Tech Saksham

Case Study Report

Data Analytics with Power BI

"Analysis Of Commercial Electricity Consumption in Indian States"

"V.O. CHIDAMBARAM COLLEGE"

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ABSTRACT

This project endeavors to examine the nuances of commercial electricity consumption patterns in different regions of India using Power BI as a tool for analysis. By delving into the intricate details of electricity usage, the study aims to uncover trends, disparities, and opportunities for optimization. Through visually compelling representations and insightful observations, the analysis illuminates consumption patterns, offering valuable guidance to policymakers and stakeholders in their quest for sustainable energy management practices. By harnessing the power of data visualization and analytics, this research contributes to a deeper understanding of energy dynamics and supports informed decision-making for a more resilient and efficient energy future in India.

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CHAPTER 1

INTRODUCTION

1.1 Problem Statement

The increasing demand for electricity poses significant challenges for sustainability, efficiency, and cost-effectiveness. Traditional methods of electricity generation and consumption are often inefficient and environmentally harmful. Moreover, the rise of electric vehicles and smart technologies further strains existing infrastructure. Finding solutions to optimize electricity consumption is crucial for meeting energy needs while mitigating environmental impact and ensuring economic viability.

1.2 Proposed Solution

Energy Storage Technologies: Deploying scalable energy storage solutions such as batteries, pumped hydro storage, and thermal storage systems can address intermittency issues associated with renewable energy sources. Energy storage facilitates efficient utilization of surplus energy during periods of low demand and helps stabilize the grid by providing backup power during outages.

1.3 Feature

- Energy Efficiency Programs: Availability of initiatives promoting energy-saving practices.

- Renewable Energy Adoption: Influenced by state incentives and resource availability.

- Grid Reliability: Stable grids impact consumption patterns.

- Government Initiatives: Economic policies and investment drive commercial activity and electricity demand.

1.4 Advantages

- Revenue Generation: Contributes to utility and government revenue.

- Environmental Benefits: Can lead to reduced emissions with clean energy adoption.

- Social Impact: Supports community development and wellbeing.

1.5 Scope

Scope for this project could involve conducting comparative analysis between urban and rural areas within Indian states to understand the disparities in commercial electricity consumption. By examining factors such as infrastructure development, economic activities, and population density, insights can be gained to tailor energy management strategies effectively. Additionally, exploring the impact of government policies and initiatives on electricity consumption patterns could provide valuable insights for policymakers and stakeholders aiming to promote sustainable energy practices.

CHAPTER 2

TOOLS REQUIRED

2.1 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

USER	FRONTEND	BACKEND

HTML 5
NODEJS 14.0

Cloudant

Database
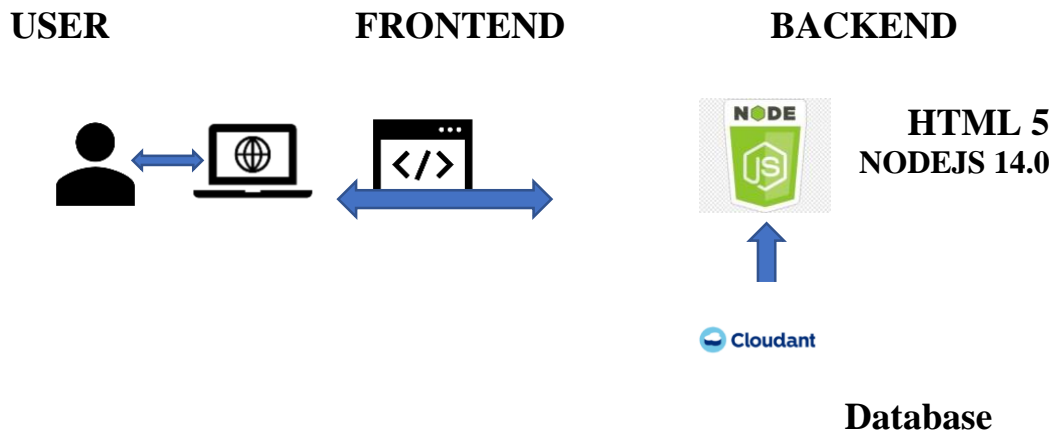
Data Integration:

- Gather data from various sources including government records, utility providers, industry reports, and satellite imagery.

- Utilize data cleaning and preprocessing techniques to ensure data quality and consistency.

Power BI Dashboard Development:

- Design interactive dashboards using Power BI to visualize electricity consumption patterns across Indian states.

- Incorporate geographical mapping features to provide spatial insights into consumption trends.
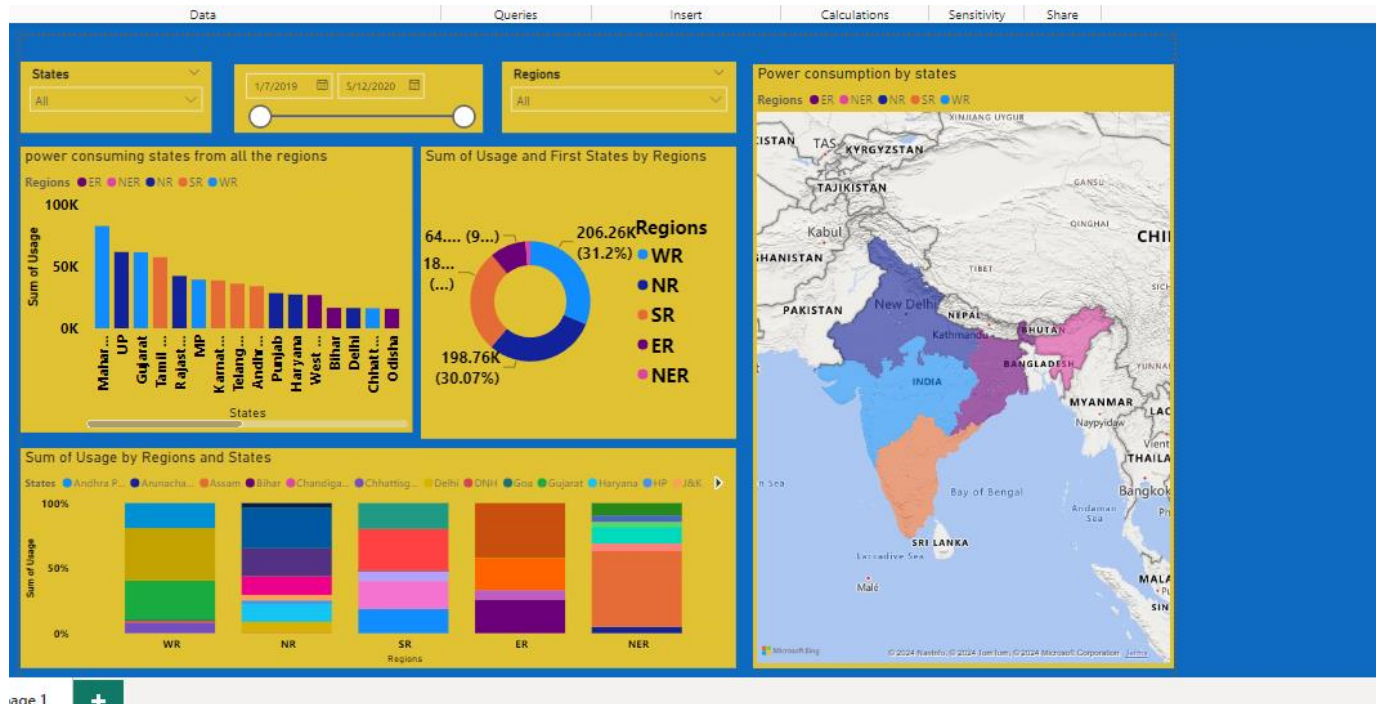
Predictive Modeling:

- Apply machine learning algorithms such as time series analysis or regression to forecast future electricity consumption trends.

- Train predictive models using historical consumption data and factors such as economic indicators, population growth, and weather patterns.

Dashboard

Sum of Usage by States

Sum of Usage by Regions and States
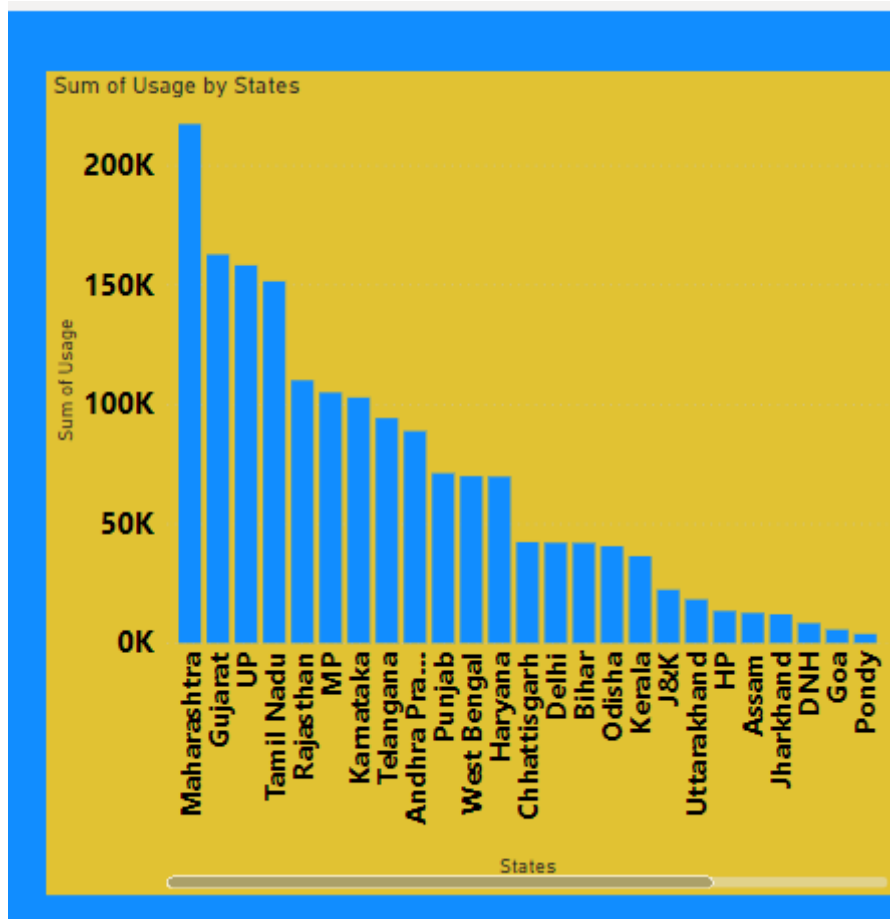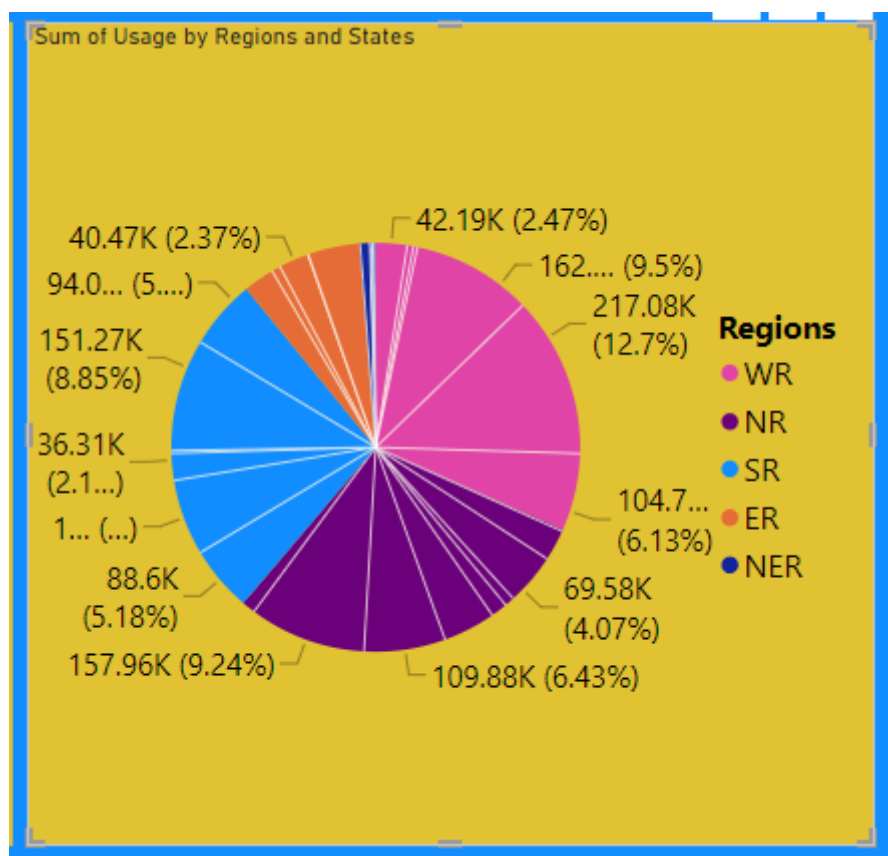
CONCLUSION

This unique project architecture offers a comprehensive approach to analyzing commercial electricity consumption in Indian states, leveraging advanced data integration, visualization, and predictive modeling techniques. By synthesizing data from diverse sources and presenting insights through interactive Power BI

dashboards, stakeholders gain a nuanced understanding of consumption patterns and disparities. The incorporation of predictive modeling enables proactive

energy management strategies, fostering sustainability and efficiency. Through stakeholder engagement and scalability considerations, the project ensures long-term impact and sustainability. Ultimately, this project architecture contributes to informed decision-making and drives positive outcomes in the realm of energy management and sustainability in India.

FUTURE SCOPE

This project has vast potential for expansion and refinement. Firstly, integrating real-time data streams from smart meters and IoT devices will enhance the accuracy and timeliness of insights into electricity consumption patterns. Secondly, optimizing machine learning algorithms will enable more precise forecasting of consumption trends, aiding in proactive energy management strategies. Thirdly, enhancing the Power BI dashboard with dynamic features like scenario analysis and personalized recommendations will provide stakeholders with actionable insights tailored to their specific needs. Additionally, extending the scope of analysis to encompass other sectors such as

residential, industrial, and agricultural electricity consumption will facilitate a holistic approach to energy management and sustainability. Collaboration with policymakers to assess the impact of energy policies on consumption patterns will inform future policy decisions. Implementing community engagement initiatives to promote energy conservation and behavioral change will foster a culture of sustainability. Lastly, exploring global best practices through international collaboration will enable the adaptation of successful strategies to the Indian context, driving positive change in energy management and sustainability efforts across the nation.

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