

AllLife Bank

Customer Segmentation

August 2021

Brian Hall – DSBA – Project 7

03 | Problem, Objective & Recommendations

04 | Customer Segmentation

06 | EDA Overview

09 | Data Overview

Problem

AllLife Bank wants to focus on its credit card customer base in the next financial year. The Marketing team proposes to run personalized campaigns to target new customers as well as upsell to existing customers. In addition, the Operations team wants to upgrade the service delivery model, to ensure that customer queries are resolved faster.

Objective

Using clustering algorithms identify different segments in the existing customer base, based on their spending patterns as well as past interaction with the bank and provide recommendations to the bank on how to better market to and service these customers.

Recommendations

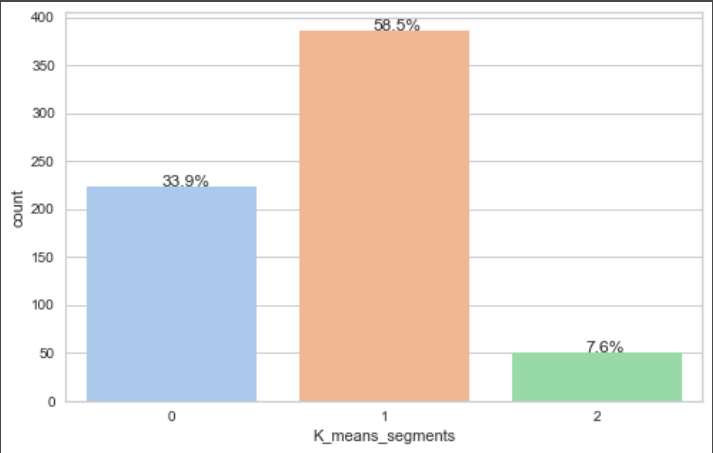
- The majority of customers (Segment 1 - 58%) prefer in person banking, determine why this is; age, location, distrust of online banking, etc, and what their specific needs are. Increase attention to those needs in person and develop / advertise those specific services across all channels to the same demographic. Increase awareness of online services that meet those same needs.
- Customers with the highest credit limits and number of credit cards (Segment 2 - 7.5%) have far more online interactions with the bank and fewer visits and calls. Perhaps the online features the bank offers are more suited to this segments needs. Advertise these services to similar demographics.
- Determine the service needs of customer segments 0 & 1 and develop online services that meet those needs. Market those specific services to demographics similar to segment 0 and 1.
- Provide incentives to appropriate segment 1 customers to acquire more credit cards and increase credit limits, potentially focus on "high touch" services



Customer Segments

The customer segments produced by K-Means and Hierarchical Clustering are nearly identical, with the exception of a single observation moving groups. Observations from EDA also help validate these clusters

We can be confident in these customer segments.



Segment 0 - 33.9% of customers

- Overall lower average credit limits and number of credit cards, some online use, infrequent in person visits and high call volume
- Much lower average credit limit and total number of credit cards than other clusters
- Highest number of calls to the bank, avg of 6.8, that is apx 3 times higher than the next cluster
- Moderate online usage, avg 3.5 time per year
- Infrequent visits to the bank, avg 0.98 visits per year

Segment 1 - 58.4% of customers

- Overall moderate average credit limits and number of credit cards, high in person bank visits, infrequent online usage and low call volume
- Moderate credit limits and total number of credit cards
- High frequency of in person bank visits, apx 3X higher than other clusters
- Very limited online usage
- Relatively few calls to the bank compared to cluster 0

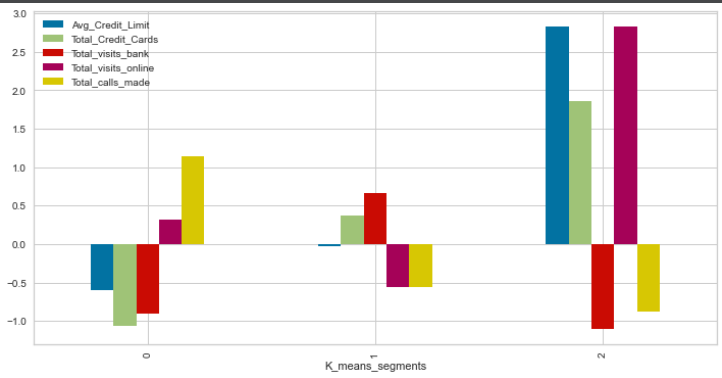
Segment 2 - 7.5% of customers

- Overall high credit limits and number of credit cards, infrequent in person bank visits, very high online usage & very low call volume
- Highest average credit limit by ~ 107,000 and number of credit cards by ~ 3
- Very infrequent in person visits to the bank
- Very high online usage. 3X higher than Cluster 0 and 10X higher than cluster 1
- Infrequent calls to the bank, avg 1 per year

	Avg_Credit_Limit	Total_Credit_Cards	Total_visits_bank	Total_visits_online	Total_calls_made	count_in_each_segment
K_means_segments						
0	12174.107143	2.410714	0.933036	3.553571	6.870536	224
1	33782.383420	5.515544	3.489637	0.981865	2.000000	386
2	141040.000000	8.740000	0.600000	10.900000	1.080000	50

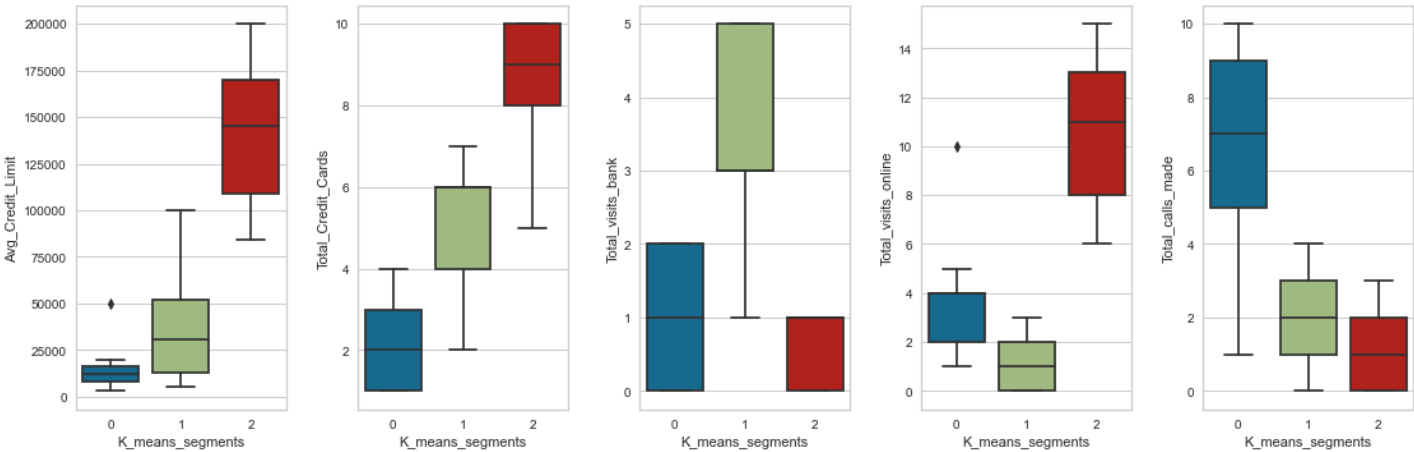
Customer Segments

K-Means Clusters

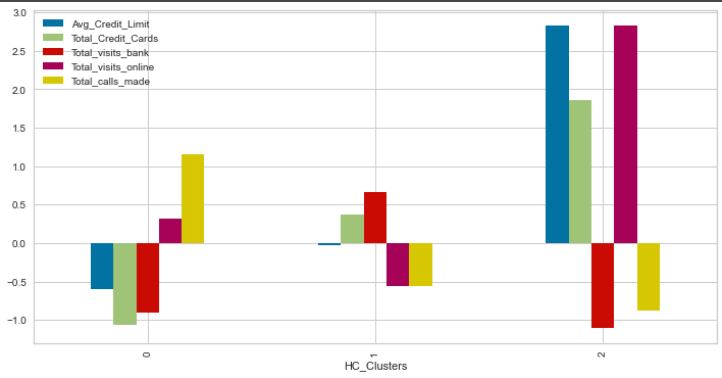


K-Means Clusters

Boxplot of numerical variables for each cluster

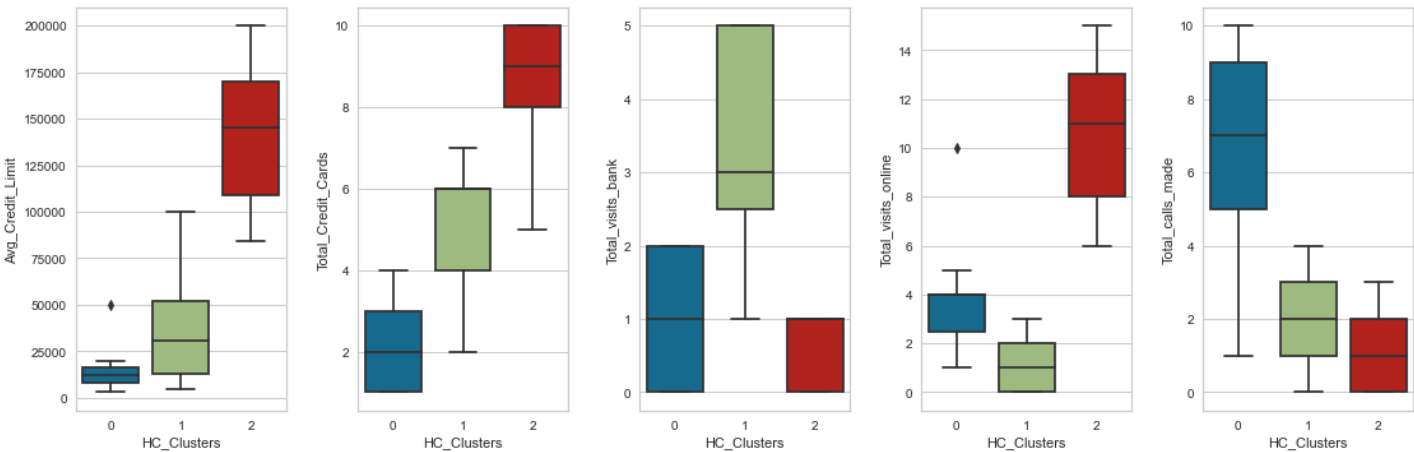


Hierarchical Clusters



Hierarchical Clusters

Boxplot of numerical variables for each cluster



EDA Overview

660 Observations and 7 Features

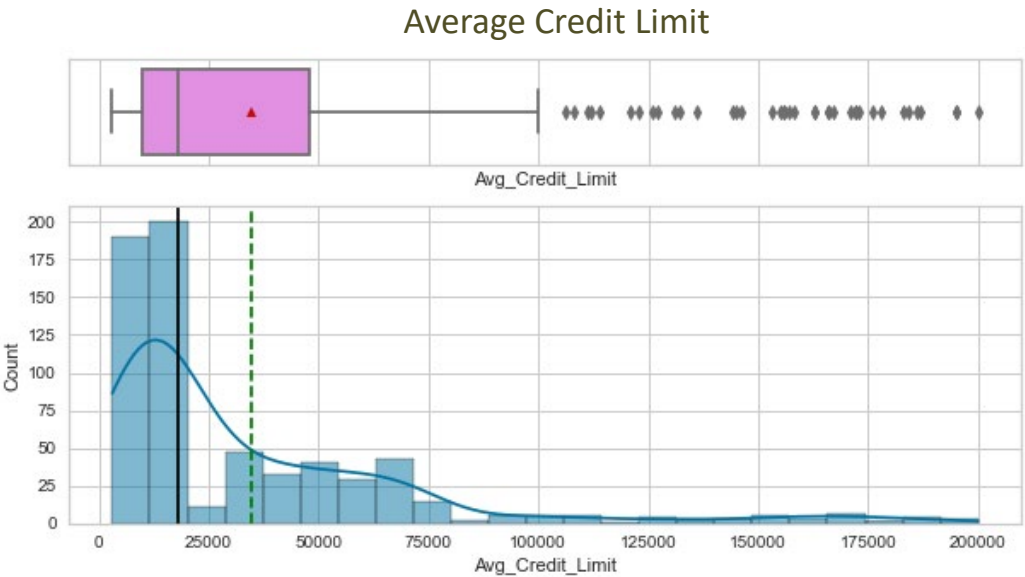
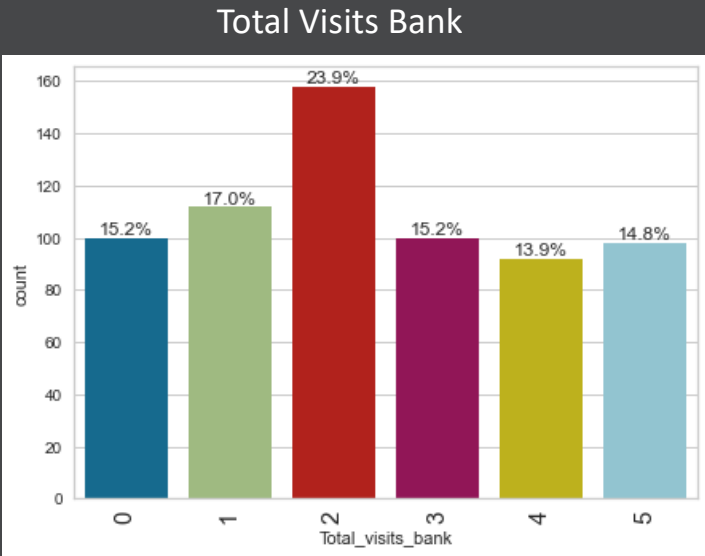
There are no missing values

There are no Duplicate Rows

SI_No & Customer Key were dropped as they would not add value to segmentation

	count	mean	std	min	25%	50%	75%	max
Avg_Credit_Limit	660.000	34574.242	37625.488	3000.000	10000.000	18000.000	48000.000	200000.000
Total_Credit_Cards	660.000	4.706	2.168	1.000	3.000	5.000	6.000	10.000
Total_visits_bank	660.000	2.403	1.632	0.000	1.000	2.000	4.000	5.000
Total_visits_online	660.000	2.606	2.936	0.000	1.000	2.000	4.000	15.000
Total_calls_made	660.000	3.583	2.865	0.000	1.000	3.000	5.000	10.000

- Avg_Credit_Limit has a mean of 34574.21 with a range of 3000 to 200000
- Total_Credit_Cards has a mean of 4.7 and a range of 1 to 10
- Total_visits_bank has a mean of 2.4 and a range of 0 to 5
- Total_visits_online has a mean of 2.6 and a range of 0 to 15
- Total_calls_made has a mean of 3.58 and a range of 0 to 10



EDA Overview

Avg_Credit_Limit

- There are 39 outliers > 100,000 with a max of 200,000
- Majority of customers have an average credit limit of < 25,000

Total_Credit_Cards

- More customers carry 4 credit cards with 6 & 7 cards being the next most common

Total_visits_bank

- Range 0 to 5 with 2 visits being the most prevalent at 29%, all other number of visits range from 14% to 17%

Total_visits_online

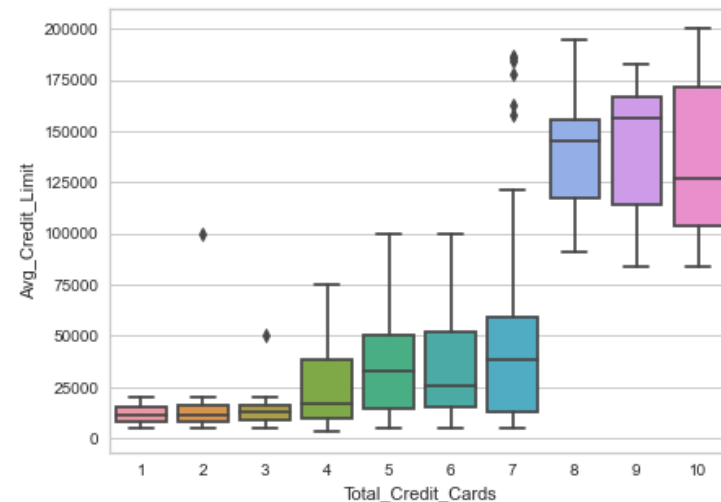
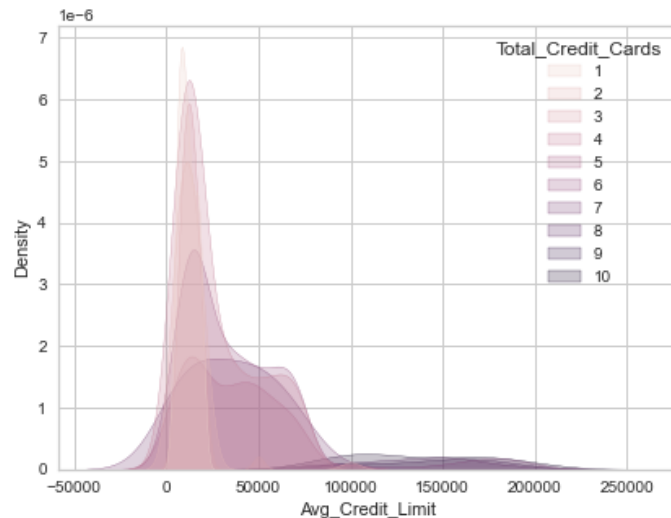
- ~7 outliers that range from 9 to 15 and accounts for ~ 9% of Online visits
- Most customers visited online ~2 times throughout the year
- 90% of the number of online visits are 5 or less

Total_calls_made

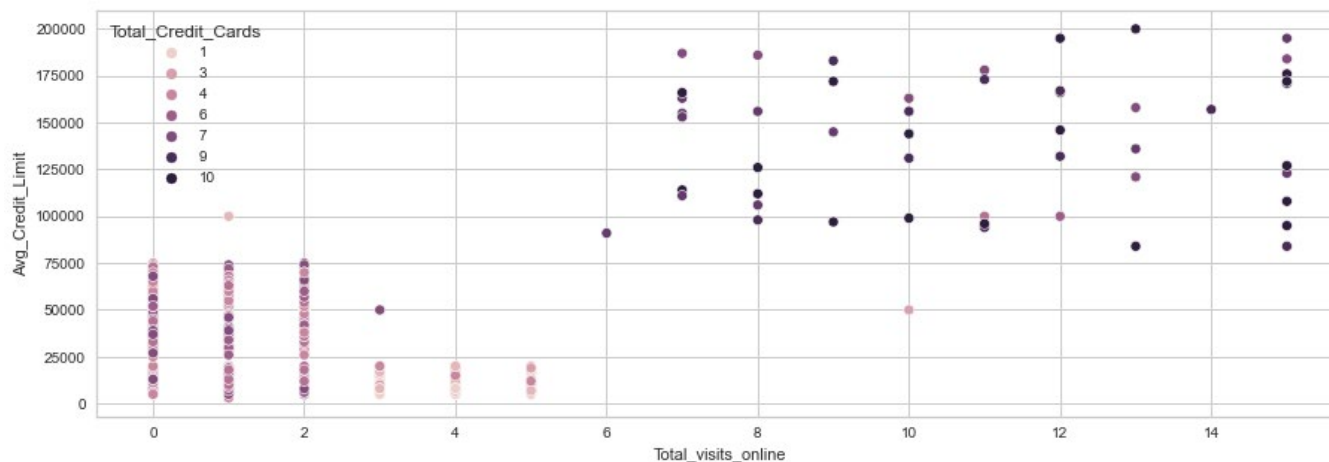
- Majority of calls ~ 57% are 4 or less
- Calls mean is ~ 3.5

Key Observations

- Average Credit Limit increases as the total number of cards increases. Moderately so for 4 to 7 cards and significantly so for 8 to 10 cards.
- With the exception of a few outliers' customers with 3 or less cards have a credit limit below 25,000



- The vast majority of online visits are for customers with 7 or more credit cards and > 100,000 credit limit

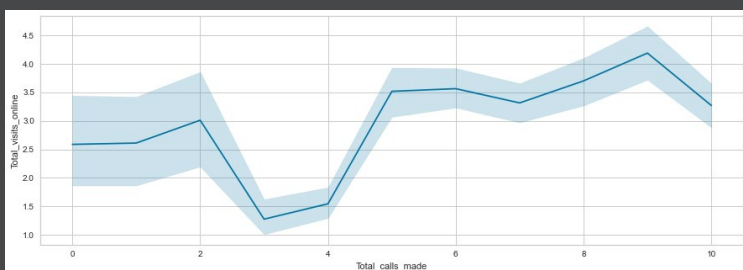


EDA Overview

An increase in online activity decreases the number of visits to the bank a customer makes however the number of online visits moderately increases after 4 calls. This could indicate that a number of customers may be encountering difficulty with one of these methods of services

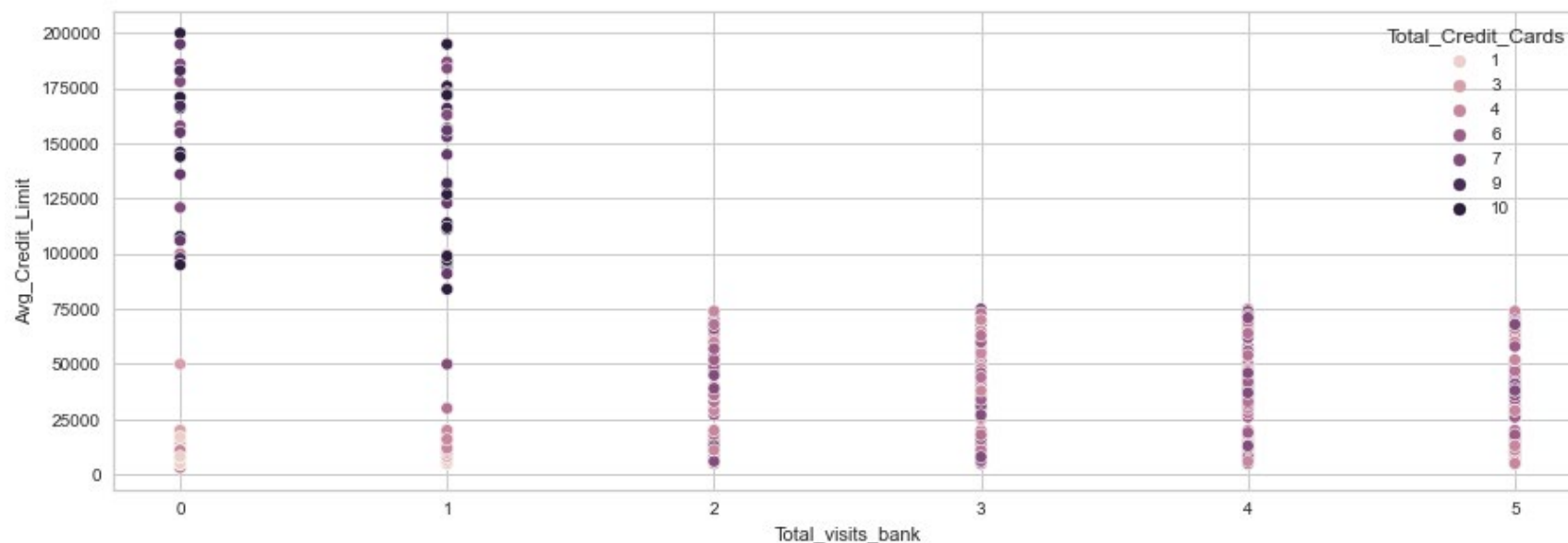
Those who visit the bank more often, two times or more, have lower average credit limit < 75,000 and generally have 6 or less credit cards

Total Visits Online vs Calls Made



Key Observations

- Customers with higher credit limits and more credit cards visit the bank and call less often but have higher online utilization
- With the exception of a few outliers customers with 3 or less cards have a credit limit below 25,000
- The vast majority of online visits are for customers with 7 or more credit cards
- Those with higher credit limits and more cards are less likely to call the bank, rarely more than 2 times
- Those with fewer cards and lower credit limit are more likely to call the bank but seldom more than 4 times
- Interestingly the number of online visits moderately increases after 4 calls. This could indicate that a number of customers may be encountering difficulty with one of these methods of service.
- The number of visits to the bank decreases rapidly after 3 calls
- As would be expected those who visit the bank more often are less likely to call the bank
- As the number of online visits increase the number of visits to the bank decreases
- There is a distinct decrease in bank visits (3 to 1) as the customer visits online more than twice
- Most customers, ~ 29%, visited online ~2 times throughout the year
- 90% of the number of online visits are 5 or less
- The majority of customers, ~ 57%, call less than 4 times throughout the year



Data Overview

The data is assumed to a random view of AllLife Bank customers and a few of their financial and interaction attributes

Data has been provided via xlsx file (Credit Card Customer Data.xlsx | 32.9 k)

Data Dictionary

- **SI_No**: Primary key of the records
- **Customer Key**: Customer identification number
- **Average Credit Limit**: Average credit limit of each customer for all credit cards
- **Total credit cards**: Total number of credit cards possessed by the customer
- **Total visits bank**: Total number of Visits that customer made (yearly) personally to the bank
- **Total visits online**: Total number of visits or online logins made by the customer (yearly)
- **Total calls made**: Total number of calls made by the customer to the bank or its customer service department (yearly)

The Data Contains:

- 660 rows and 7 columns
- There are no missing values
- There are no Duplicate Rows

Data Treatment:

- **SI_No & Customer Key** were dropped as they would not add value to segmentation
- All outliers in the data were left untreated due to distinct patterns that would likely contribute to important segmentation attributes
- Data was scaled with StandardScaler prior to clustering