

BANKING ANALYSIS USING AI AND CLOUD TECHNOLOGIES

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Introduction

The Banking Analysis project leverages AI and cloud technology to enhance banking operations.

Powered by Azure, SQL Server, Power BI, and Python, this project delivers improved customer segmentation, robust risk management, and streamlined operational efficiency for smarter banking decisions.



PROJECT GOALS



Technology Stack

01

Microsoft Azure

Cloud storage and processing of banking data.



02

SQL Server

Data management and querying for preprocessing.



03

Power BI

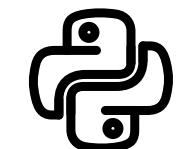
Visualization using Power Query, DAX, Measures, and Dashboards.



04

Python (Jupyter Notebook)

RFM segmentation, predictive modeling, and fraud detection.



05

AI Chatbot

AI-driven data interaction and customer query handling.



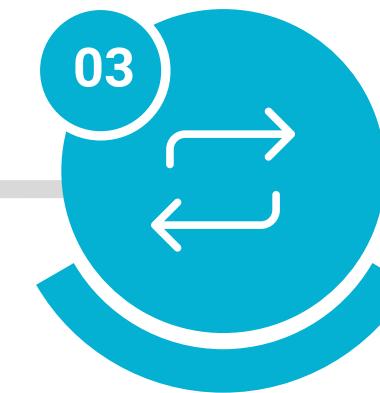
Dataset Structure



Customers



Accounts



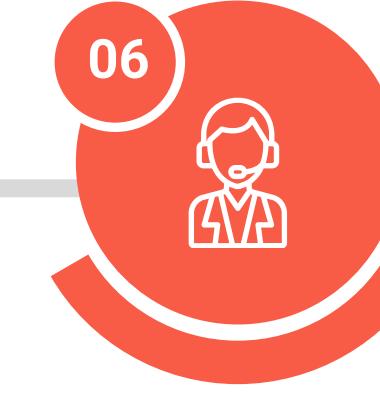
Transactions



Loans



Credit Cards



Support Calls



Microsoft Azure

Key Features and Benefits

It is used in this project only to create a SQL Server instance for hosting and managing the database to run SQL queries for customer analytics, account analysis, and fraud detection.

POWER BI

Bank Analysis Dashboard



Customers



Support
Performance



Loans



Account & Card



Transactions

EYouth 
Data Analytics
Bootcamp

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Year
All

Segment
All

Customer Analysis

State
All

RFM Segment
All



Total Customers
 3171

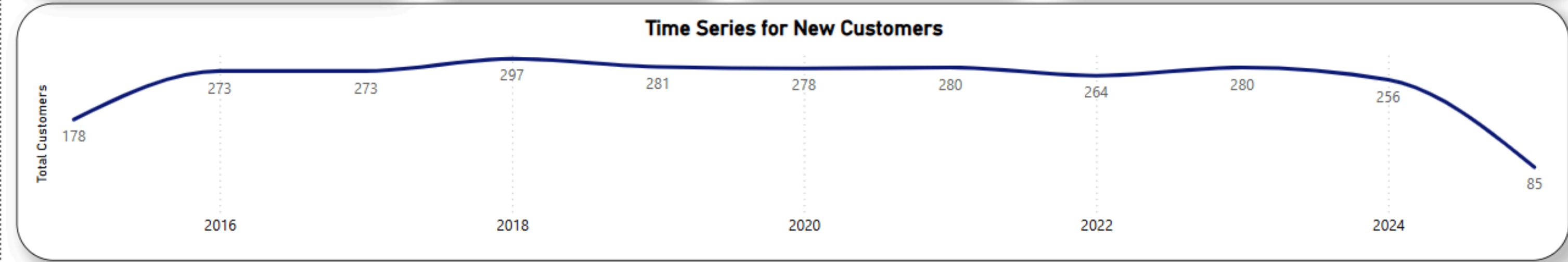
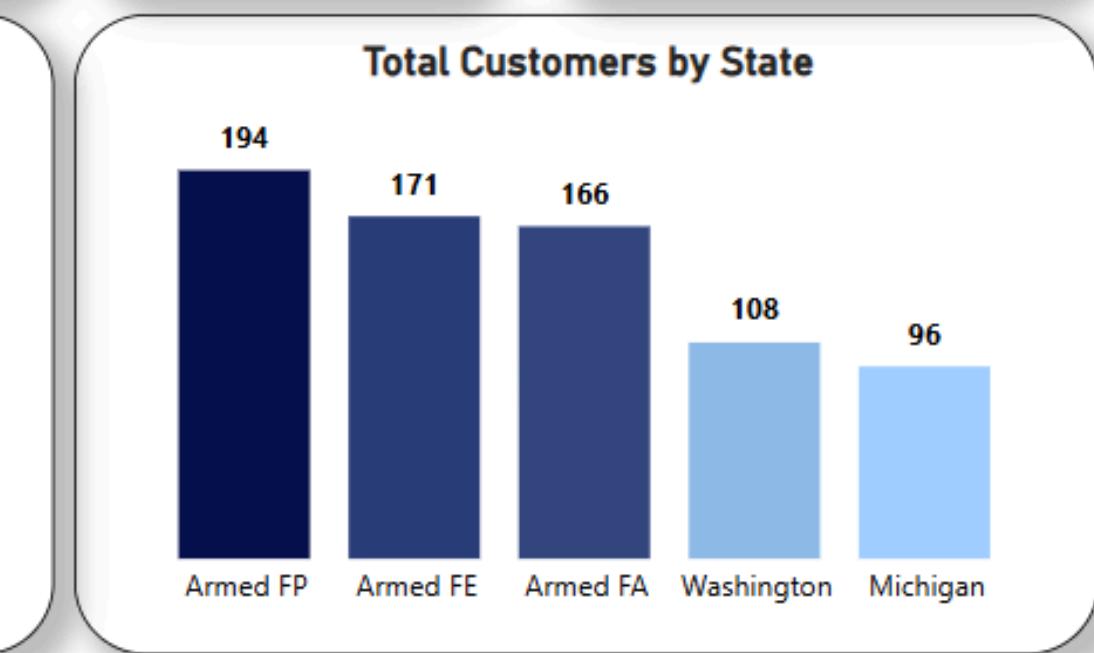
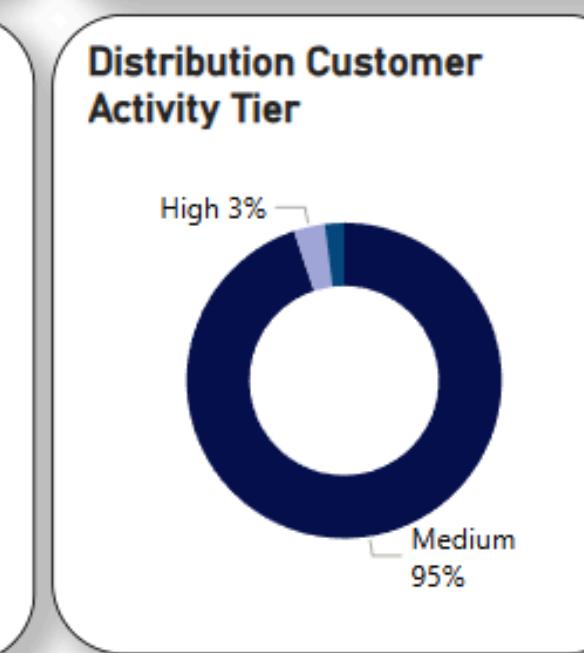
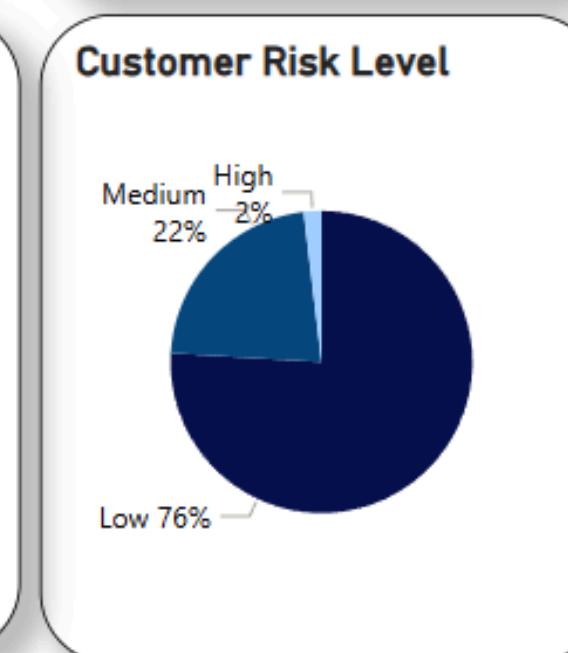
Avg Tenure (Years)
 5

Avg Accounts Per Customer
 1

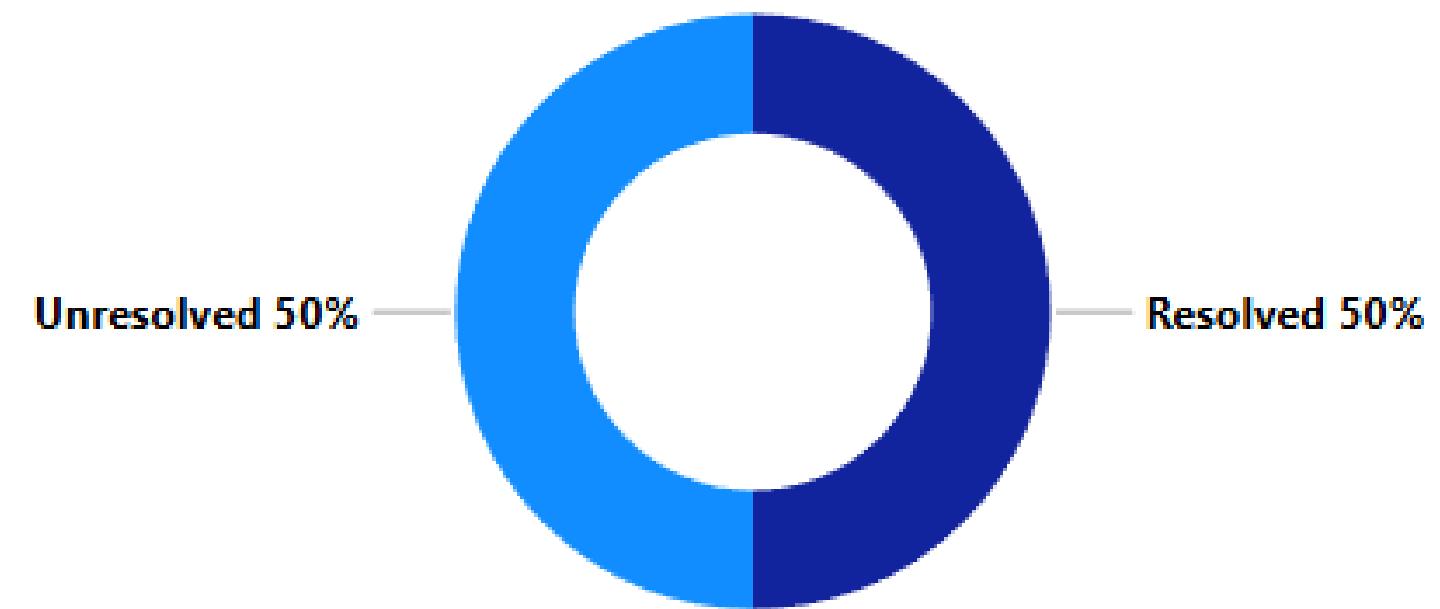
Avg RFM Segmentation Score
 333

Customer Suspicious

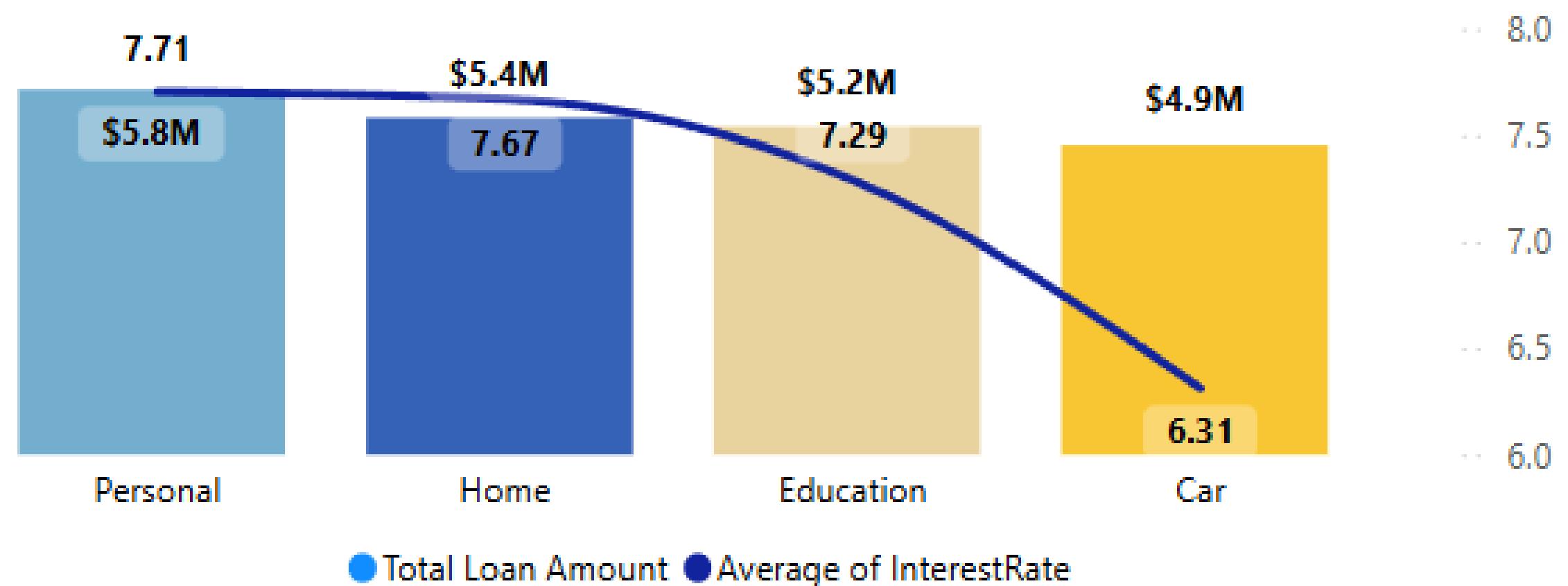
FirstName	CustomerID	Suspicion	
Aaron	3035	Normal	688-44
Abigail	3155	Normal	(606)34
Abigail	4624	Normal	732-23
Adrian	4978	Normal	488.00
Adrian	4673	Normal	692-28
Adrienne	3403	Normal	001-20
Alexander	548	Normal	(700)65
Alexander	272	Normal	710-79
Total			



Resolution Status



Loan Type by Total Loans Amount and Interest Rate





BankProject(V4) - Copy

Home Insert Mod

Total Customer 57 **Avg Tenure (Years)** 5 **Avg Accounts Per Customer** 1 **Total Accounts** 87 **Total Cards** 54 **Average Account Balance** 50K

Total Loans 29 **Total Loans Amount** \$8M **Total Transactions** 374 **Total Transaction Amount** 2M

Customer Risk Level

Risk Level	Percentage
Low	72%
Medium	28%

Distribution Customer Activity Tier

Tier	Percentage
High	2%
Medium	96%
Low	2%

Customer Suspicious

FirstName	Suspicion	CustomerID	Phone	Email
Alexander	Normal	373	218-785-8114x383	sandraday@sullivan.com
Danielle	Normal	1227	(493)928-0060x8730	joshua05@russell.info
Derek	Normal	2180	308.360.3512x364	annetteallen@gmail.com
Isaac	Normal	1186	5281910228	stokeslarry@hotmail.com
Jennifer	Normal	2628	001-810-779-7733x860	stokeslarry@baker.net
Kayla	Normal	2679	787.529.8258x295	troy89@gmail.com
Mark	Normal	3733	209-237-0593x3673	patricia34@gmail.com
Michelle	Normal	1761	8186597671	ryanngutierrez@marsh-sosa.com
Miguel	Normal	3205	395.872.4775	james69@gmail.com
Sydney	Normal	4626	(048)725-5621x692	seancoleman@gmail.com

State Hawaii

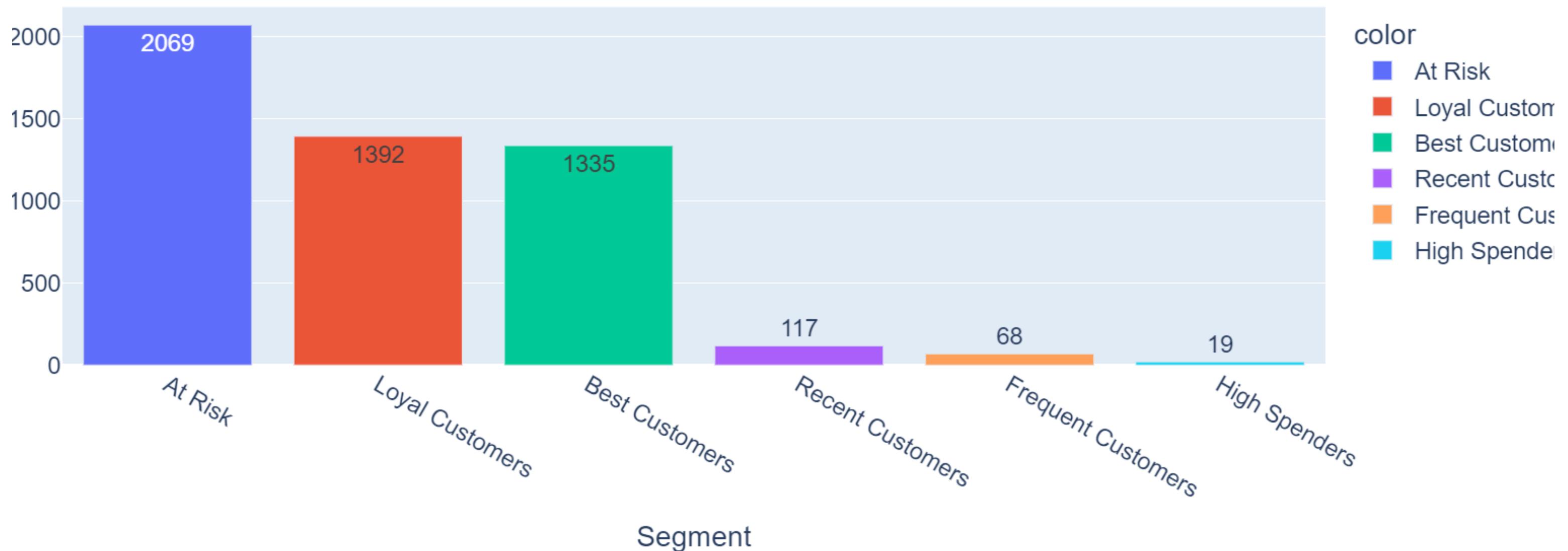
Time Series for New Customers

Year	Total Customers
2016	6
2017	2
2018	1
2019	7
2020	6
2021	3
2022	1
2023	6
2024	2

Microsoft Bing

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RFM Customer Segmentation



Accounts & Cards

01

Count of Accounts

02

Average Accounts Available

03

Total Balance

04

Change Account by Year

05

Accounts with no transactions



Year

All

CardType

All

Accounts & Cards

AccountType

All

accounts Alert

All



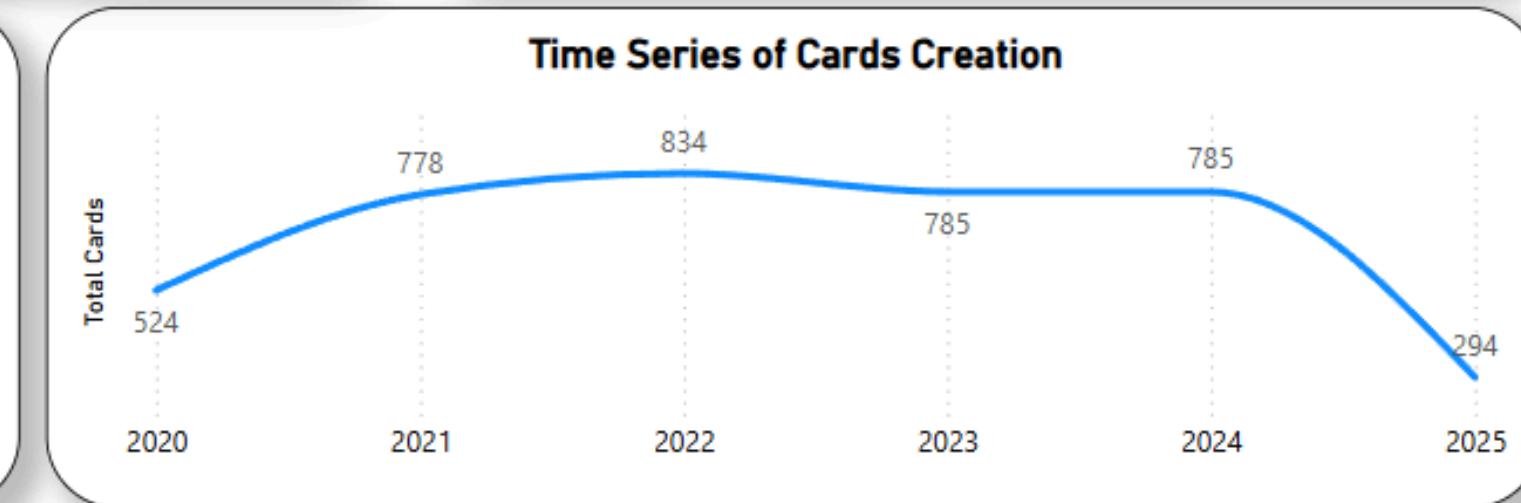
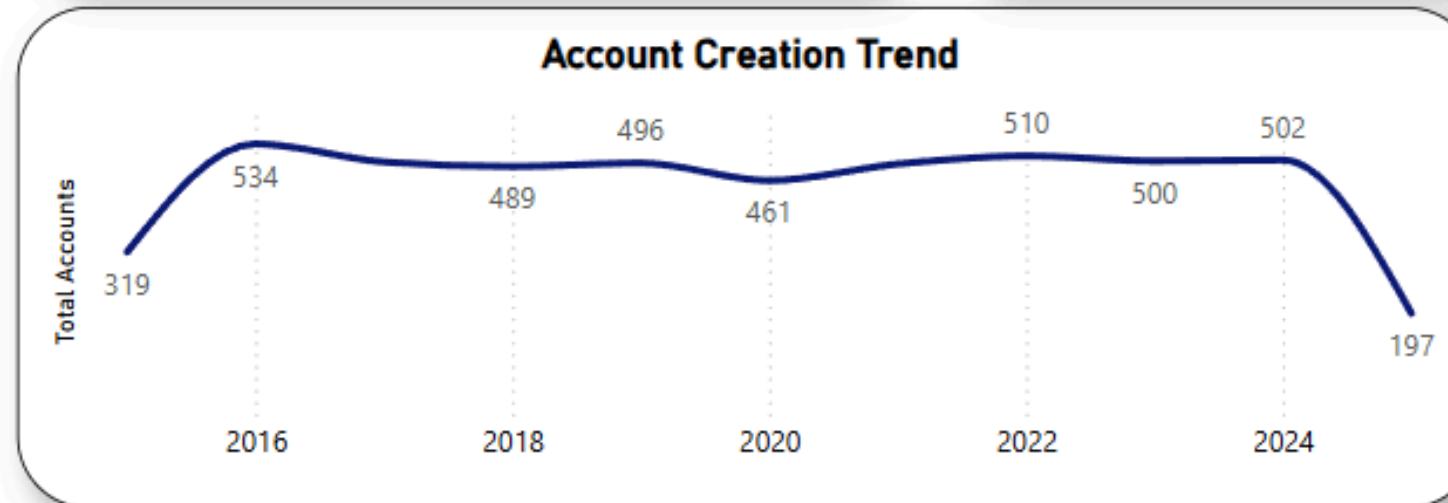
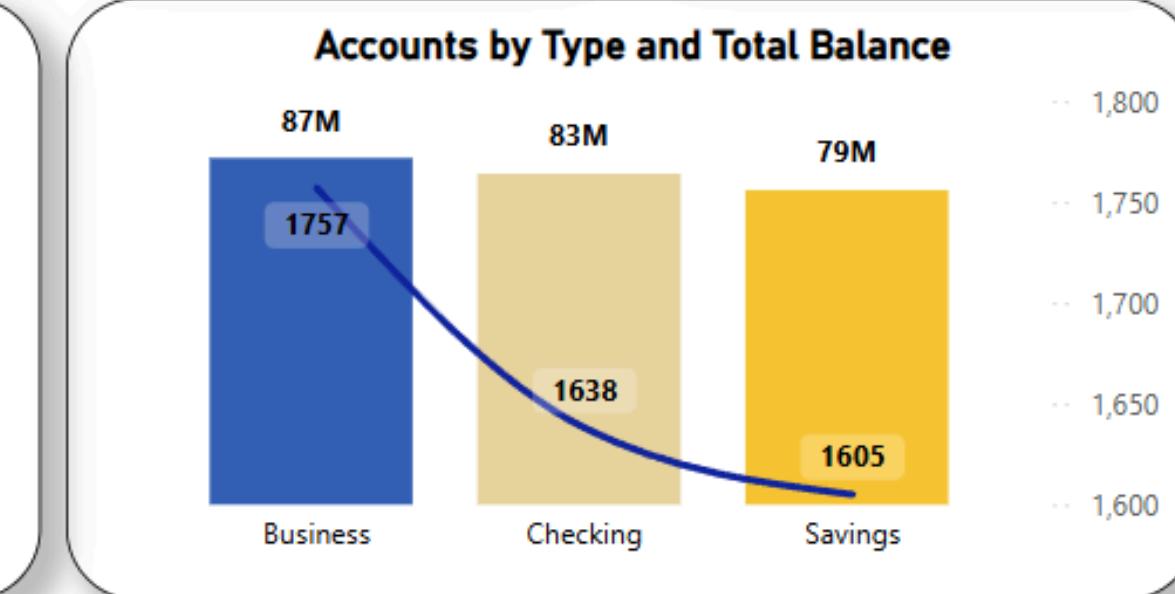
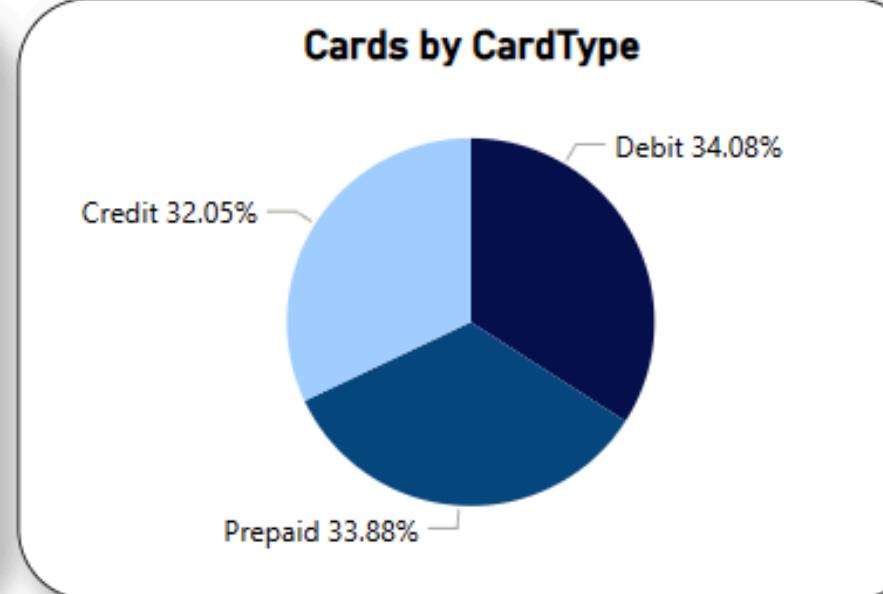
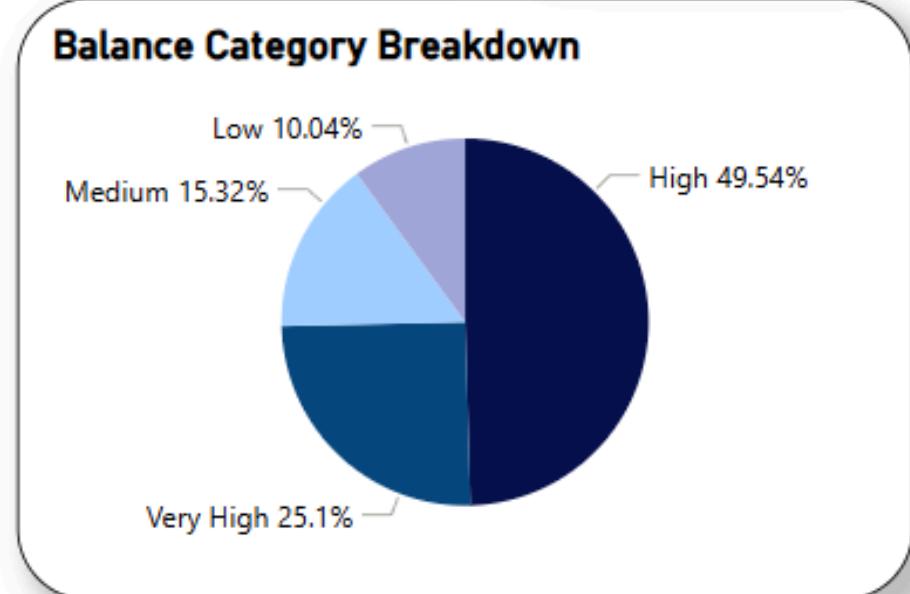
Total Accounts
 5000

Total Cards
 4000

Average Account Balance
 50K

Avg Account Age(Years)
 5

Avg Card Period(Years)
 6





Year

All

Transaction Categ...

All

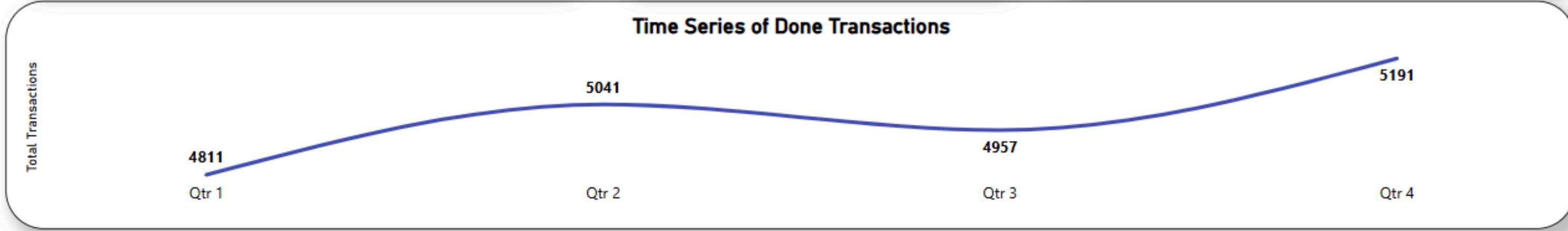
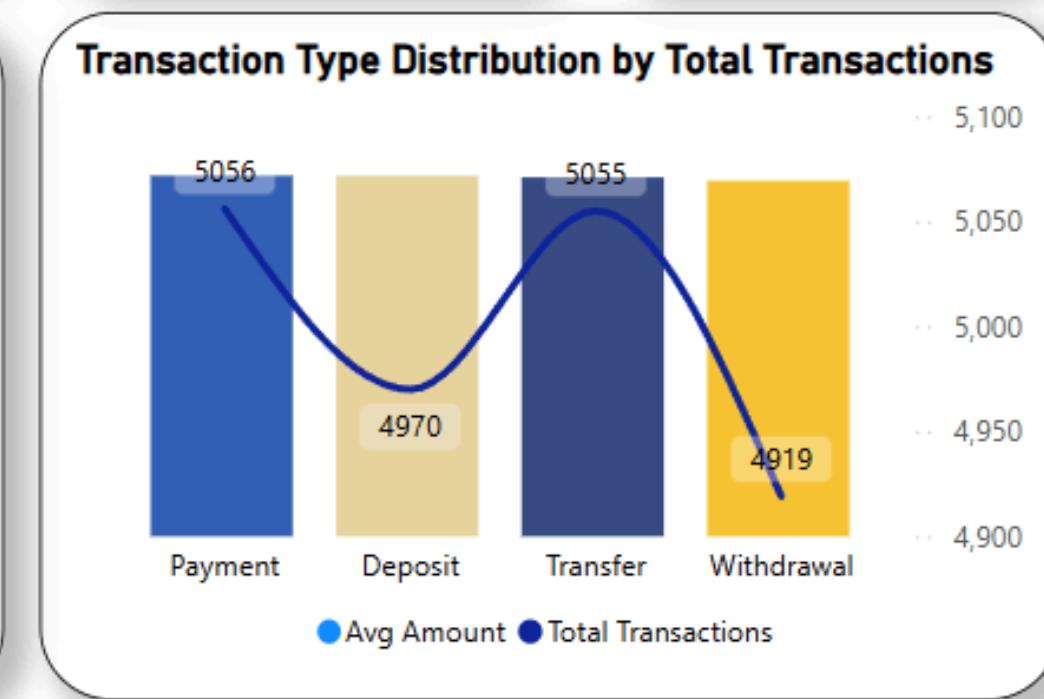
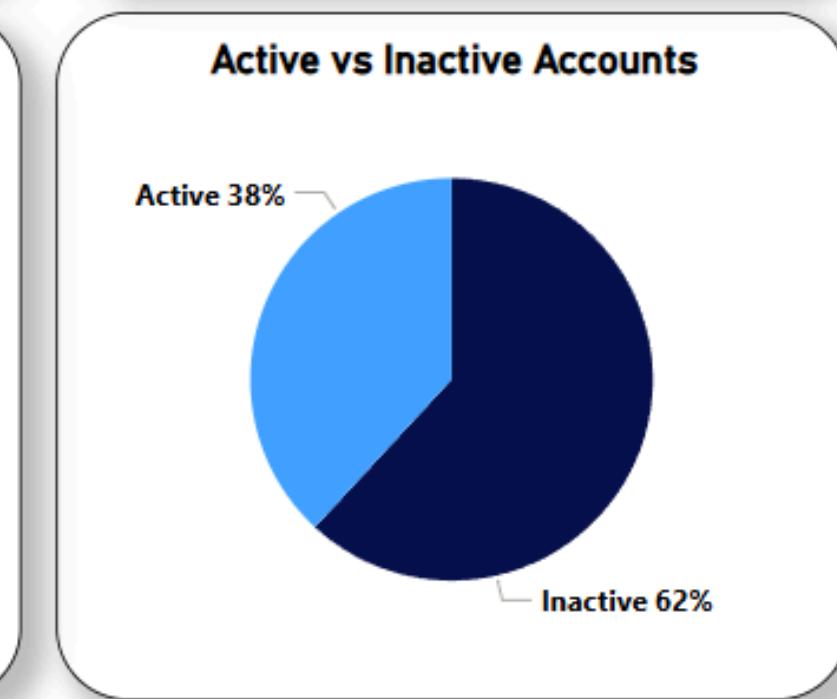
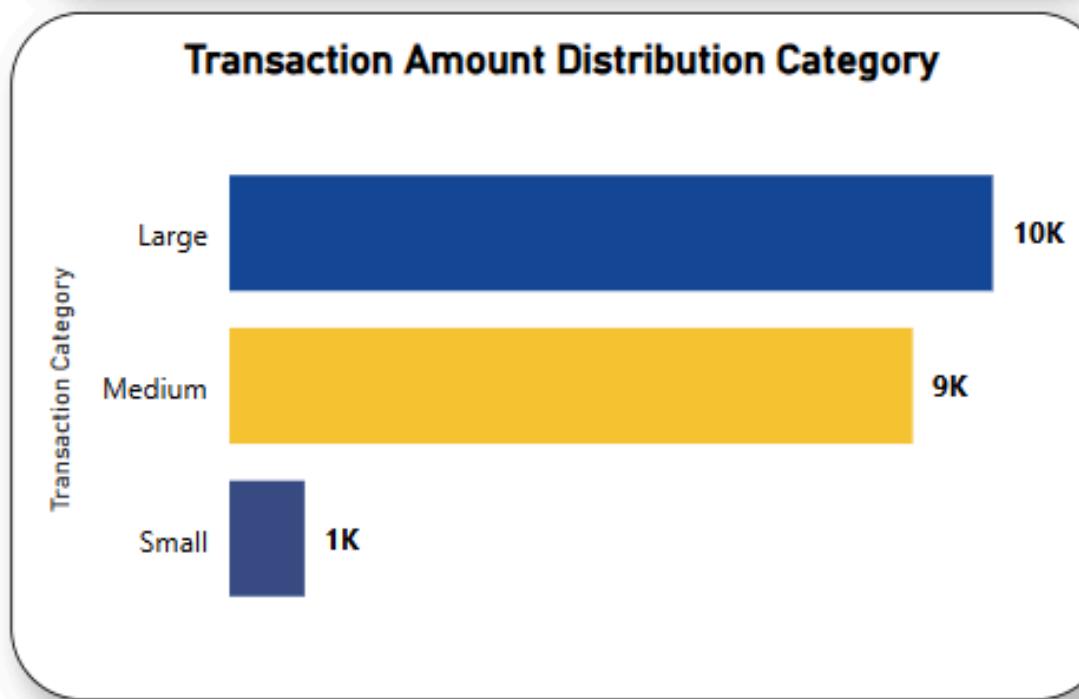
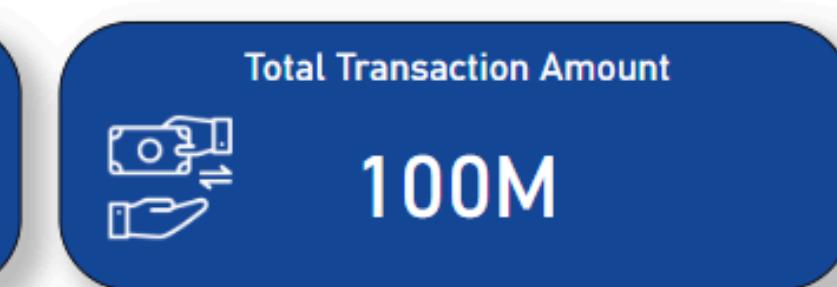
Transactions Analysis

AccountType

All

Risk Level

All





Year
All

Suspicion
All

Loans Analysis

LoanType
All

Risk Level
All



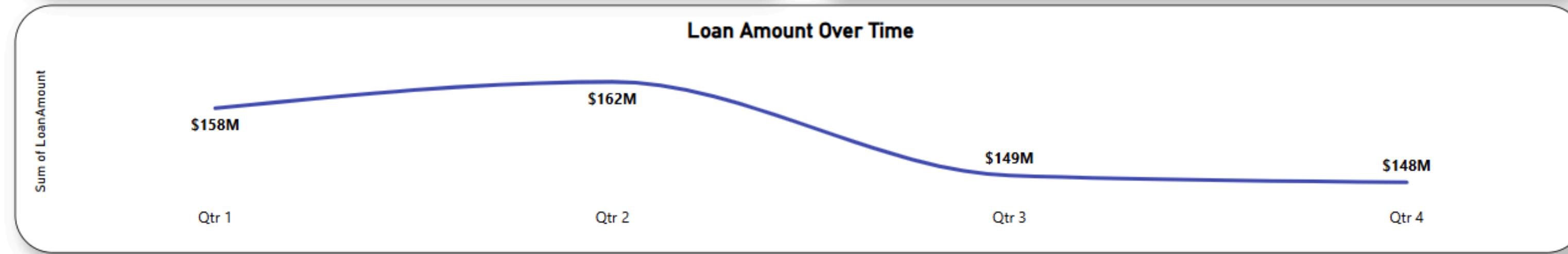
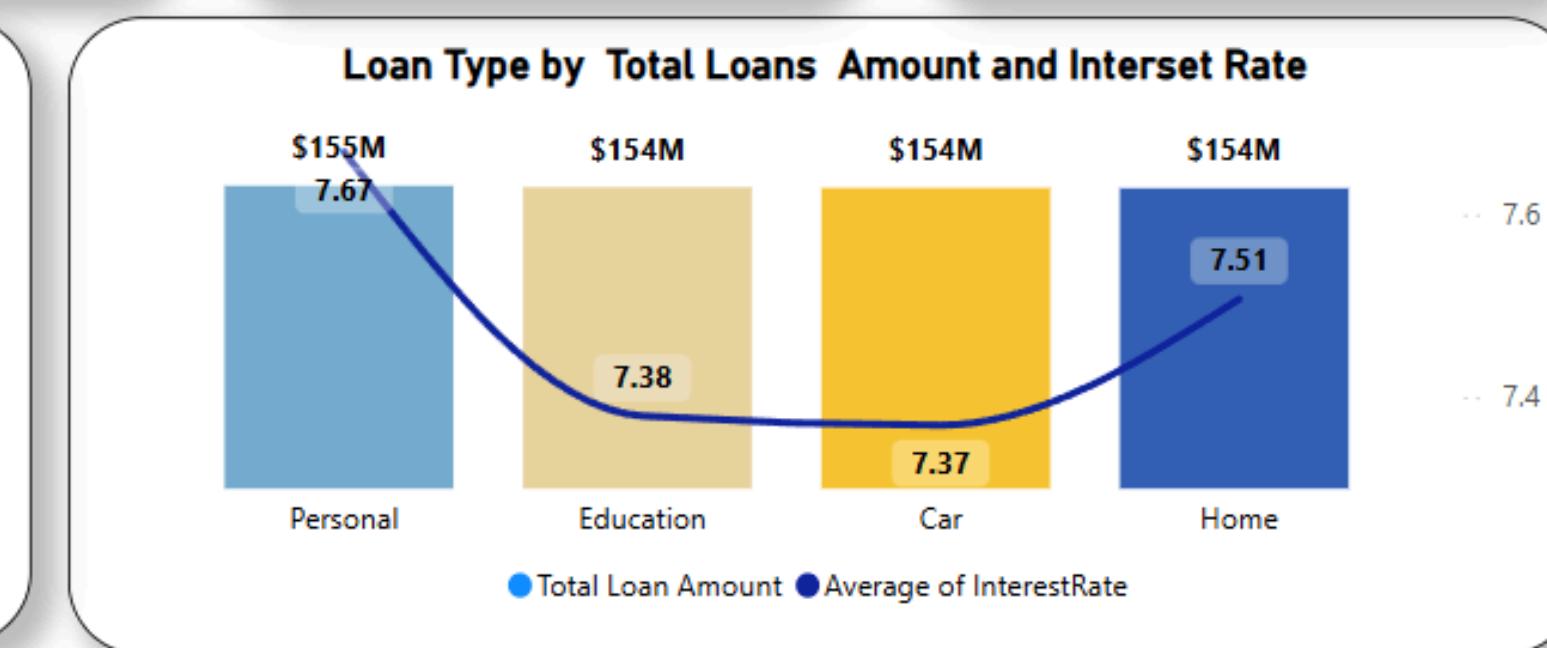
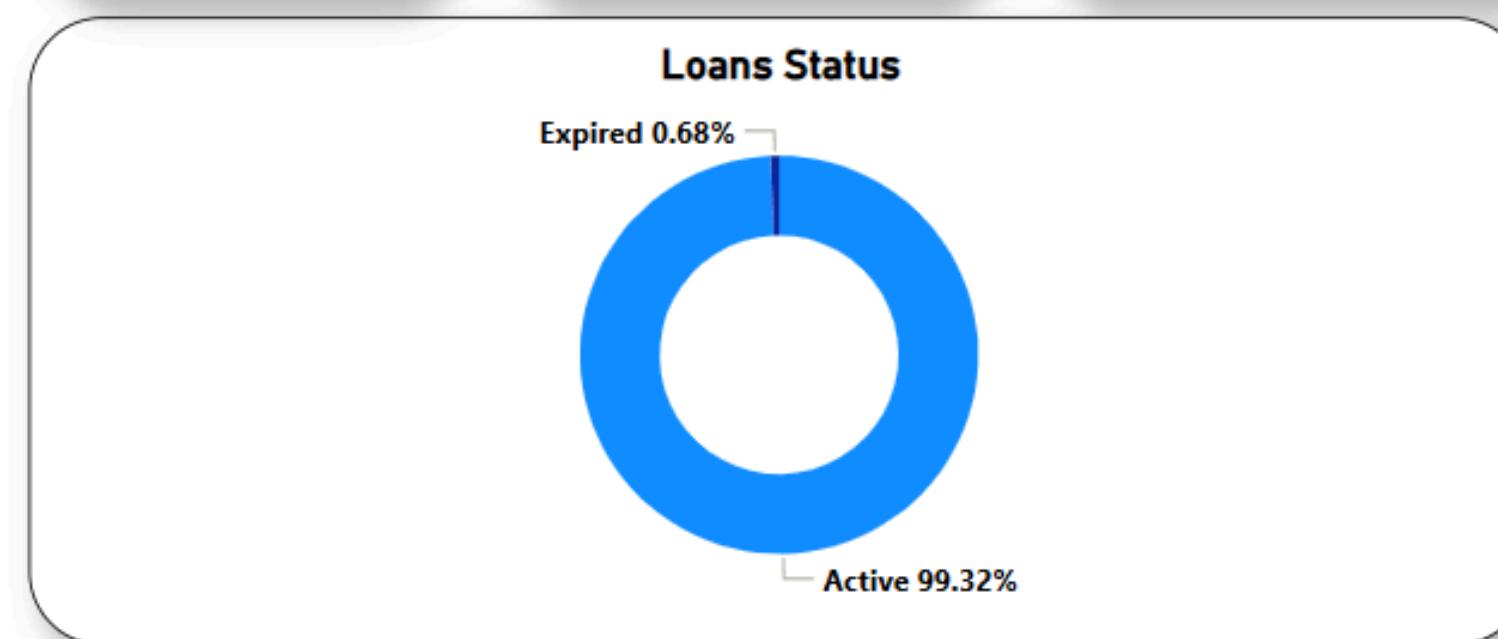
Total Loans
 2500

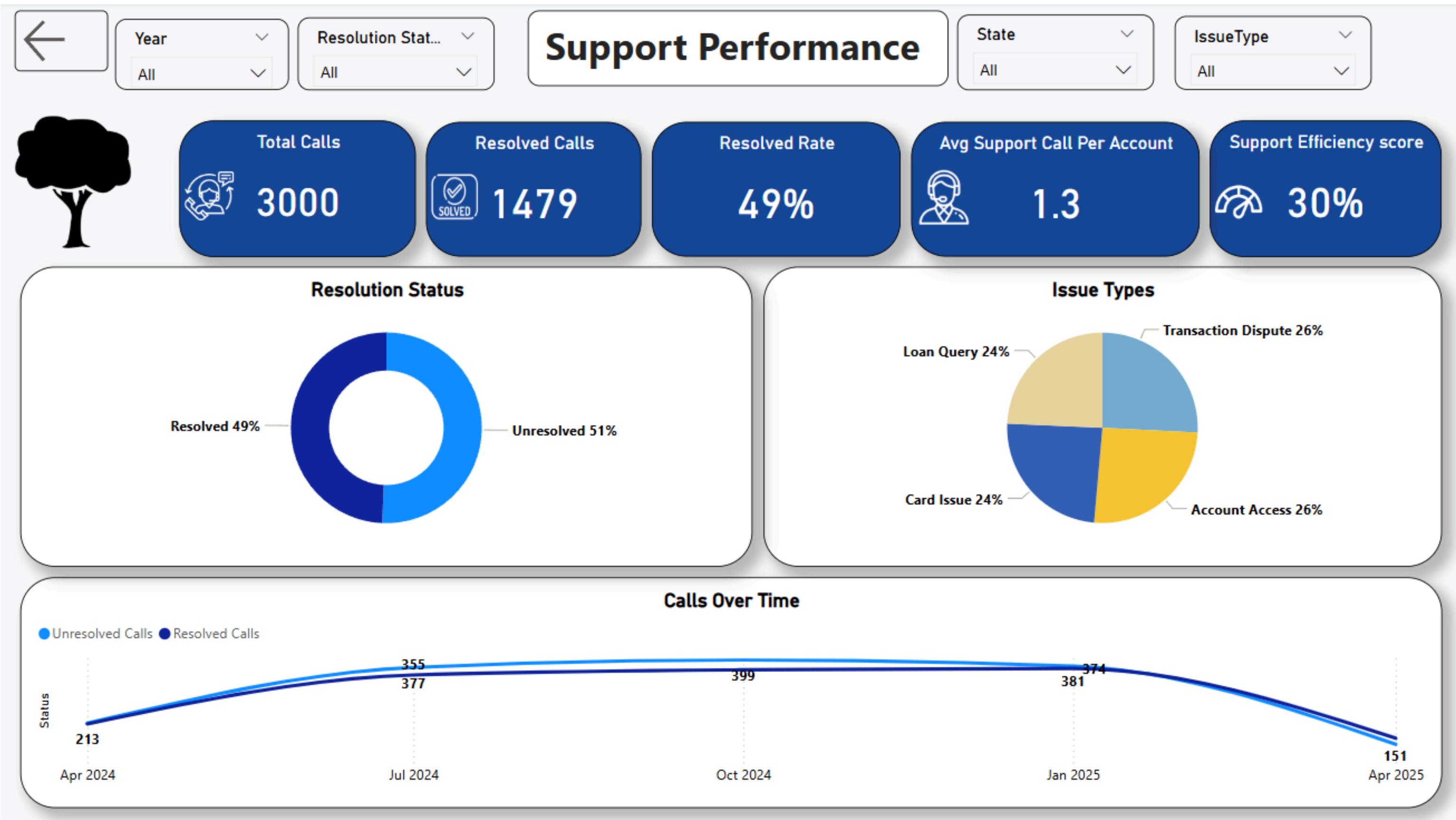
Total Loan Amount
 \$617M

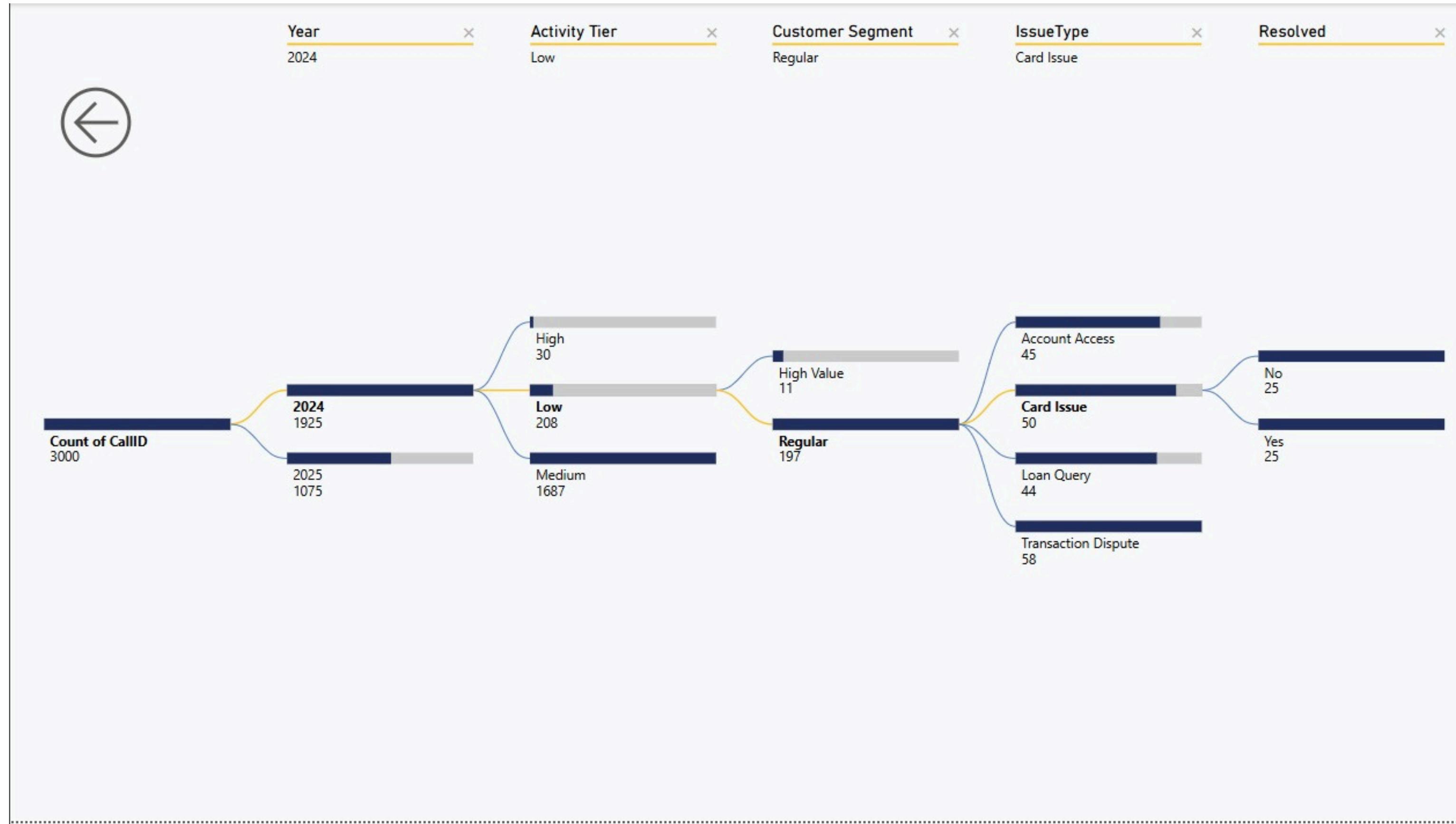
Avg Interest Rate
 7.5

Avg Credit Score Per Customer
 132.09

Risky Loans Indicator(%)
 17.3







Analysis of customer complaints and transactions

Identifying the number of transactions performed after a customer complaint was registered

	CustomerID	CustomerName	Phone	Email	ComplaintDate	TransactionsAfterComplaint	LastTransactionDate
1	1378	Donna O'Neill	001-499-402-5961x51499	bakergeorge@white.net	2024-11-24	11	2025-05-05
2	213	William Murphy	001-846-230-7398x99456	collinmorales@douglas.net	2024-11-19	11	2025-03-11
3	2679	Kayla Chandler	787.529.8258x295	troy89@gmail.com	2025-01-28	10	2025-05-07
4	2672	Nicole Johnson	+1-183-489-5228x46953	patrickhorton@page-chen.com	2024-09-16	10	2025-04-06
5	4937	Joyce Savage	(570)862-7262	nhartman@hotmail.com	2024-08-27	10	2025-03-04
6	2823	Richard Bennett	9323620616	robertmorgan@thompson.com	2024-12-15	10	2025-02-06
7	1653	Sara Harris	001-507-857-4196x114	caseywilliam@yahoo.com	2024-06-14	9	2025-04-30
8	3550	Danny Young	001-602-996-3730x435	jenniferstrickland@yahoo.com	2024-08-06	9	2025-04-27
9	2464	Patricia Thomas	+1-263-152-0897x354	james79@baker-jackson.net	2024-07-25	9	2025-04-26
10	2842	Gilbert Todd	(762)970-3203x73544	cindy09@yahoo.com	2024-08-30	9	2025-01-24
11	1075	Sara Thompson	891-479-8056x53881	frojas@vaughn-walton.com	2024-10-26	8	2025-05-10
12	2364	Caleb Bennett	7440460662	toddwalter@rose.com	2024-09-05	8	2025-05-01
13	2377	James Schmidt	960-607-3013	guzmanbrian@gmail.com	2024-07-24	8	2025-04-18
14	79	Heather Barber	001-720-508-7478x760	oaguilar@yahoo.com	2024-05-18	8	2025-04-02
15	2302	Amanda Vance	556.116.5987x474	ramirezseth@yahoo.com	2024-08-27	8	2025-03-09
16	549	Jessica Cox	+1-002-802-5207	lewisclaudia@mendoza-alexander.com	2024-09-04	8	2025-02-07
17	3677	James Myers	(321)439-0915x59063	whiteandrew@lloyd.com	2024-11-11	7	2025-02-26
18	2243	Frank Hudson	088-297-1223	kellynathaniel@hotmail.com	2024-09-20	7	2024-12-20
19	2924	Sara Parker	(129)447-3147x33170	juanperry@gmail.com	2024-05-31	6	2025-05-07
20	402	John Wagner	(707)933-0426x57215	qford@brown-smith.biz	2025-01-05	6	2025-04-30
21	3670	Brenda Lopez	001-216-534-3208x9520	jennifer83@brown.com	2024-10-26	6	2025-04-27

Comparison between number of transactions before and after the complaint

Analyzing trends to determine if there is an increase or decrease in transactions post-complaint

	CustomerID	CustomerName	CallDate	TransactionsBeforeComplaint	TransactionsAfterComplaint
1	319	Victor Johnson	2024-07-05	10	9
2	3401	Brittany Hampton	2024-08-06	12	7
3	213	William Murphy	2024-06-16	5	6
4	2231	Robert Lawson	2024-06-10	1	6
5	1264	Lauren Peterson	2024-06-10	11	6
6	226	Scott Walls	2024-07-30	12	6
7	4247	Emma Tucker	2024-09-09	2	6
8	3164	Amy Mitchell	2024-07-22	15	6
9	550	Gregory Peterson	2024-08-28	8	5
10	3437	Jimmy Burgess	2024-10-07	7	5
11	4245	Todd Vaughan	2024-07-28	11	5
12	3635	Kayla Smith	2024-06-18	9	5
13	1844	Katherine Johnson	2024-05-22	6	5
14	3480	Nancy Crawford	2024-10-27	6	5
15	1409	Brian Payne	2024-08-19	20	5
16	4583	Charles Thomas	2024-07-24	2	5
17	2764	Roger Smith	2024-08-04	7	5
18	1625	William Riddle	2024-06-26	6	5
19	3293	Kimberly Smith	2024-07-01	3	5
20	493	Emily Gonzales	2024-05-27	5	5
21	1870	Angela Austin	2024-09-21	15	5

First transaction after the complaint: How much Time taken to initiate the first transaction

	CustomerID	CustomerName	IssueType	CallDate	FirstTransactionAfterCall	DaysBetweenCallAndFirstTransaction
1	3489	Andrea Ford	Transaction Dispute	2024-05-18	2025-04-23	340
2	4534	Jonathan Gomez	Card Issue	2024-05-30	2025-04-02	307
3	3254	Dennis Campbell	Transaction Dispute	2024-05-19	2025-03-14	299
4	245	Patrick Cook	Card Issue	2024-05-30	2025-03-24	298
5	1350	Christopher Richardson	Card Issue	2024-05-25	2025-03-18	297
6	3739	Michael Gardner	Card Issue	2024-05-11	2025-03-03	296
7	1096	Sandra Middleton	Card Issue	2024-05-23	2025-03-10	291
8	2094	Kara Lowe	Transaction Dispute	2024-06-19	2025-03-31	285
9	1432	Rebecca Arnold	Card Issue	2024-06-13	2025-03-21	281
10	10	Patricia Wilcox	Transaction Dispute	2024-06-14	2025-03-20	279
11	3001	Joanna Finley	Transaction Dispute	2024-07-30	2025-05-04	278
12	245	Patrick Cook	Card Issue	2024-06-21	2025-03-24	276
13	3409	Jodi Smith	Card Issue	2024-07-11	2025-04-11	274
14	2349	Marie Lester	Transaction Dispute	2024-07-20	2025-04-18	272
15	3077	Kim Sullivan	Card Issue	2024-06-08	2025-03-05	270
16	3737	Deborah Carroll	Transaction Dispute	2024-06-08	2025-03-02	267
17	3523	Nicole Mckenzie	Transaction Dispute	2024-06-16	2025-03-08	265
18	2697	Eric Lucas	Card Issue	2024-06-01	2025-02-20	264
19	3420	Tyler Mathews	Transaction Dispute	2024-07-19	2025-04-08	263
20	3051	Barbara Jackson	Card Issue	2024-06-01	2025-02-17	261
21	1446	Danielle Vaughn	Transaction Dispute	2024-07-02	2025-03-20	261

Python Jupyter Notebook



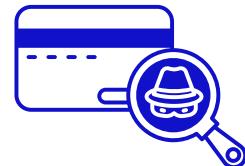
RFM Customer Segmentation

Identifies Best , Loyal and At-Risk customers to optimize marketing strategies



Risk Prediction

Uses Random Forest to predict loan risks, enhancing financial security



Fraud Detection

Combines rule-based and AI-based methods to flag suspicious transactions

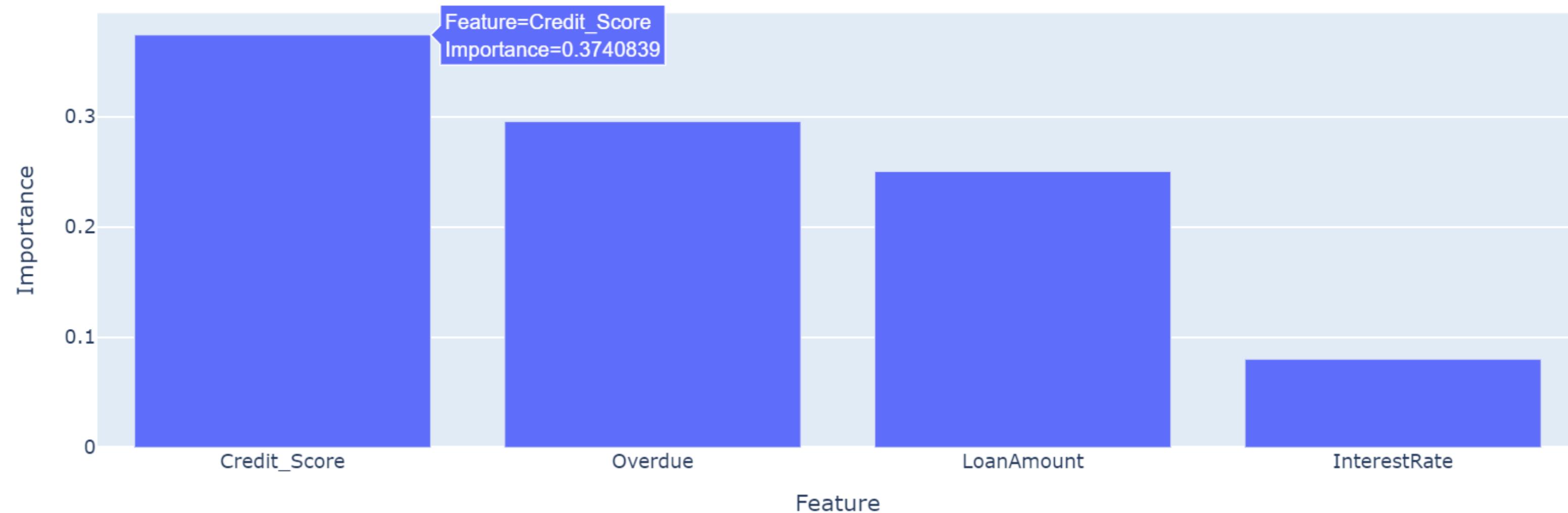


Forecasting

Predicts transaction over time and loan trends for strategic planning

Risk prediction

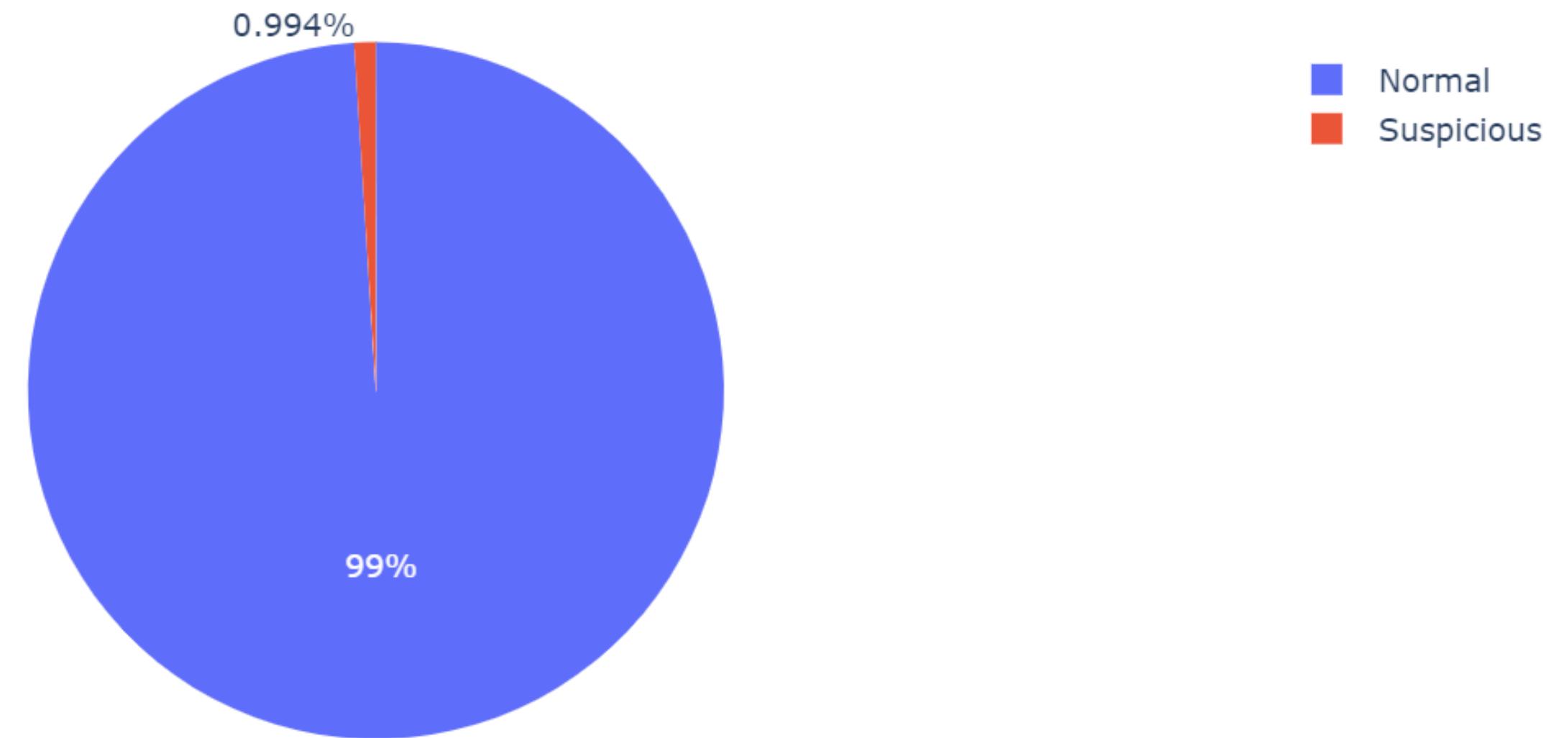
Feature Importance in Default Prediction



Fraud Detection

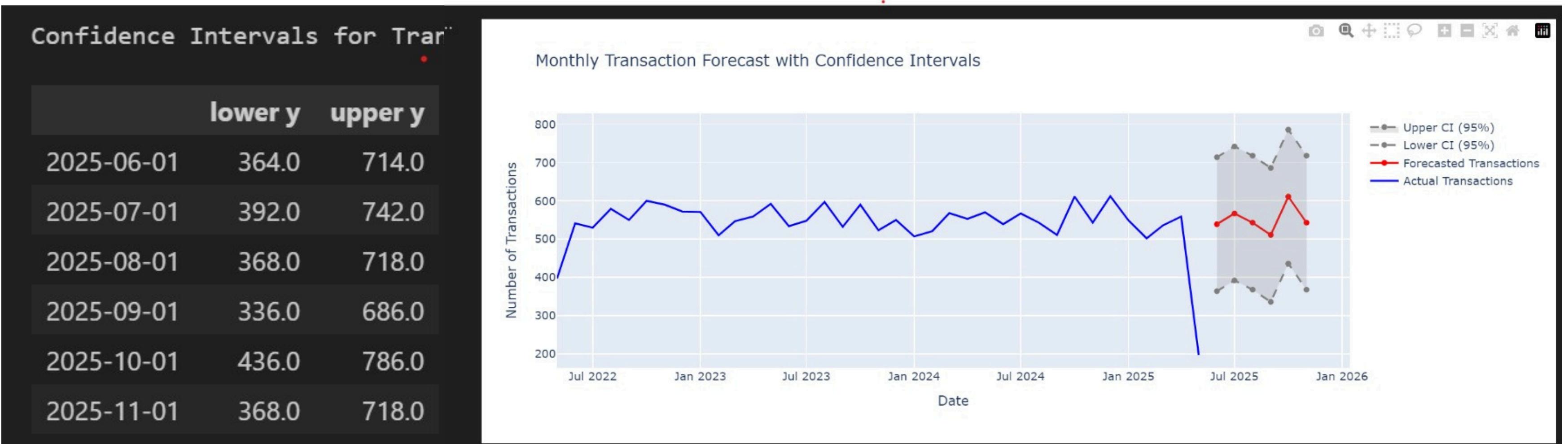
Fraud vs. Normal Transactions

(AI Detection)



Forecasting

Transaction Forecast



Forecasting

Loan Forecast

TransactionYear	TransactionMonth	TransactionCount
2022	5	397
2022	9	550
2023	5	592
2023	9	532
2024	5	570
2024	9	511
2025	5	197



AI CHATBOT

logging.py:

Handles structured and colored logging in the terminal using the rich library.

app.py:

This is the Streamlit file; it handles the user interface.

agent.py:

Contains the chatbot logic. It receives the user's question, builds the conversation history, interacts with the language model, etc.



Talk to your database using natural language

models.py:

Defines how to load and configure the language model (Ollama or OpenRouter) with the appropriate settings.

config.py:

Holds the project configurations, such as the model name, model type, database path.

tools.py:

Contains the tools that the model can use, such as `list_tables`, `sample_table`, `describe_table`, and `execute_sql`.

File: data/banking.sqlite

Size: 3.18 MB

Tables:

 Banking_Transactions (20000 rows)

 Banking_Loans (2500 rows)

 Banking_Cards (4000 rows)

 Banking_SupportCalls (3000 rows)

 HR_Employees (1000 rows)

 HR_Hiring (1000 rows)

 HR_SickLeaves (2500 rows)



ChatBot

Talk to your database using natural language

Created by EYouth Bootcamp - TEAM 20



What's The Number of Transactions in 2022



The number of transactions in 2022 is 4,359.



What is the average amount of all transactions?



The average transaction amount is approximately 5005.44 USD.

Type your message...



Database Information

File: data\banking.sqlite

Size: 3.18 MB

Tables:

Banking_Transactions (20000 rows)

	Amount	TransactionDate
0	3150.12	2023-09-24 00:00:00
1	6212.12	2022-06-07 00:00:00
2	451.72	2024-11-24 00:00:00
3	8525.28	2023-04-06 00:00:00
4	7306.17	2025-01-21 00:00:00

Banking_Loans (2500 rows)

Banking_Cards (4000 rows)



What are the different types of transactions?



The different types of transactions are:

- Deposit
- Withdraw
- Transfer
- Payment



How many transactions happened in total?



The total number of transactions is 20,000.



What is the earliest transaction date in the database?

Type your message...





Our Great Team



<https://linktr.ee/TTeam20>



THANK YOU



› End Slide