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Predictive Analytics for Default of Credit Card Clients

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Outline

- Introduction
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  - Business understanding
  - Data understanding
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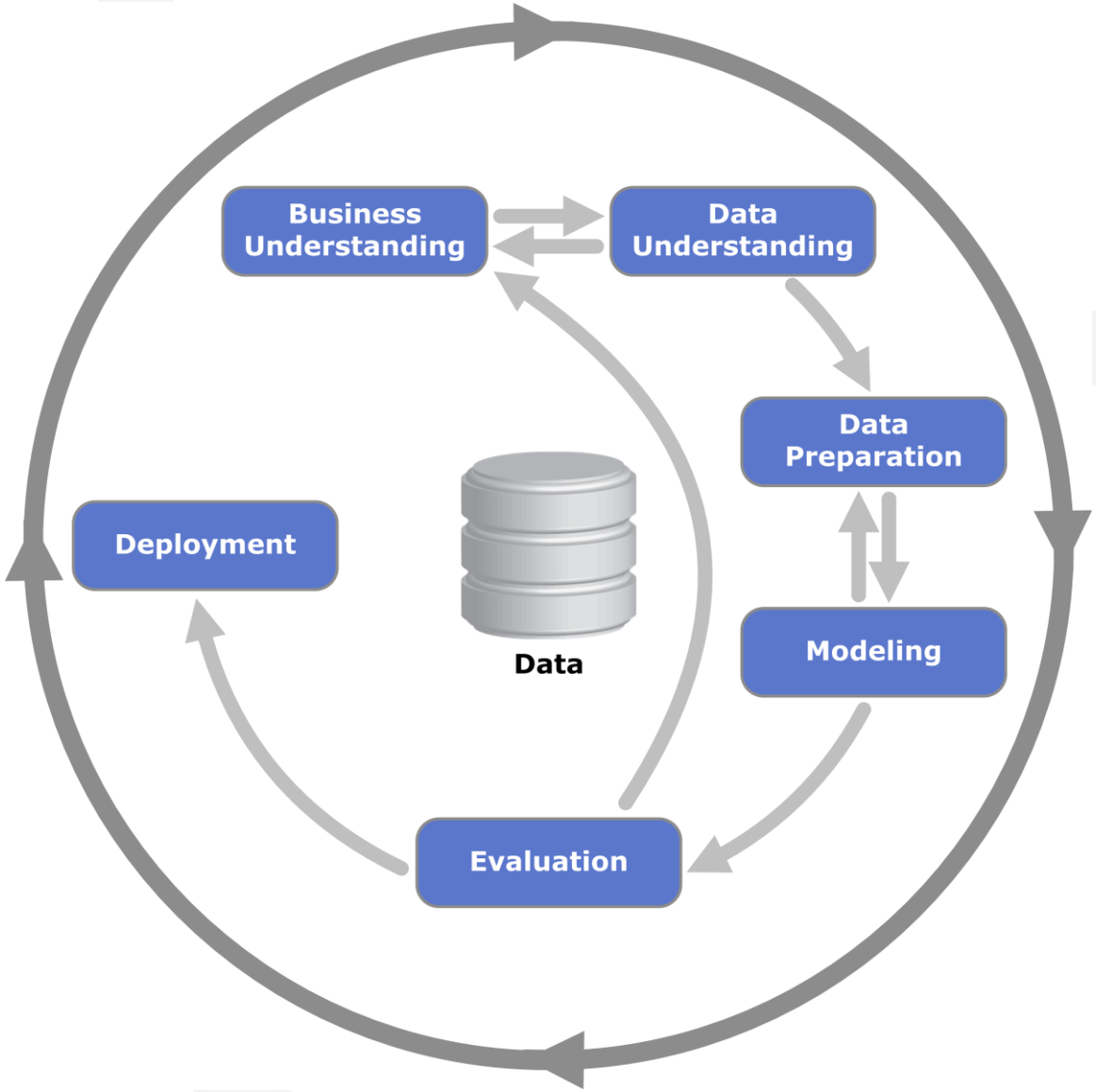
Introduction

- The banking industry produces a significant amount of data every day that holds valuable information.
- The analysts can apply predictive methods to bank transaction data, clients ‘data, credit card history, customer experience, and stock market data.
- The Accenture study proposes a scenario that Artificial intelligence will transform financial service providers into data- and AI-based businesses.
- Artificial intelligence and machine learning offer a wide range of methods and algorithms. It is necessary to test, verify and select the most suitable ones based on the type of task.

CRISP-DM

- Cross-industry process for data mining as a process methodology for successful data analysis, modeling, and knowledge discovery.

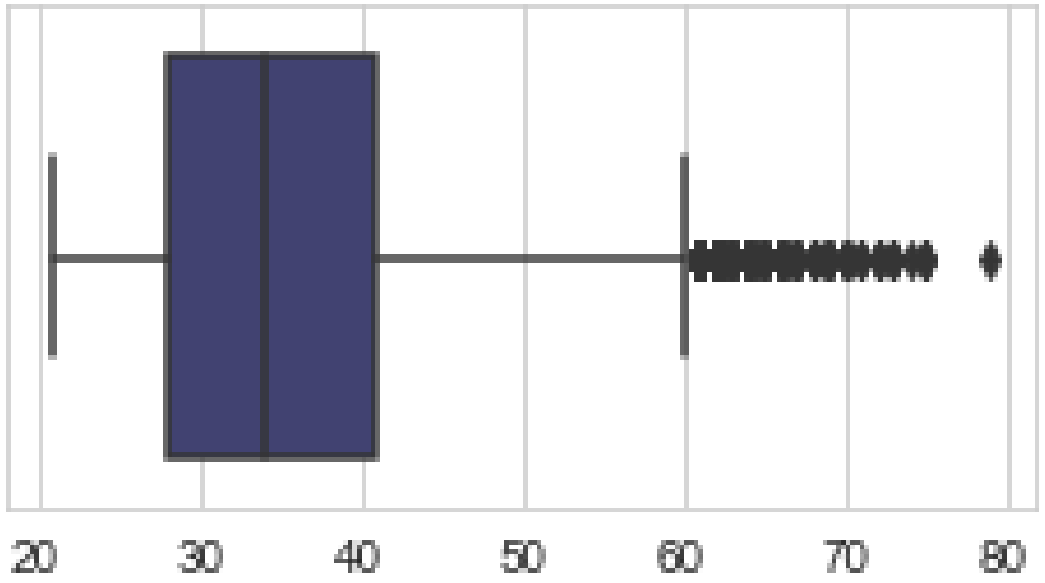


Business and Data understanding

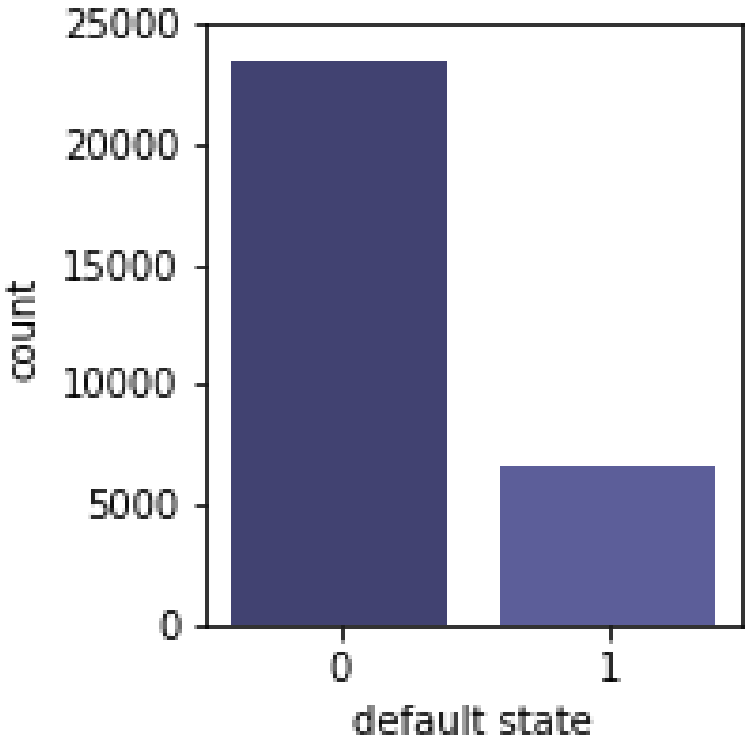
- The default risk of bank customers and the decision-making process => a classification task.
- Public data of credit card holders from Taiwan from April to September 2005.
- 30 thousand records, 25 attributes.
- Target attribute (binary) = defaulter or non-defaulter.
- Examples:
  - EDUCATION: (0 = unknown, 1 = graduate school, 2 = university, 3 = high school, 4 = others, 5 = unknown, 6 = unknown).
  - MARRIAGE: marital status of individual (0 = unknown, 1 = married, 2 = single, 3 = others).

Data understanding

- The age structure



- The target attribute histogram



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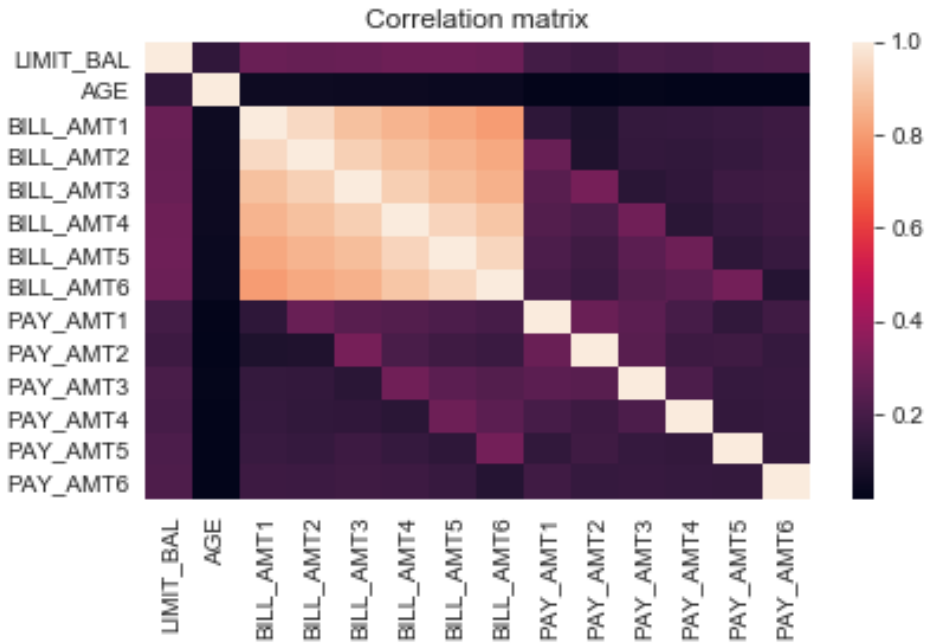
Data preparation

- Correlation matrix



- Original data without any preprocessing => baseline model.
- Preprocessed data <= inconsistencies removing, data standardisation.
- Data division => stratified splitting 70% for training and 30% for testing; 80:20 and 60:40.

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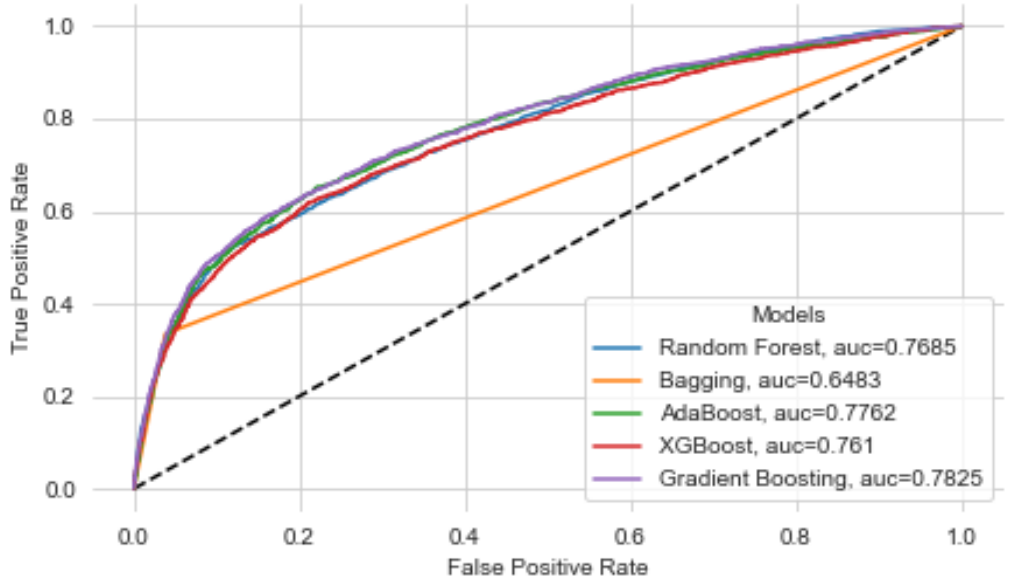
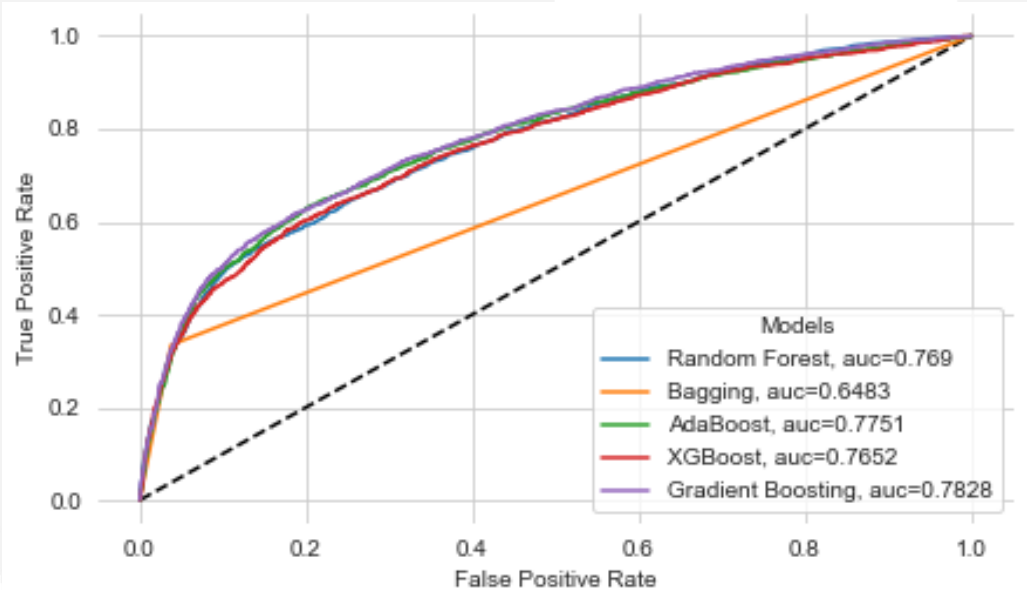
Modelling and evaluation

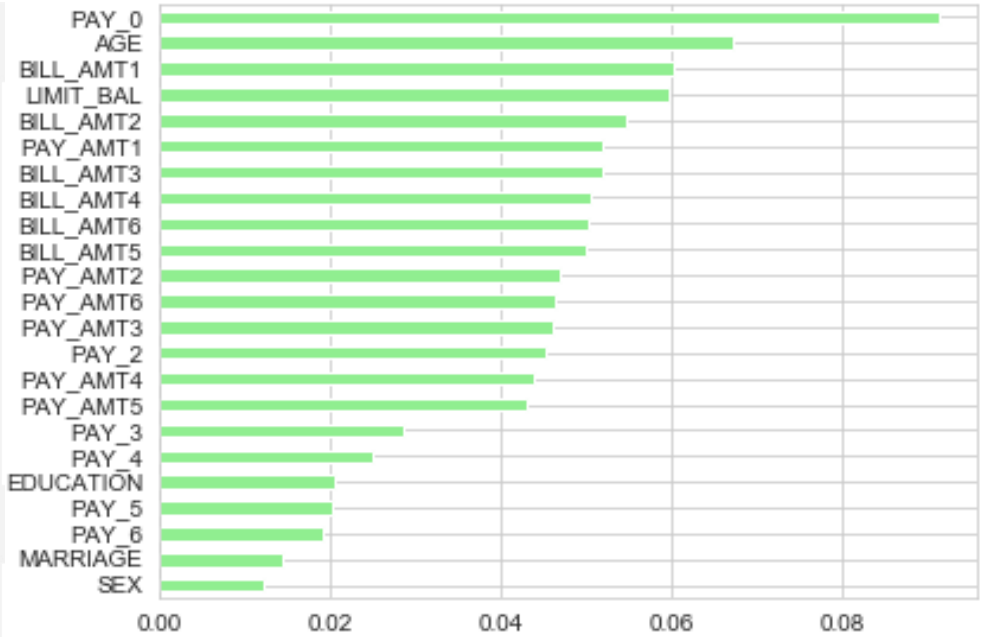
- Random Forest, AdaBoost, XGBoost, and Gradient Boosting algorithm.
- Accuracy, precision, recall, ROC, and AUC.





Original / preprocessed dataset

Feature importance:



Conclusion

Matthews correlation coefficient:

- The original data => Gradient Boosting (0.4111), Bagging (0.4044), and Random forest (0.3918).
- Minimal or no improvement on preprocessed data.

- According to the precision score and ROC, the best algorithms are AdaBoost and Gradient Boosting (defaulter).
- We can state that our study's algorithms are valuable for identifying clients' default state and producing a good performance.

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Thank you for your attention ☺