

Tech Saksham

Case Study Report

Data Analytics with Power BI

“Real-Time Analysis of Bank Customers”

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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 realtime 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 Power BI 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 upselling, and tailor their products and services to meet customer needs.

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.

1.4 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.

1.5 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 Tools and Software used

Tools:

- **Power BI:** The main tool for this project is Power BI, 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:

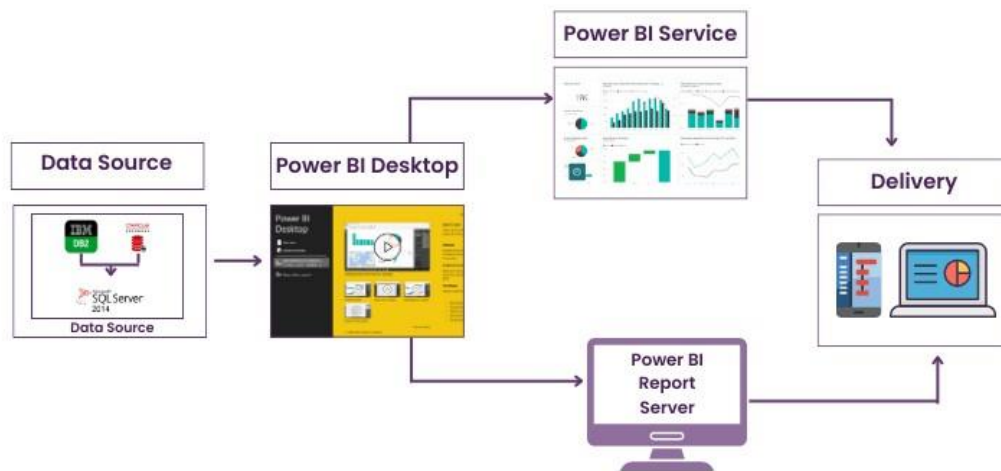
- **Power BI Desktop:** This is a Windows application that you can use to create reports and publish them to Power BI.
- **Power BI Service:** This is an online SaaS (Software as a Service) service that you use to publish reports, create new dashboards, and share insights.

CHAPTER 3

PROJECT ARCHITECTURE

3.1 Architecture

The Power BI Architecture working process



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.

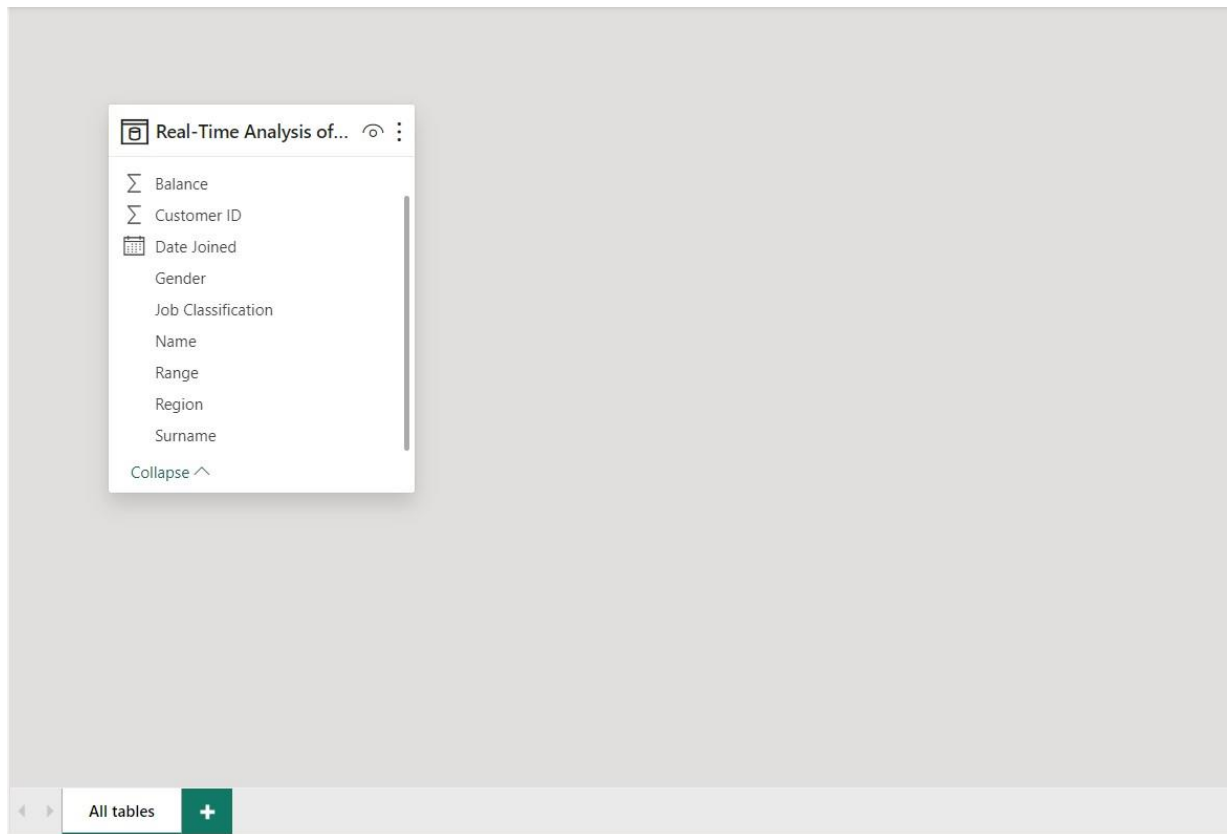
5. **Data Visualization:** The processed data and the results from the predictive models are visualized in real-time using Power BI. Power BI allows you to create interactive dashboards that can provide valuable insights into the data.
6. **Data Access:** The dashboards created in Power BI can be accessed through Power BI Desktop, Power BI Service (online), and Power BI Mobile.
7. **Front End Cluster :** The front-end cluster of the Power BI Service Architecture, also known as the front-end cluster, acts as an intermediate connection between clients and the back-end of the architecture. Front-end services are used to establish connections and authenticate clients using Azure Active Directory – a directory that stores user identities.

CHAPTER 4

MODELING AND RESULT

Manage relationship

The “Real-Time Analysis of Bank Customers “ file is the only file used in this data where it has 8 data files and 1 altered data called “Range” which is used to group the ages into 5 groups.



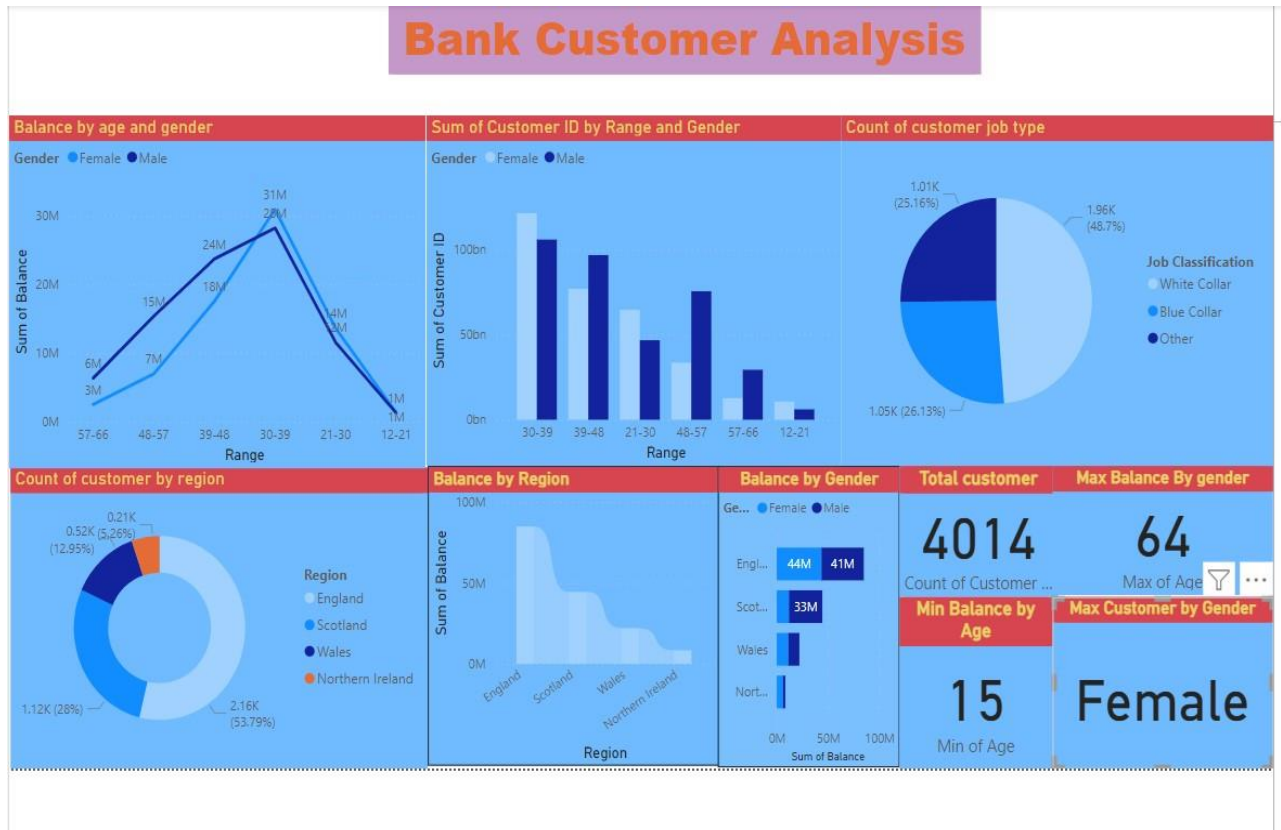
Grouping of age by ranges

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.

Customer ID	Name	Surname	Gender	Age	Region	Job Classification	Date Joined	Balance	Range
100001209	Keith	Bailey	Male	18	England	Blue Collar	14 July 2015	40572.06	12-21
200003141	Steven	Cornish	Male	18	Scotland	Blue Collar	12 November 2015	25898.72	12-21
400003370	Jessica	Lyman	Female	20	Northern Ire	Other	26 November 2015	82598.94	12-21
100003380	Victor	Cameron	Male	20	England	White Collar	27 November 2015	11434.59	12-21
400000048	Carolyn	Lewis	Female	19	Northern Ire	Other	08 February 2015	14337.82	12-21
300003409	Dan	Vaughan	Male	18	Wales	Blue Collar	27 November 2015	77682	12-21
400003415	Amanda	Kerr	Female	19	Northern Ire	Other	27 November 2015	2184.18	12-21
100003446	Faith	Glover	Female	18	England	White Collar	30 November 2015	93603.84	12-21
300003471	Wendy	Martin	Female	20	Wales	White Collar	30 November 2015	68569.21	12-21
100003510	Peter	King	Male	18	England	Other	03 December 2015	18231.91	12-21
300003534	Audrey	Thomson	Female	18	Wales	White Collar	03 December 2015	5557.32	12-21
100003557	John	Mackenzie	Male	20	England	White Collar	05 December 2015	52109.92	12-21
200003661	Keith	Reid	Male	20	Scotland	Blue Collar	11 December 2015	3715.81	12-21
400003743	Keith	Davies	Male	19	Northern Ire	Other	15 December 2015	50562.98	12-21
100003893	Lisa	Terry	Female	20	England	White Collar	23 December 2015	34528.03	12-21
100003948	Owen	Baker	Male	18	England	Blue Collar	26 December 2015	3858.9	12-21
100003992	Andrew	Cornish	Male	18	England	White Collar	29 December 2015	23399.53	12-21
100000082	Neil	Robertson	Male	20	England	White Collar	16 March 2015	11624.36	12-21
400000114	Fiona	Mills	Female	18	Northern Ire	Other	16 March 2015	51171.29	12-21
100000119	Vanessa	Lyman	Female	18	England	White Collar	31 March 2015	33524.41	12-21
100000132	James	Marshall	Male	20	England	Blue Collar	01 April 2015	9578.65	12-21
300000340	Rebecca	Nash	Female	20	Wales	White Collar	29 April 2015	1488.04	12-21
400000359	Gabrielle	MacDonald	Female	17	Northern Ire	Other	03 May 2015	65798.4	12-21

Real-Time Analysis of Bank Customers (Data Analytics with Power BI) (4,014 rows) Column: Range (6 distinct values)

Dashboard



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.

FUTURE SCOPE

The future scope of this project is vast. With the advent of advanced analytics and machine learning, Power BI 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, Power BI'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.

REFERENCES

<https://learn.microsoft.com/en-us/power-bi/create-reports/power-bi-hyperlinks-in-tables>



LINK

<https://github.com/SvickyB/Case-Study/>