ANALYSIS CARDSCORE MODEL

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PROBLEM RESEARCH

PROJECT BACKGROUND

Many people **struggle to get loans** due to **insuffficient or non-existent credit histories**. Home Credit strives to broaden financial inclusion for the unbanked population by providing a positive and safe borrowing experience. In order to make sure this underserved population has a positive loan experience. Home Credit makes use of a variety of alternative data to **predict their clients' repayment abilities**. Doing so will **ensure that clients capable of repayment are not rejected** and that loans are given with a principal, maturity, and repayment calendar that will empower their clients to be successful.

DATA SOURCE

The data used are **application train** and **application test**. There are our main table, broken into two files for train (with TARGET) and test (without TARGET).

OBJECTIVE

1. **Identify** characteristics of of potential clients who will have difficulty repaying loans and who will not.
2. **Predict** client's repayment abilities.

ACTIONS

1. Perform **data cleaning**, and **visualization** for business insights.
2. **Build a models** with machine learning algorithms.
3. Provide **recommendations** for company to increase their clients succeed in applying for loans.

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DATA PREPROCESSING

Data Application Train

122 Number of Columns

307,511 Number of Rows

EDA

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Bivariate Visualization

Visualization of the relationship between 2 features

Multivariate Visualization

Visualization of the relationship of more than 2 features

DATA CLEANING

Detecting Duplication

No duplicate rows

Handling Missing Values

There are some column that are dropped and the rest are imputed

Detecting Outliers

There are some column that have outliers, but it was decided the outlier will not be removed

MODEL BUILDING

Label Encoding

Transform non-numerical to numerical labels

Feature Selection

Identify the top 20 best features to include in the model

Handling Imbalanced Data

Re-sampling so that the data is balanced

Model Building

Build models with multiple machine learning algorithms and compare which one is the best

Model Evaluation

Compare which one of the model is the best

Data Application Test	121	48,744
	Number of Columns	Number of Rows

DATA CLEANING

Detecting Duplication

No duplicaīte rows

Handling Missing Values

There are some column that are dropped and the rest imputed

Label Encoding

Transform non-numerical to numerical labels

PREDICTION

Predicted clients repayment abilities with best machine learning model obtained before

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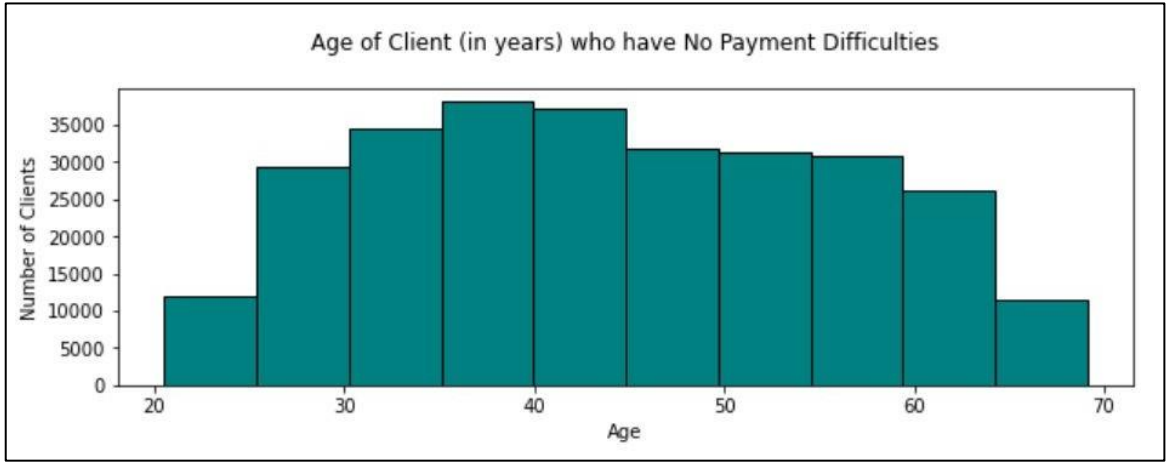
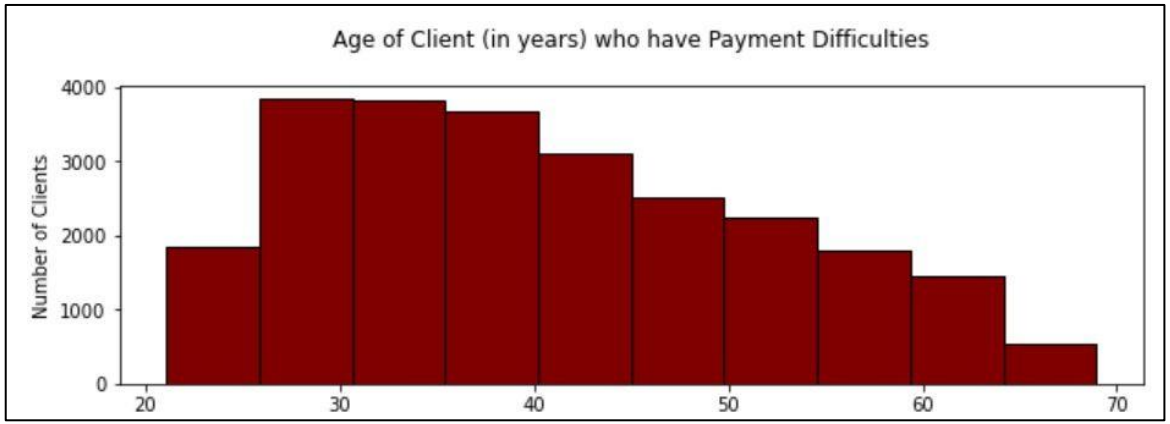
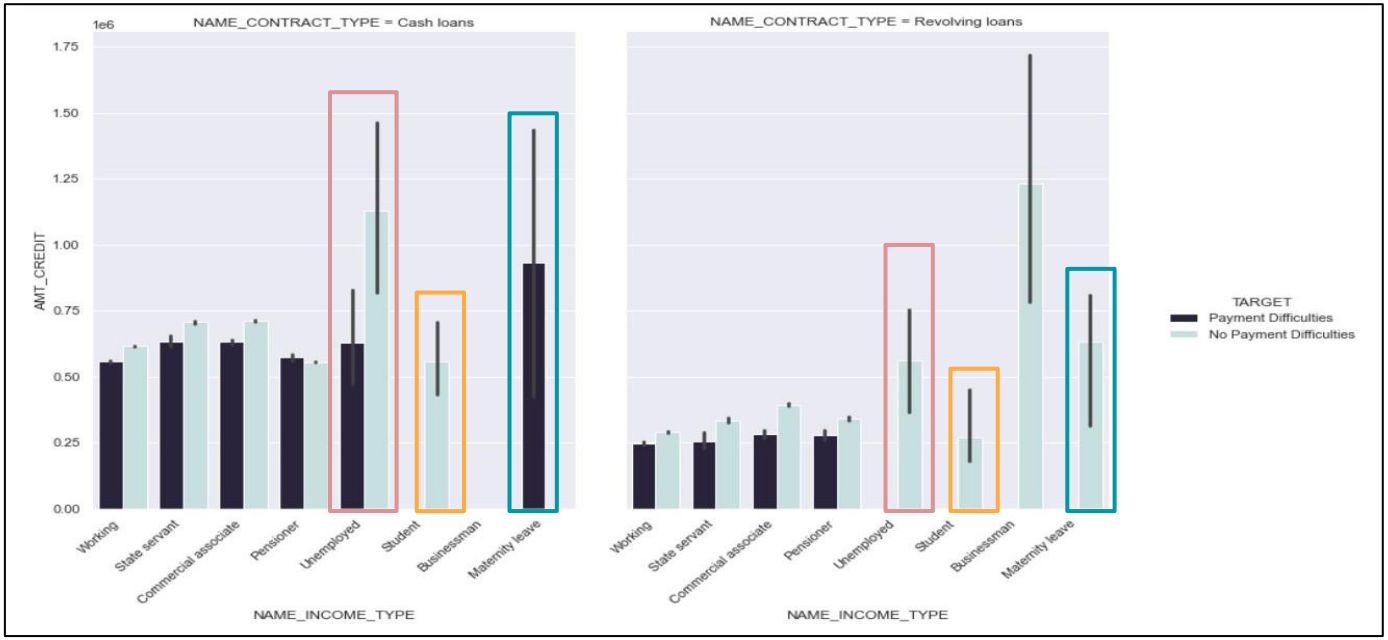
BUSINESS INSIGHTS





- Most number of clients who apply for loans are in the range of 35-40 years.
- Meanwhile, the number of applicants for clients aged <25 or age >65 is very low.

- Clients who have **no payment diffficulties** are clients in the range of **35-45** years. You can target these clients as your priority.
- While clients who **have payment diffficulties** are client the range of **25-35** years.



All student clients **have no diffficulty repaying the loans** whether with **cash loan or revolving loan** for **a low to medium credit amount of the loan**.

For the income type of **maternity leave** with **cash loans**, **all** the clients **have problems repaying the loans** for a **medium credit amount of the loan**. While all clients with maternity leaves and revolving loans have no difficulty repaying the loans.

For **unemployed** clients with **cash loans**, **more than 50%** of clients **have problems repaying loans** with **medium credit amounts of the loan**. While all unemployed clients with revolving loans have no difficulty repaying the loan.

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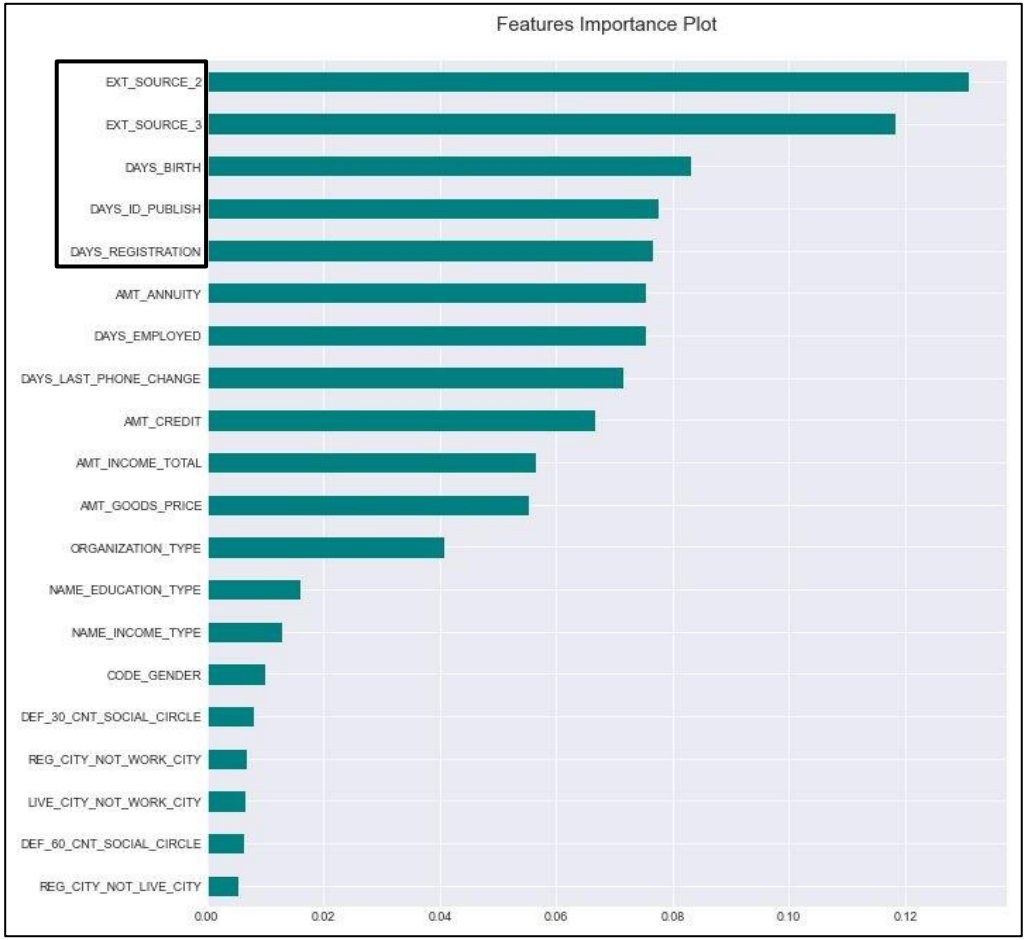
MACHINE LEARNING MODEL

MODEL COMPARISON

Algorithm	Training Accuracy Score	Testing Accuracy Score	Error Margin	ROC Score
Logistic Regression	67.16%	67.29%	0.13%	0.6728
Gaussian Naive Bayes	60.24%	60.39%	0.15%	0.604
Decision Tree	100%	83.9%	11.74%	0.8826
Random Forest	100%	99.65%	0.35%	0.9965
K-Nearest Neighbor	91.56%	88.07%	3.79%	0.8806
Neural Network	70.01%	69.48%	0.58%	0.6948

The prediction accuracy of the train and test data in **Random Forest** model has a value that is not much different, it can be said that the model is very good, which is there is **no underffitting or overffitting**. So the **Random Forest** model was chosen as the **best model** to **predict client's repayment abilities**.

BEST MODEL



Algorithm — **Random Forest Classifier**

Performance

- Random forest model gives **100% correct results**
- There is **0.35% error margin**

The 5 most important features

- Score from external data source 2
- Score from external data source 3
- Client's age in days
- Days ID publish
- Days registration

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BUSINESS RECOMMENDATION

RECOMMENDATION

1. A client with an income type of **student** can be said to be a client who is **capable of repaying the loans** whether with a cash loan or revolving loan (100% of applications approved). But there only 0.005% of applications come from the student.
2. A client who works as an **accountant** can be said to be a client who is **capable of repaying the loans** (95% of applications approved). But, there is only 3.19% of applications come from an accountant. So do, the client who work as **high skill tech staff** and **manager**, they are capable of repaying the loans, but there are only a few applications that come from them

Create a campaign so that **more** student, accountant, high skill tech staff, manager **interested in applying for a loan**

RECOMMENDATION

1. Clients with **maternity leaves** and **cash loans** can be said to be a client who is **incapable of repaying the loan** (100% of applications rejected). On the contrary, all clients with maternity leave but taking revolving loans to have their applications approved.

2. For **unemployed** clients, more than 50% of them **have a problem repaying their loans** if they take **cash loan** contracts. Meanwhile, all unemployed client who takes revolving loans is capable of repaying the loan.

Need further analysis, you can **survey** to find out if there is a problem if a client with maternity leaves or unemployed takes a cash loans contract. So, in the future, if there are clients with that type of income, you **can recommend the right contract type** so that their applications will be approved

You can see the entire project documentation here!

https://github.com/saadahmardatillah/Project-Analysis-CardScore

THANK YOU