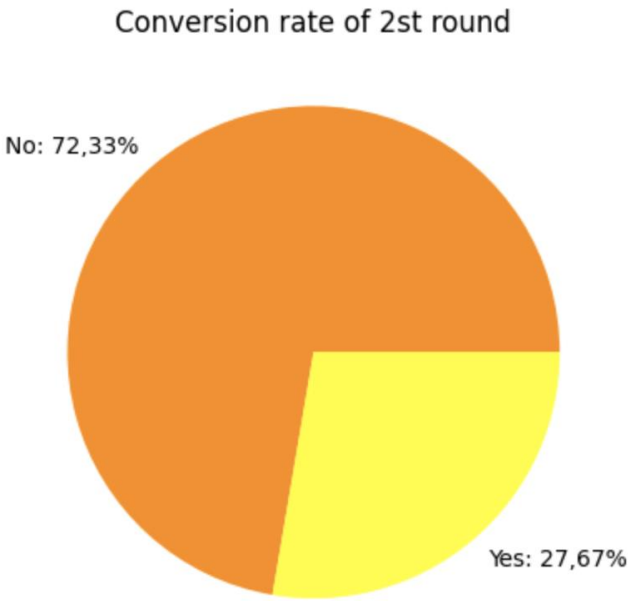
- Targeted clients : 521
- Conversion rate: 6,3 %
- Revenue: € 1,125,795
- Profit: € 112,580
- Cost: € 60,661
- ROI: 85 %



Source: https://www.ruleranalytics.com/blog/reporting/financial-services-marketing-statistics/

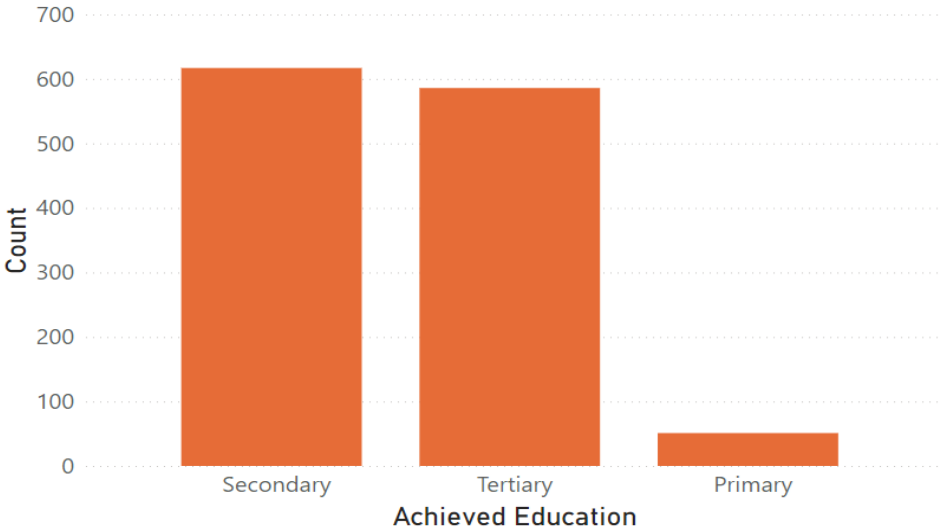
Evaluation of the 2nd Campaign

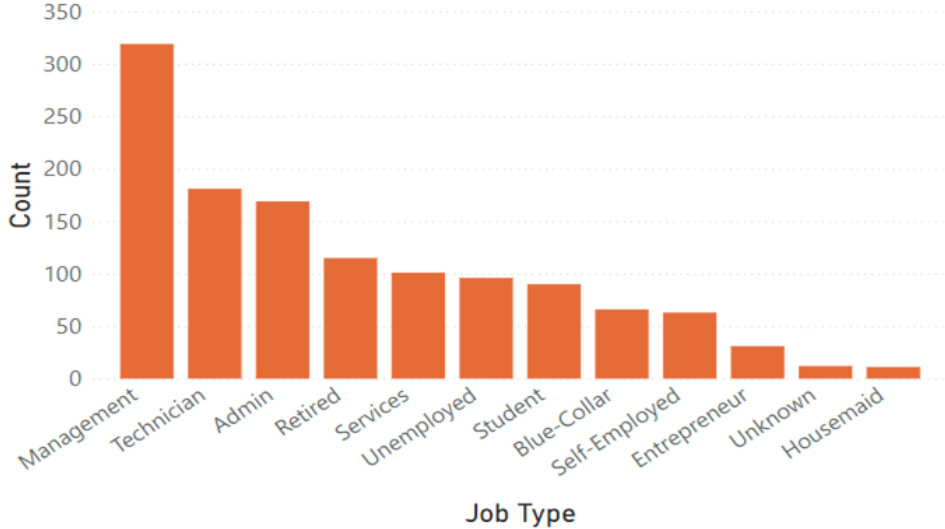
- Selected clients : 5000
- Expected Revenue : € 7.489.000
- Conversion rate: 27,68%
- Successful contacts: 1384
- Revenue: € 2,952,403 (39,42%)
- Profit: € 295,240
- Cost: € 142,858
- Net profit: € 152,382
- ROI: 106,5 %



Client profile

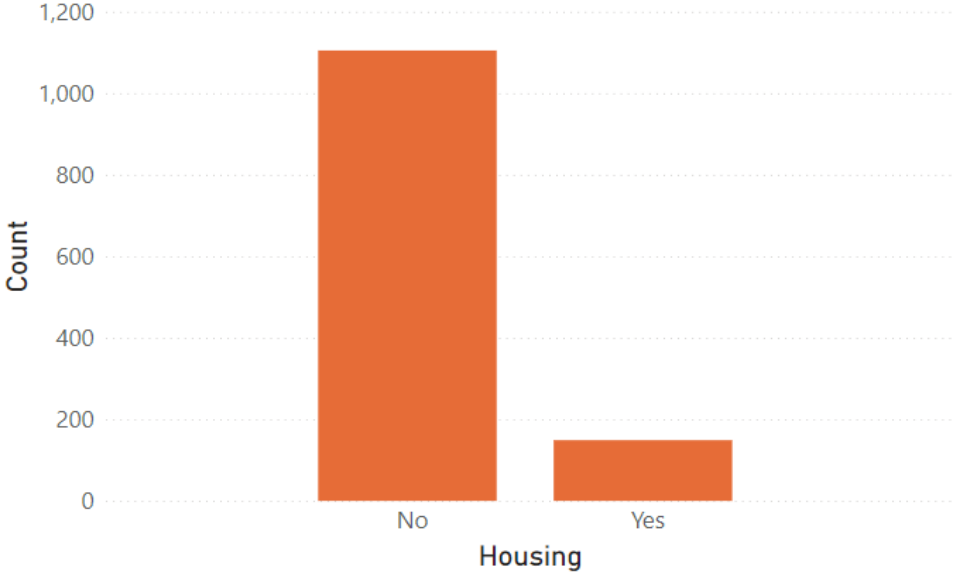
Education and Job distributions

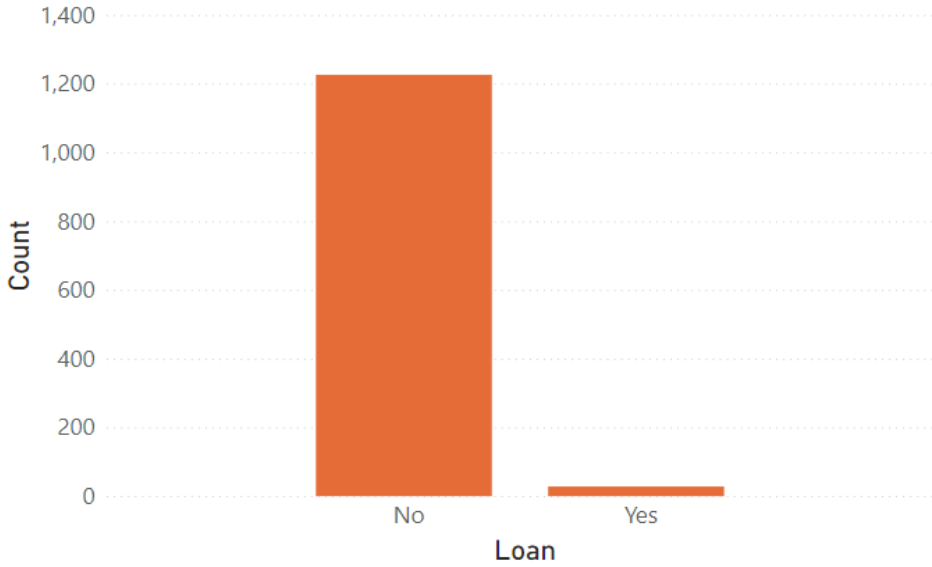




Client profile

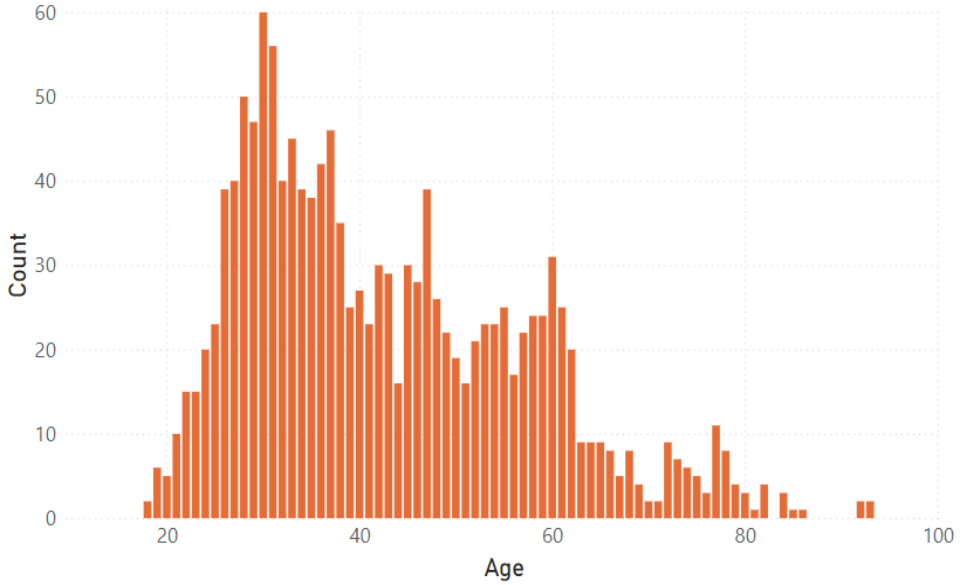
Housing and Loans

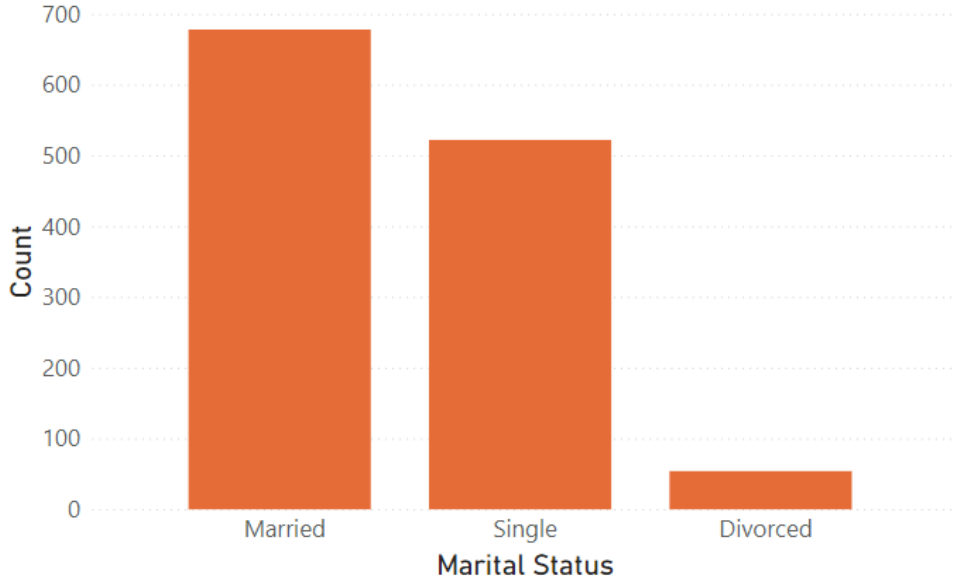




Client profile

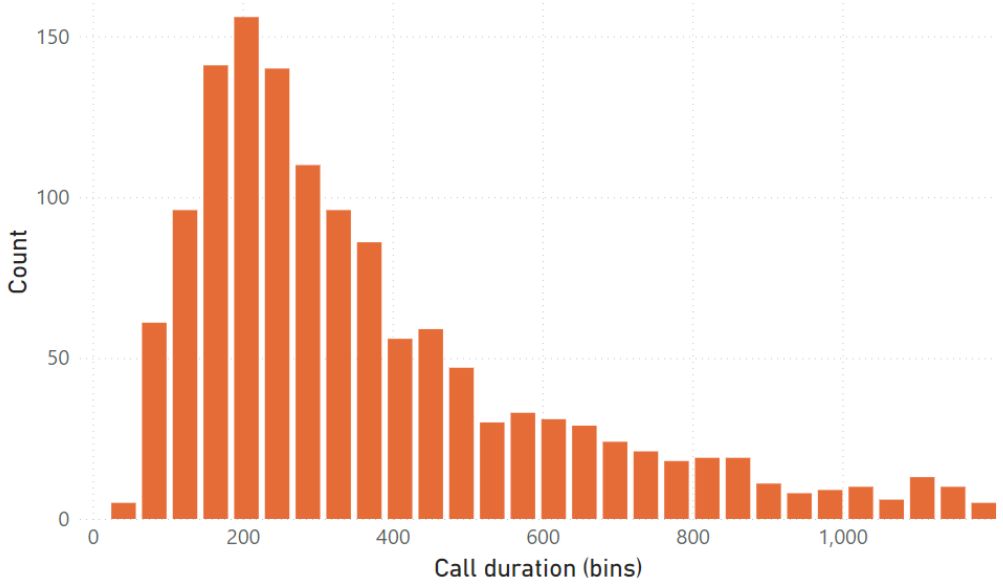
Age and Marital Status





Client profile

Success contacts by month and Call duration distribution



Conclusion

- Our second campaign has significantly outperformed our first campaign.
- Achieving a remarkable conversion rate of 27.68 % compared to 6.3 % in the first campaign.
- With an expected revenue of € 7,489,000 and achieving € 2,952,403 in revenue, we successfully realized 39.42% of our target.
- Our profit soared to € 295,240, and with a cost of € 142,858, we achieved an impressive ROI of 106,5 %.