

## 1 Introduction

Businesses are embracing Machine Learning (ML), a subset of Artificial Intelligence, to differentiate themselves amongst their competitors to gain a competitive advantage. ML helps in better understanding of the needs of the customers and enables relevant marketing interactions that are more likely to engage customers.

## 2 Background

This study uses customer and product data supplied by an international bank to predict the product(s) that a customer is likely to invest in. The Cross-Industry Standard Process for Data Mining (CRISP-DM) methodology has guided the research.

Different ML algorithms, including Naive Bayes (NB), Support Vector Machines (SVM), Random Forests and Decision Trees were applied on four years of historical data.

## 3 Results

Based on the empirical results obtained based on accuracy, low classification error, precision, recall, F-measure and training time, the Decision Tree algorithm was chosen to train an ensemble made up of a binary classification model for each product. Prediction tested on four months of new customer data resulted in over 74% accuracy while for existing customers, the ensemble was 99% accurate. The prediction was more than 79% accurate for customers who had stopped their investment in particular products. The bank can use the results to:

1. Make targeted marketing campaigns while avoiding interaction with customers who are probably not interested in a product;
2. Create a recommendation engine to recommend products;
3. Indirectly prevent attrition by shifting customers to a new product if prediction shows that an investment will lose its popularity;
4. Enable higher management to identify changes in customer preferences.

## 4 Conclusion

ML resulted in being a valuable tool to answer a specific business question by using only internal data that is readily available. Data preparation has proved to be the most time-consuming task in the ML project while feature engineering to create new data from existing data was key to the success of the model rather than trying of different algorithms or tweaking the parameters of the model.

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