Tech Saksham

Case Study Report

Data Analytics with Power BI

"ANALYSIS OF COMMERCIAL ELECTRICITY CONSUMPTION IN INDIAN STATES"

"APC MAHALAXMI COLLEGE FOR WOMEN,TUTICORIN"

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ABSTRACT

In the digital age, data has become an invaluable asset for all over world,especially in government sector such as electricity board. The proposed project, “ANALYSIS OF ELECTRICITY CONSUMPTION IN INDIAN STATES,” aims to leverage PowerBI, a leading intelligence tool, to analyze and visualize real-time consumer data. This project will enable to gain deep insights into consumer behavior, preferences, and trends, thereby facilitating data-driven decision-making and enhancing consumer satisfaction. This analysis will allow us to respond promptly to changes in consumer behavior or preferences, identify opportunities for consumer needs. The project will also contribute to the broader goal of digital transformation in the EB, promoting efficiency, innovation, and consumer-centricity.

PROBLEM STATEMENT:

A problem statement is a concise summary of the user's needs and specifications that must be met. A problem statement brings the organization together around the user problem, providing everyone a clear goal to work toward. A powerful problem statement is one that is focused on people. We have two personas for the qualitative participants' group. So two problem statements are created based on the user's characteristics and the user's insights.

The problem statement is " **A** student staying at student accommodation with bills **who** needs an application **service** to push notifications as reminders, to know the daily usage **because** she is busy doing her project and I don't know how much she consumed ".

1.1 Proposed Solution

The proposed solution is to develop a PowerBI dashboard that can analyze and visualize customer data. The dashboard will integrate data from various sources such as regions,states and

everywhere in all over in India. It will provide a comprehensive view of customer behavior, preferences, and trends, enabling to make informed decisions. The dashboard will be interactive, user-friendly, and customizable, allowing to tailor it to their specific needs. The dashboard will enable us to respond promptly to changes in customer behavior or preferences, identify opportunities and services to meet customer needs.

1.2 Feature

- **Analysis**: The dashboard will provide analysis of consumer data.
- **Customer Segmentation**: It will segment customers based on various sectors, etc.
- **Trend Analysis**: The dashboard will identify and display trends in customer behavior.

Predictive Analysis: It will use historical data to predict future consumer behavior.

Advantages

Advantages of electricity

- a. Easily accessible and produced. ...
- b. Renewable source of energy. ...
- c. Easy to manage and transport. ...
- d. Versatile and easy to transform. ...
- e. Reduces greenhouse emission. ...
- f. More efficient and convenient. ...
- g. Have lower maintenance. ...
- h. It requires less labor force.

SCOPE:

The scope of electrical engineering is vast and encompasses domains such as power generation, electronics, control systems, telecommunications, renewable energy, robotics, and biomedical engineering, among others

CHAPTER 2

SERVICES AND TOOLS REQUIRED

2.1 Services Used

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

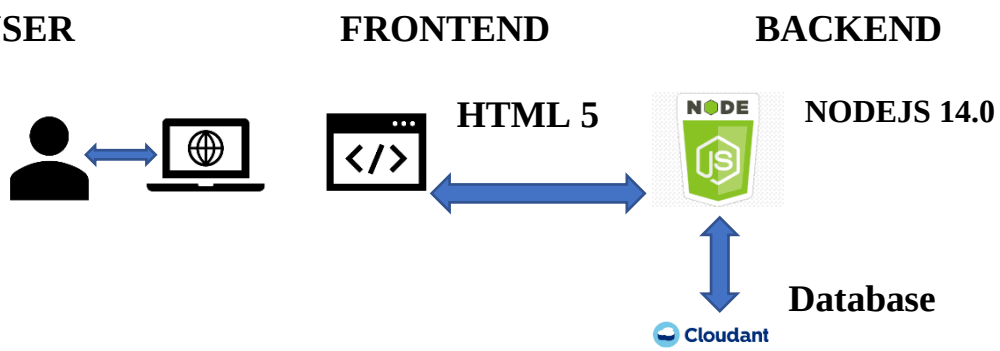
- **PowerBI Service: This is an online SaaS (Software as a Service) service that you use to publish reports, create new dashboards, and share insights.**

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

CHAPTER 3

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 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 using services like Azure Stream Analytics or AWS Kinesis Data Analytics.**

- **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.

4. 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.
5. 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 analysis of electricity consumption.. 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.

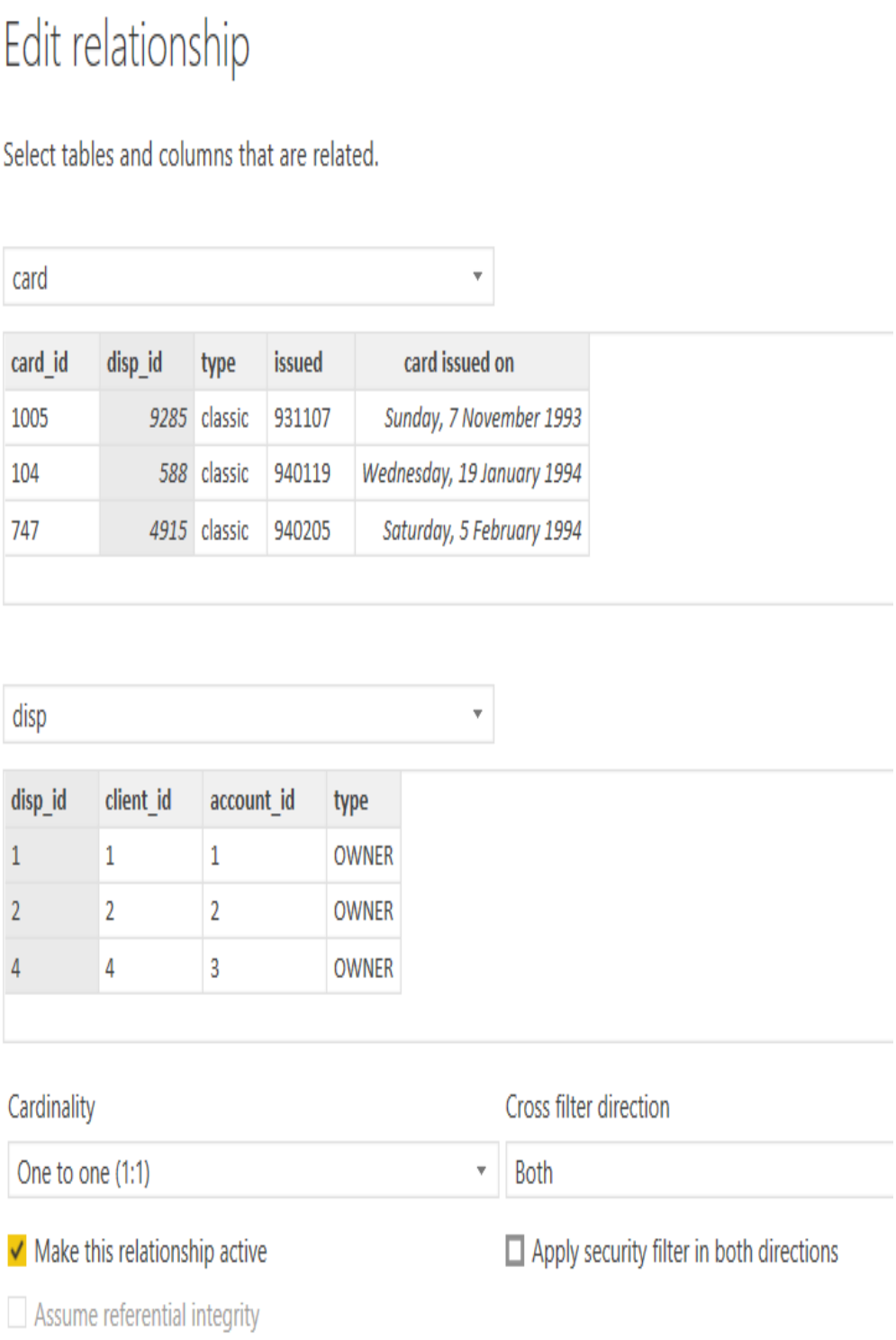
CHAPTER 4

MODELING AND RESULT

MANAGE RELATIONSHIP

Manage relationships

Active	From: Table (Column)	To: Table (Column)
☑	card (disp_id)	disp (disp_id)
☑	client (district_id)	district (district_id)
☑	disp (account_id)	account (account_id)
☑	disp (account_id)	loan (account_id)
☑	disp (client_id)	client (client_id)
☑	order (account_id)	account (account_id)
☑	transaction (account_id)	disp (account_id)
☐	account (district_id)	district (district_id)
☐	transaction (account_id)	loan (account_id)



MODELLING FOR GENDER AND AGE DATA

- NOTICE THAT THE GENDER AND AGE OF THE CLIENT ARE MISSING FROM THE DATA. THESE CAN BE FORMULATED FROM THE BIRTH NUMBER YYMMDD WHERE AT MONTHS (THE 3RD AND 4TH DIGITS) GREATER THAN

50 means that client is a female. We can create a column for gender.

```
1  Gender =
2  VAR stringDate = FORMAT(client[birth_number],"General Number")
3  VAR month = VALUE(MID(stringDate,3,2))
4  RETURN IF(month > 50,"F","M")
5
```

client_id	birth_number	district_id	Gender	Birthday	age
3428	875927	42	F	27/09/1987	13
4354	860813	28	M	13/08/1986	14
3417	855318	35	F	18/03/1985	15
10201	851019	13	M	19/10/1985	15
734	855114	46	F	14/01/1985	15

For birthday, we need to reduce the birth month of the female by 50 and then change the date format to DD/MM/YYYY adding 1900 to the year.

```
1  Birthday =
2  VAR stringDate = FORMAT(client[birth_number],"General Number")
3  VAR stringMonth = VALUE(MID(stringDate,3,2))
4  VAR mth = IF(stringMonth > 50, stringMonth - 50,stringMonth)
5  VAR year = VALUE(MID(stringDate,1,2))
6  VAR day = VALUE(MID(stringDate,5,2))
7  RETURN FORMAT(DATE(year+1900,mth,day),"DD/MM/YYYY")
```

client_id	birth_number	district_id	Gender	Birthday	age
3428	875927	42	F	27/09/1987	13
4354	860813	28	M	13/08/1986	14
3417	855318	35	F	18/03/1985	15
10201	851019	13	M	19/10/1985	15

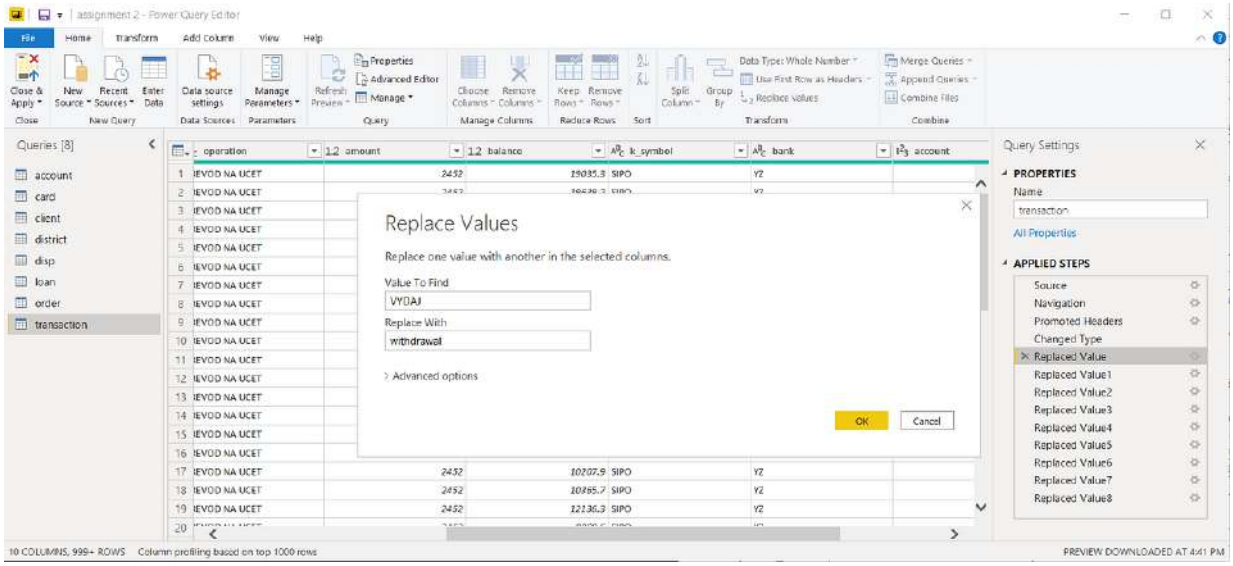
For age, we shall assume it is year 1999 as explain previously and use it to minus from the birth year.

```
1  age = 1999 -RIGHT(client[Birthday],4)
```

client_id	birth_number	district_id	Gender	Birthday	age	age (groups)
2	450204	1	M	04/02/1945	54	36 -54 Baby Boomers

REPLACING VALUES

SET SOME FIELDS TO ENGLISH FOR EASY UNDERSTANDING, WE REPLACE VALUES TO ENGLISH WITH THE POWER QUERY EDITOR.

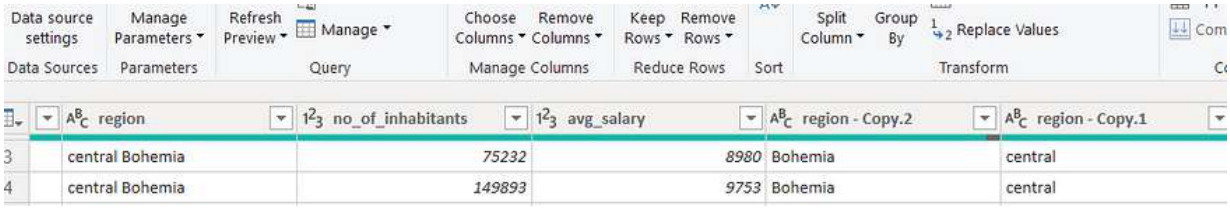


type	+/- transaction	"PRIJEM" stands for credit "VYDAJ" stands for withdrawal

k_symbol	characterization of the transaction	"POJISTNE" stands for insurance payment "SLUZBY" stands for payment for statement "UROK" stands for interest credited "SANKC. UROK" sanction interest if negative balance "SIPO" stands for household "DUCHOD" stands for old-age pension "UVER" stands for loan payment

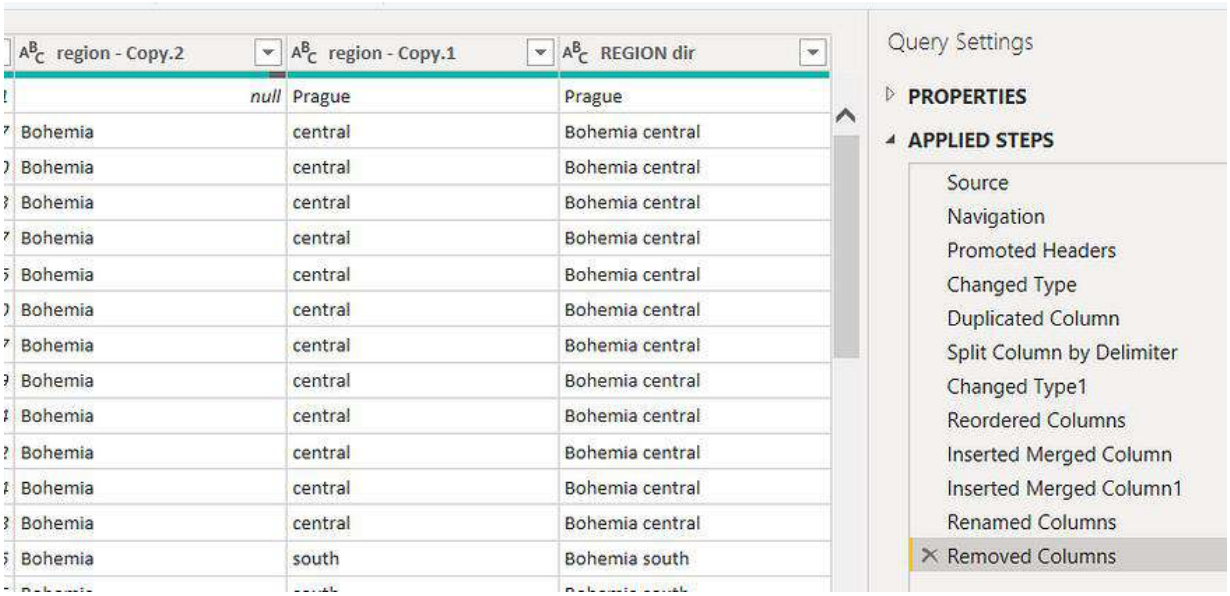
CHANGING THE ORDER OF REGION NAME AT POWER QUERY

DUPLICATE THE "DISTRICT /REGION" THEN SPLIT COLUMN USING SPACE AS DELIMITER.



	region	no_of_inhabitants	avg_salary	region - Copy.2	region - Copy.1
3	central Bohemia	75232	8980	Bohemia	central
4	central Bohemia	149893	9753	Bohemia	central

THEN MERGE COLUMN BY REGION AND DIRECTION. REFER TO APPLIED STEPS FOR DETAILS.



region - Copy.2	region - Copy.1	REGION dir
null	Prague	Prague
Bohemia	central	Bohemia central
Bohemia	central	Bohemia central
Bohemia	central	Bohemia central
Bohemia	central	Bohemia central
Bohemia	central	Bohemia central
Bohemia	central	Bohemia central
Bohemia	central	Bohemia central
Bohemia	central	Bohemia central
Bohemia	central	Bohemia central
Bohemia	central	Bohemia central
Bohemia	central	Bohemia central
Bohemia	central	Bohemia central
Bohemia	south	Bohemia south

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.

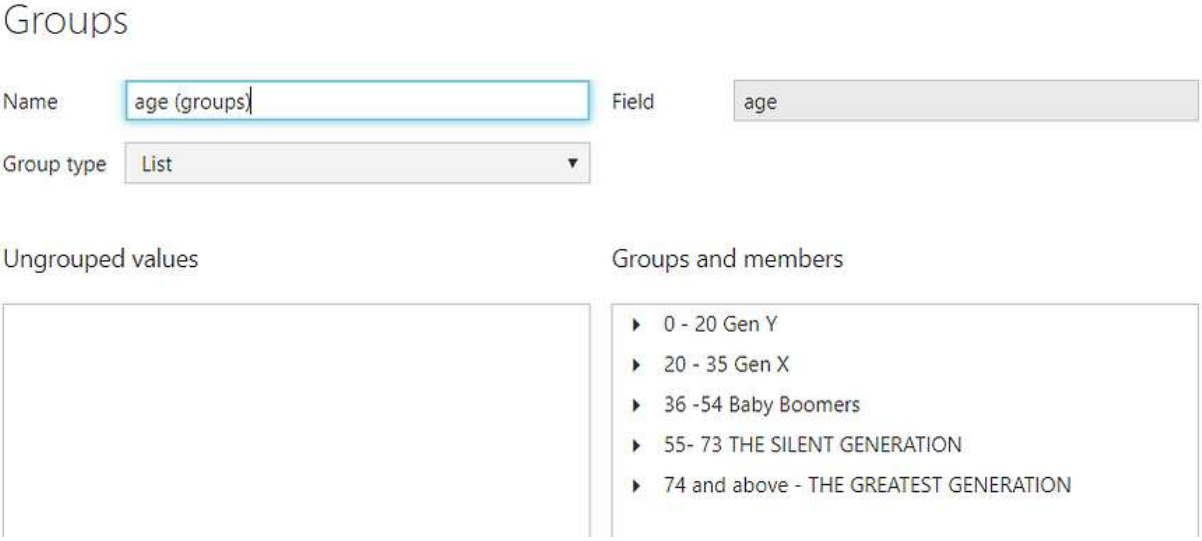
THE GEN Y ARE YOUTHS,

GEN X ARE YOUNG WORKING ADULTS, SOME STARTING THEIR FAMILIES

BABY BOOMER ARE WORKING ADULTS WITH FAMILIES.

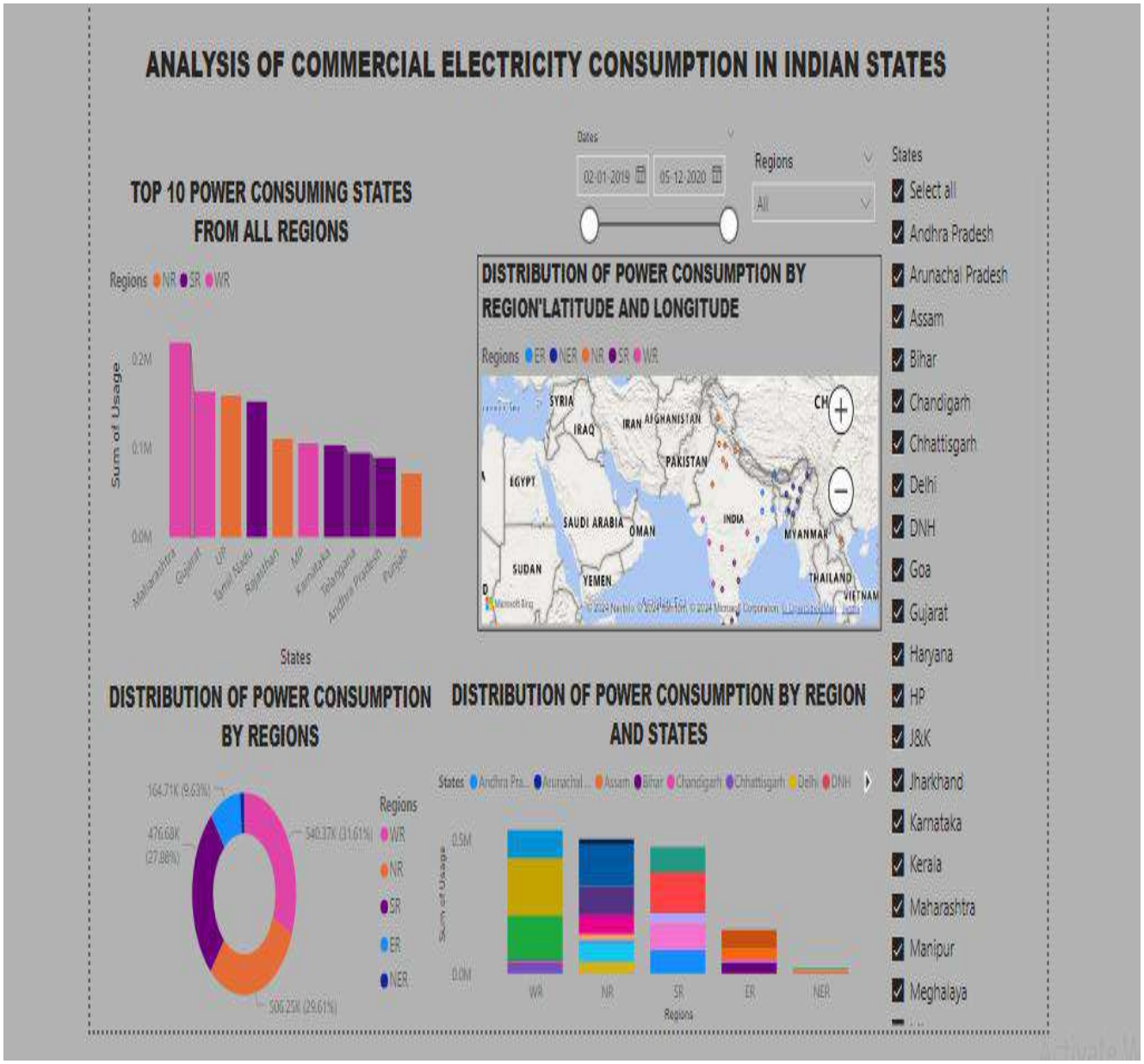
THE SILENT GENERATIONS SOME ARE WORKING AND RETIRED, LIVING ON PENSIONS.

THE GREATEST GENERATION, RETIRED ELDERLY LIVING ON PENSIONS.



DASHBOARD

ANALYSIS OF ELECTRICITY CONSUMPTION IN INDIAN STATES



Microsoft

edunet foundation

SAP

Save Electricity

CONCLUSION

The discovery of electricity was a turning point of history because without it we wouldnt live in the world that we live in today which is filled with life changing technology but it all needs and uses electricity. Without electricity you wouldnt be able to view this page or be on a computer at this very moment. Electricity is something that we all live by whether we notice it or not, some of us wouldnt be able to survive without it because it is a must needed source to our everyday lives. It is used to help save people, in hospitals etc., we live by

this incredible creation that mother nature has given us and we have been able to control it with our very own hands . Especially in this changing world where things are being invented and created everyday, it would not be possible without "Electricity".

FUTURE SCOPE

As per recent economic indicators, the Gross Domestic Product (GDP) is expected to grow at an average rate of 6%, leading to a proportional increase in electricity demand. Projections estimate that by 2030, electricity consumption could reach 2.5 trillion units annually.

REFERENCE

https://medium.com/analytics-vidhya/analysis-of-bank-customers-using-dashboard-in-power-bi-a366f2b3e563

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LINK