BANK LOAN CASE STUDY

FINAL PROJECT - 2

Project Description

This project aims at analyzing the risk appetite of banks. When the company receives a loan application, the company must decide for loan approval based on the applicant's profile. Two types of risks are associated with the bank's decision:

- If the applicant is likely to repay the loan, then not approving the loan results in a loss of business to the company.
- If the applicant is not likely to repay the loan, i.e., he/she is likely to default, then approving the loan may lead to a financial loss for the company.

The data given contains the information about the loan application at the time of applying for the loan. It contains two types of scenarios:

- The client with payment difficulties: he/she had late payment more than X days on at least one of the first Y instalments of the loan in our sample.
- All other cases: All other cases when the payment is paid on time.

Based on the scenarios a detailed analysis must be conducted and insights needs to be drawn to help bank identify the pattern which may be used for taking actions such as denying the loan, reducing the amount of loan, lending (too risky applicants) at a higher interest rate, etc. This will ensure that the consumers capable of repaying the loan are not rejected.

Tech Stack Used

MICROSOFT EXCEL

PURPOSE

All the analysis has been performed in excel. This tool is also used to create graphical representation of the results and to understand the result set better.

Detailed Approach

IDENTIFICATION

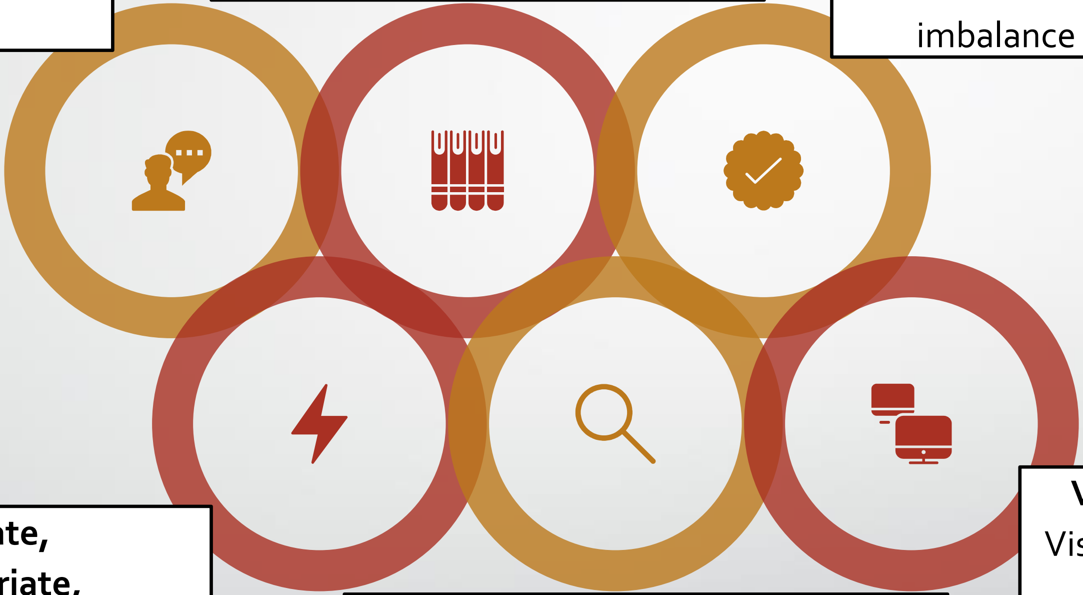
We have identified how we will approach the data , finding missing dataset and working on it accordingly to gain the required results .

OUTLIERS

Identify Outliers and show how they play any role in our data.

IMBALANCE.

Understanding the ratio of imbalance in our data.



Results Of Univariate, Segmented Univariate, Bivariate Analysis.

Correlation Analysis

Finding the correlation between the 5 variables with respect to the target variables and find the top three correlation .

VISUALISATION.(Result)

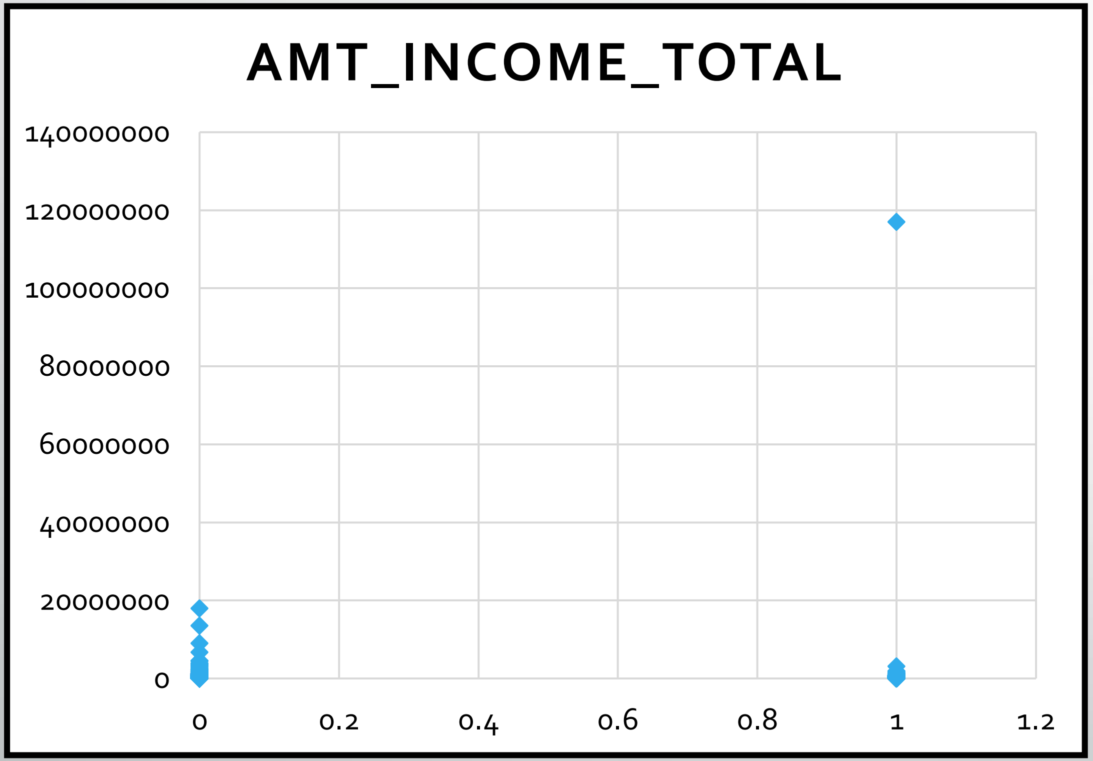
Visualize data with the help of charts and graphs

Project Approach

- Used the COUNTA function to count the total rows in each column.
- Secondly, found the percentage of null values in each column using the formula – total row counts for each column / total row counts.
- Further, removed all the columns having null value percentages of more than 30%. For columns having less than 30% null value percentages, have done mean, median, and mode imputations for the missing values for columns having null value percentages less than 30%.
- Also found the outliers using the interquartile range method considering relevant columns.
- After going through each column description, have kept only relevant columns to bring out the insights.
- The columns having days were converted into years by simply dividing the days by 365.
- Click on the below link to open the excel file. The excel file contain all the analysis.

https://d.docs.live.net/f1a9bd82e288721e/Documents/Bank%20loan%20EDA.xlsb

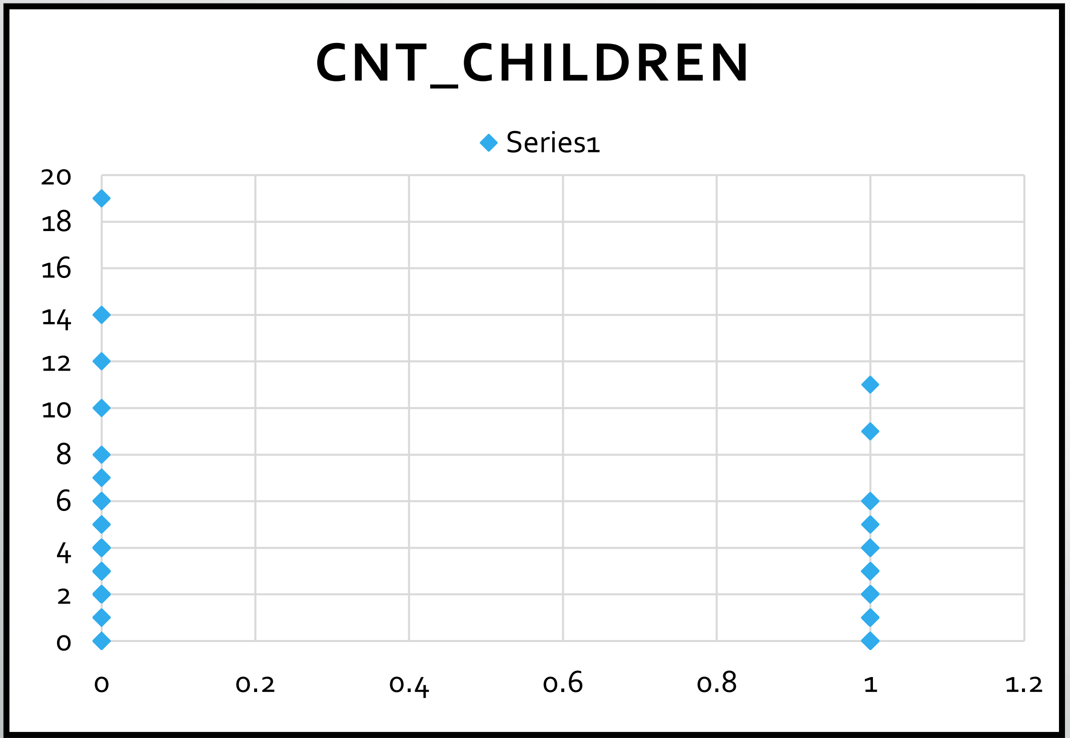
OUTLIERS



- In the above XY plotter we can see that for the target variable 1 there are income which are beyond the limit.

- There are applicants who are drawing an income of around 11 crores whereas majority of applicants are drawing income in lacs only. For analysis refer the sheet outliers for AMT_TOTAL_INCOME in the above link.

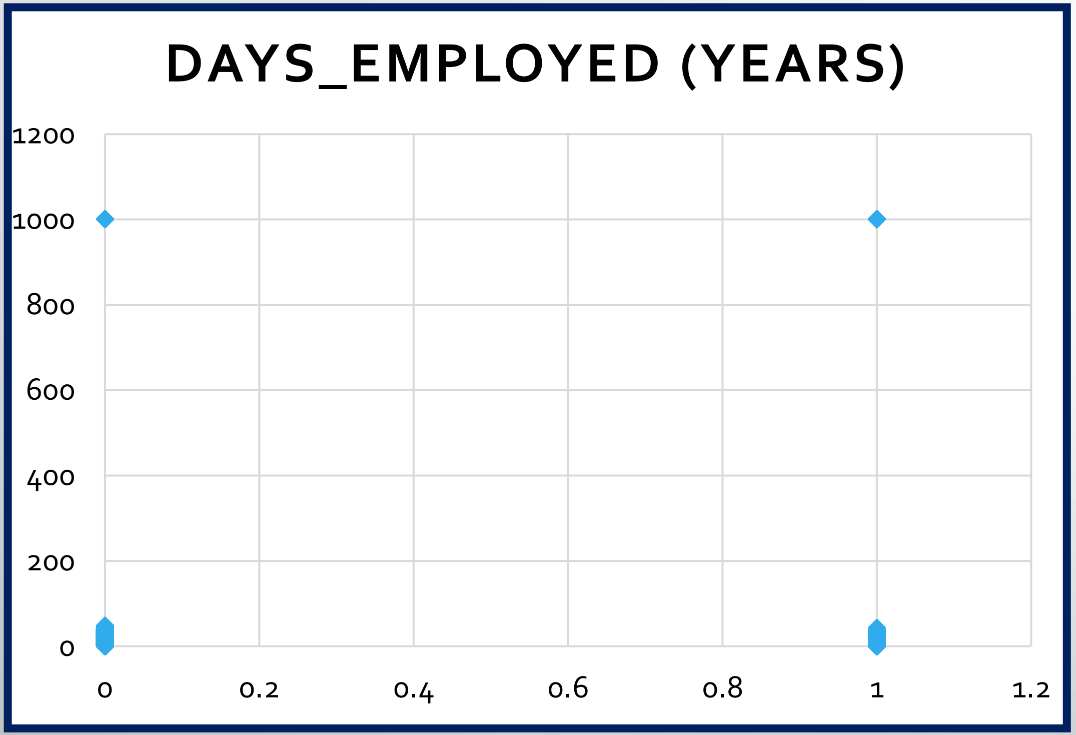
OUTLIERS



- In the sheet outliers for CNT_CHILDREN there are outliers for the target column 0 and as well as 1.

- The XY Plotter for 0 shows 19 children which is highly unusual these days. The XY plotter for 1 shows more than 7 children.

OUTLIERS



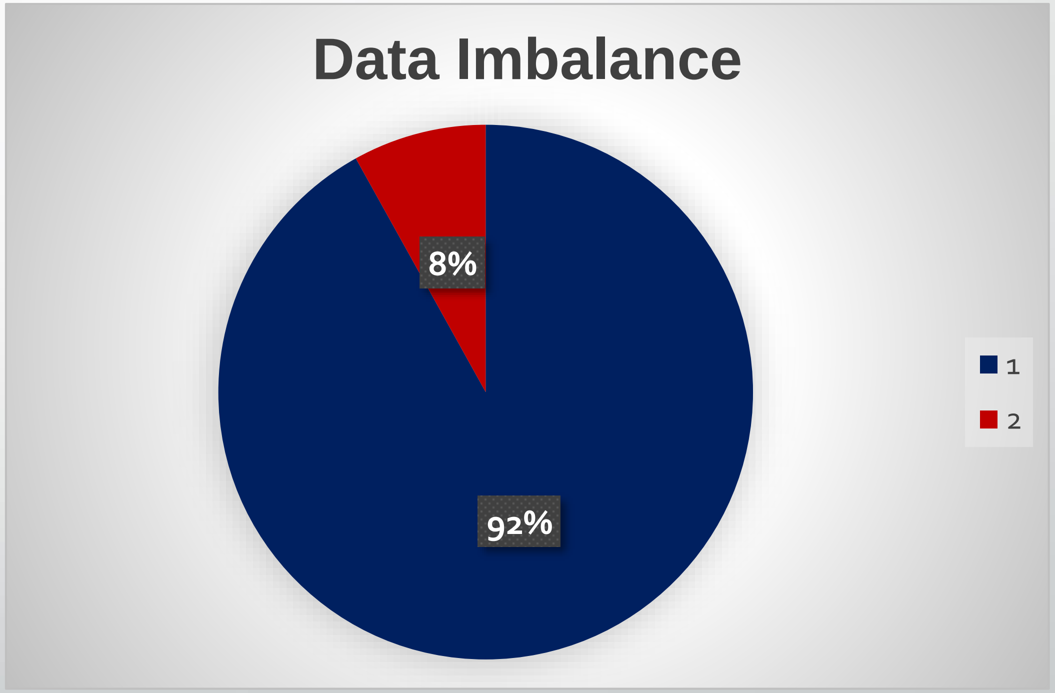
- **In the sheet outliers for Days Employed there are outliers for both target column 0 and 1.**

- **The XY plotter shows there are applicants being employed for 1000 years from the day of application which is clearly an anomaly**

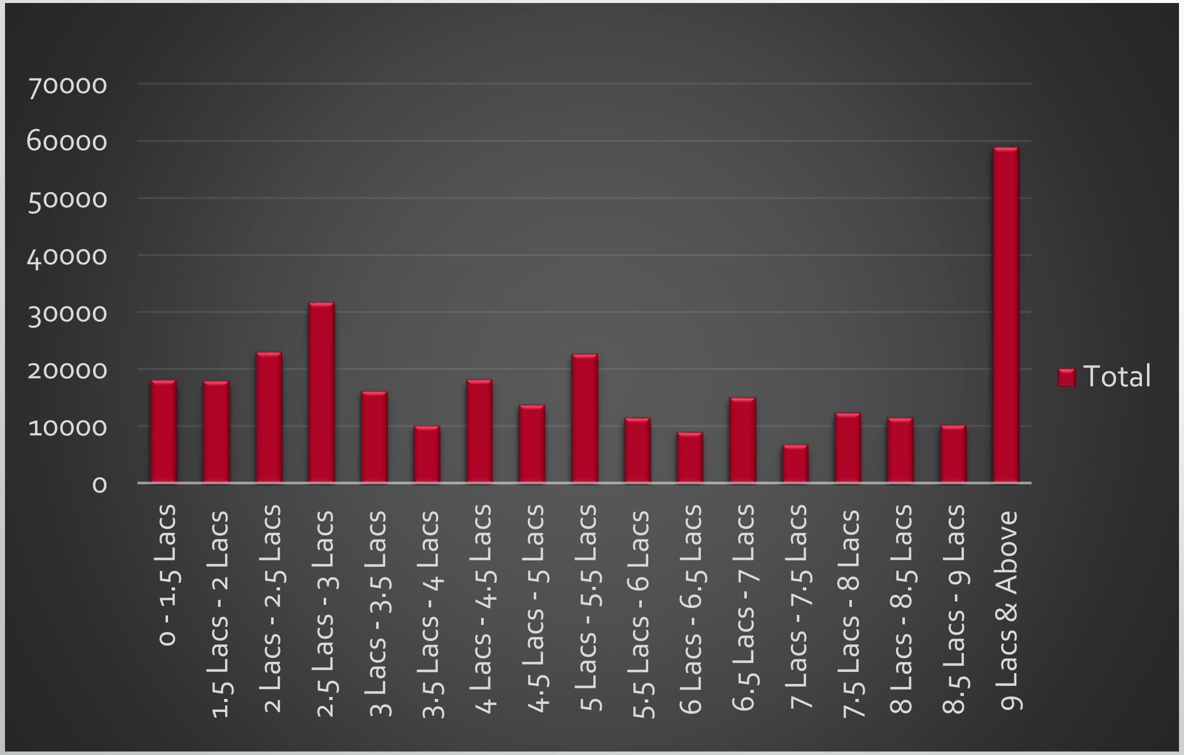
Data Imbalance

- **In the excel file attached above the sheet Data imbalance shows the ratio of total applicants with payment difficulties (1) to the total applicants with installments being paid on time (0) to be 11.39.**

- **That is out of total applications of 3075011, 92% applicants paid installments on time thus makes the majority class and the rest of the 8% of applicants had payment difficulties thus makes the minority class.**



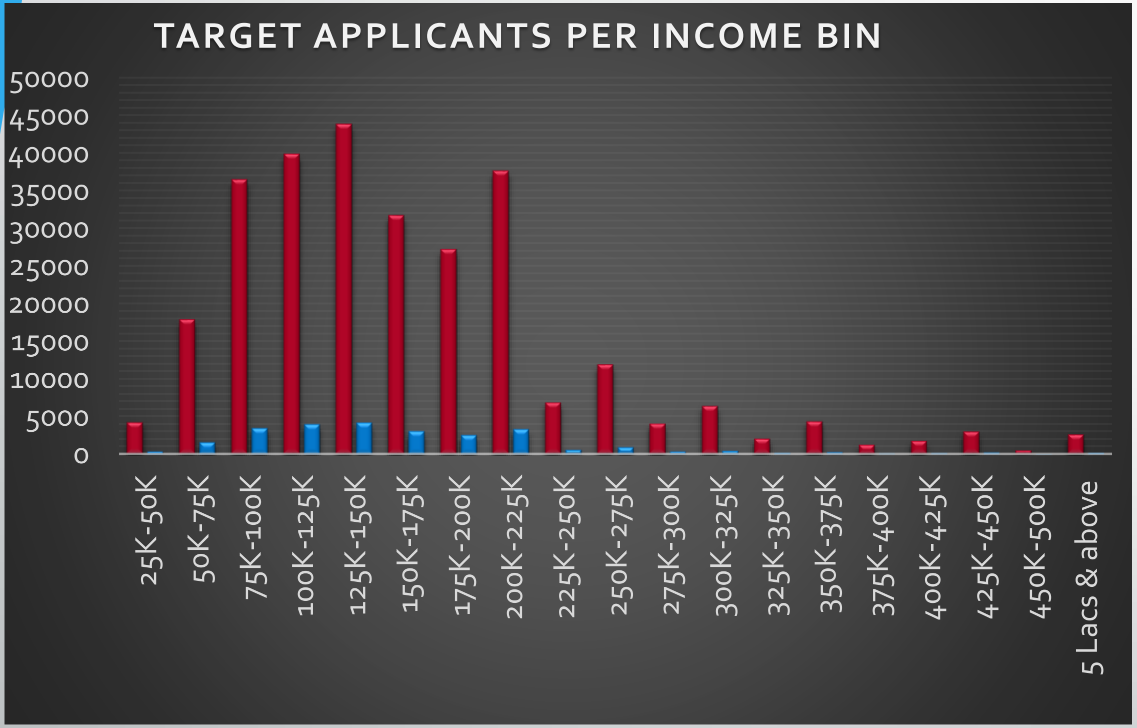
Univariate Analysis



- **Univariate Analysis refers to the analysis of data that contains only one variable. It does not deal with causes or relationships and the main purpose of the analysis is to describe the data and find patterns that exist within it.**

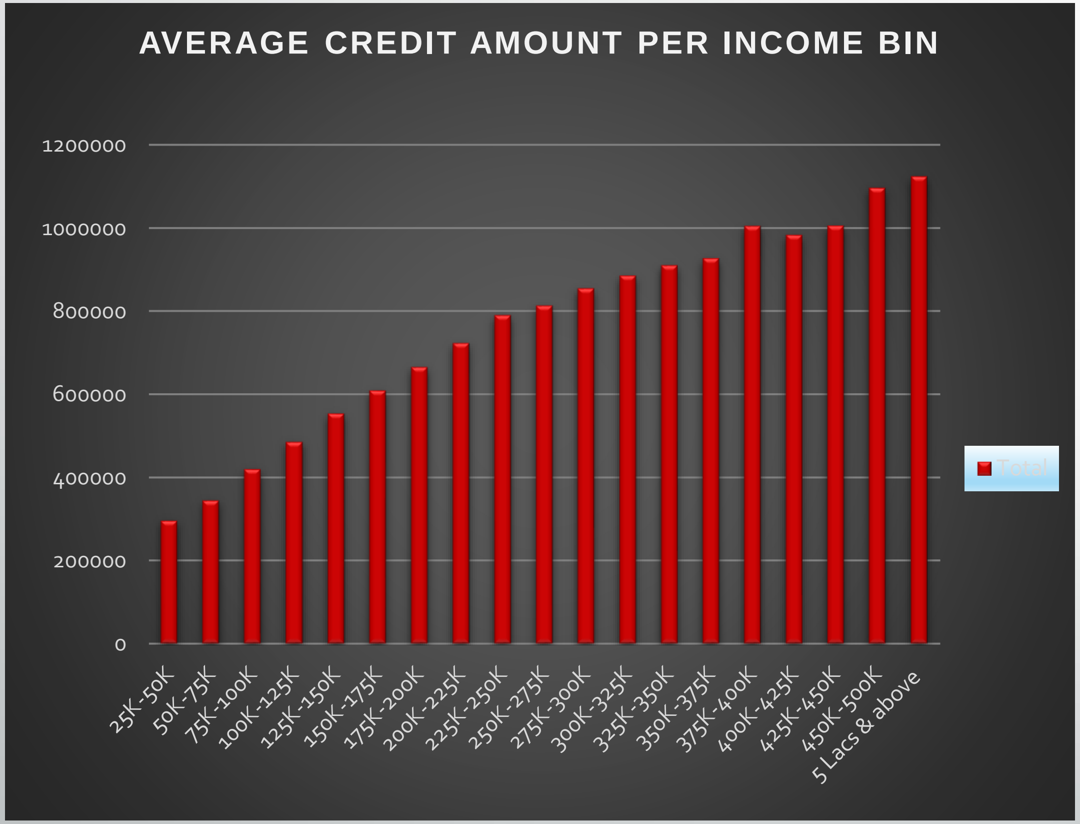
- **The graph is an example of univariate analysis which depicts simply the count of applicants for the variable AMT_CREDIT grouped in different credit bins. Majority of the applicants were offered loans in the credit range of 9 Lacs and above.**

Univariate segmented Analysis



- Univariate Analysis refers to the analysis of data that contains only one variable. Segmented analysis here means that the data variable is analyzed in subsets.
- The graph is an example of univariate segmented analysis which depicts simply the count of segmented applicants (0 & 1) for the variable AMT_TOTAL_INCOME grouped in different income bins. As evident from the graph there are very few targets 1 applicant who draw an income of more than 50 Lacs and above which can be the reason for the difficulties in the payments. Also, maximum applicants (0,1) draw an income between 1.25 Lacs to 1.5 Lacs but there are applicants which are having payment difficulties despite belonging to the same income range.

Bivariate Analysis



- Bivariate Analysis refers to the analysis of data that contains only two variables. The analysis of this type of data deals with causes and relationships and the analysis is done to find out the relationship among the two variables.

- The above graph is an example of bivariate analysis which depicts the relation between AMT_CREDIT and AMT_TOTAL_INCOME. As evident from the graph applicants drawing higher income were offered higher loan amount. Thus, these two variables follow a directionally proportional relation.

CORRELATIONS FOR APPLICANTS WITH PAYMENT MADE ON TIME

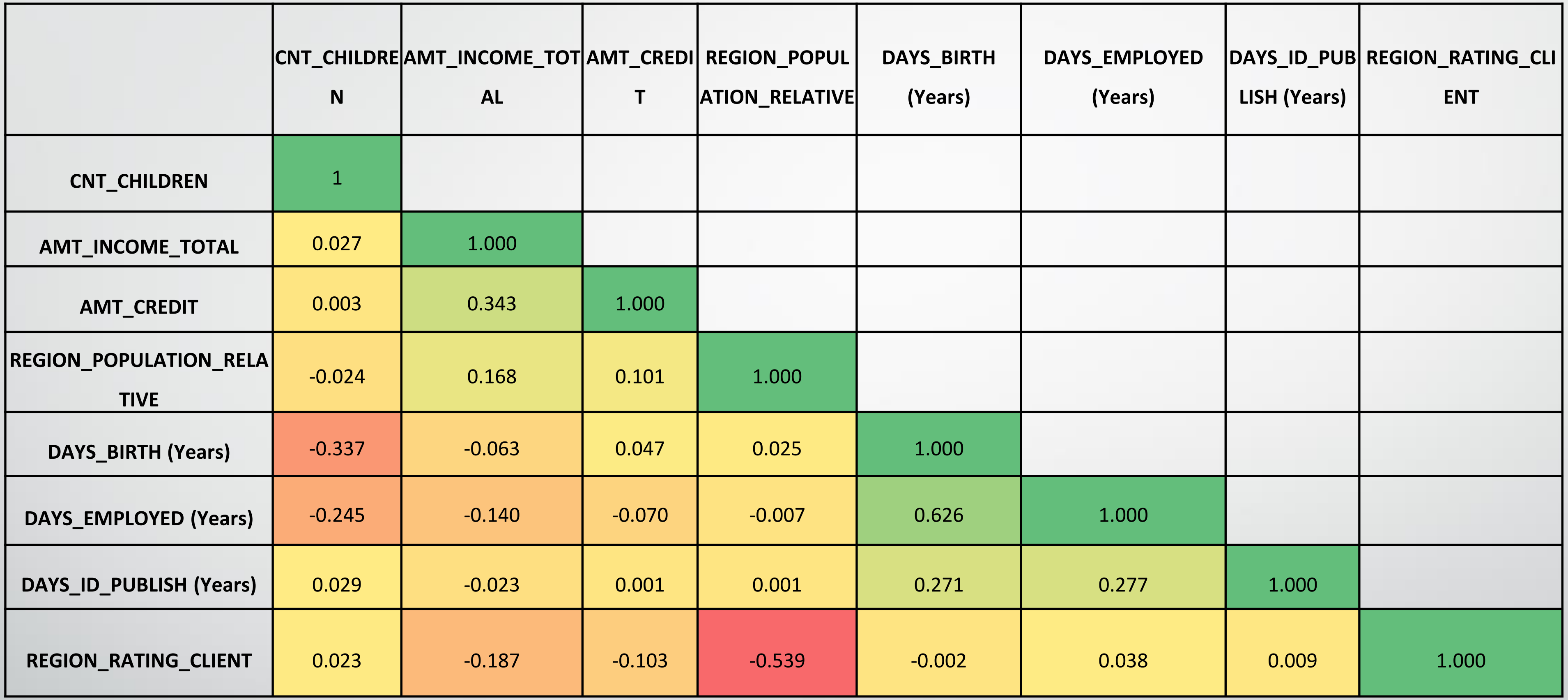
The heat map in the below slide shows the correlations between the different variables for the target (0) that is applicants with no payment difficulties.

The color scheme used for the heat map in the below slide is green to Red which indicates the strongest correlations are in green and the weakest correlations being in Reds.

The most relevant correlations can be seen between the variables are:

- AMT_TOTAL_INCOME to AMT_CREDIT
- DAYS_EMPLOYED to DAYS_BIRTH
- REGION_POPULATION_RELATIVE to AMT_INCOME_TOTAL

Correlation Target 0



	CNT_CHILDREN	AMT_INCOME_TOTAL	AMT_CREDIT	REGION_POPULATION_RELATIVE	DAYS_BIRTH (Years)	DAYS_EMPLOYED (Years)	DAYS_ID_PUBLISH (Years)	REGION_RATING_CLIENT
CNT_CHILDREN	1							
AMT_INCOME_TOTAL	0.027	1.000						
AMT_CREDIT	0.003	0.343	1.000					
REGION_POPULATION_RELATIVE	-0.024	0.168	0.101	1.000				
DAYS_BIRTH (Years)	-0.337	-0.063	0.047	0.025	1.000			
DAYS_EMPLOYED (Years)	-0.245	-0.140	-0.070	-0.007	0.626	1.000		
DAYS_ID_PUBLISH (Years)	0.029	-0.023	0.001	0.001	0.271	0.277	1.000	
REGION_RATING_CLIENT	0.023	-0.187	-0.103	-0.539	-0.002	0.038	0.009	1.000

** The Analysis can be found on the above attached link on page 5 on sheet "Correlation for Target 0" in excel file Bank Loan Case Study

CORRELATIONS FOR APPLICANTS WITH PAYMENT DIFFICULTIES

The heat map in the below slide shows the correlations between the different variables for the target (1) that is applicants with payment difficulties.

The color scheme used for the heat map in the below slide is green to Red which indicates the strongest correlations are in green and the weakest correlations being in Reds.

The most relevant correlations can be seen between the variables are:

- AMT_TOTAL_INCOME to AMT_CREDIT
- DAYS_EMPLOYED to DAYS_BIRTH
- REGION_POPULATION_RELA TIVE to AMT_INCOME_TOTAL

Correlation Target 1

	CNT_CHILDREN	AMT_INCOME_TOTAL	AMT_CREDIT	REGION_POPULATION_RELATIVE	DAYS_BIRTH (Years)	DAYS_EMPLOYED (Years)	DAYS_ID_PUBLISH (Years)	REGION_RATING_CLIENT
CNT_CHILDREN	1							
AMT_INCOME_TOTAL	0.005	1						
AMT_CREDIT	-0.002	0.038	1					
REGION_POPULATION_RELATIVE	-0.032	0.009	0.069	1				
DAYS_BIRTH (Years)	-0.259	-0.003	0.135	0.048	1			
DAYS_EMPLOYED (Years)	-0.193	-0.015	0.002	0.016	0.582	1		
DAYS_ID_PUBLISH (Years)	0.032	0.004	0.052	0.016	0.253	0.229	1	
REGION_RATING_CLIENT	0.041	-0.021	-0.059	-0.443	-0.034	0.003	-0.001	1

* The Analysis can be found on the above attached link on page 5 on sheet “Correlation for Target 1” in excel file Bank Loan Case Study.

RESULT

The project helps in handling large datasets. How EDA can be applied to large datasets. When dealing with large datasets it is also important to select only those columns which are extremely useful to our analysis. Finding correlation columns can become very convenient while dealing with large datasets as it saves time selecting which columns should be considered for analysis. The project helped in understanding the various terminologies used in the banking domain. The insights drawn from the project are as follow.

- Applicants drawing higher income were offered higher loan amount by the bank.
- Majority of applicants drawn an income range between 1.25 Lacs – 1.5 Lacs, also the defaults drawn income between the same range.
- Majority of applicants were offered loans in the credit range of 9 Lacs and above

Thank You