

Machine Learning For Profit Based Investing

Predictive Modelling (2024 P3A)

Koen van Esterik Steven Bontius

HAN - Master Applied Data Science

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Your Role in Today's Meeting

- Your Position: You are the Data Science leadership team of our investment company.
- The Challenge: Our telemarketing division is currently operating at a loss.
- The Proposal: We will present our research findings and a strategic plan for a turnaround.
- Your Objective: Evaluate our proposal and decide whether to approve this project.

Dear stakeholders, we would like to present the findings of our research.

- ① Exploratory Data Analysis
- ② Predictive Modelling
 - Introducing the **Maximum Profit** metric
- ③ Model Selection
- ④ Model Evaluation
- ⑤ Conclusion
 - Comparison of profit with and without predictive modelling

Maximum Profit Metric

Introducing the **Maximum Profit** metric to evaluate the performance of models, as well as the profitability of the telemarketing division:

$$y_{pred}^{\vec{}} = \sum_{i=1}^{thresholds} \begin{cases} 1 & \text{if } y_{probs}^{\vec{}} \geq threshold_i \\ 0 & \text{otherwise} \end{cases}$$

$$t\vec{ps}, f\vec{ns}, f\vec{ps}, t\vec{ns} = \sum_{i=1}^{thresholds} \text{confusion_matrix}(y_{true}^{\vec{i}}, y_{pred}^{\vec{i}})$$

$$\textit{total profit} = \max(\textit{profit per subscription} * \vec{tps} - \textit{cost per call} * \vec{fps})$$

Basically, we are calculating the profit for each threshold. Then we are plotting these results to create a **Profit Curve**. This plot allows us to find the **Maximum Profit**.

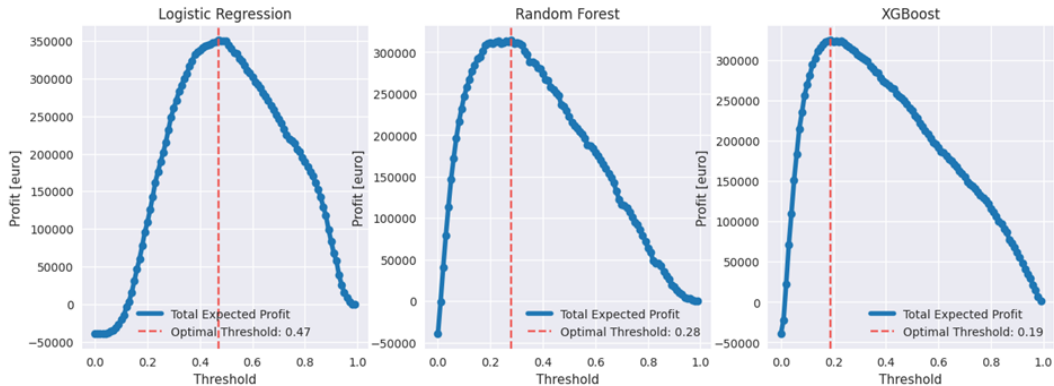


Figure 1: Model Shortlist

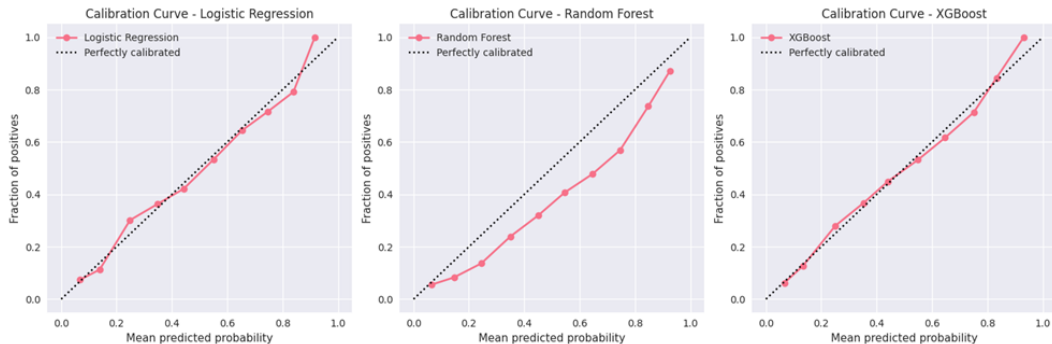


Figure 2: Model Calibration

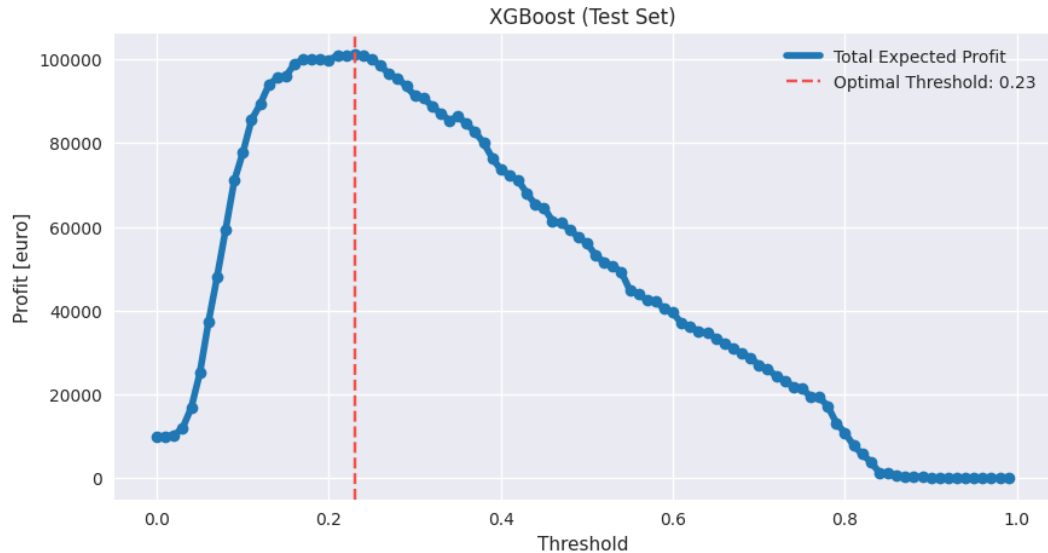


Figure 3: Model Selection

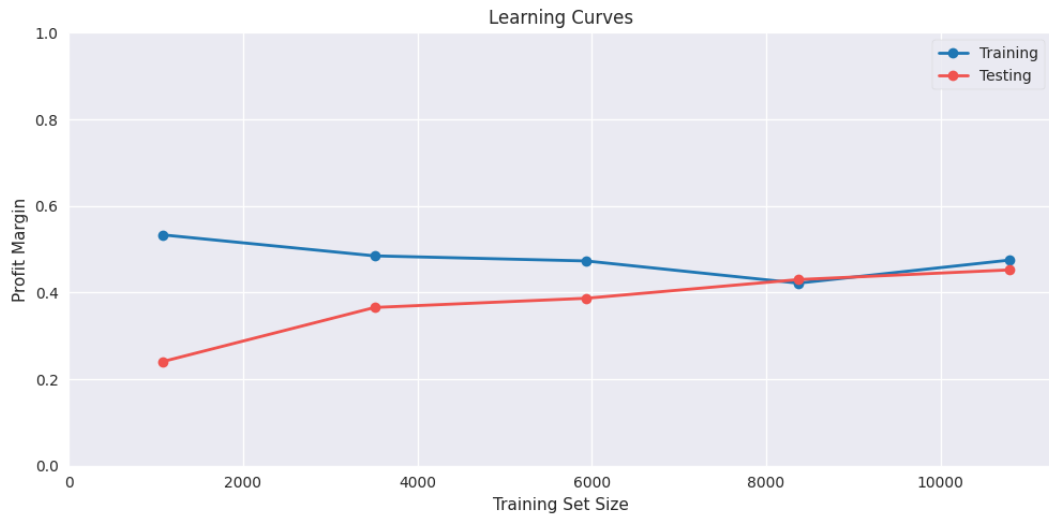


Figure 4: Learning Curves

Comparison of profit with and without predictive modelling:

Procedure	Profit
Call All Prospects	10,000
Call Preselected Prospects	101,100

“Gas op die lolly?”

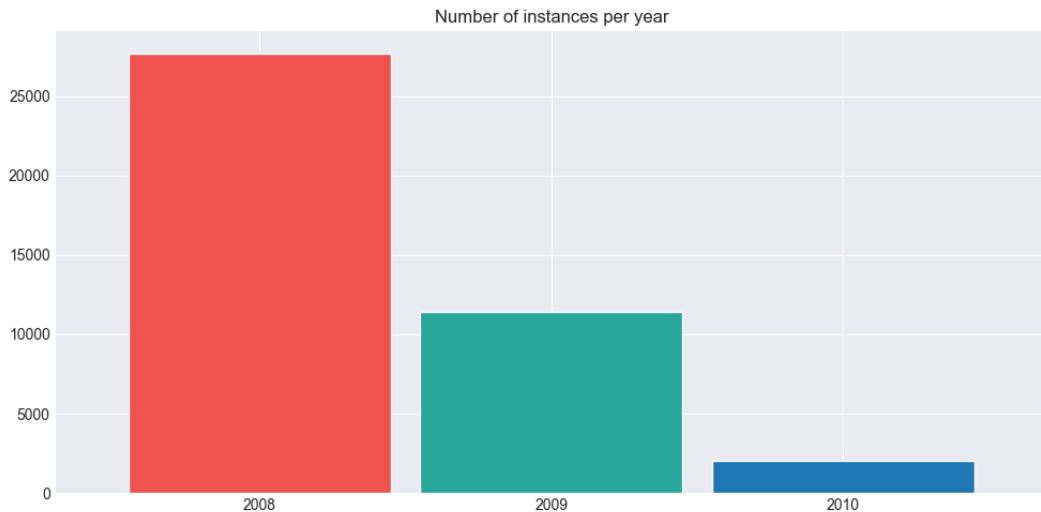


Figure 5: Instances per Year

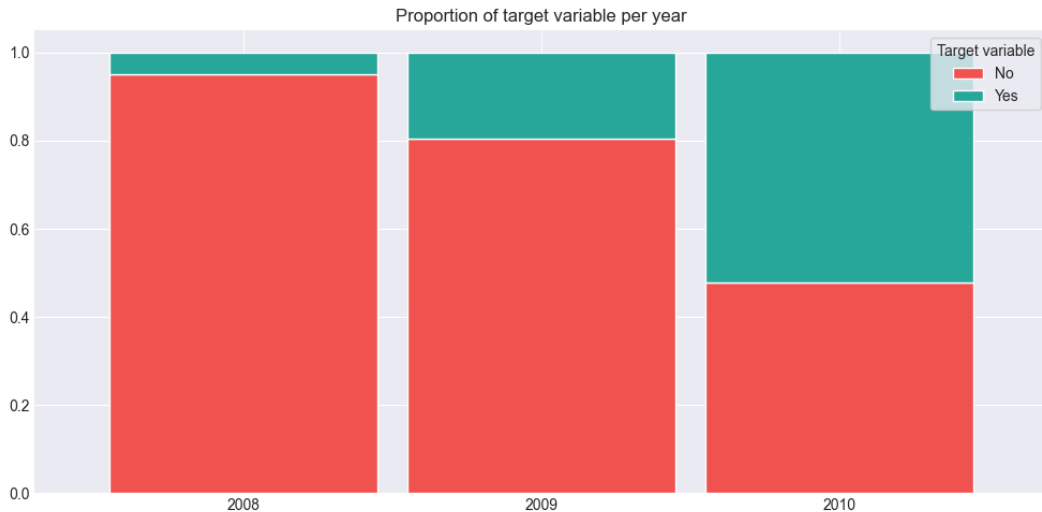


Figure 6: Proportion of Target Variable per Year

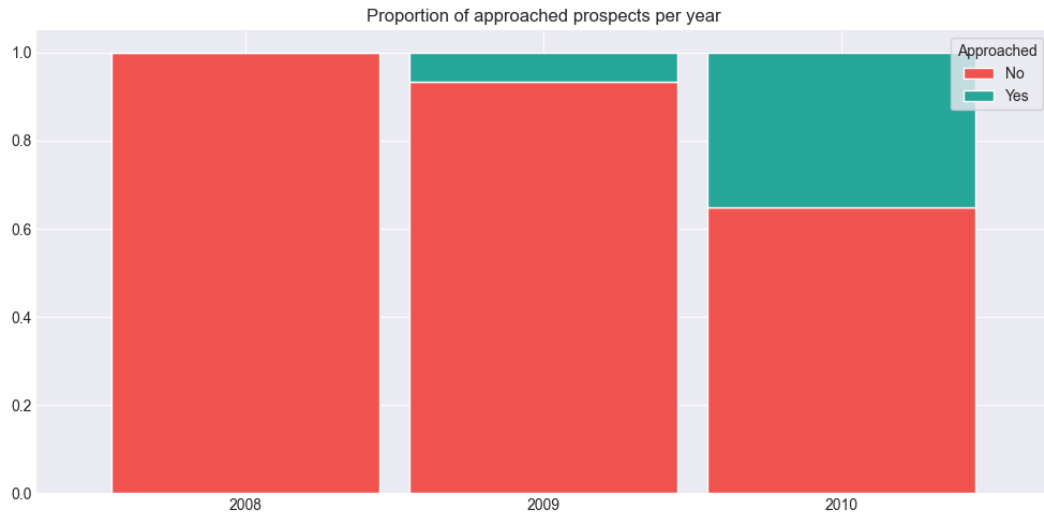


Figure 7: Proportion of Approached Prospects per Year

Questions?