Tech Saksham

Case Study Report

Data Analytics with Power BI

“Analysis of Commercial Electricity Consumption in Indian State.”

“A.P.C. Mahalaxmi College for womens”

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ABSTRACT

The demand for energy has been increasing over the years in India,whichmaybethe result of its rapid economic growth trajectory. In this context, thisstudyexaminesthe direction of the Granger-causal relationship between electricity consumption and economic growth at the state and sectoral levels in India. In doing so, the panel cointegration tests with the structural break, the heterogeneous panel causality test, andthepanelVARbasedimpulse-responsemodelareemployed.

Further,theresultsprovideevidenceforthepresenceofunidirectional Granger-causalityflowinginthedirectionofoveralleconomicgrowthtoelectricity consumptionattheaggregatestatelevel.

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CHAPTER 1

INTRODUCTION

1.1 Problem Statement

Electricity outages have been a major impediment to doing business in countries worldwide Efficient electricity supply is an important prerequisite for aidingsustained agricultural and industrial growth to any economy. Electricity contributes to agricultural production either directly, by energising agricultural machinery and irrigation systems, or indirectly, as a complement to other inputs such as fertilizers and pesticides. Electricity in rural areas is widely believed to be a stimulus factor for increasedagriculturalproductivityandmechanization

1.2 Proposed Solution

The proposed solution involves leveraging data analytics techniques with data sourced from the cloud and web to conduct an in-depth analysis of commercial electricity consumption in an Indian state.As we know, developing country like India has been promoting itself by enhancing various initiatives on all sectors and regions to achieve economic targets and for prepare to meet global competition for proclaim efficient nation. Accumulation of changes in energy consumption especially commercial energy pointed is indirectly spurs the problems on the consumption of non-commercial energy regularly consumes by ruralpeople.Though,initiationof various commercial energy is alwayssupportstoeconomicgrowthandit neverever make worsen to that yet looking for another trend ofconsumptioninnon-commercial type and its reflects among the rural have to consider and necessary steps need to execute for the support of primary energy consumers and to boost economy level. Visualization tools will be used to present findings comprehensively, informed decision-making, while continuous monitoring will ensure ongoing optimizationofenergyresourcesandefficiencyinitiatives.

1.3 Feature

Utilisationpatterns:Analyzepeakandoff-peakconsumptiontimestoidentify trendsincommercialelectricityusage,aidinginresourceallocationand infrastructureplanning.

- SectoralBreakdown:Segmentconsumptiondatabyindustrysectorsto

understandwhichsectorsarethelargestconsumers,enablingtargetedenergy efficiencyinitiativesandtariffstructure.

● SeasonalVariation :Evaluateseasonalfluctuationsinelectricitydemandto anticipatefuturedemands,optimizesupplychainmanagement,andimplement demand-sidemanagementstrategies.

1.4 Advantages

● EnchanceResourceManagement: Electricitymanagementisavasttopicin environmentalsciencethatdealswiththecontrol,monitoring,andconservation ofenergyconsumption.Thisnotonlyincludesefficiencyinconsumptionbut alsothecreationanddistributionofelectricpower.

● ProactiveDecision-Making:Byleveragingcloud/web-baseddataanalytics, stakeholderscanproactivelyidentifyconsumptionpatterns,anticipatedemand fluctuations,andplaninfrastructureupgradesormaintenanceactivities accordingly.Thisproactiveapproachenhancesgridstability,reduces downtime,andenhancesoveralloperationalefficiency.

1.5 Scope

BasedonrecentdatafromtheCentralElectricityAuthority(CEA), thepeakpowerdemandisexpectedtoreach230GWby2035.Meetingthisdemandrequir esstrategiccapacityadditionandrobustinfrastructuredevelopment.PoweringIndia:an analysisofcommercialelectricityconsumptioninanIndianstateusingdataanalyticsso urcedfromcloudorweb platformswouldentailexaminingtrends,patterns,andfactors influencingelectricityusage.Thisanalysiscouldencompassidentifyingpeakconsuon periods,understandingtheimpactofeconomicactivitiesandindustrialsectorsonelectri citydemand, detectinganomaliesorinefficienciesinconsumptionpatterns,and forecastingfutureconsumptiontrendstoaidinresourceallocationandinfrastructnning. Additionally,itcouldinvolveexploringcorrelationsbetweenelectricnalfactorssuchas weatherconditions,demographicshifts,orpolicychanges,providingorpolicymakers, utilityproviders,andbusinessestooptimizeenergymanagementstrategiesandpromote sustainable development.

CHAPTER 2

SERVICES AND TOOLS REQUIRED

2.1 Services Used

● Datacollectionandintegration
Dependingonyourdatasourcesandneeds,youcanusedifferentmethodsto collectenergydata,suchasmanualreading,wiredorwirelesscommunication, orcloud-basedservices.Manualreadingisthesimplestbutmost time-consuminganderror-pronemethod..Thiscouldincludeindustries,offices, retailoutlets,etc.Dataintegrationtechniqueswillbecrucialtoensure uniformityandconsistencyinthedataset.

● DescriptiveAnalytics: Performdescriptiveanalyticstounderstandthecurrent patternsandtrendsincommercialelectricityconsumption.Thisinvolves summarizingthedatathroughmeasuressuchasmean,median,mode,and standarddeviation,aswellasvisualizingthedatausingchartsandgraphsto identifyanyoutliersoranomalies.

● PredictiveModeling:Preciseelectricityforecastingisapertinent challengeineffectivelycontrollingthesupplyanddemandofpower. Thisisduetotheinherentvolatilityofelectricity,whichcannotbe storedandmustbeutilisedpromptly.

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:

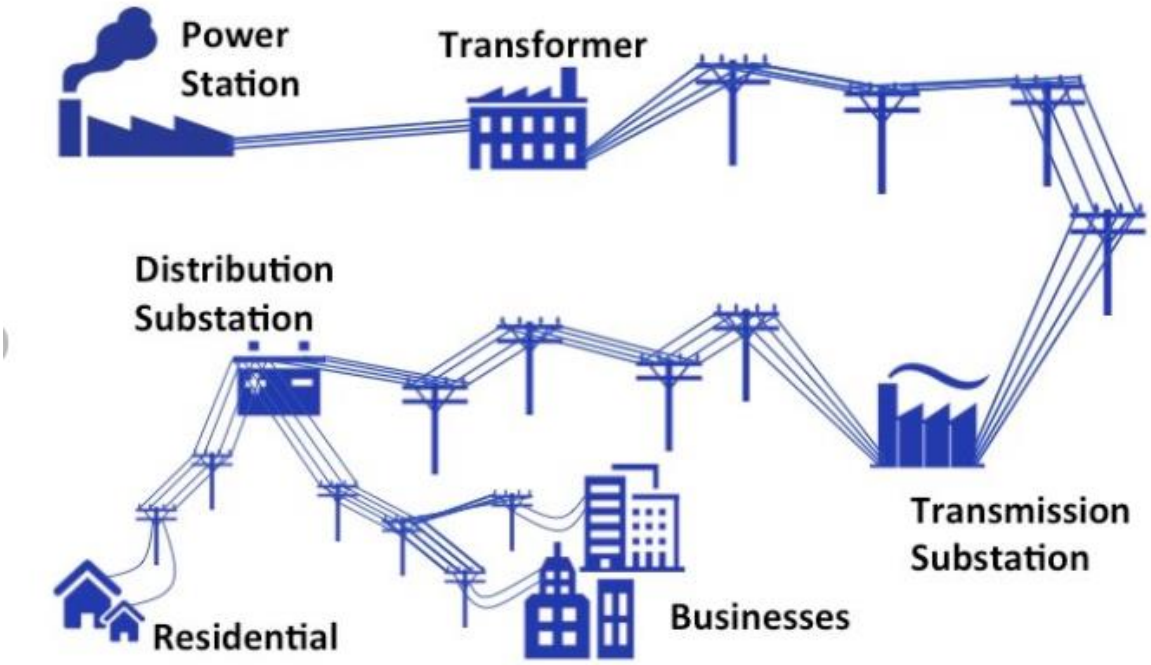
PowerBI Desktop: This is a Windows application that you can use to create reports and publish them to PowerBI.

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

CHAPTER 3

PROJECT ARCHITECTURE

3.1 Architecture



****DataAnalyticsArchitectureforCommercialElectricityConsumptioninIndia n State:****

● Datacollection: Gather data from cloud/websources including government databases,utility companies,and Io Tdevices.
● DataPreprocessing : Cleanse and preprocess the data to handle missing values,outliers,and inconsistencies.
● DataStorage :Store the processed data inascalable and efficient data storage system such as a dataware house or data lake.

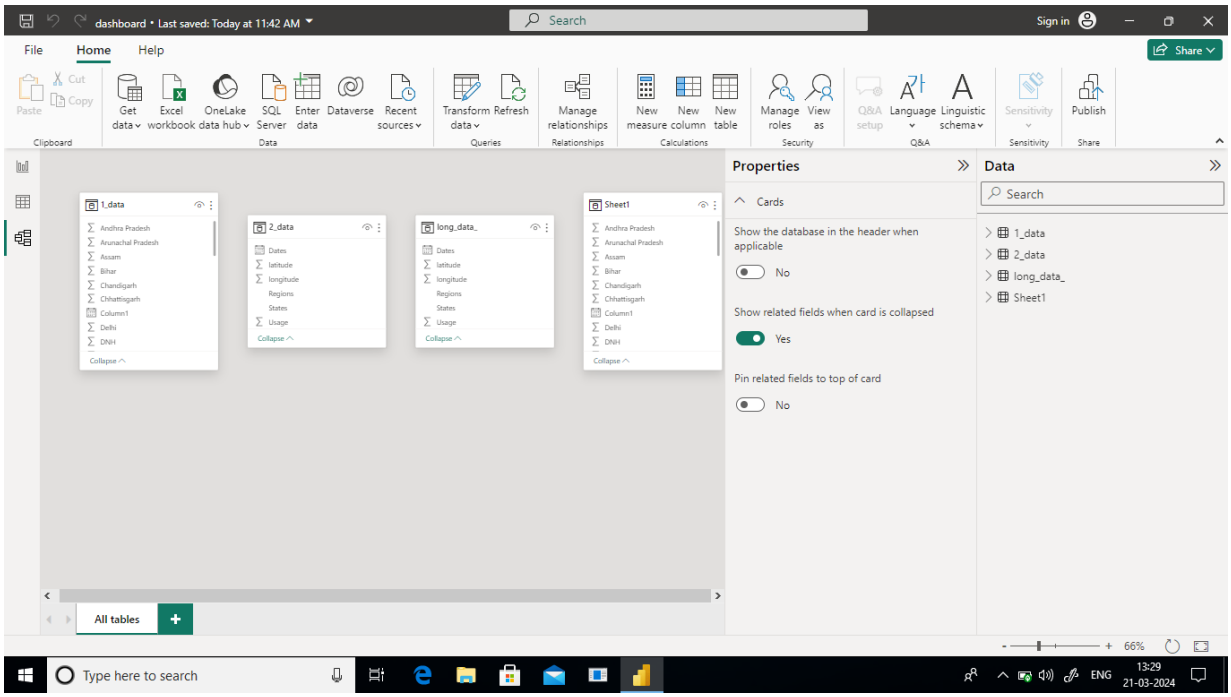
● Dataintegration: Integratedata from multiple sources to create a comprehensive dataset for analysis.
● AnalysisandModeling:Utilize machine learning and statistical techniques to analyze the data and build predictive models.
● Visualization:Create visualizations such as charts,graphs,and maps to present insights and trends in electricity consumption.
● Interpretation: Interpret there sults of the analysis to understand patterns, identify consumption drivers,and inform decision-making.
● ReportingandDeployment: Generate reports and deploythe analytics solution forstake holders to use in optimizing electricity consumption strategies.

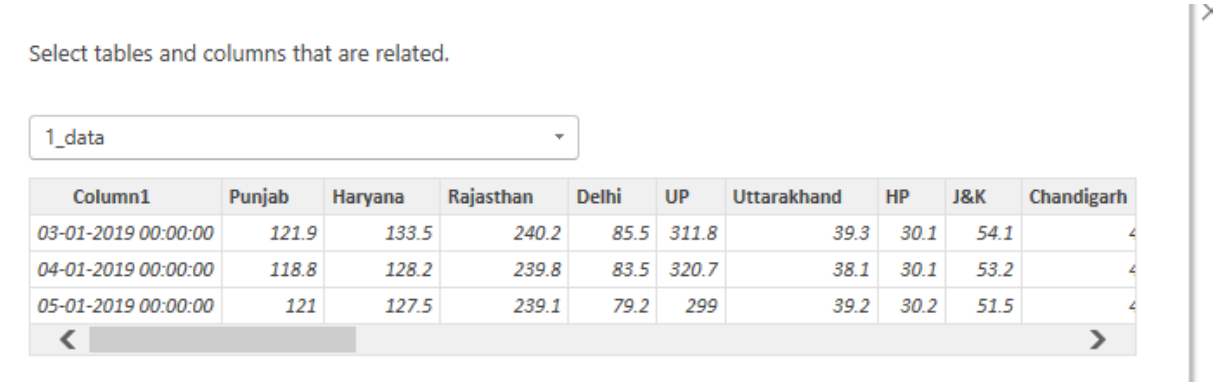
CHAPTER 4

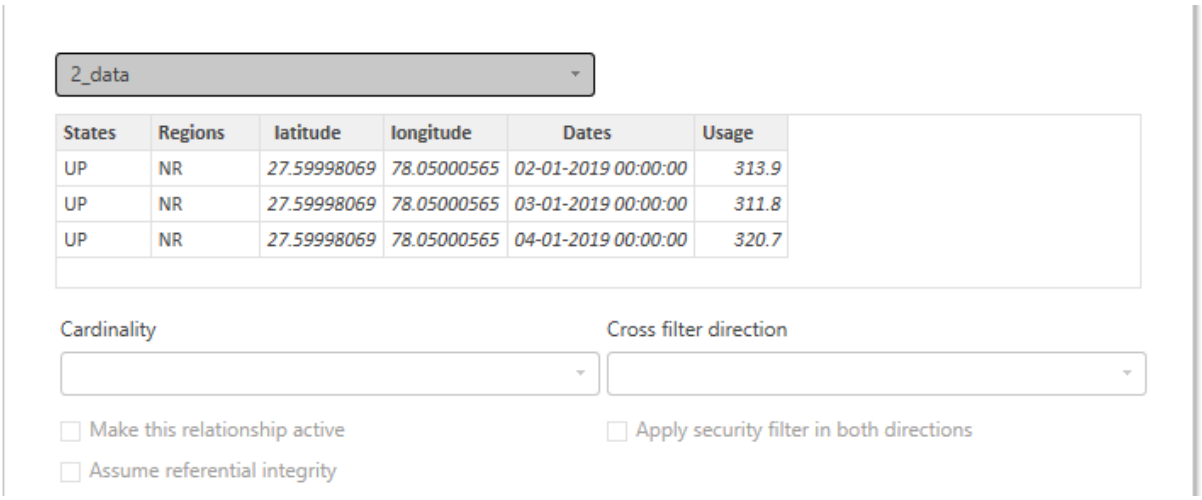
MODELING AND RESULT

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”

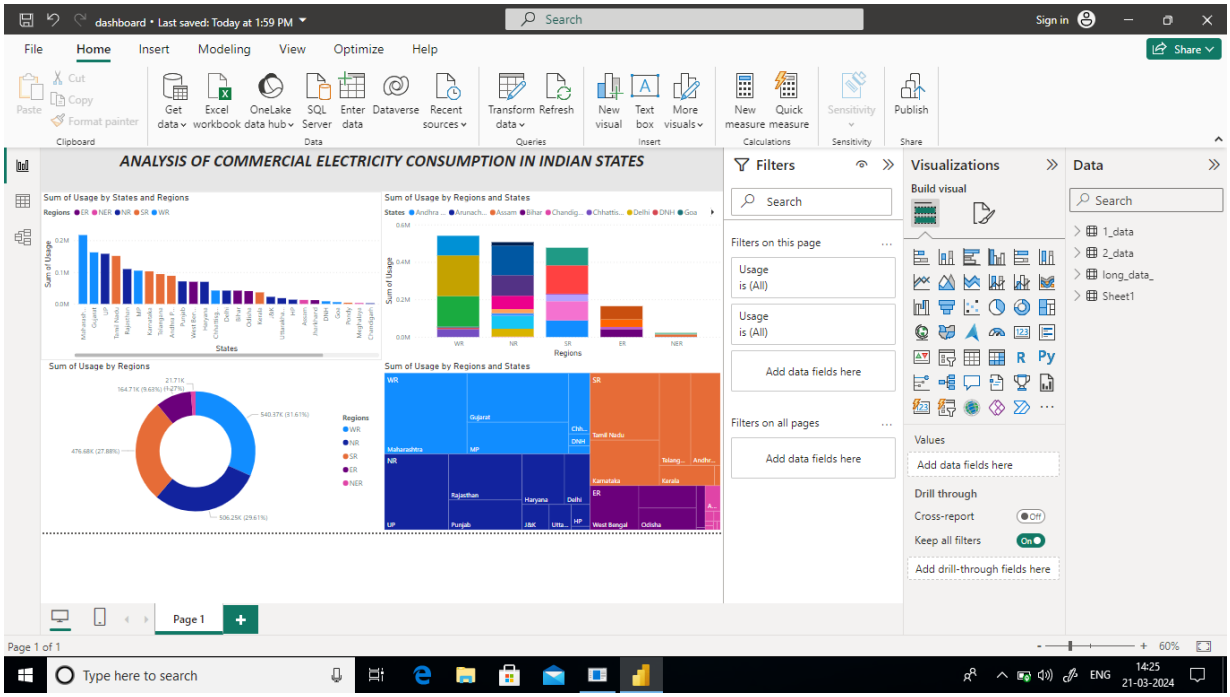






Dashboard

Analysis of Commercial Electricity Consumption in Indian State.



CONCLUSION

After conducting a comprehensive analysis of commercial electricity consumption in the selected Indian state using data analytics with datasourced from cloud/webplatforms ,It is evident that several key patterns and trends emerge. The nanalysis reveals distinct seasonal variations inconsumption ,with notable peaks during periods of economic activity and industrial production. Additionally,certain geographic regions within the state exhibit higher consumptionrates, likely influenced by factors such as urbanization,industrial development ,and infrastructure availability. Furthermore, the study highlights the importance of proactive energy managemen tstrategies,including demand-side management initiatives and investment inrenewable energy infrastructure,toensure sustainable electricity usage and mitigate potential supply constraints.Overall,these insight sunder score the significance of leveraging data-driven approaches to optimize commercial electricity consumption and drive towards a more resilient and efficient energy ecosystem in the state.

FUTURE SCOPE

Looking ahead, there are several promising avenues for further exploration and enhancement of the analysis of commercial electricity consumption in the Indian state leveraging data analytics and cloud/web-based data sources. Future research could delve deeper into granular sub-sector analysis to identify specific industries or business categories driving electricity demand and develop targetedenergyefficiencymeasurestailoredtotheiruniquerequirements. Additionally, integrating real-time data streams and advanced predictive analytics techniques can enable proactive demand forecasting and optimization, empowering stakeholders to anticipate and respond to fluctuations in electricity usage more effectively. Furthermore, exploring the intersection of emerging technologies such as Internet of Things (IoT) devices and smart meters with data analytics holds immense potential for enabling finer-grained monitoring and control of electricity consumption at the commercial level,pavingthewayfor moreagileandsustainableenergymanagementpracticesinthestate

REFERENCES

https://ideas.repec.org/a/ebl/ecbull/eb-17-00173.html

LINK

https://github.com/Pavithra-200/Analysis-of-Commercial-Electricity-Consumption-in-Indian-State/tree/main

