

# Tech Saksham

## Case Study Report

### Data Analytics with Power BI

## “Real-Time Analysis of Bank Customers”

### “Sengunthar Arts and Science College”

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# ABSTRACT

Real-time analysis of bank customer types is essential for banks to effectively understand and cater to the diverse needs of their clientele. This process involves continuously analyzing various customer data points such as transaction history, account balances, demographics, and behavior patterns. By employing advanced analytics and machine learning algorithms, banks can categorize customers into segments such as savers, spenders, investors, borrowers, high-net-worth individuals, and business owners. This real-time segmentation enables banks to personalize marketing strategies, tailor product offerings, and provide targeted services, ultimately enhancing customer satisfaction and loyalty.

## INDEX

Sr. No.	Table of Contents	Page No.
1	Chapter 1: Introduction	1
2	Chapter 2: Services and Tools Required	3
3	Chapter 3: Modeling and Result	5
4	Conclusion	12
5	Future Scope	13

## CHAPTER 1

### INTRODUCTION

#### 1.1 Problem Statement

Real-time analysis of bank customers involves continuously monitoring and analyzing various aspects of customer behavior, transactions, preferences, and satisfaction levels to identify patterns, trends, and potential issues. This includes:

- **Transaction Monitoring:** Analyzing transactions in real-time to detect anomalies, fraud, or unusual activity that may indicate fraudulent behavior or security threats.
- **Customer Segmentation:** Segmenting customers based on demographics, behavior, and transaction patterns to tailor marketing strategies, product offerings, and personalized services.
- **Customer Support Optimization:** Analyzing customer support interactions and service requests in real-time to identify common issues, improve response times, and enhance overall customer experience.

#### 1.2 Proposed Solution

The real-time analysis of bank customers in a proposed solution typically involves continuously monitoring and processing incoming data streams to derive insights and make decisions instantly. This could include analyzing transaction data, customer interactions, account balances, and other relevant information to detect patterns, anomalies, or potential risks in real time. Such analysis allows banks to offer personalized services, detect fraudulent activities promptly, and optimize customer experiences in the moment.

### 1.3 Feature

- **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 real-time analysis of bank customers encompasses the immediate monitoring, analysis, and interpretation of customer data to drive timely decision-making, enhance risk management, personalize customer interactions, and optimize operational efficiency within the banking sector. This involves leveraging advanced technologies such as data analytics, machine learning, and artificial intelligence to extract actionable insights from diverse sources of customer information, including transactional data, behavioral patterns, and demographic profiles. By enabling swift responses to emerging trends, threats, and opportunities, real-time analysis plays a pivotal role in ensuring competitiveness, compliance, and customer satisfaction in the dynamic landscape of banking services.

## CHAPTER 2

### SERVICES AND TOOLS REQUIRED

#### 2.1 Services Used

- **Data Collection and Storage Services:** Banks need to collect and 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:

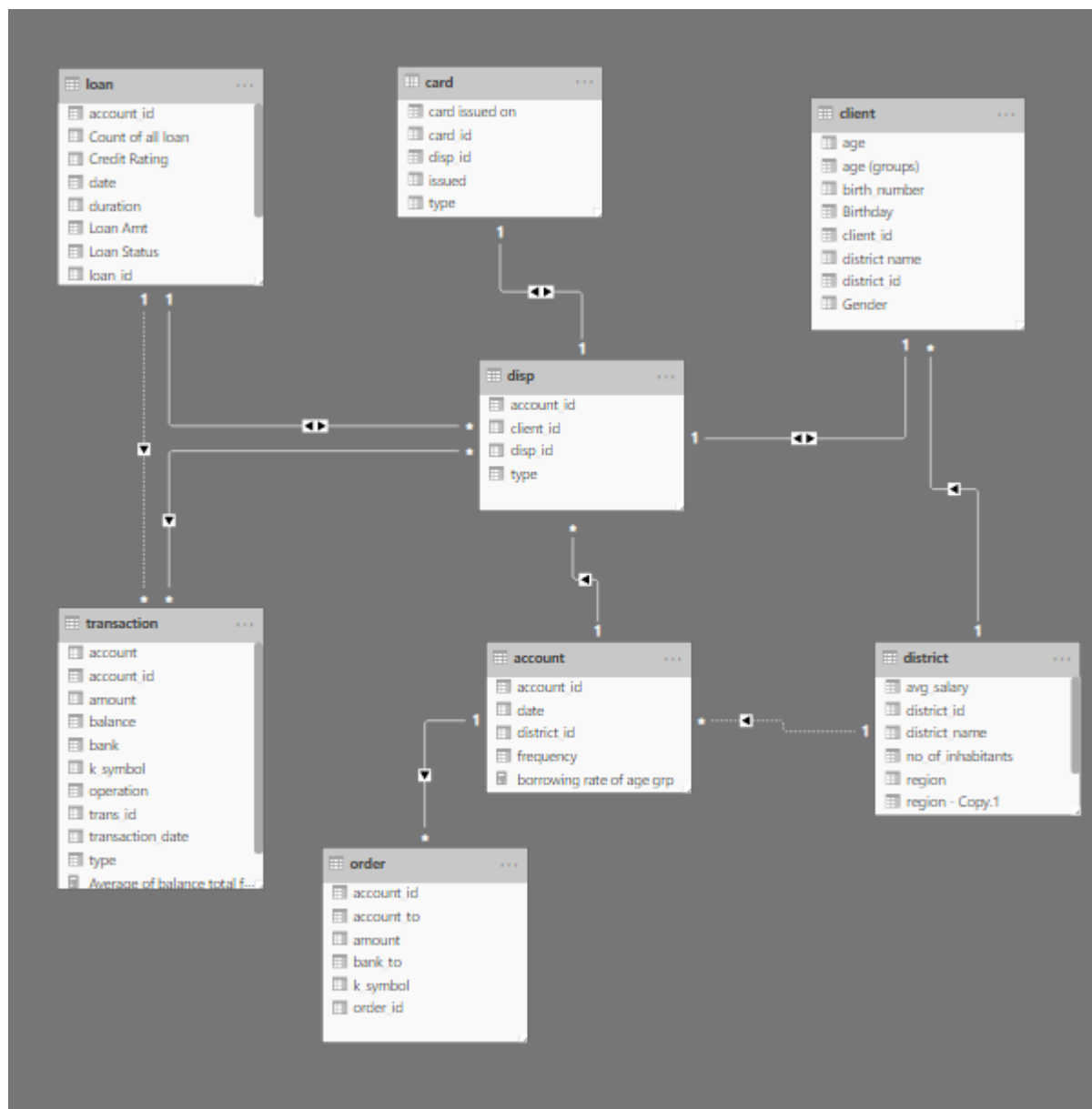
- **PowerBI Desktop:** This is a Windows application that you can use to create reports and publish them to PowerBI.
- **PowerBI Service:** This is an online SaaS (Software as a Service) service that you use to publish reports, create new dashboards, and share insights.
- **PowerBI Mobile:** This is a mobile application that you can use to access your reports and dashboards on the go.

## CHAPTER 3

### MODELING AND RESULT

#### Manage relationship

The “disp” file will be used as the main connector as it contains most key identifier (account id, client id and disp id) which can be use to relates the 8 data files together. The “district” file is use to link the client profile geographically with “district id”





## Grouping of age by ranges

As the customers' age ranges from 12 to 88, we shall group them into different generation age range for easier profiling, we will group the ages into 5 groups.

The Gen Y are youths,

Gen X are young working adults, some starting their families

Baby Boomer are working adults with families.

The silent Generations some are working and retired, living on pensions.

The greatest Generation, retired elderly living on pensions.

### Groups

Name

age (groups)

Field

age

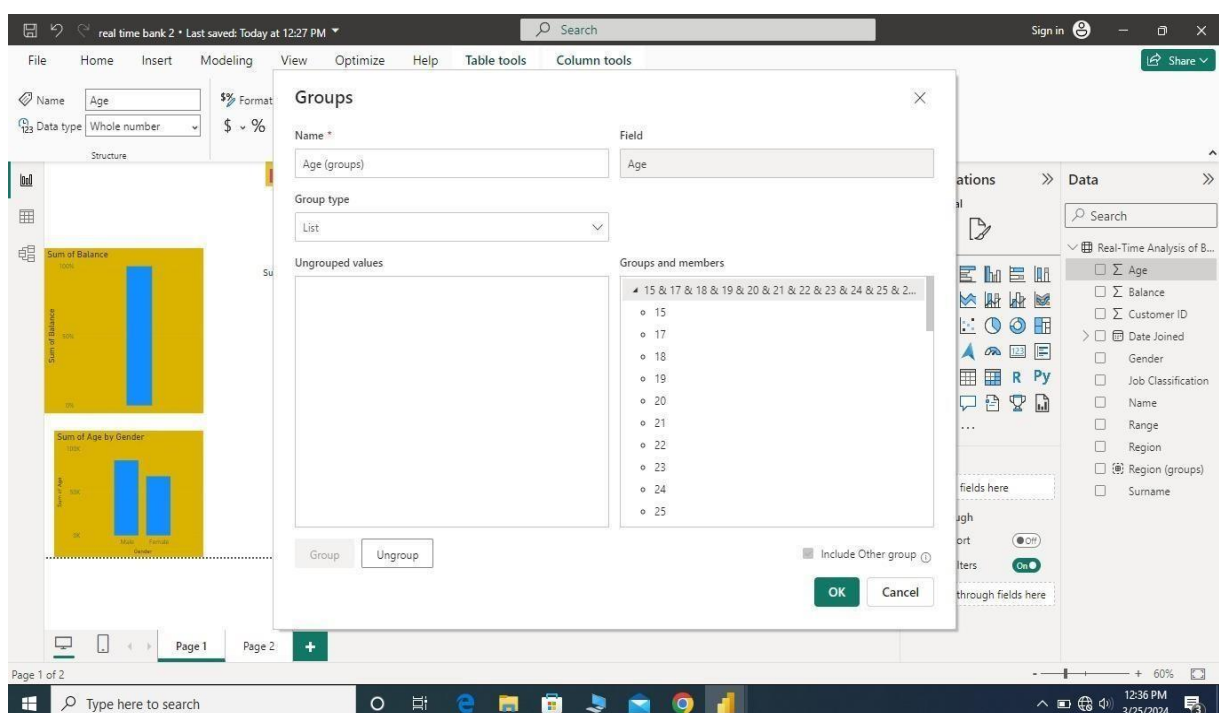
Group type

List

Ungrouped values

Groups and members

- ▶ 0 - 20 Gen Y
- ▶ 20 - 35 Gen X
- ▶ 36 - 54 Baby Boomers
- ▶ 55 - 73 THE SILENT GENERATION
- ▶ 74 and above - THE GREATEST GENERATION



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File Home Help **Table tools** **Column tools**

Name: Age (groups) Format: [Dropdown] Summarization: Don't summarize Data category: Uncategorized Sort by column: [Dropdown] Data groups: [Dropdown] Manage relationships: [Dropdown] New column: [Dropdown]

Data type: Text \$ - % 9 00 0 Structure Formatting Properties Sort Groups Relationships Calculations

Date Joined	Balance	Range	Age (groups)
Saturday, January 31, 2015	91680.67	30-40	15 & 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 & 25 & 26 & 27 & 28 & 29 & 30 & 31 & 32 & 33 & 34 & 35 & 36 & 37 & 38 & 39 & 40 & ...
Monday, March 16, 2015	59995.75	30-40	15 & 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 & 25 & 26 & 27 & 28 & 29 & 30 & 31 & 32 & 33 & 34 & 35 & 36 & 37 & 38 & 39 & 40 & ...
Monday, March 16, 2015	14306	30-40	15 & 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 & 25 & 26 & 27 & 28 & 29 & 30 & 31 & 32 & 33 & 34 & 35 & 36 & 37 & 38 & 39 & 40 & ...
Sunday, April 5, 2015	57019.91	30-40	15 & 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 & 25 & 26 & 27 & 28 & 29 & 30 & 31 & 32 & 33 & 34 & 35 & 36 & 37 & 38 & 39 & 40 & ...
Tuesday, July 7, 2015	21236.23	30-40	15 & 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 & 25 & 26 & 27 & 28 & 29 & 30 & 31 & 32 & 33 & 34 & 35 & 36 & 37 & 38 & 39 & 40 & ...
Sunday, April 12, 2015	109026.81	30-40	15 & 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 & 25 & 26 & 27 & 28 & 29 & 30 & 31 & 32 & 33 & 34 & 35 & 36 & 37 & 38 & 39 & 40 & ...
Wednesday, April 15, 2015	42635.27	30-40	15 & 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 & 25 & 26 & 27 & 28 & 29 & 30 & 31 & 32 & 33 & 34 & 35 & 36 & 37 & 38 & 39 & 40 & ...
Wednesday, April 29, 2015	25132.97	30-40	15 & 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 & 25 & 26 & 27 & 28 & 29 & 30 & 31 & 32 & 33 & 34 & 35 & 36 & 37 & 38 & 39 & 40 & ...
Thursday, April 30, 2015	10174.7	30-40	15 & 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 & 25 & 26 & 27 & 28 & 29 & 30 & 31 & 32 & 33 & 34 & 35 & 36 & 37 & 38 & 39 & 40 & ...
Thursday, May 7, 2015	23722.37	30-40	15 & 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 & 25 & 26 & 27 & 28 & 29 & 30 & 31 & 32 & 33 & 34 & 35 & 36 & 37 & 38 & 39 & 40 & ...
Tuesday, May 19, 2015	7483.28	30-40	15 & 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 & 25 & 26 & 27 & 28 & 29 & 30 & 31 & 32 & 33 & 34 & 35 & 36 & 37 & 38 & 39 & 40 & ...
Friday, May 22, 2015	27754.62	30-40	15 & 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 & 25 & 26 & 27 & 28 & 29 & 30 & 31 & 32 & 33 & 34 & 35 & 36 & 37 & 38 & 39 & 40 & ...
Friday, May 29, 2015	151542.67	30-40	15 & 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 & 25 & 26 & 27 & 28 & 29 & 30 & 31 & 32 & 33 & 34 & 35 & 36 & 37 & 38 & 39 & 40 & ...
Monday, June 8, 2015	65227.05	30-40	15 & 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 & 25 & 26 & 27 & 28 & 29 & 30 & 31 & 32 & 33 & 34 & 35 & 36 & 37 & 38 & 39 & 40 & ...
Friday, June 12, 2015	15461.71	30-40	15 & 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 & 25 & 26 & 27 & 28 & 29 & 30 & 31 & 32 & 33 & 34 & 35 & 36 & 37 & 38 & 39 & 40 & ...
Saturday, June 20, 2015	9406.07	30-40	15 & 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 & 25 & 26 & 27 & 28 & 29 & 30 & 31 & 32 & 33 & 34 & 35 & 36 & 37 & 38 & 39 & 40 & ...
Sunday, June 21, 2015	31644.37	30-40	15 & 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 & 25 & 26 & 27 & 28 & 29 & 30 & 31 & 32 & 33 & 34 & 35 & 36 & 37 & 38 & 39 & 40 & ...
Thursday, July 2, 2015	53344.6	30-40	15 & 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 & 25 & 26 & 27 & 28 & 29 & 30 & 31 & 32 & 33 & 34 & 35 & 36 & 37 & 38 & 39 & 40 & ...
Thursday, July 2, 2015	49717.13	30-40	15 & 17 & 18 & 19 & 20 & 21 & 22 & 23 & 24 & 25 & 26 & 27 & 28 & 29 & 30 & 31 & 32 & 33 & 34 & 35 & 36 & 37 & 38 & 39 & 40 & ...
Thursday, July 9, 2015	3108.56	30-40	15 & 17 & 18 & 19 & 20 & 21 & 22 & 23 &

## Replacing values

Set some fields to English for easy understanding, we replace values to English with the Power Query Editor.

The screenshot shows the Power Query Editor interface. A 'Replace Values' dialog box is open, allowing the user to replace 'VYDAI' with 'withdrawal' in the selected columns. The background table has columns: operation, amount, balance, k\_symbol, bank, and account. The 'APPLIED STEPS' pane on the right shows the sequence of transformations, with 'Replaced Value' being the current step.

The screenshot shows the Power Query Editor with a formula bar containing the following M code: `Table.AddColumn(#'Changed Type', 'Range', each let rangeSize = 10, offset = 0, inclusive = false, rangeIndex = Number.RoundDown(([Age] - offset) / rangeSize) in Text.From(rangeIndex * rangeSize + offset, 'en-US') & '-' & Text.From((rangeIndex + 1) * rangeSize + offset - (if inclusive then 1 else 0), 'en-US'), type text)`. The table below has columns: Job Classification, Date Joined, Balance, and Range. The 'APPLIED STEPS' pane on the right shows 'Inserted Range' as the current step.



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File Home Insert Modeling View Optimize Help

real time bank 2

File Home Transform Add Column View Tools Help

Column From Custom Invoke Custom Examples • Column Function Duplicate Column

General

Format Extract • Parse • From Text

Statistics Standard Scientific Information •

From Number

From Date & Time

Text Analytics Vision Azure Machine Learning AI Insights

Query Settings

NAME

Real-Time Analysis of Bank Customers (D

ALL PROPERTIES

APPLIED STEPS

Source Promoted Headers Changed Type Inserted Range X Column From Examples

Enter sample values to create a new column (Ctrl+Enter to apply). Please enter more sample values.

	Job Classification	Date Joined	1.2 Balance	Region
1	White Collar	1/5/2015		
2	Blue Collar	1/6/2015		
3	White Collar	1/7/2015		
4	White Collar	1/8/2015		
5	Blue Collar	1/9/2015		
6	Blue Collar	1/9/2015		
7	Blue Collar	1/11/2015		
8	Other	1/11/2015		
9	White Collar	1/11/2015		
10	White Collar	1/12/2015		
11	White Collar	1/12/2015		
12	White Collar	1/12/2015		
13	White Collar	1/12/2015		
14	Other	1/12/2015		
15	Other	1/12/2015		
16	White Collar	1/14/2015		
17				

Page 1 of 2

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File Home Insert Modeling View Optimize Help

real time bank 2

File Home Transform Add Column View Tools Help

Close & Apply • New Source • Recent Sources • Enter Data • Data source settings • Data Source... • Manage Parameters • Refresh Preview • Advanced Editor • Manage • Properties

Manage Columns • Reduce Rows • Sort • Split Column • Group By • Data Type: Whole Number • Use First Row as Headers • Replace Values • Transform

Text Analytics • Vision • Azure Machine Learning • AI Insights

Query Settings

NAME

Real-Time Analysis of Bank Customers (D

ALL PROPERTIES

APPLIED STEPS

Source Promoted Headers Changed Type X Inserted Range

Table.AddColumn(#"Changed Type", "Range", each let rangeSize = 10, offset = 0,

	Job Classification	Date Joined	1.2 Balance	Range
1	White Collar	1/5/2015	113810.15	20-30
2	Blue Collar	1/6/2015	36919.73	30-40
3	White Collar	1/7/2015	101536.83	40-50
4	White Collar	1/8/2015	1421.52	30-40
5	Blue Collar	1/9/2015	35639.79	30-40
6	Blue Collar	1/9/2015	122443.77	30-40
7	Blue Collar	1/11/2015	42879.84	30-40
8	Other	1/11/2015	36680.17	40-50
9	White Collar	1/11/2015	74284.35	30-40
10	White Collar	1/12/2015	10912.45	40-50
11	White Collar	1/12/2015	39667.83	40-50
12	White Collar	1/12/2015	32281.62	30-40
13	White Collar	1/12/2015	40781.63	20-30
14	Other	1/12/2015	48791.46	40-50
15	Other	1/12/2015	2846.03	30-40
16	White Collar	1/14/2015	2116.85	40-50
17	Other	1/14/2015	16556.31	30-40
18	Other	1/14/2015	3801.69	40-50
19				

Page 2 of 2

10 COLUMNS, 999+ ROWS Column profiling based on top 1000 rows

PREVIEW DOWNLOADED AT 12:29 PM

Type here to search

12:29 PM 3/25/2024

AB_C region - Copy.2	AB_C region - Copy.1	AB_C REGION dir
1 null	Prague	Prague
7 Bohemia	central	Bohemia central
7 Bohemia	central	Bohemia central
3 Bohemia	central	Bohemia central
7 Bohemia	central	Bohemia central
5 Bohemia	central	Bohemia central
7 Bohemia	central	Bohemia central
7 Bohemia	central	Bohemia central
9 Bohemia	central	Bohemia central
1 Bohemia	central	Bohemia central
2 Bohemia	central	Bohemia central
1 Bohemia	central	Bohemia central
3 Bohemia	central	Bohemia central
5 Bohemia	south	Bohemia south

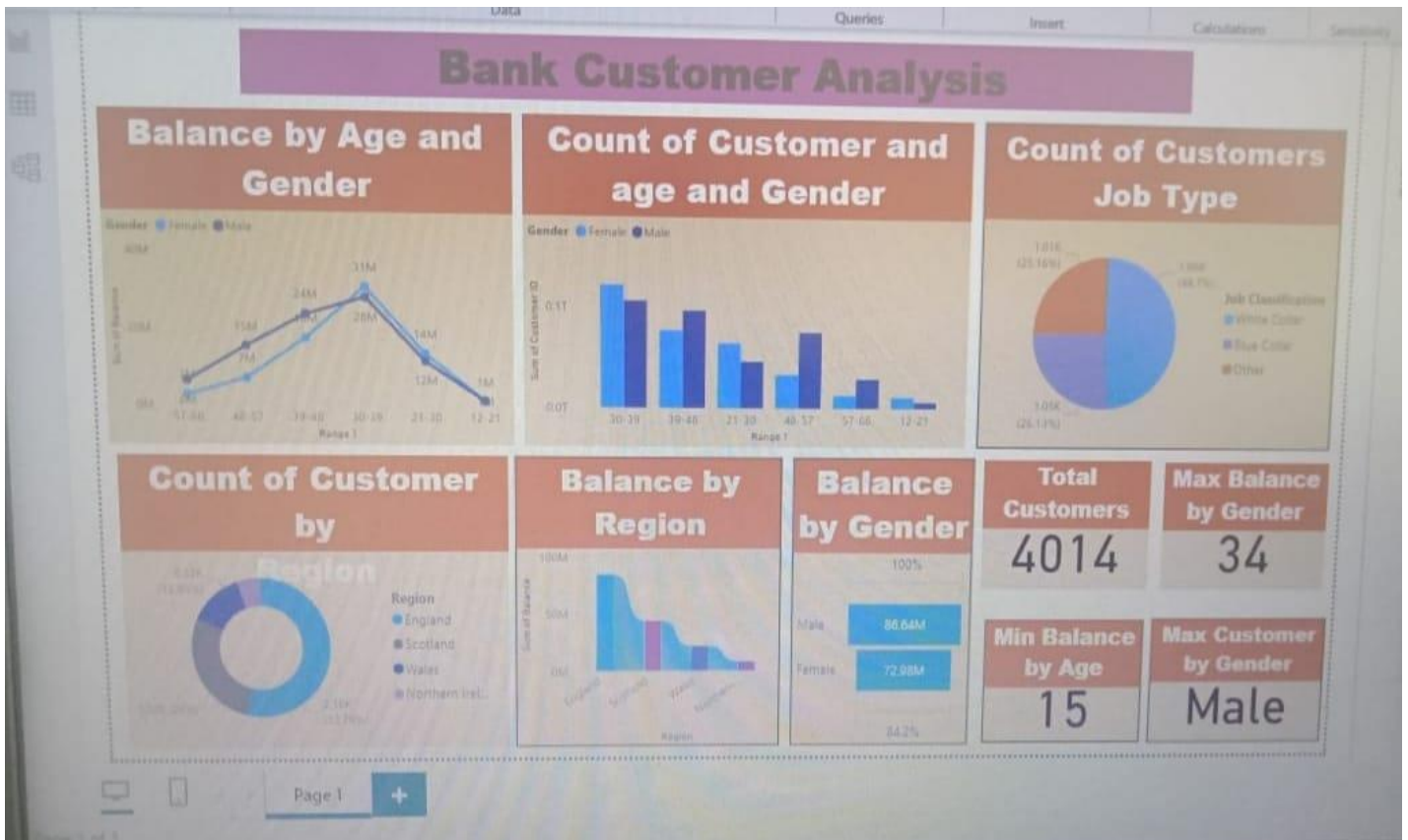
Query Settings

PROPERTIES

APPLIED STEPS

- Source
- Navigation
- Promoted Headers
- Changed Type
- Duplicated Column
- Split Column by Delimiter
- Changed Type1
- Reordered Columns
- Inserted Merged Column
- Inserted Merged Column1
- Renamed Columns
- Removed Columns

## Dashboard



## CONCLUSION

The project “Real-Time Analysis of Bank Customers” using PowerBI 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 PowerBI has made it possible to present data in a visually appealing and easy-to-understand format, thereby aiding in better decision-making.

## **FUTURE SCOPE**

The future scope for real-time analysis of bank customers is promising. Advancements in artificial intelligence, machine learning, and big data analytics will continue to enhance banks' ability to understand customer behavior, detect fraud in real-time, personalize services, and offer proactive financial advice. Additionally, the integration of IoT devices and wearables may provide further insights into customer habits and preferences, leading to more tailored banking experiences. As data privacy regulations evolve, ensuring compliance will be crucial for maintaining customer trust while leveraging the full potential of real-time analysis.