

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

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 PowerBI, 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.

INDEX

Sr. No.	Table of Contents	Page No.
1	Chapter 1: Introduction	1
2	Chapter 2: Services and Tools Required	3
3	Chapter 3: Project Architecture	4
4	Chapter 4: Modeling and Result	6
5	Conclusion	12
6	Future Scope	13

CHAPTER 1

INTRODUCTION

1.1 Problem Statement

In today's competitive banking industry, understanding customer behavior and preferences in real-time is crucial for providing personalized services, improving customer satisfaction, and retaining customers. However, many banks struggle to effectively analyze and visualize their customer data in real-time to make informed decisions.

This case study aims to address this challenge by leveraging Power BI, a powerful business analytics tool, to create a dynamic dashboard that provides real-time insights into bank customers' behavior, preferences, and needs.

1.2 Proposed Solution

Integrate real-time data sources such as transaction logs, customer interactions, and demographic information into Power BI. Utilize Power BI's data connectors to seamlessly connect to various data repositories within the bank's infrastructure. Leverage Power BI's capabilities to track customer engagement metrics such as satisfaction scores, Net Promoter Score (NPS), and response rates. Design interactive reports to monitor customer feedback, complaints, and sentiment analysis in real-time.

1.3 Feature

- **Real-Time Analysis:** Implement a solution that enables real-time analysis of bank customer data including transactions, account activities, demographics, and interactions.

- **Customer Segmentation:** Utilize Power BI to segment customers based on various criteria such as transaction frequency, account balances, demographics, and product usage.
- **Trend Analysis:** Product usage trends to optimize product offerings and cross-selling strategies. Customer churn trends to identify at-risk customers and implement retention strategies.
- **Predictive Analysis:** Integrate predictive analytics models to forecast customer behavior, identify potential churn, and recommend personalized offers or services.

1.4 Advantages

- **Data-Driven Decisions:** Power BI empowers banks to harness real-time data from various sources such as transaction records, customer interactions, and market trends.
- **Improved Customer Engagement:** By understanding customer sentiment and preferences, banks can tailor their communication channels, product recommendations, and service offerings to enhance the overall customer experience.
- **Increased Revenue:** By segmenting customers based on their financial behavior and lifecycle stage, banks can deploy targeted marketing campaigns and upsell relevant products or services.

1.5 Scope

Define the scope of the project, including the specific aspects of bank customer data that will be analyzed in real-time using Power BI. This may include transaction data, customer demographics, account balances, and customer interactions. Real-time monitoring of transaction volumes and patterns. Analysis of customer demographics and segmentation. Monitoring of account balances and financial trends. Tracking of customer interactions across multiple channels (e.g., branch visits, website visits, mobile app usage). Identification of potential fraud or security threats in real-time. Personalized marketing campaigns based on customer behavior and preferences.

CHAPTER 2

SERVICES AND TOOLS REQUIRED

2.1 Services Used

- **Data Collection and Storage Services:** Implemented Power BI Data flows to streamline data collection from multiple sources, including transactional data, CRM systems, and customer interactions. Utilized Azure Data Lake Storage for centralized storage, ensuring scalability, security, and ease of access to data.
- **Data Processing Services:** Leveraged Power BI Query Editor for data cleansing, transformation, and integration, ensuring data accuracy and consistency. Employed Power BI Data flows to automate data preparation processes, reducing manual effort and minimizing errors.
- **Machine Learning Services:** Integrated Azure Machine Learning Studio with Power BI to develop predictive models for customer segmentation, churn prediction, and product recommendation. Deployed machine learning models within Power BI to generate real-time insights and recommendations based on customer interactions and behavior.

2.2 Tools and Software used

Tools:

- **Power BI:** For data visualization, dashboard creation, and report generation.

- **Power Query:** For data preparation, transformation, and integration.

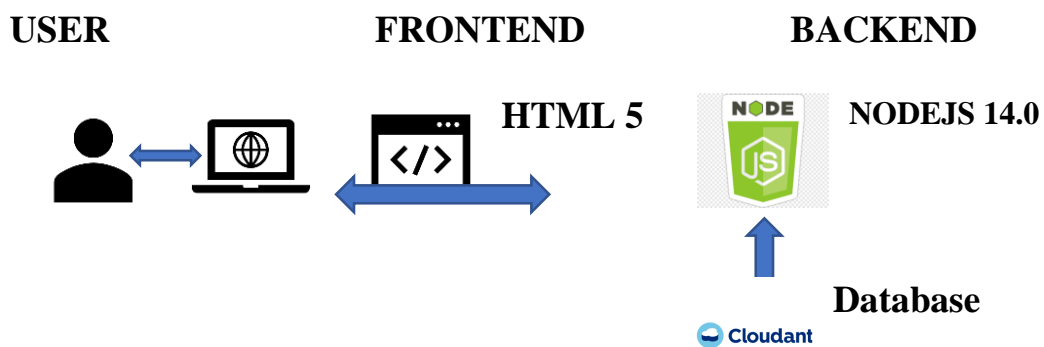
Software Requirements:

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

PROJECT 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. PowerBI allows you to create interactive dashboards that can provide valuable insights into the data.
6. **Data Access:** The dashboards created in PowerBI 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

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

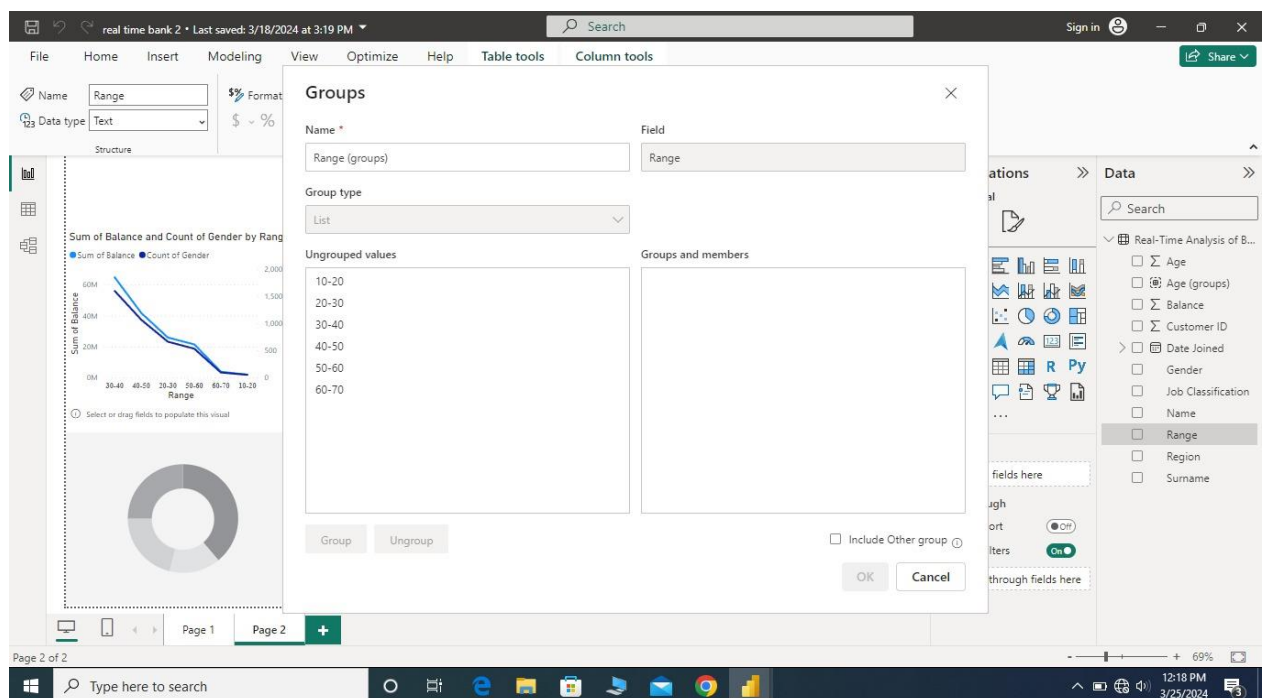
Name Field

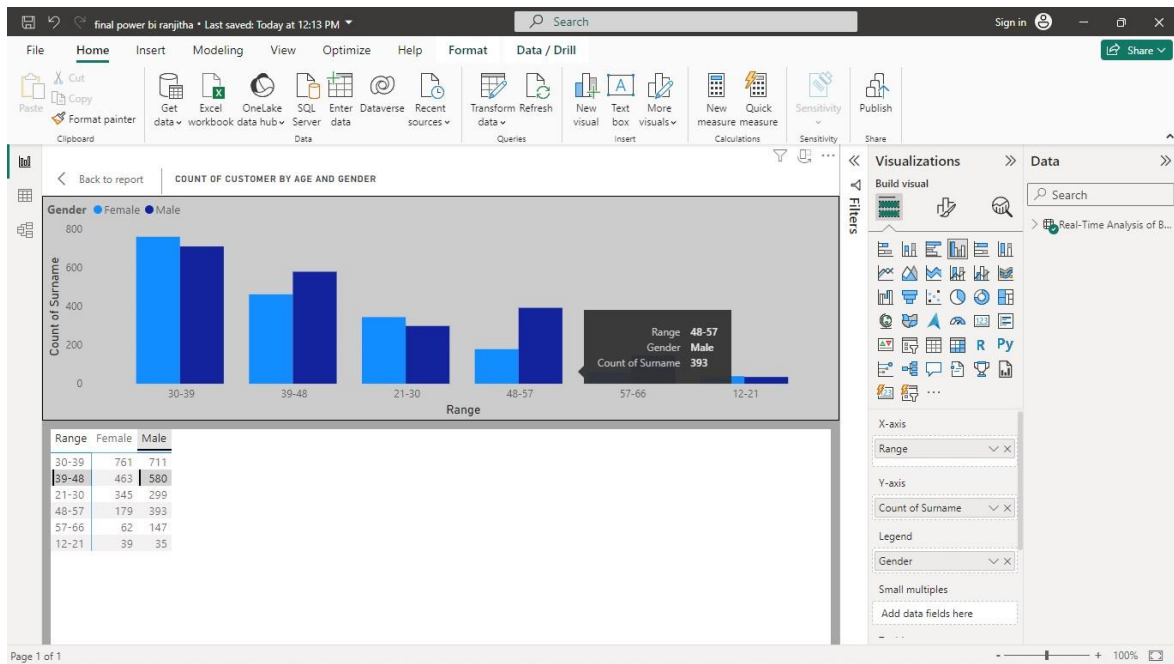
Group type

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





real time bank 2 • Last saved: 3/18/2024 at 3:19 PM

Search

File Home Help Table tools Column tools

Name: Age (groups)

Data type: Text

Format: 0

Summarization: Don't summarize

Data category: Uncategorized

Sort by column

Data groups

Manage relationships

New column

Structure

Formatting

Properties

Sort

Groups

Relationships

Calculations

Data

Search

Real-Time Analysis of Bank Custo...

Age

Age (groups)

Balance

Customer ID

Date Joined

Gender

Job Classification

Name

Range

Region

Region (groups)

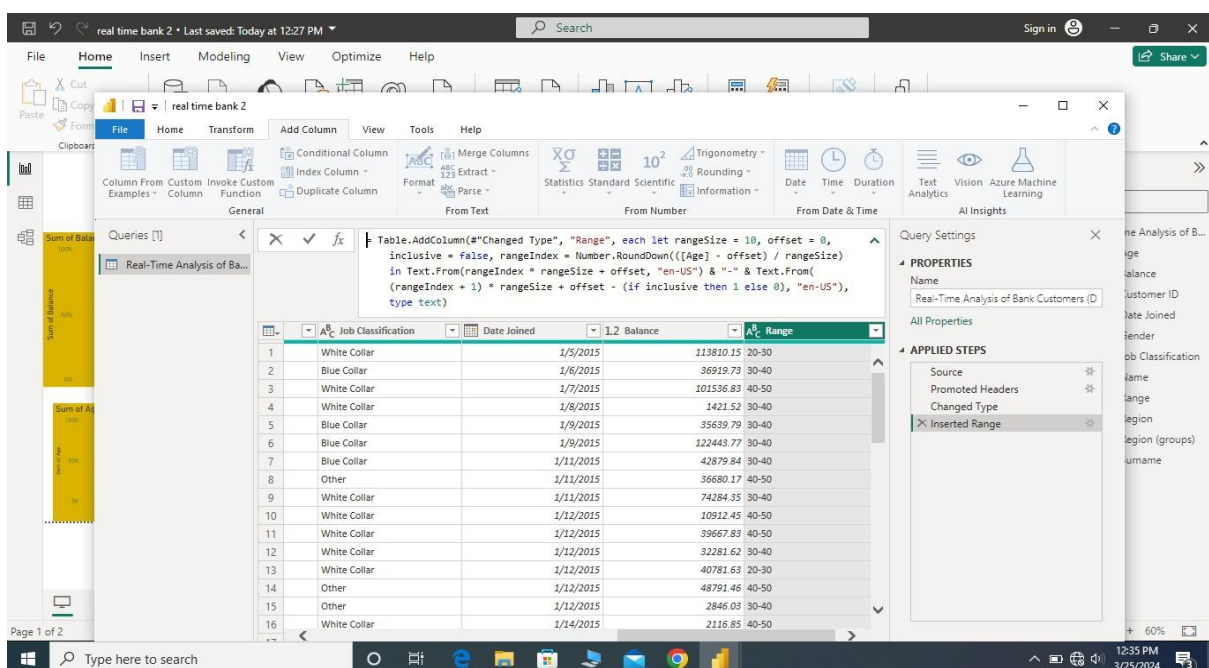
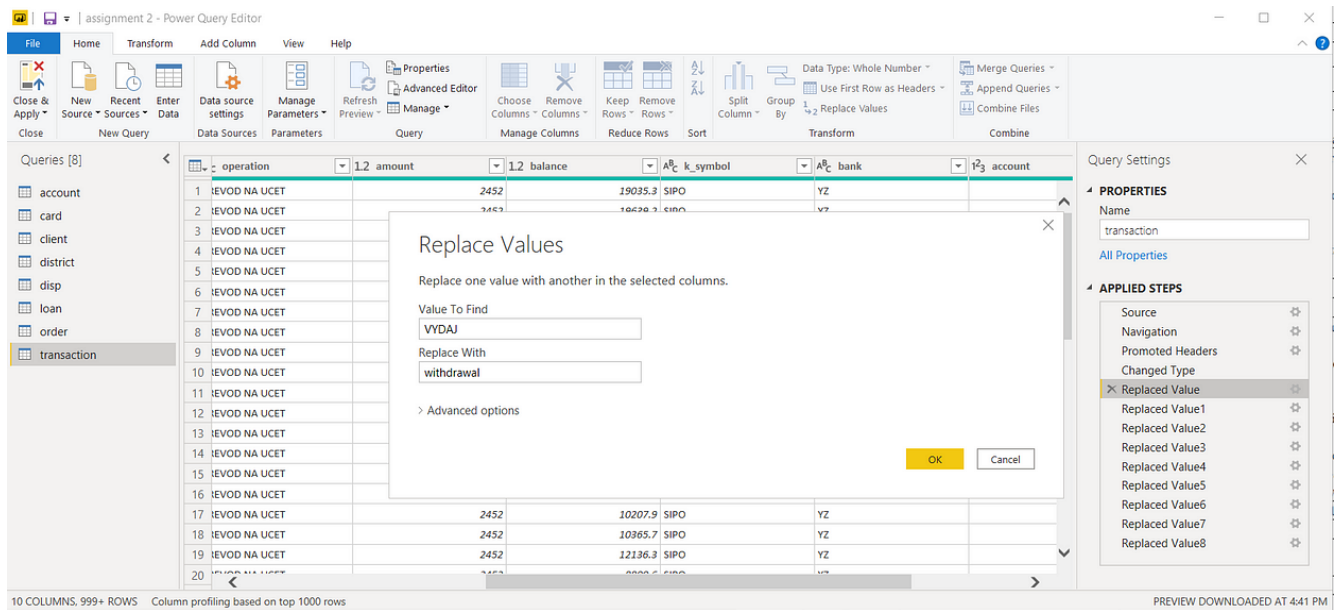
Surname

Date Joined	Balance	Range	Age (groups)
Saturday, January 31, 2015	31680.67	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	59935.75	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	1430.6	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 & ...
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, April 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	51542.67	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 & ...
Friday, 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 & 24 & 25 & 26 & 27 & 28 & 29 & 30 & 31 & 32 & 33 & 34 & 35 & 36 & 37 & 38 & 39 & 40 & ...
Sunday, July 12, 2015	38836.01	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, July 12, 2015	47422.55	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 & ...

Table: Real-Time Analysis of Bank Customers (Data Analytics with Power BI) (4,014 rows) Column: Age (groups) (1 distinct values)

Replacing values

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



real time bank 2

File Home Transform Add Column View Tools Help

Column From Custom Invoke Custom Examples Column Function Duplicate Column General

Conditional Column Index Column Merge Columns Extract Format Parse Statistics Standard Scientific Rounding Information Date Time Duration Text Analytics Vision Azure Machine Learning

Queries [1] f_x = 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)

	A _C Region	A _C Job Classification	Date Joined	1.2 Balance	A _C Range
9	33 Wales	White Collar	1/11/2015	74284.35	30-40
10	42 England	White Collar	1/12/2015	10912.45	40-50
11	40 England	White Collar	1/12/2015	39667.83	40-50
12	39 England	White Collar	1/12/2015	32281.62	30-40
13	24 England	White Collar	1/12/2015	40781.63	20-30
14	46 Scotland	Other	1/12/2015	48791.46	40-50
15	36 Wales	Other	1/12/2015	2846.03	30-40
16	42 England	White Collar	1/14/2015	2116.85	40-50
17	31 Scotland	Other	1/14/2015	10356.31	30-40
18	42 Scotland	Other	1/14/2015	3801.69	40-50
19	40 England	Blue Collar	1/15/2015	65534.69	40-50
20	46 England	Blue Collar	1/15/2015	11462.64	40-50
21	37 Wales	Other	1/16/2015	31778.9	30-40
22	58 Scotland	Blue Collar	1/18/2015	21252.97	50-60
23	41 Wales	White Collar	1/18/2015	66785.78	40-50
24	52 Scotland	Blue Collar	1/19/2015	6580.81	50-60
25	38 England	White Collar	1/20/2015	20505.32	30-40
26	55 Scotland	Blue Collar	1/21/2015	43249.26	50-60
27	37 Northern Ireland	White Collar	1/23/2015	3967.2	30-40

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

Query Settings

PROPERTIES

Name Real-Time Analysis of Bank Customers (D)

APPLIED STEPS

Source

Promoted Headers

Changed Type

Inserted Range

PREVIEW DOWNLOADED AT 12:29 PM 12:35 PM 3/25/2024

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

Query Settings

PROPERTIES

APPLIED STEPS

Source

Navigation

Promoted Headers

Changed Type

Duplicated Column

Split Column by Delimiter

Changed Type1

Reordered Columns

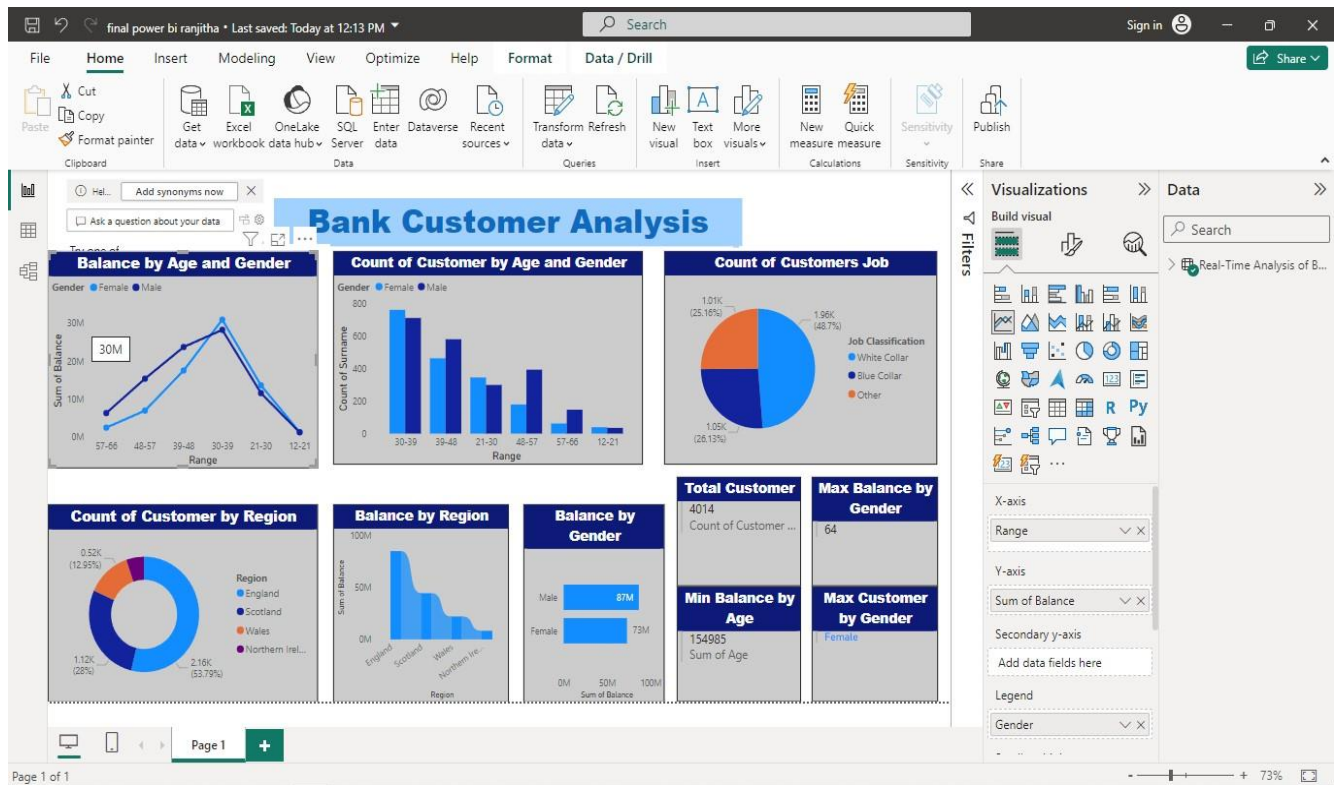
Inserted Merged Column

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 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. Additionally, the project could explore the integration 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.

