Machine Learning For Profit Based Investing

Predictive Modelling (2024 P3A)

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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.

Methodology

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:

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

$$\vec{tps}, \vec{fns}, \vec{fps}, \vec{tns} = \sum_{i=1}^{\vec{thresholds}} \text{confusion\_matrix}(y_{\vec{true}}, y_{\vec{pred}})$$

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

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**.

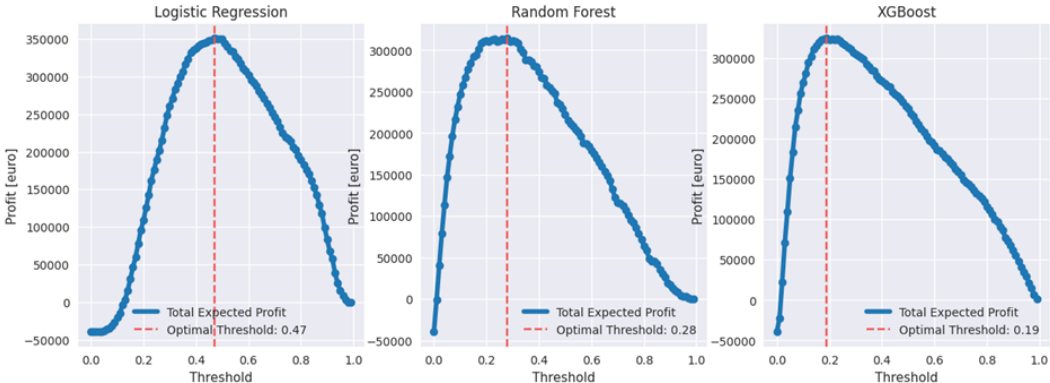

Figure 1: Model Shortlist

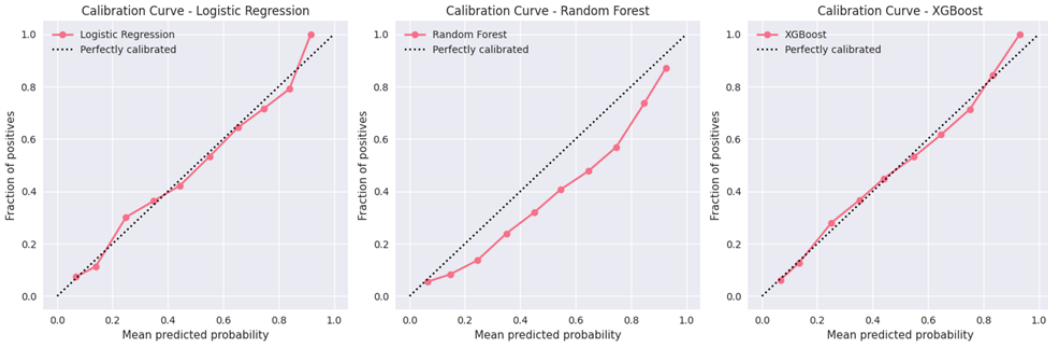

Figure 2: Model Calibration

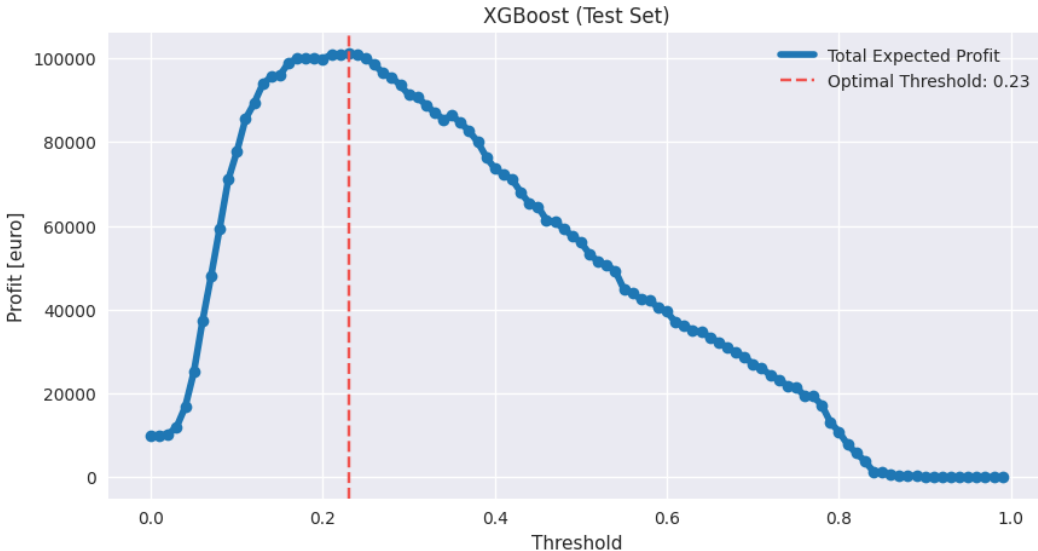

Figure 3: Model Selection

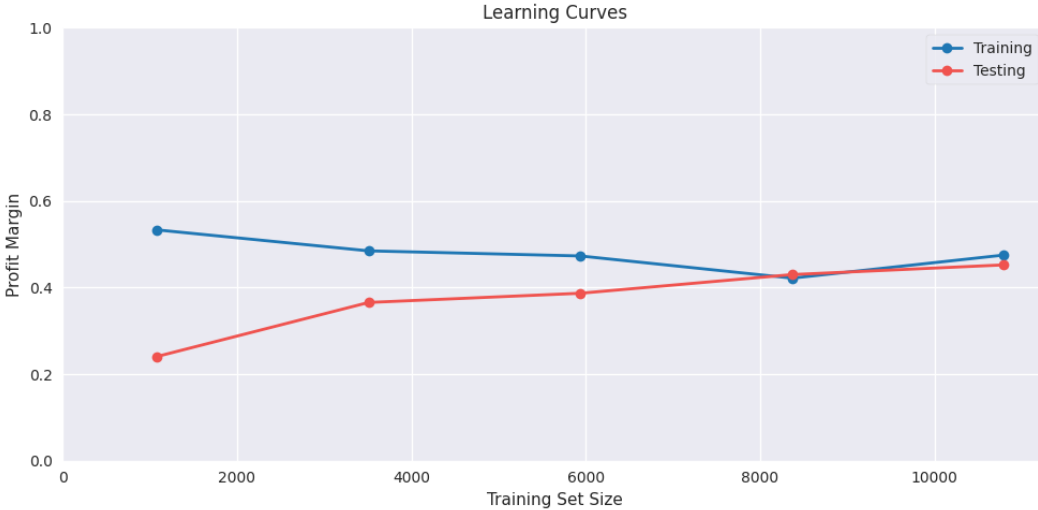

Figure 4: Learning Curves

Comparison of profit with and without predictive modelling:

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

“Gas op die lolly?”

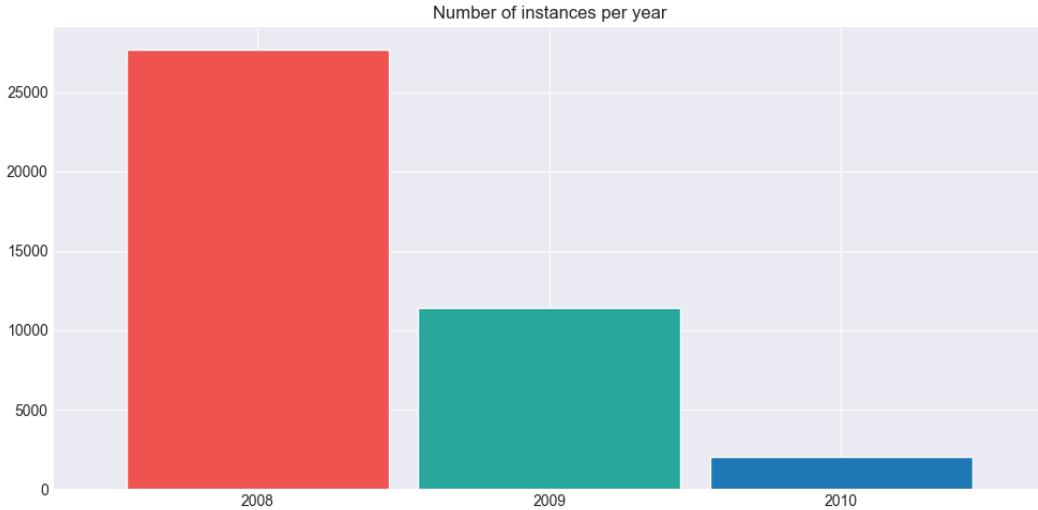

Figure 5: Instances per Year

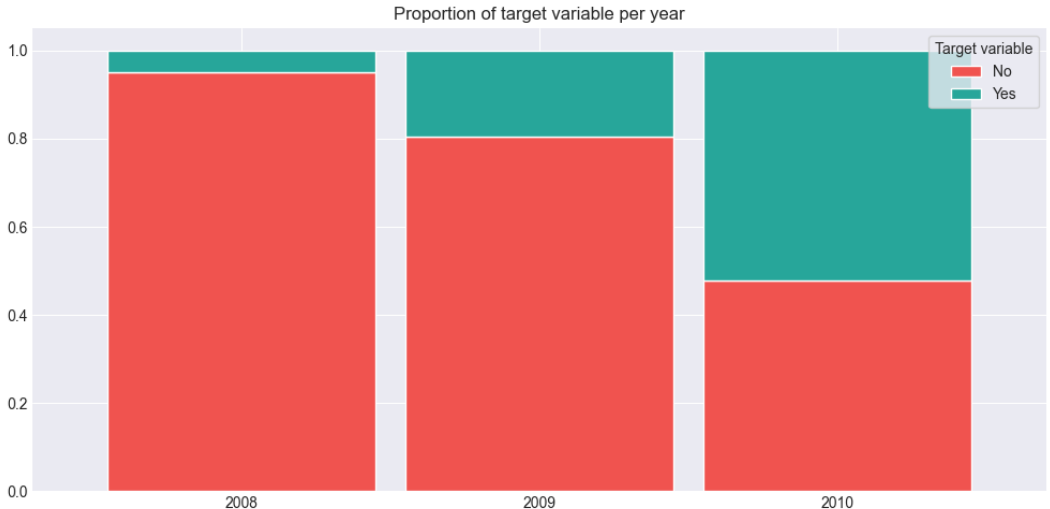

Figure 6: Proportion of Target Variable per Year

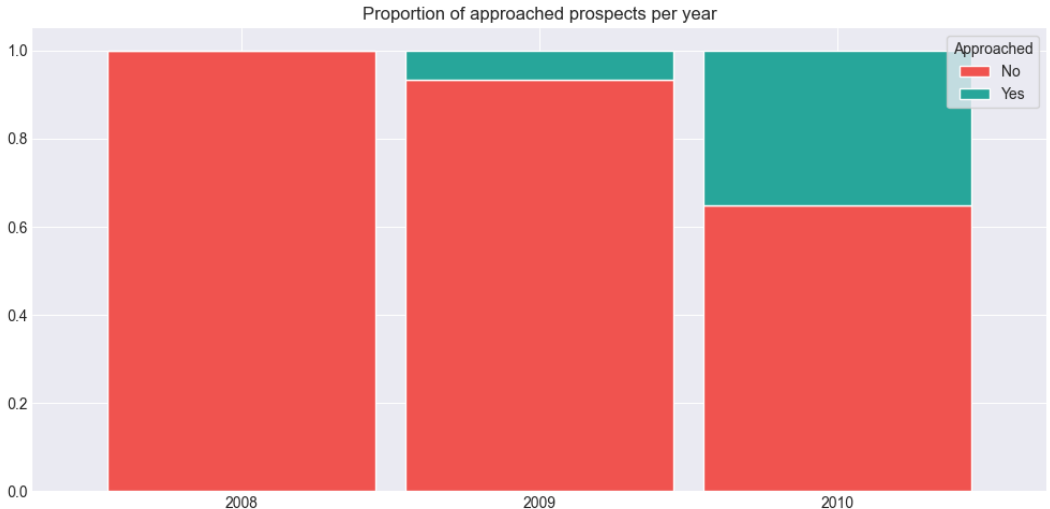

Figure 7: Proportion of Approached Prospects per Year

Questions?