Tech Sakhsam

Case Study Report

Data Analytics with Power BI

"Real-Time Analysis of Bank Customers"

"DR UMAYAL RAMANATHAN COLLEGE FOR WOMEN"

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ABSTRACT

In the digital age, data has become an invaluable asset for businesses, particularly in the banking sector. The proposed project, "Real-Time Analysis of Bank Customers," aims to leverage Power BI, a leading business intelligence tool, to analyze and visualize real-time customer data. This project will enable banks to gain deep insights into customer behavior, preferences, and trends, thereby facilitating data-driven decision-making and enhancing customer satisfaction. The real-time analysis will allow banks to respond promptly to changes in customer behavior or preferences, identify opportunities for cross-selling and up-selling, and tailor their products and services to meet customer needs. The project will also contribute to the broader goal of digital transformation in the banking sector, promoting efficiency, innovation, and customer-centricity.

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CHAPTER 1

INTRODUCTION

1.1 Problem Statement

In today's competitive banking landscape, understanding customer behavior and preferences is crucial for customer retention and revenue generation. However, banks often face challenges in analyzing customer data due to the sheer volume and velocity of data generated. Traditional data analysis methods are time-consuming and often fail to provide real-time insights. This lack of real-time analysis can lead to missed opportunities for customer engagement, cross-selling, and up-selling, impacting the bank's revenue generation and customer satisfaction. Furthermore, the complexity and diversity of customer data, which includes transaction history, customer feedback, and demographic data, pose additional challenges for data analysis.

1.2 Proposed Solution

The proposed solution is to develop a PowerBI dashboard that can analyze and visualize real-time customer data. The dashboard will integrate data from various sources such as transaction history, customer feedback, and demographic data. It will provide a comprehensive view of customer behavior, preferences, and trends, enabling banks to make informed decisions. The dashboard will be interactive, user-friendly, and customizable, allowing banks to tailor it to their

specific needs. The real-time analysis capability of the dashboard will enable banks to respond promptly to changes in customer behavior or preferences, identify opportunities for cross-selling and up-selling, and tailor their products and services to meet customer needs.

1.3Feature

- **Real-Time Analysis**: The dashboard will provide real-time analysis of customer data.
- **Customer Segmentation**: It will segment customers based on various parameters like age, income, transaction behavior, etc.
- **Trend Analysis**: The dashboard will identify and display trends in customer behavior.
- **Predictive Analysis**: It will use historical data to predict future customer behavior.

1.3 Advantages

- **Data-Driven Decisions**: Banks can make informed decisions based on real-time data analysis.
- **Improved Customer Engagement**: Understanding customer behavior and trends can help banks engage with their customers more effectively.

  Increased Revenue: By identifying opportunities for cross-selling and up-selling, banks can increase their revenue

1.4 Scope

The scope of this project extends to all banking institutions that aim to leverage data for decision-making and customer engagement. The project can be further extended to incorporate more data sources and advanced analytics techniques, such as machine learning and artificial intelligence, to provide more sophisticated insights into customer behavior. The project also has the potential to be adapted for other sectors, such as retail, healthcare, and telecommunications, where understanding customer behavior is crucial. Furthermore, the project contributes to the broader goal of digital transformation in the banking sector, promoting efficiency, innovation, and customer-centricity.

CHAPTER 2

SERVICES AND TOOLS REQUIRED

2.1 Services Used

- **Data Collection and Storage Services**: store customer data in real-time. This could be achieved through services like Azure Data Factory, Azure Event Hubs, or AWS Kinesis for real-time data collection, and Azure SQL Database or AWS RDS for data storage.

- **Data Processing Services**: Services like Azure Stream Analytics or AWS Kinesis Data Analytics can be used to process the real-time data.

- **Machine Learning Services**: Azure Machine Learning or AWS SageMaker can be used to build predictive models based on historical data.

2.2 Tools and Software used

Tools:

- **PowerBI**: The main tool for this project is PowerBI, which will be used to create interactive dashboards for real-time data visualization.

- **Power Query**: This is a data connection technology that enables you to discover, connect, combine, and refine data across a wide variety of sources.

Software Requirements:

- **PowerBI Desktop**: This is a Windows application that you can use to create reports and publish them to PowerBI.

- **PowerBI Service**: This is an online SaaS (Software as a Service) service that you use to publish reports, create new dashboards, and share insights.

- **PowerBI Mobile**: This is a mobile application that you can use to access your reports and dashboards on the go.

CHAPTER 3

ARCHITECTURE

3.1 Architecture
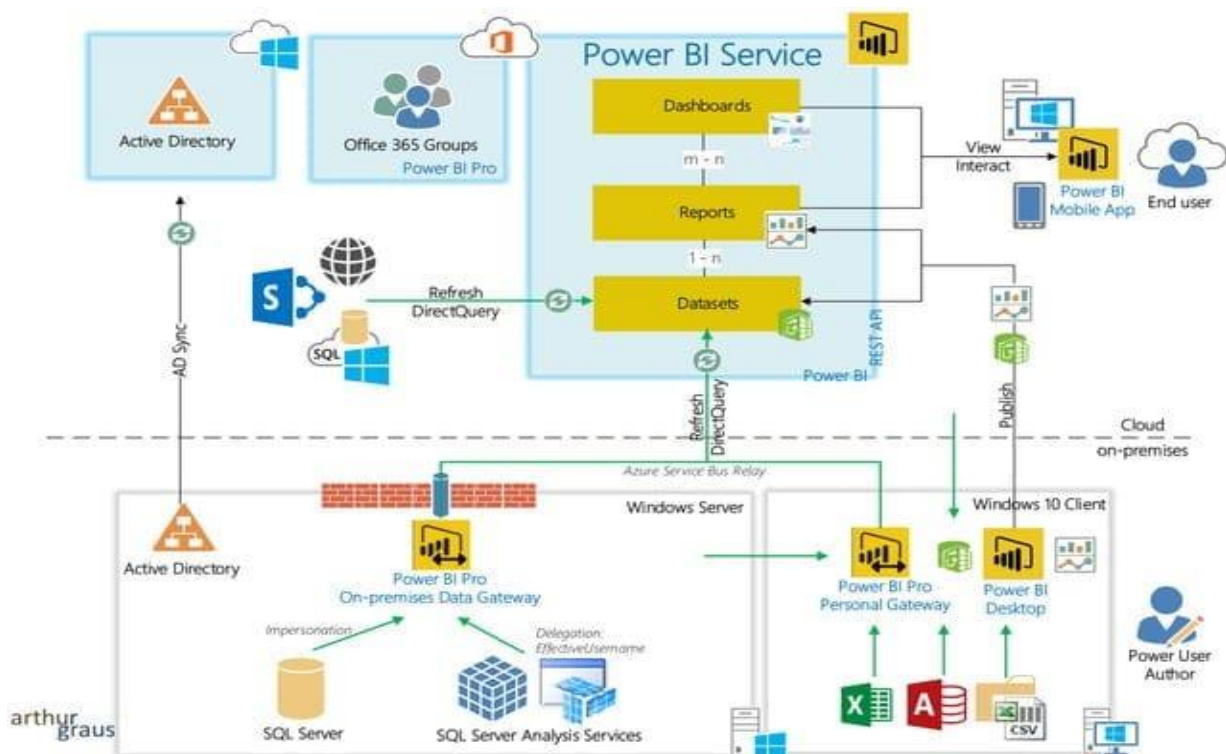
Here's a high-level architecture for the project:

1. **Data Collection**: Real-time customer data is collected from various sources like bank transactions, customer interactions, etc. This could be achieved using services like Azure Event Hubs or AWS Kinesis.

2. **Data Storage**: The collected data is stored in a database for processing. Azure SQL Database or AWS RDS can be used for this purpose.

3. **Data Processing**: The stored data is processed in real-time using services like Azure Stream Analytics or AWS Kinesis Data Analytics.

4. **Machine Learning**: Predictive models are built based on processed data using Azure Machine Learning or AWS SageMaker. These models can help in predicting customer behavior, detecting fraud, etc.

5. **Data Visualization**: The processed data and the results from the predictive models are visualized in real-time using PowerBI allows you to create interactive dashboards that can provide valuable insights into the data.

6. **Data Access**: The dashboards created in Power BI can be accessed through PowerBI Desktop, PowerBI Service (online), and PowerBI Mobile.

This architecture provides a comprehensive solution for real-time analysis of bank customers. However, it's important to note that the specific architecture may vary depending on the bank's existing infrastructure, specific requirements, and budget. It's also important to ensure that all tools and services comply with relevant data privacy and security regulations.

CHAPTER 4

MODELING AND RESULT

Power BI data modeling is the process of creating a relationship between common columns of multiple tables. If the column headings are the same across tables, then Power BI auto-detects the relationship between tables. Using these columns, we can merge the tables as well.

Model view
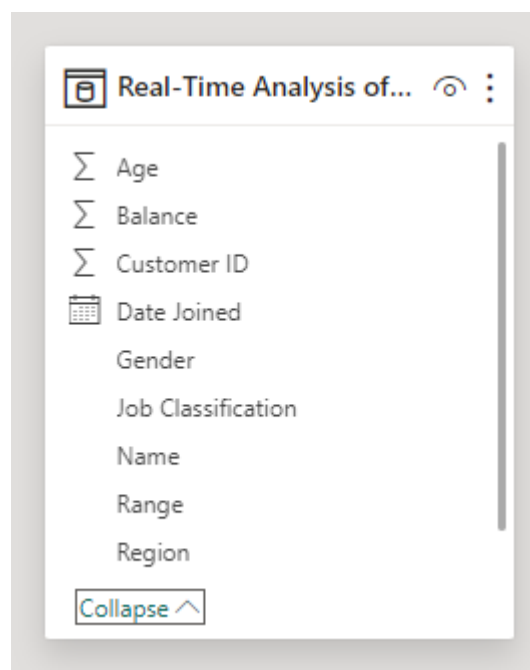
It is used to create a dashboards and reports that provides real-time insights into customer behavior .The above code is to add a column range in the existing table and to format it.

```
X  √  fx  = Table.AddColumn(#"Removed Columns", "Range", each let rangeSize = 9, offset = 3, inclusive = false,
               rangeIndex = Number.RoundDown(([Age] - offset) / rangeSize) in Text.From(rangeIndex * rangeSize +
               offset, "en-IN") & "-" & Text.From((rangeIndex + 1) * rangeSize + offset - (if inclusive then 1
               else 0), "en-IN"), type text)
```

		A^B_C Name	A^B_C Surname	A^B_C Gender	1^2_3 Age	A^B_C Region
1	100000001	Simon	Walsh	Male	21	England
2	400000002	Jasmine	Miller	Female	34	Northern Irelai
3	100000003	Liam	Brown	Male	46	England
4	300000004	Trevor	Parr	Male	32	Wales
5	100000005	Deirdre	Pullman	Female	38	England
6	300000006	Ava	Coleman	Female	30	Wales
7	100000007	Dorothy	Thomson	Female	34	England
8	200000008	Lisa	Knox	Female	48	Scotland
9	300000009	Ruth	Campbell	Female	33	Wales
10	100000010	Dominic	Parr	Male	42	England
11	100000011	Dominic	Lewis	Male	40	England
12	100000012	Benjamin	Grant	Male	39	England
13	100000013	Ryan	MacDonald	Male	24	England

Column profiling based on top 1000 rows

Modelling for Gender and Age data

The table containing customer information including attributes like gender
and age.By getting the sum of balance of gender and age data, we can
formulate the given data with gender and age column.

	Surname	Gender	Age	Region	Job Classification	Date Joined	Balance
1	Ish	Male	21	England	White Collar	05-01-2015	
2	ler	Female	34	Northern Ireland	Blue Collar	06-01-2015	
3	wn	Male	46	England	White Collar	07-01-2015	
4	r	Male	32	Wales	White Collar	08-01-2015	
5	man	Female	38	England	Blue Collar	09-01-2015	
6	eman	Female	30	Wales	Blue Collar	09-01-2015	
7	mson	Female	34	England	Blue Collar	11-01-2015	
8	x	Female	48	Scotland	Other	11-01-2015	
9	npbell	Female	33	Wales	White Collar	11-01-2015	
10	r	Male	42	England	White Collar	12-01-2015	
11	vis	Male	40	England	White Collar	12-01-2015	
12	nt	Male	39	England	White Collar	12-01-2015	
13	cDonald	Male	24	England	White Collar	12-01-2015	
14	rence	Male	46	Scotland	Other	12-01-2015	
15	rshall	Female	36	Wales	Other	12-01-2015	
16	wman	Male	42	England	White Collar	14-01-2015	
17		Female	31	Scotland	Other	14-01-2015	
18	eman	Female	42	Scotland	Other	14-01-2015	
19	e	Male	40	England	Blue Collar	15-01-2015	
20	es	Female	46	England	Blue Collar	15-01-2015	
21	nston	Male	37	Wales	Other	16-01-2015	
22	ler	Male	58	Scotland	Blue Collar	18-01-2015	
23	Donald	Female	41	Wales	White Collar	18-01-2015	
24							

Formula bar: `= Table.AddColumn(#"Removed Columns", "Range", each let rangeSize = 9, offset = 3, inclusive = false, rangeIndex = Number.RoundDown((`

Adding a new column

We can create a new column by clicking the ribbon modelling, and then select
the column for examples, to create a range column for this table.And then we can
add ranges to the table by selecting the age column and give the values in the
range column.

```
fx    = Table.AddColumn(#"Removed Columns", "Range", each let rangeSize = 9, offset = 3, inclusive = false, rangeIndex = Number.RoundDown((
```

|	Age	Region	Job Classification	Date Joined	Balance	Range
1	21	England	White Collar	05-01-2015	113810.15	21-30
2	34	Northern Ireland	Blue Collar	06-01-2015	36919.73	30-39
3	46	England	White Collar	07-01-2015	101536.83	39-48
4	32	Wales	White Collar	08-01-2015	1421.52	30-39
5	38	England	Blue Collar	09-01-2015	35639.79	30-39
6	30	Wales	Blue Collar	09-01-2015	122443.77	30-39
7	34	England	Blue Collar	11-01-2015	42879.84	30-39
8	48	Scotland	Other	11-01-2015	36680.17	48-57
9	33	Wales	White Collar	11-01-2015	74284.35	30-39
10	42	England	White Collar	12-01-2015	10912.45	39-48
11	40	England	White Collar	12-01-2015	39667.83	39-48
12	39	England	White Collar	12-01-2015	32281.62	39-48
13	24	England	White Collar	12-01-2015	40781.63	21-30
14	46	Scotland	Other	12-01-2015	48791.46	39-48
15	36	Wales	Other	12-01-2015	2846.03	30-39
16	42	England	White Collar	14-01-2015	2116.85	39-48
17	31	Scotland	Other	14-01-2015	10356.31	30-39
18	42	Scotland	Other	14-01-2015	3801.69	39-48
19	40	England	Blue Collar	15-01-2015	65534.69	39-48
20	46	England	Blue Collar	15-01-2015	11462.64	39-48
21	37	Wales	Other	16-01-2015	31778.9	30-39
22	58	Scotland	Blue Collar	18-01-2015	21252.97	57-66
23	41	Wales	White Collar	18-01-2015	66785.78	39-48
24						

Grouping of age by ranges

As the customers' age ranges from 12 to 31, we shall group them into different generation age range for easier profiling, we will group the ages into more groups.

To facilitate age-based analysis within datasets, grouping individuals into predefined age ranges can offer insightful perspectives on demographic distributions or preferences. This process, pivotal for data analysis and visualization tasks, can be implemented in various analytics tools, including Power BI. The essence of this task lies in partitioning continuous age data into discrete categories or bins, such as "0-12", "12-31", and so forth. This categorization enables analysts to easily compare metrics across different age groups, identify trends, and make informed decisions.

Dashboard

Bank Customer Analysis
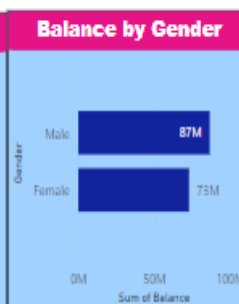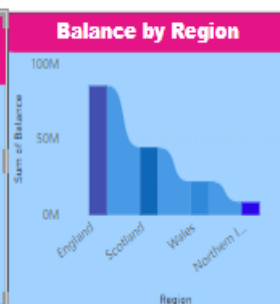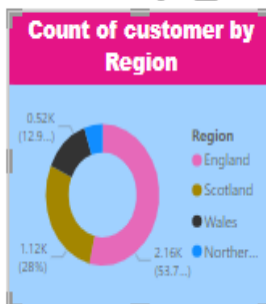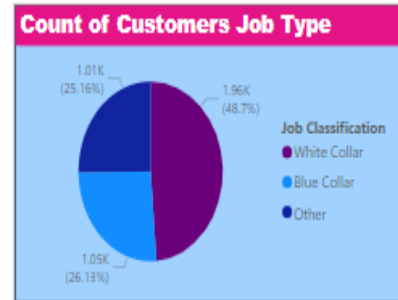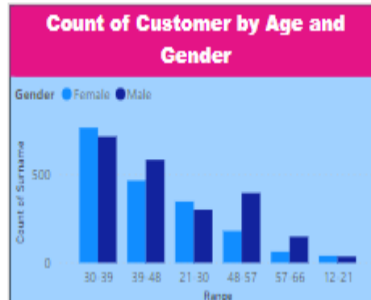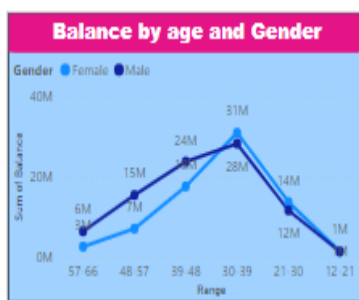
CONCLUSION

The project "Real-Time Analysis of Bank Customers" using Power BI has successfully demonstrated the potential of data analytics in the banking sector. The real-time analysis of customer data has provided valuable insights into customer behavior, preferences, and trends, thereby facilitating informed decision-making. The interactive dashboards and reports have offered a comprehensive view of customer data, enabling the identification of patterns and correlations. This has not only improved the efficiency of data analysis but also enhanced the bank's ability to provide personalized services to its customers. The project has also highlighted the importance of data visualization in making complex data more understandable and accessible. The use of Power BI has made it possible to present data in a visually appealing and easy-to-understand format, thereby aiding in better decision-making.

FUTURESCOPE

The future scope of this project is vast. With the advent of advanced analytics and machine learning, PowerBI can be leveraged to predict future trends based on historical data. Integrating these predictive analytics into the project could enable the bank to anticipate customer needs and proactively offer solutions. Furthermore, PowerBI's capability to integrate with various data sources opens up the possibility of incorporating more diverse datasets for a more holistic view of customers. As data privacy and security become increasingly important, future iterations of this project should focus on implementing robust data governance strategies. This would ensure the secure handling of sensitive customer data while complying with data protection regulations of real-time data streams to provide even more timely and relevant insights. This could potentially transform the way banks interact with their customers, leading to improved customer satisfaction and loyalty.