Introduction to Data Management

PROJECT REPORT

(Project Semester January-April 2025)

Analysis of unemployment during Covid Period In India

Submitted by

Ashish Garud

Registration No: 12317762

Section: K23PM

Programme: B. Tech - Computer Science and Engineering

Course Code: INT217

Under the Guidance of

Maneet Kaur (UID: 15709)

Discipline of CSE/IT

Lovely School of Computer Science and Engineering

Lovely Professional University, Phagwara

CERTIFICATE

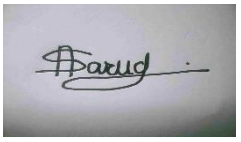
This is to certify that Ashish Garud bearing Registration no. 12317762 has completed INT217 (Introduction to Data Management) project titled, **"***Analysis of unemployment during Covid Period In India* **"** under my guidance and supervision. To the best of my knowledge, the present work is the result of his/her original development, effort and study.

Signature
Maneet Kaur (UID: 15709)
Designation of the Supervisor
School of Computer Science and Engineering
Lovely Professional University
Phagwara, Punjab.

Date:

DECLARATION

I, Ashish Garud, student of Computer Science and Engineering under CSE/IT Discipline at, Lovely Professional University, Punjab, hereby declare that all the information furnished in this project report is based on my own intensive work and is genuine.

Date: 11/04/2025 Signature : 

Registration No. 12317762

Name of the student: Ashish Garud

Acknowledgement

The opportunity of attaining a course based on Data Management using Excel at Lovely Professional University was worth learning. It was a prestige for me to be part of it. During the period of my course, I received tremendous knowledge related to Microsoft Excel and Data Management.

Pre-eminently, I would like to express my deep gratitude and special thanks to my course teacher Sameeksha Khare for her theoretical knowledge and encouragement on this project and for her valuable guidance and affection for the successful completion of this project.

Secondly, I would like to thank Lovely Professional University for giving me an opportunity to learn this course.

Lastly, I would like to thank the almighty and my parents for their constant encouragement, moral support, personal attention, and care.

Ashish Garud 12317762

– K23PM

B. Tech - Computer Science and Engineering

Lovely Professional University, Phagwara

Contents

Abstract

Microsoft Excel is a powerful data analysis tool widely used across industries to organize, process, and visualize data efficiently. With built-in features like formulas, charts, pivot tables, and Visual Basic for Applications (VBA), Excel serves as an excellent platform for building interactive dashboards and making informed decisions.

This project presents an **Excel Dashboard on Unemployment in India during the COVID-19 period**. The dashboard visually represents crucial insights from employment-related data using a variety of charts and visual tools. Key components include an area graph showing month-wise estimated employment, a bar chart and line graphs analyzing region-wise and temporal trends, a doughnut chart displaying area-wise employment, and a map of India to highlight geographic patterns.

The dashboard simplifies the interpretation of large datasets by consolidating key insights into a single view, enhancing decision-making and data storytelling. This project also reflects my practical learning and application of Excel-based data analysis techniques during the course.

List of Tables and Figures

Chapter 1 - Introduction

I have created an Excel Dashboard analyzing **unemployment trends in India during the COVID-19 period**. This dashboard highlights key facts, patterns, and trends related to employment and labor participation across different regions, timeframes, and area types (urban/rural).

The dataset used for this analysis contains detailed information on employment and unemployment figures across Indian states. It includes metrics such as estimated employment, unemployment rates, labor participation, and region-wise statistics, recorded over multiple months and years.

To perform this analysis, I cleaned and organized the raw dataset, created a new MonthlyYear column for better time-based grouping, and used Excel features like **pivot tables**, **charts**, **formulas**, and **slicers** to extract and visualize insights. The results are presented through a dynamic dashboard that includes various charts—such as area graphs, bar charts, line graphs, a doughnut chart, and an India map—offering a clear and interactive representation of unemployment trends during the pandemic.

Chapter 2 - Objectives

This project on **Unemployment Analysis in India during the COVID-19 period** aims to highlight key patterns and trends across various states, regions, and timeframes. The main objectives showcased in the dashboard are:

- Displaying the total number of estimated employed individuals and their month-wise distribution.
- Comparing unemployment rates across different regions (e.g., North, South, East, West) and states, over specific months and years.
- Analyzing labor participation trends across regions and area types (urban vs rural).
- Highlighting variations in employment and unemployment based on geographic regions.
- Visualizing time-series trends in unemployment and labor participation during the pandemic.
- Identifying regions and periods with the most significant employment shifts.
- Showcasing the state-wise and region-wise contribution to national employment trends.
- Presenting insightful and interactive visuals to support data-driven decisions and raise awareness about employment challenges during the pandemic.

Chapter 3 - Source of Dataset

The dataset used in this project was sourced from CMIE (Centre for Monitoring Indian Economy) and publicly available government records. It contains monthly labor statistics across Indian states and union territories, including details such as the **Estimated Unemployment Rate (%), Estimated Employed**, **Labor Participation Rate (%), Region**, **Date**, **Year**, and **Area type (Urban/Rural)**. This dataset offers valuable insights into employment trends before, during, and after the COVID-19 pandemic, enabling regional and temporal comparisons for more informed analysis.

Here are the details of my chosen dataset:

Name - Death Rates for Suicide by Sex, Race, Hispanic Origin, and Age — United States
Link - https://dge.gov.in/dge/sites/default/files/2024-01/2159.pdf
Worked on CSV Format after collection of datasets.
Format -PDF

Data Fields:

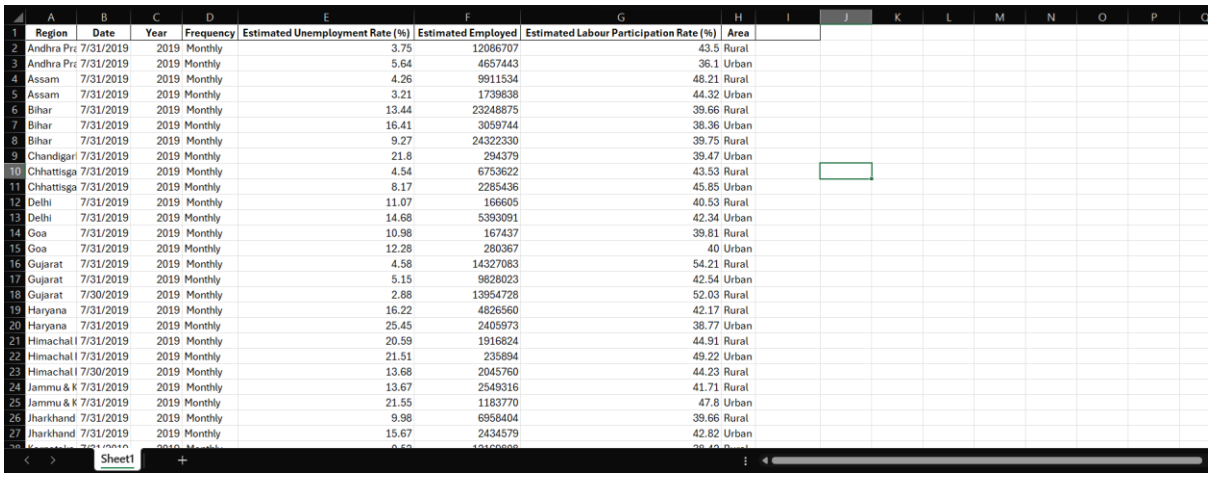
- **Date** — *(Date)* — Represents the month and year of the employment data.
- **Region** — *(String)* — Geographical classification (e.g., North, South, East, West).
- **State** — *(String)* — Specific state within the region.
- **Area** — *(String)* — Classification of area type (Urban or Rural).
- **Estimated Employed** — *(Numeric)* — Number of estimated employed individuals.
- **Estimated Unemployed** — *(Numeric)* — Number of estimated unemployed individuals.
- **Unemployment Rate (%)** — *(Numeric)* — Percentage of unemployed individuals.
- **Labour Participation Rate (%)** — *(Numeric)* — Percentage of people participating in the labor force.
- **MonthlyYear** — *(String)* — Custom column combining Month and Year for better time-based visualization.

Chapter 4 - Dataset Preprocessing

In this project, the dataset preprocessing was an important step to ensure accurate and meaningful analysis. The dataset was downloaded from the official United States Government Open Data Portal (Data.gov). The raw dataset contained information about suicide death rates in the United States categorized by gender, race, age group, and year.

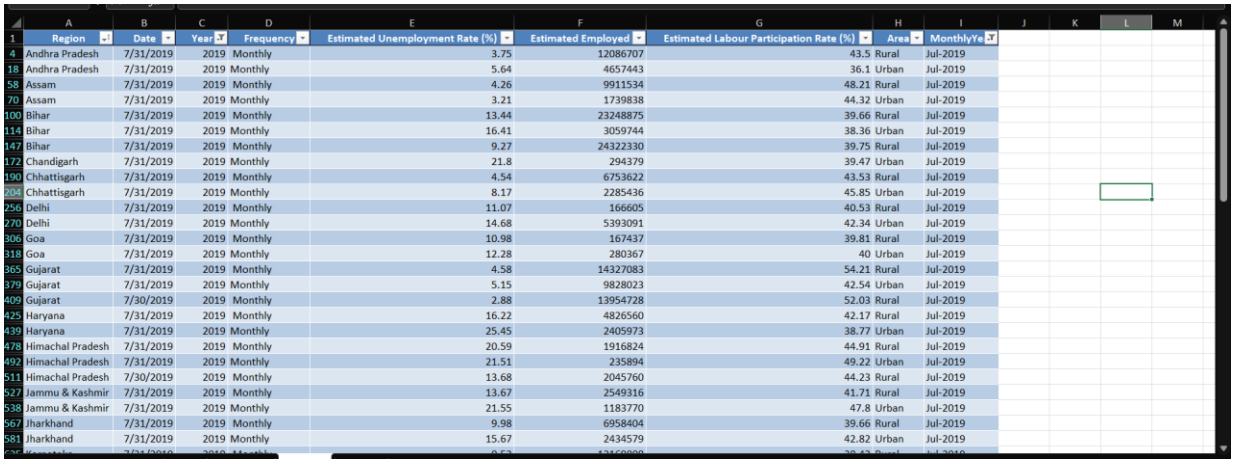
The following preprocessing steps were performed:

- **1. Data Cleaning:**
- Removed irrelevant or redundant columns not required for the analysis.
- Checked for and handled missing or inconsistent values in key columns.
- Ensured consistent formatting across all entries (e.g., date formats, area types).
- ---
- **2. Data Transformation:**
- Renamed column headers for better clarity and readability.
- Created a new derived column MonthlyYear to combine month and year for time-series analysis.
- Filtered out incomplete or ambiguous records to retain only valid data points.
- ---
- **3. Creating Clean Dataset Sheet:**
- After cleaning and organizing the data, a new sheet titled **"Clean Dataset"** was created within the Excel workbook.
- This sheet served as the foundation for building all visuals and performing the analysis in the dashboard.
- The following screenshots represent:

- 

Region	Date	Year	Frequency	Estimated Unemployment Rate (%)	Estimated Employed	Estimated Labour Participation Rate (%)	Area
Andhra Pra	7/31/2019	2019	Monthly	3.75	12086707	43.5	Rural
Andhra Pra	7/31/2019	2019	Monthly	5.64	4657443	36.1	Urban
Assam	7/31/2019	2019	Monthly	4.26	9911534	48.21	Rural
Assam	7/31/2019	2019	Monthly	3.21	1739838	44.32	Urban
Bihar	7/31/2019	2019	Monthly	13.44	23248875	39.66	Rural
Bihar	7/31/2019	2019	Monthly	16.41	3059744	38.36	Urban
Bihar	7/31/2019	2019	Monthly	9.27	24322330	39.75	Rural
Chandigarl	7/31/2019	2019	Monthly	21.8	294379	39.47	Urban
Chhattisga	7/31/2019	2019	Monthly	4.54	6753622	43.53	Rural
Chhattisga	7/31/2019	2019	Monthly	8.17	2285436	45.85	Urban
Delhi	7/31/2019	2019	Monthly	11.07	166605	40.53	Rural
Delhi	7/31/2019	2019	Monthly	14.68	5393091	42.34	Urban
Goa	7/31/2019	2019	Monthly	10.98	167437	39.81	Rural
Goa	7/31/2019	2019	Monthly	12.28	280367	40	Urban
Gujarat	7/31/2019	2019	Monthly	4.58	14327083	54.21	Rural
Gujarat	7/31/2019	2019	Monthly	5.15	9828023	42.54	Urban
Gujarat	7/30/2019	2019	Monthly	2.88	13954728	52.03	Rural
Haryana	7/31/2019	2019	Monthly	16.22	4826560	42.17	Rural
Haryana	7/31/2019	2019	Monthly	25.45	2405973	38.77	Urban
Himachal I	7/31/2019	2019	Monthly	20.59	1916824	44.91	Rural
Himachal I	7/31/2019	2019	Monthly	21.51	235894	49.22	Urban
Himachal I	7/30/2019	2019	Monthly	13.68	2045760	44.23	Rural
Jammu & K	7/31/2019	2019	Monthly	13.67	2549316	41.71	Rural
Jammu & K	7/31/2019	2019	Monthly	21.55	1183770	47.8	Urban
Jharkhand	7/31/2019	2019	Monthly	9.98	6958404	39.66	Rural
Jharkhand	7/31/2019	2019	Monthly	15.67	2434579	42.82	Urban

Figure 1: The original/raw dataset imported from Data.gov.



Region	Date	Year	Frequency	Estimated Unemployment Rate (%)	Estimated Employed	Estimated Labour Participation Rate (%)	Area	MonthlyYe
Andhra Pradesh	7/31/2019	2019	Monthly	3.75	12086707	43.5	Rural	Jul-2019
Andhra Pradesh	7/31/2019	2019	Monthly	5.64	4657443	36.1	Urban	Jul-2019
Assam	7/31/2019	2019	Monthly	4.26	9911534	48.21	Rural	Jul-2019
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Chhattisgarh	7/31/2019	2019	Monthly	4.54	6753622	43.53	Rural	Jul-2019
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Goa	7/31/2019	2019	Monthly	10.98	167437	39.81	Rural	Jul-2019
Goa	7/31/2019	2019	Monthly	12.28	280367	40	Urban	Jul-2019
Gujarat	7/31/2019	2019	Monthly	4.58	14327083	54.21	Rural	Jul-2019
Gujarat	7/31/2019	2019	Monthly	5.15	9828023	42.54	Urban	Jul-2019
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Haryana	7/31/2019	2019	Monthly	25.45	2405973	38.77	Urban	Jul-2019
Himachal Pradesh	7/31/2019	2019	Monthly	20.59	1916824	44.91	Rural	Jul-2019
Himachal Pradesh	7/31/2019	2019	Monthly	21.51	235894	49.22	Urban	Jul-2019
Himachal Pradesh	7/30/2019	2019	Monthly	13.68	2045760	44.23	Rural	Jul-2019
Jammu & Kashmir	7/31/2019	2019	Monthly	13.67	2549316	41.71	Rural	Jul-2019
Jammu & Kashmir	7/31/2019	2019	Monthly	21.55	1183770	47.8	Urban	Jul-2019
Jharkhand	7/31/2019	2019	Monthly	9.98	6958404	39.66	Rural	Jul-2019
Jharkhand	7/31/2019	2019	Monthly	15.67	2434579	42.82	Urban	Jul-2019

Figure 2: The cleaned dataset sheet created after data preprocessing.

- This clean dataset sheet was used as the primary source for performing analysis and creating visualizations in the dashboard.

2. Data Preparation:

- Created calculated columns for better analysis (e.g., calculating total suicide rates, average rates, etc.).
- This screenshot represent:

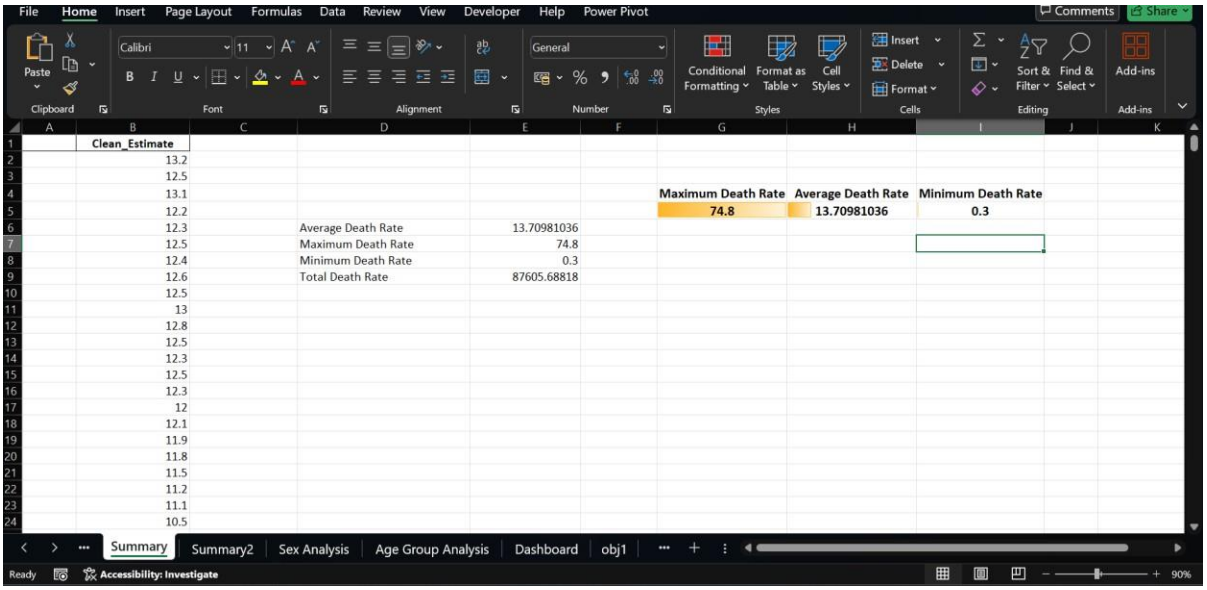


Figure 3: The calculated columns for better analysis

- Used sorting and filtering techniques to analyse specific data points.

This preprocessing phase ensured that the dataset was accurate, consistent, and ready for further analysis using Excel tools like Pivot Tables, Charts, Slicers, and Conditional Formatting.

Chapter 5 - Analysis on dataset

- General Description:

The dataset provides detailed insights into the employment and unemployment patterns in India during the COVID period. It includes month-wise, region-wise, area-wise, and state-wise information, which helps in understanding how the pandemic affected the Indian labor market. The dataset tracks variables such as estimated employment, unemployment rates, labor participation, and area-wise employment distribution.

This project focuses on analyzing how employment trends shifted due to COVID-19. It highlights which regions and states faced higher unemployment, how urban and rural areas were differently affected, and the overall monthly trends in labor participation. A new column, MonthlyYear, was created from the existing date column to enable clear and precise time-based analysis.

To ensure the dataset was ready for accurate and meaningful insights, it was preprocessed and cleaned before analysis. Various Excel tools such as Pivot Tables, Charts, Slicers, Conditional Formatting, and Formulas were used to create a comprehensive and dynamic dashboard. The dashboard visually presents trends and insights, enabling quick interpretation and data-driven decision-making.

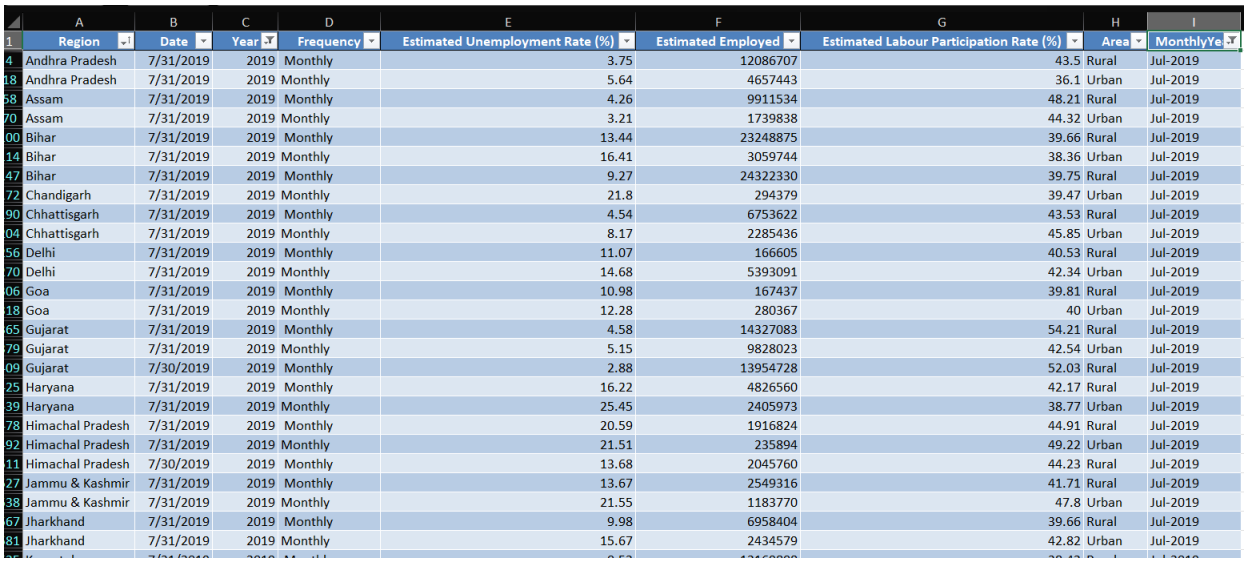
The findings from this analysis aim to help government agencies, policymakers, researchers, and the general public understand the economic impact of COVID on employment in India and support targeted strategies for recovery.

- Specific Requirements:

The specific requirements of this project were to analyze the unemployment dataset and draw insightful conclusions using Microsoft Excel. The goal was to transform raw COVID-period employment data into meaningful visual representations via a user-friendly dashboard.

The main requirements included:

- Cleaning and preprocessing the dataset for structured and accurate analysis.
- Creating a new MonthlyYear column to simplify monthly time-series tracking.
- Designing a dynamic Excel Dashboard that visually communicates the trends and patterns in employment and unemployment during the COVID period.
- Using Excel features like Pivot Tables, Charts (Area, Bar, Line, Doughnut), Slicers, and Conditional Formatting to extract and display insights effectively.



	A	B	C	D	E	F	G	H	I
1	Region	Date	Year	Frequency	Estimated Unemployment Rate (%)	Estimated Employed	Estimated Labour Participation Rate (%)	Area	MonthlyYe
4	Andhra Pradesh	7/31/2019	2019	Monthly	3.75	12086707	43.5	Rural	Jul-2019
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67	Jharkhand	7/31/2019	2019	Monthly	9.98	6958404	39.66	Rural	Jul-2019
81	Jharkhand	7/31/2019	2019	Monthly	15.67	2434579	42.82	Urban	Jul-2019

Figure 4: *The cleaned dataset sheet showing well-structured columns such as State, Date, Region, Area, Estimated Employed, Estimated Unemployed, Labor Participation, and the derived column MonthlyYear for improved time-based analysis and accessibility*

- Generating pivot tables to analyse suicide rates state-wise, gender-wise, race-wise, and age-wise.
- Designing various charts like bar charts, line charts, pie charts, and heatmaps to visualize different aspects of the data.
- Incorporating slicers to filter the dataset interactively based on parameters like year, state, gender, and age group.
- Highlighting key performance indicators (KPIs) like states with the highest suicide rates, lowest suicide rates, and average suicide rates across the dataset.

- Ensuring the dashboard is dynamic, user-friendly, and provides a comprehensive overview of the data.
- Utilizing conditional formatting to visually emphasize significant values and trends in the data.

These requirements were fulfilled using Excel tools and functions, ensuring an effective analysis of the dataset and the creation of a dynamic and insightful dashboard that can help users better understand suicide trends in the United States and facilitate data-driven decision-making.

- Analysis results:

Based on the analysis of the unemployment dataset in India during the COVID period using Excel, the following key insights were obtained:

- **Month-wise analysis** (via area graph) showed clear fluctuations in estimated employment, with sharp drops during the nationwide lockdown phases and a gradual increase as restrictions were lifted.

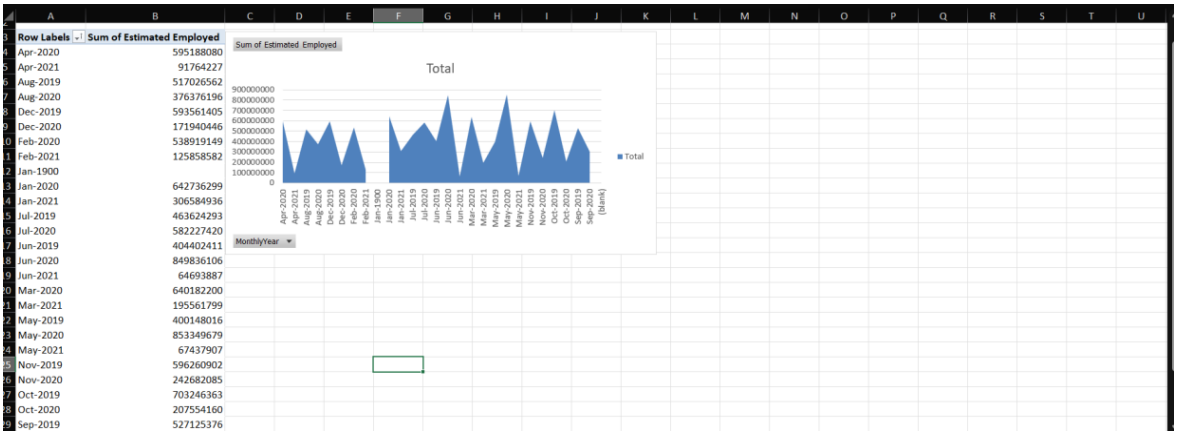


Figure 5: Pivot Tables to analyse month wise Employment analysis

- **Region-wise analysis** (through bar and line graphs) revealed that certain regions faced higher unemployment rates compared to others, indicating uneven impact across the country.

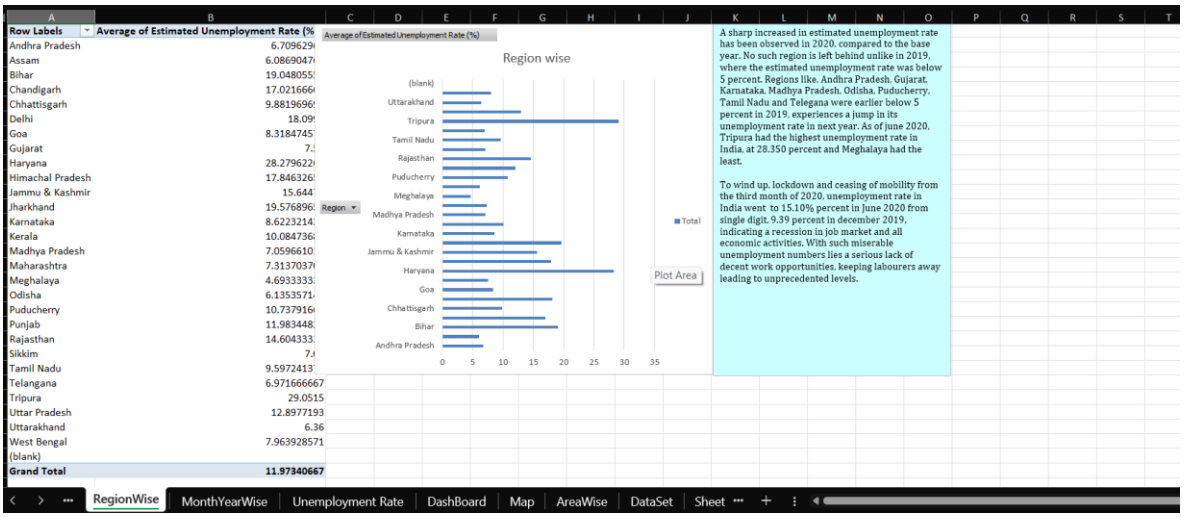


Figure 6: The representation unemployemnet region wise

- **Area-wise employment distribution** (visualized with a doughnut chart) showed the proportion of employment in rural vs urban areas, highlighting how different areas were affected during the pandemic.

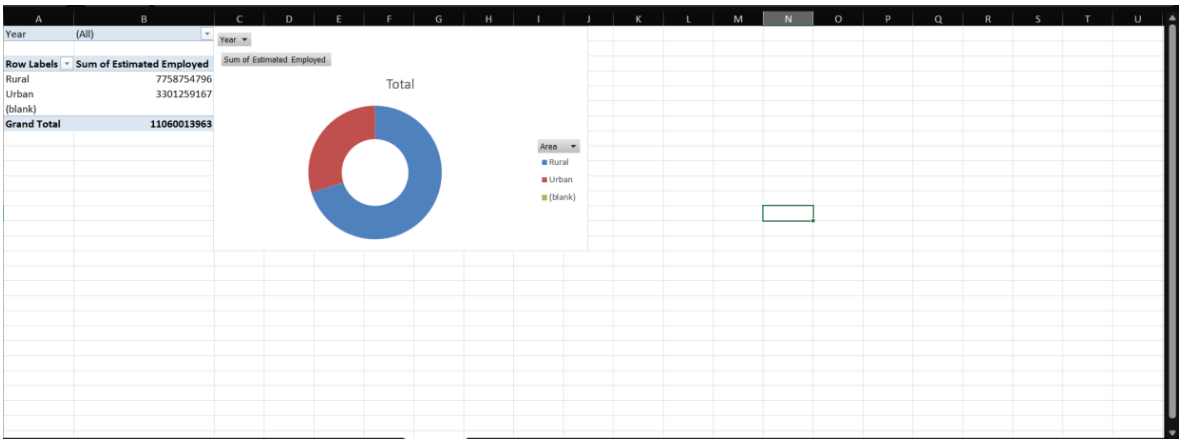


Figure 7: The representation of employment Area wise

• The use of slicers in the dashboard allowed users to interactively filter the data and focus on specific areas of interest, such as regions, time periods, and area types (urban/rural). This enhanced the overall analytical experience by making the dashboard dynamic and user-friendly.

These results provide a clear understanding of unemployment trends across India during the COVID period and support data-driven decision-making for policy planning and economic recovery strategies. The analysis also demonstrates the effectiveness of Excel's powerful features in handling large datasets and transforming them into meaningful insights for real-world challenges.

- Visualization:

  This section presents the visualizations created during the analysis of the unemployment dataset using Excel. These visualizations offer a clear and interactive representation of the data, making it easier to identify patterns and support informed decision-making.The following visualizations were created:

  - **Area Chart** – Month-wise estimated employed population

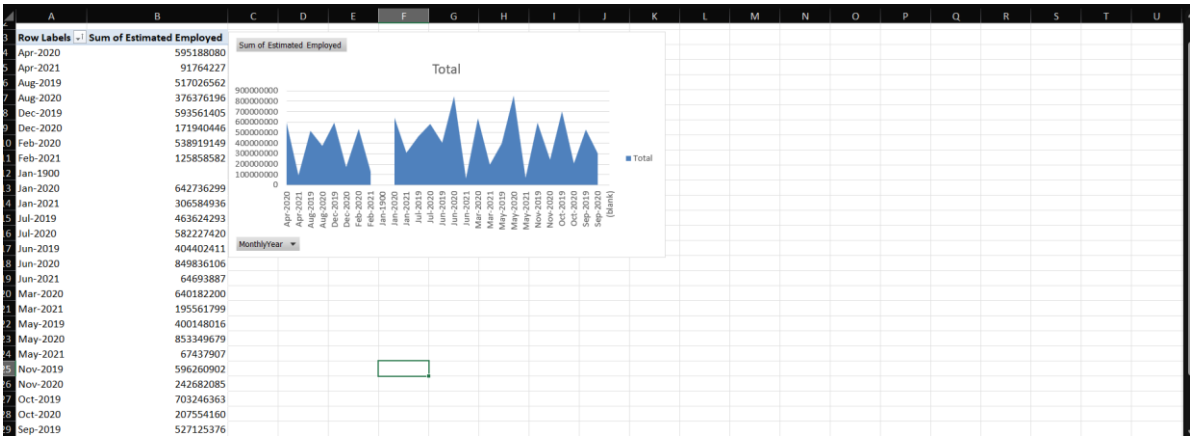
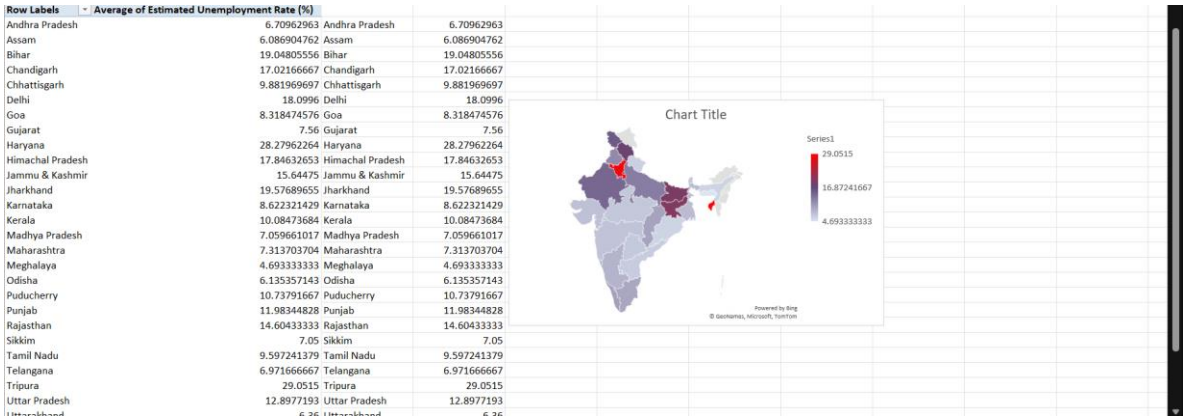


Figure 8: Area Chart of employed Month-wise

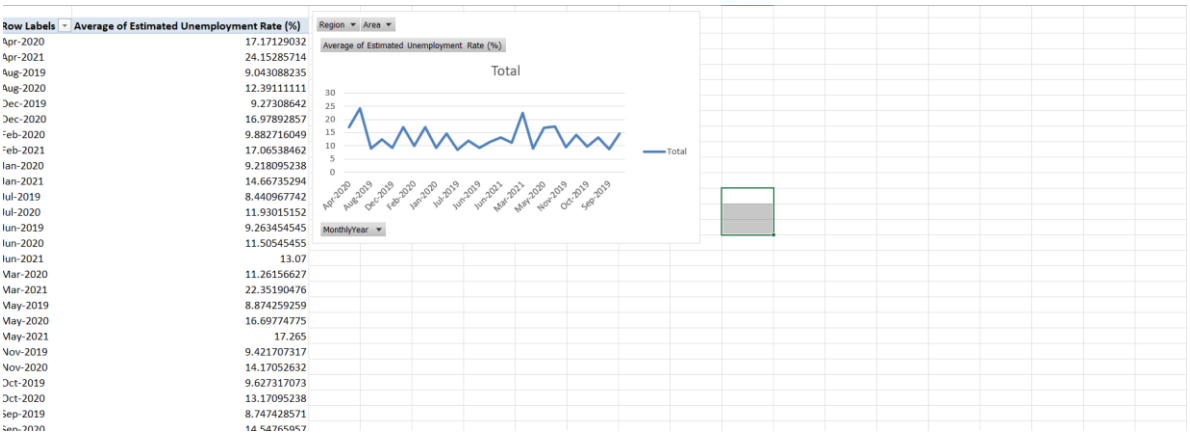
  - **India Map** – State-wise unemployment distribution



Row Labels	Average of Estimated Unemployment Rate (%)		
Andhra Pradesh	6.70962963	Andhra Pradesh	6.70962963
Assam	6.086904762	Assam	6.086904762
Bihar	19.04805556	Bihar	19.04805556
Chandigarh	17.02166667	Chandigarh	17.02166667
Chhattisgarh	9.881969697	Chhattisgarh	9.881969697
Delhi	18.0996	Delhi	18.0996
Goa	8.318474576	Goa	8.318474576
Gujarat	7.56	Gujarat	7.56
Haryana	28.27962264	Haryana	28.27962264
Himachal Pradesh	17.84632653	Himachal Pradesh	17.84632653
Jammu & Kashmir	15.64475	Jammu & Kashmir	15.64475
Jharkhand	19.57689655	Jharkhand	19.57689655
Karnataka	8.622321429	Karnataka	8.622321429
Kerala	10.08473684	Kerala	10.08473684
Madhya Pradesh	7.059661017	Madhya Pradesh	7.059661017
Maharashtra	7.313703704	Maharashtra	7.313703704
Meghalaya	4.693333333	Meghalaya	4.693333333
Odisha	6.135357143	Odisha	6.135357143
Puducherry	10.73791667	Puducherry	10.73791667
Punjab	11.98344828	Punjab	11.98344828
Rajasthan	14.60433333	Rajasthan	14.60433333
Sikkim	7.05	Sikkim	7.05
Tamil Nadu	9.597241379	Tamil Nadu	9.597241379
Telangana	6.971666667	Telangana	6.971666667
Tripura	29.0515	Tripura	29.0515
Uttar Pradesh	12.8977193	Uttar Pradesh	12.8977193

Figure 9: India map distribution for Unemployment

- **Line Graph** – Monthly-year-wise unemployment trend



Row Labels	Average of Estimated Unemployment Rate (%)
Apr-2020	17.17129032
Apr-2021	24.15285714
Aug-2019	9.043088235
Aug-2020	12.39111111
Dec-2019	9.27308642
Dec-2020	16.97892857
Feb-2020	9.882716049
Feb-2021	17.06538462
Jan-2020	9.218095238
Jan-2021	14.66735294
Jul-2019	8.440967742
Jul-2020	11.93015152
Jun-2019	9.263454545
Jun-2020	11.50545455
Jun-2021	13.07
Mar-2020	11.26156627
Mar-2021	22.35190476
May-2019	8.874259259
May-2020	16.69774775
May-2021	17.265
Nov-2019	9.421707317
Nov-2020	14.17052632
Oct-2019	9.627317073
Oct-2020	13.17095238
Sep-2019	8.747428571
Sep-2020	14.54765957

Figure 10: Line Graph for Monthly – year wise trend for unemployment

- **Doughnut Chart** – Area-wise (urban/rural) employment share

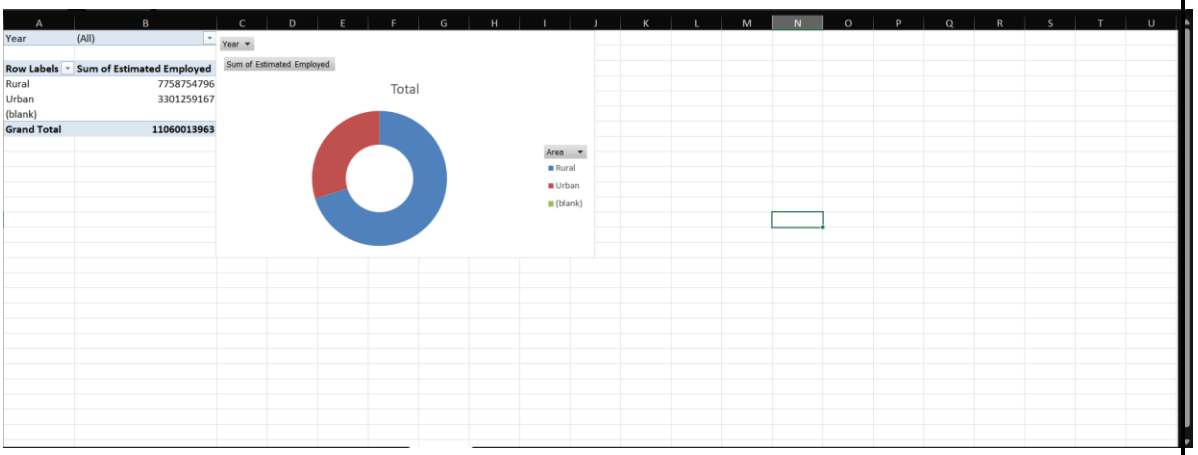


Figure 11: Doughnut chart for Area wise distribution

- **Line Graph** – Region-wise labor participation trend

Figure 12: Donut Chart of Comparison of Distribution of Labour Participation region wise

These charts and visuals effectively represented the key insights derived from the dataset in a visually appealing and user-friendly manner. They enabled users to quickly interpret trends in employment and unemployment across different regions and time periods, allowing for a focused analysis of critical areas. The dynamic and interactive nature of the dashboard also enhanced the clarity of reporting, making it easier to communicate findings and support data-driven decisions.

Chapter 6 - Dashboard

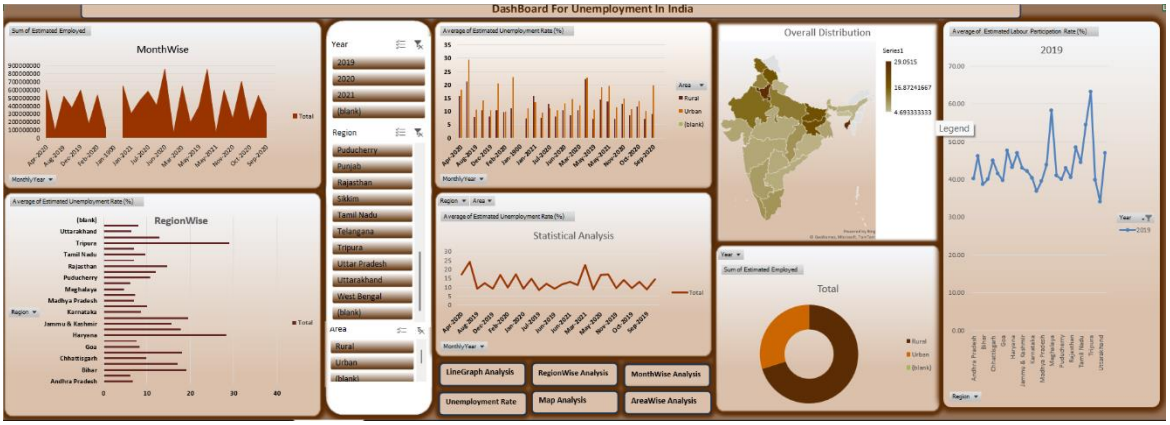


Figure 13: Final Dashboard

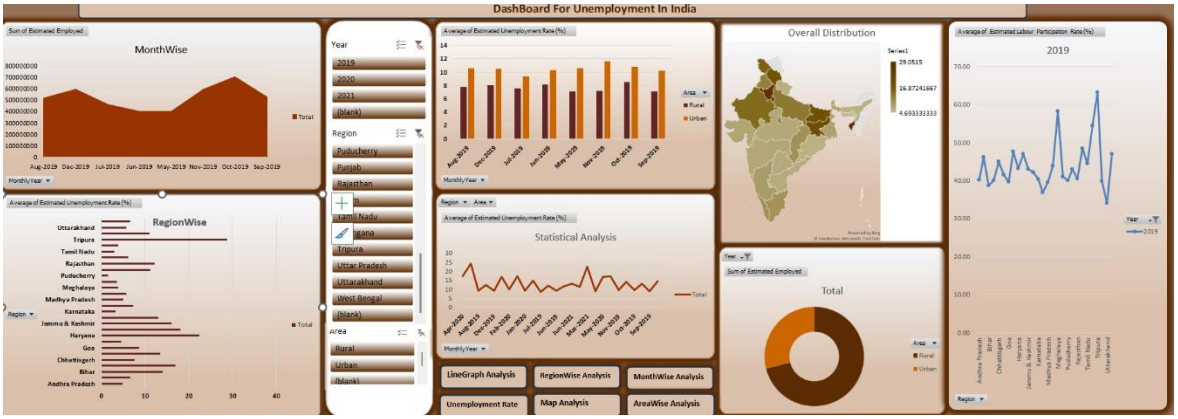


Figure 14: Analysing data using slicers

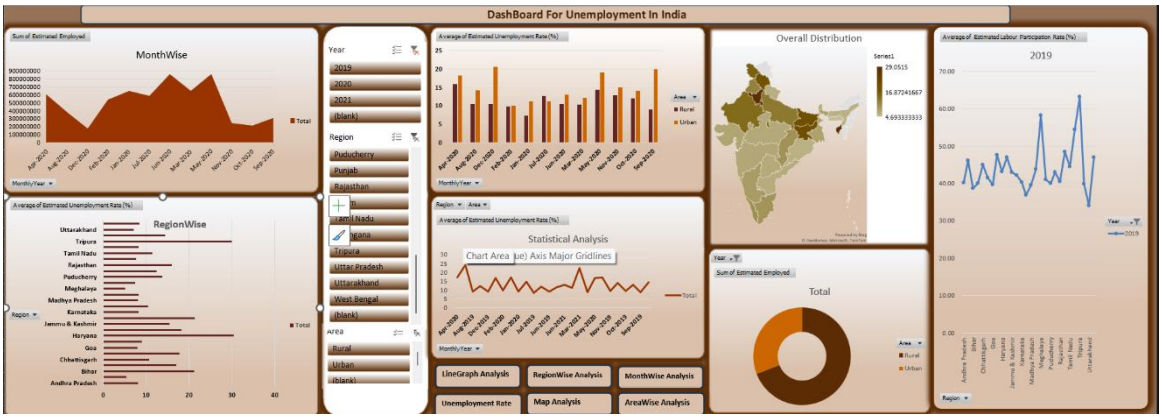


Figure 15: Analysing data using slicers

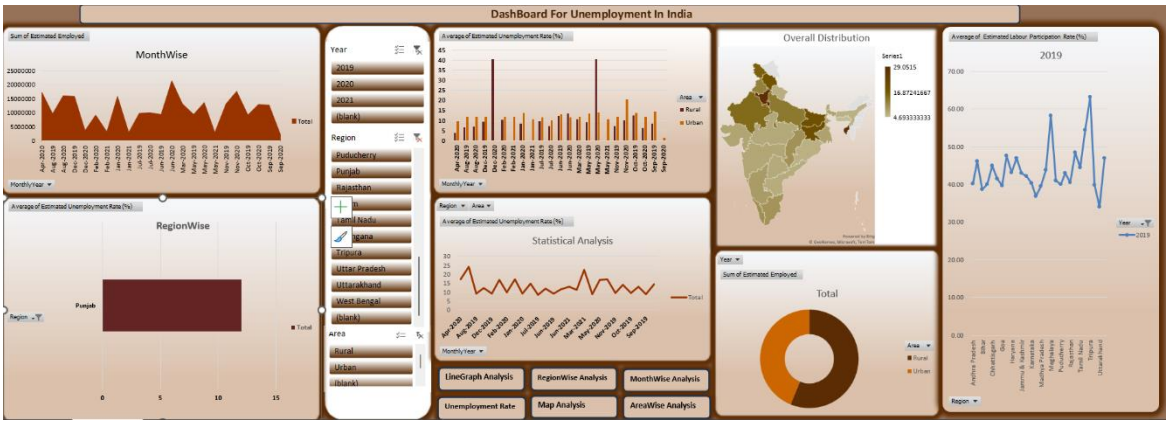


Figure 16: Analysing data using slicers

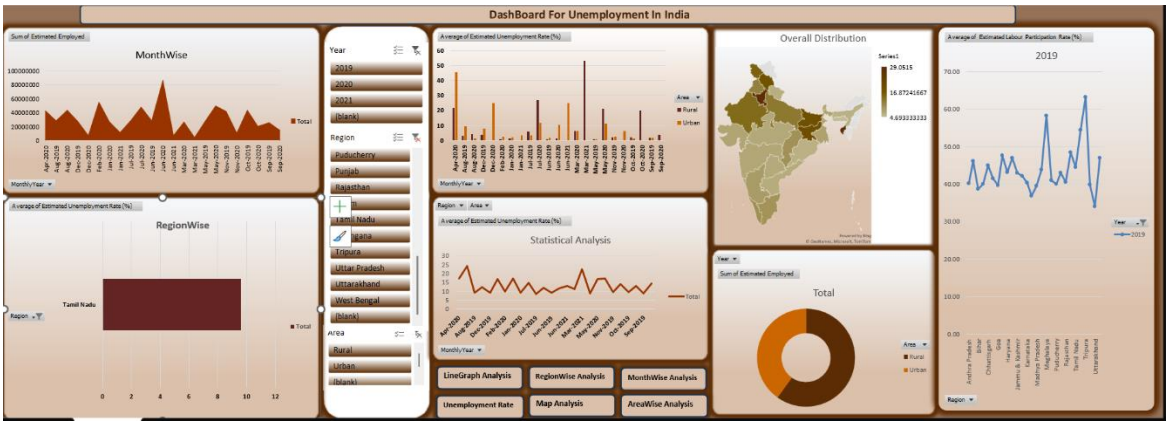


Figure 17: Analysing data using slicers

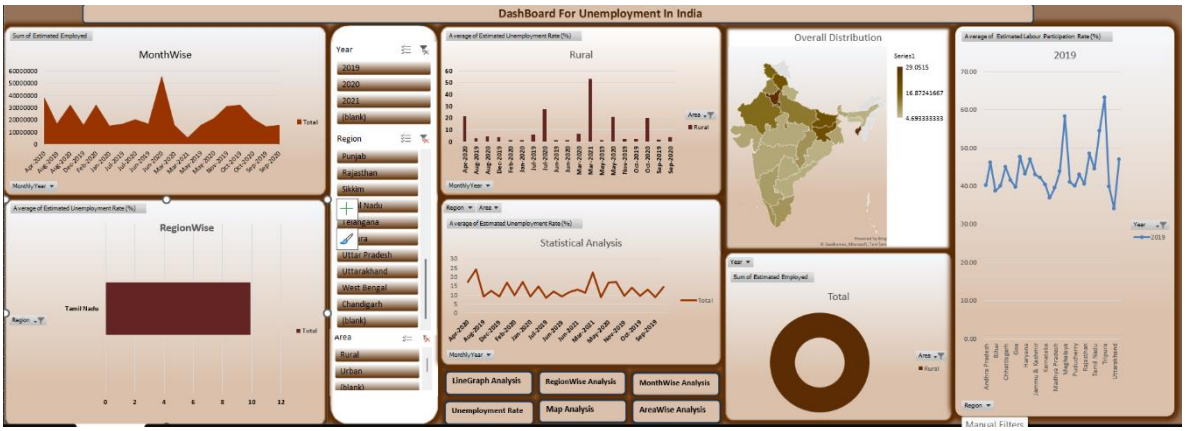


Figure 18: Analysing data using slicers

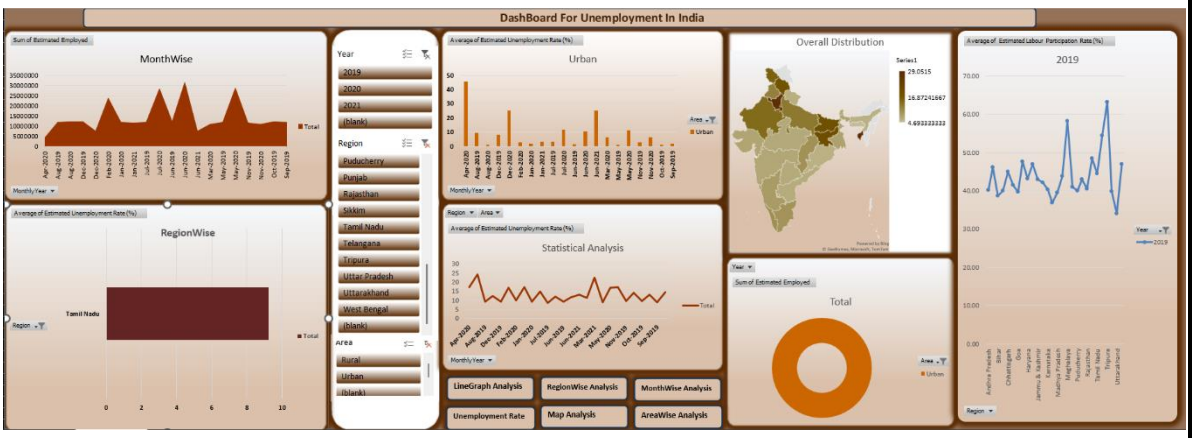


Figure 19: Analysing data using slicers

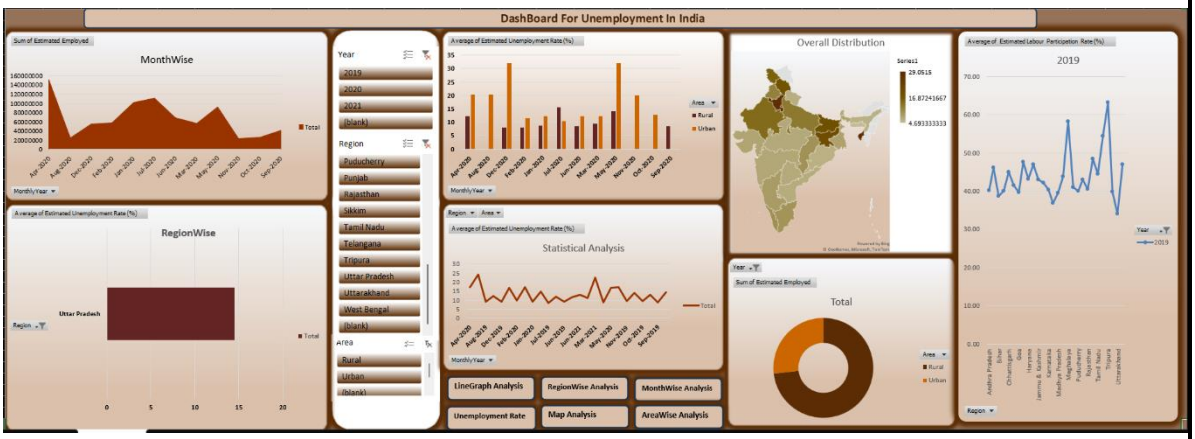


Figure 21: Analysing data using slicers

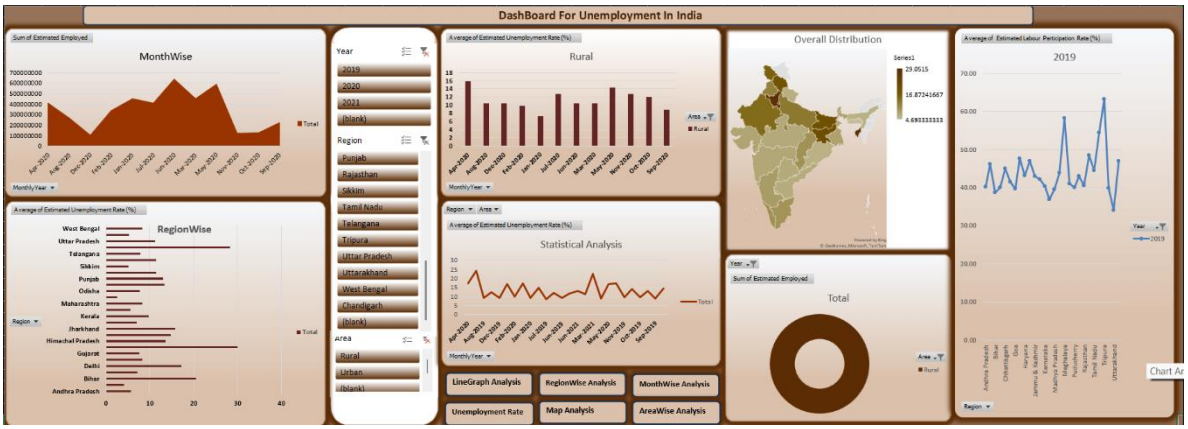


Figure 22: Analysing data using slicers

Chapter 7 - Conclusion

This project provided valuable insights into unemployment trends across different states and regions in India during the COVID-19 pandemic. By leveraging Excel's tools and features, I was able to clean, organize, and analyze the dataset efficiently. The visualizations created using pivot tables, slicers, and various chart types allowed for an interactive and user-friendly dashboard experience.

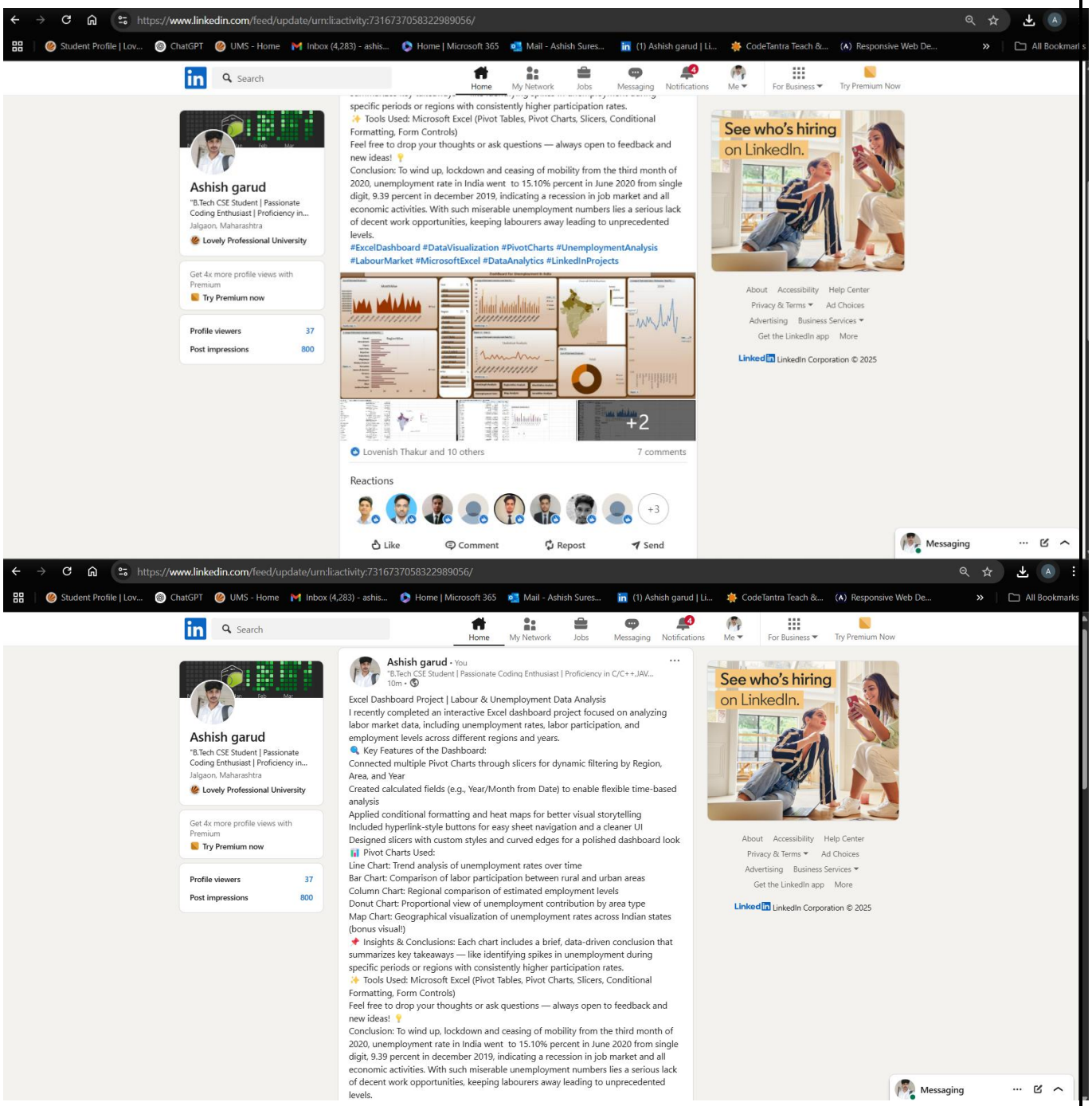
The analysis uncovered significant trends, such as fluctuations in estimated employment over time, regional disparities in unemployment rates, and variations in labor force participation between urban and rural areas. The month-wise and region-wise breakdowns helped identify which areas were most affected during specific periods of the pandemic.

This project enabled a deeper understanding of how geographic and demographic factors influenced employment patterns during a national crisis. These insights are valuable for policymakers and researchers aiming to design targeted employment recovery strategies.

Overall, this project enhanced my skills in data preprocessing, analysis, and visualization using Excel. It showed how complex datasets can be transformed into powerful visual stories to support informed decision-making. Moreover, it emphasized the real-world importance of data analytics in addressing major socio-economic issues, such as employment and economic stability during unprecedented times.

Working on this dashboard gave me hands-on experience in handling real-time data, performing exploratory data analysis (EDA), and building a dynamic dashboard to present meaningful insights effectively.

Linkdin:



https://www.linkedin.com/feed/update/urn:li:activity:7316737058322989056/

Chapter 8 - Future scope

This project successfully demonstrates the use of Excel as a powerful tool for data cleaning, analysis, and visualization in understanding unemployment trends during the COVID-19 period. However, there is ample scope for future enhancements to broaden the project's impact and applicability to real-world policy-making and workforce planning.

In the future, the dataset can be extended to include more recent years beyond the COVID period, allowing for a comparative analysis between pre-pandemic, pandemic, and post-pandemic unemployment trends. Additional parameters such as education level, income group, industry type, employment sector (formal/informal), and skill level can be integrated to provide a more detailed and layered understanding of employment patterns.

Advanced data visualization platforms like **Power BI**, **Tableau**, or **Python-based tools** (e.g., Matplotlib, Plotly, Seaborn) can be used to make the dashboard more dynamic, interactive, and accessible to a wider audience. These tools can also handle larger datasets efficiently and enable real-time insights with improved visual appeal and analytical depth.

Another potential enhancement is the use of **predictive analytics** and **machine learning models** to forecast unemployment trends based on historical data. This can support governments and organizations in proactive decision-making and resource planning by identifying regions or sectors likely to face higher unemployment risks.

Real-time data integration from official sources like the Ministry of Labour and Employment, NSSO, or CMIE can ensure that the dashboard remains up-to-date and reliable for continuous tracking. This will make the tool more relevant for researchers, policymakers, and job market analysts.

Lastly, **collaborations with policy institutions, NGOs, and employment agencies** can turn this dashboard into a public resource to design better employment schemes, targeted skill development programs, and regional economic strategies.

This project lays a solid foundation for further development into a more comprehensive, scalable, and impactful analytical tool that can support **employment recovery planning, economic resilience, and informed decision-making** at national and regional levels.

Chapter 9 - References

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