

ANALYSIS OF UNEMPLOYMENT IN INDIA

A MAJOR PROJECT REPORT

In partial fulfillment for the award of the degree

Of

MASTER OF SCIENCE

In

DATA SCIENCE AND ANALYTICS

Session

(2020-2022)

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SCHOOL OF DATA SCIENCE AND FORECASTING

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SCHOOL OF DATA SCIENCE AND FORECASTING

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...“STATEMENT OF ORIGINALITY”...

In accordance with the requirements for the Degree of Master of Science in Data Science and Analytics, in SCHOOL OF DATA SCIENCE AND FORECASTING, I present this report entitled ANALYSIS OF UNEMPLOYMENT IN INDIA.

This report is completed under the supervision of:-

Mr. Vandit Hedau Sir

Professor & Placement Officer

I declare that the work presented in the report is our own work except as acknowledged in the text and footnotes, and that to my knowledge this material has not been submitted either in whole or in part, for any other degree at this University or at any other such Institution.

Signature :-



Name :- Rajkumar Choudhary

Date :- 15/06/2022

SCHOOL OF DATA SCIENCE AND FORECASTING
DEVI AHILYA VISHWAVIDYALAYA
INDORE(M.P.)

...“RECOMMENDATION”...

This dissertation entitled “**ANALYSIS OF UNEMPLOYMENT IN INDIA**” submitted by **Rajkumar Choudhary** towards the fulfillment of Degree of Master of Science in Data Science and Analytics of Devi Ahilya Vishwavidyalaya, Indore is a satisfactory account of her project work and is recommended for the award of degree.

-:Internal Supervisor:-
Mr. Vandit Hedau Sir
Professor & Placement Officer

SCHOOL OF DATA SCIENCE AND FORECASTING

DEVI AHILYA VISHWAVIDHYALAYA

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...“CERTIFICATE”...

This is to certify that the dissertation entitled “**ANALYSIS ON UNEMPLOYMENT IN INDIA**” submitted by **Rajkumar Choudhary** is approved of Master of Science in Data Science and Analytics.

-:INTERNAL EXAMINER:-

Name:- Mr. Vandit Hedau Sir

Date:-

...“ACKNOWLEDGEMENT”...

I have immense pleasure in expressing my sincerest and deepest sense of gratitude towards our guide as well as **Professor of the Department Mr. Vandit Hedau**, for the assistance, valuable guidance and co-operation in carrying out this Project successfully, Also for providing the required facilities in completing this project. We have developed this project with the help of Faculty members of our institute and I am extremely grateful to all of them. I am greatly thankful to our parents, friends and faculty members for their motivation, guidance and help whenever needed.

Signature :-



Name :- **Rajkumar Choudhary**

Date :- 15/06/2022

...“ABSTRACT”...

The goal of this research is to learn more about India's unemployment condition and how the country's GDP and inflation rate influence unemployment. I used around five years of data from the date 14th May 2017 to 13th May 2022 in my project. In this project & research, regression analysis is used to determine the relationship between India's unemployment, GDP, and inflation rate. I can readily determine how India's GDP and inflation rate influence unemployment in India using Visualization. Unemployment is greatly influenced by GDP. India's unemployment rate falls as the country's GDP rises. While India's inflation rate has a no significant impact on the country's unemployment rate.

Keywords:- Estimated Unemployment Rate, Estimated Employed, Estimated Labour Participation Rate, Region, Country, Latitude, Longitude.

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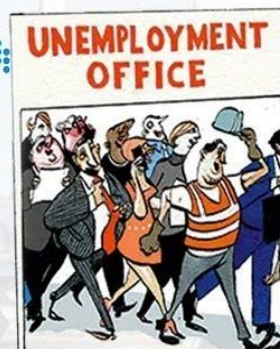
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“CHAPTER :- 1 Project Code Explanation”

1.1 Introduction of Unemployment in India.

India has a population of about 1.3 billion people, accounting for around 18 percent of the world's total population. So, if unemployment is a severe problem in India, it is also a major one throughout the rest of the globe. It is critical to research and comprehend unemployment in India in order to reduce the danger of unemployment. The two most significant problems that any growing country's economy confronts is unemployment and economic development. It was faced with the twin problems of unemployment and poverty when it achieved independence in 1947. Unemployment is India's most serious problem. It's becoming more serious every day. When a person who is actively searching for job is unable to find one, they are considered unemployed. Unemployment is exacerbated by population growth, migration, a lack of practical skills, and the unequal distribution of industrialization. As a consequence, poverty, stress, crime, and social and economic inequalities have increased. A scenario in which job seekers are unable to obtain employment. Unemployment is defined as the proportion of the workforce that is jobless. The amount of people who are jobless varies based on economic and other variables. Persons who have been actively searching for employment for the previous four weeks and have not found work are considered unemployed. Unemployment is a complex problem that impacts both the economy and the social structure of a nation. An increase in the proportion of young people as a consequence of the demographic "dividend" or "youth bulge" seems to be one of the key drivers of India's future economic growth. Despite the fact that the percentage of young people in the labour market has decreased as school and college enrolment rates have risen, their significant representation of the labour population suggests that youth unemployment and underemployment will remain a key policy problem in India for many years.

Unemployment in India



“By Rajkumar Choudhary”

1.2 Project Introduction.

➤ **Problem Statement:-** “How Unemployment effect Indian states and how it’s a major problem for Indian GDP Growth internationally”.

Unemployment is measured by the unemployment rate which is the number of people who are unemployed as a percentage of the total labour force. We have seen a sharp increase in the unemployment rate during **Covid-19**, so analyzing the unemployment rate can be a good data science project. In this article, I will take you through the task of Unemployment analysis with Python. I take around five years of data that is from 1st of June 2017 to 31st of May 2022 from the Indian government website.

➤ **How I got the data:-**

The Unemployment in india is the major problem for our country’s GDP growth. For our GDP it is important to collect the unemployed people’s data to find the rate and compare it with last year to improve our scheme to provide more employment opportunities for our youth. And that data collection process will run under “**The Ministry of Labour and Employment**” in india.

I collected that data of five year from 1st June 2017 to 31st May 2022 from the government website of “**Centre for Monitoring Indian Economy Pvt. Ltd. (CMIE)**” Sub website is “Unemployment Rate in India” link is :- <https://unemploymentinindia.cmie.com/>. Some Charts and visualization process was there but I did some more visualization process and sorting process on the data to understand quickly and in briefly.

❖ Unemployment Analysis with Python

The unemployment rate is calculated based on a particular region, so to analyse unemployment I will be using an unemployment dataset of India. The dataset I’m using here contains data on India’s unemployment rate during Covid-19. So let’s start the task of Unemployment analysis by importing the necessary Python libraries and the dataset :-

"Project on Analysis of Unemployment in India in Last Five Years from 1st June 2017 to 31st May 2022".

"This dataset contains the unemployment rate of all the states in India".

- States = states in India
- Date = date which the unemployment rate observed
- Frequency = measuring frequency (Monthly)
- Estimated Unemployment Rate (%) = percentage of people unemployed in each States of India
- Estimated Employed = Number of people employed
- Estimated Labour Participation Rate (%) = The labour force participation rate is the portion of the working population in the 16-64 years' age group in the economy currently in employment or seeking employment.

"Index".

- ["Import data and Neccessary Libraries for further use"](#).
- ["Perform Statistics process on data"](#).
- ["groupby data by region wise"](#).
- ["Exploratory Data Analysis"](#).
- ["plot boxplot of Unemployment Rate by Statewise"](#).
- ["Draw Scatterplot on the data"](#).
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- ["Scatter plot on latitude and longitude"](#).
- ["Map of india showing states using latitude and longitude"](#).
- ["Get the whole running time duration of this project"](#).
- ["End"](#).

1.3 Import important libraries.

'Import data and Neccessary Libraries for further use'.

```
In [1]: import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import plotly.express as px
import calendar
from datetime import datetime as dt
start_time=dt.now()

import plotly.io as pio
import warnings
warnings.filterwarnings('ignore')
```

❖ Know plotly templates:-

```
In [2]: pio.templates

Out[2]: Templates configuration
-----
Default template: 'plotly'
Available templates:
['ggplot2', 'seaborn', 'simple_white', 'plotly',
'plotly_white', 'plotly_dark', 'presentation', 'xgridoff',
'ygridoff', 'gridon', 'none']
```

❖ Getting the data from from the data source using pandas library and show only five rows:-

'Getting the data from the source'.

```
In [3]: data = pd.read_csv("D:/CSV Files/Unemployment/Unemployment Data.csv")
data.head()
```

```
Out[3]:
```

	States	Country	Date	Frequency	Estimated Unemployment Rate	Estimated Employed	Estimated Labour Participation Rate	Region	Area
0	Andhra Pradesh	India	30-06-2017	M	3.36	5116921	40.82	South Eastern	Urban
1	Andhra Pradesh	India	31-07-2017	M	3.04	4980708	39.51	South Eastern	Urban
2	Andhra Pradesh	India	31-08-2017	M	5.73	5025117	40.92	South Eastern	Urban
3	Andhra Pradesh	India	30-09-2017	M	8.44	4911744	41.09	South Eastern	Urban
4	Andhra Pradesh	India	31-10-2017	M	4.81	5102145	40.97	South Eastern	Urban

❖ Show the whole data in the form of CSV and check how many rows and columns in the data.

'Show data and see how many rows and columns are there'.

```
In [4]: data
```

```
Out[4]:
```

	States	Country	Date	Frequency	Estimated Unemployment Rate	Estimated Employed	Estimated Labour Participation Rate	Region	Area
0	Andhra Pradesh	India	30-06-2017	M	3.36	5116921	40.82	South Eastern	Urban
1	Andhra Pradesh	India	31-07-2017	M	3.04	4980708	39.51	South Eastern	Urban
2	Andhra Pradesh	India	31-08-2017	M	5.73	5025117	40.92	South Eastern	Urban
3	Andhra Pradesh	India	30-09-2017	M	8.44	4911744	41.09	South Eastern	Urban
4	Andhra Pradesh	India	31-10-2017	M	4.81	5102145	40.97	South Eastern	Urban
...
4920	India	India	31-01-2022	M	6.56	402616049	39.84	All	Total
4921	India	India	28-02-2022	M	8.11	397057157	39.89	All	Total
4922	India	India	31-03-2022	M	7.57	395969754	39.46	All	Total
4923	India	India	30-04-2022	M	7.83	402949020	40.19	All	Total
4924	India	India	31-05-2022	M	7.12	403981241	39.91	All	Total

4925 rows × 9 columns

1.4 Checking Null values and Renaming Columns name for simplicity.

❖ Let's see if this dataset contains missing values or not:-

'Checking is there any null values in the columns or not'.

```
In [5]: print(data.isnull().sum())
```

```
States          0
Country         0
Date            0
Frequency       0
Estimated Unemployment Rate  0
Estimated Employed  0
Estimated Labour Participation Rate  0
Region          0
Area            0
dtype: int64
```

❖ While analyzing the missing values, I found that the column names are not correct. So, for a better understanding of this data, I will rename all the columns:-

'Renaming the columns for simplicity'.

```
In [6]: data.columns = ["States", "Country", "Date", "Frequency",
                        "Estimated_Unemployment_Rate",
                        "Estimated_Employed",
                        "Estimated_Labour_Participation_Rate",
                        "Region", "Area"]
data
```

Out[6]:

	States	Country	Date	Frequency	Estimated_Unemployment_Rate	Estimated_Employed	Estimated_Labour_Participation_Rate	Region	Area
0	Andhra Pradesh	India	30-06-2017	M	3.36	5116921	40.82	South Eastern	Urban
1	Andhra Pradesh	India	31-07-2017	M	3.04	4980708	39.51	South Eastern	Urban
2	Andhra Pradesh	India	31-08-2017	M	5.73	5025117	40.92	South Eastern	Urban
3	Andhra Pradesh	India	30-09-2017	M	8.44	4911744	41.09	South Eastern	Urban
4	Andhra Pradesh	India	31-10-2017	M	4.81	5102145	40.97	South Eastern	Urban
...
4920	India	India	31-01-2022	M	6.56	402616049	39.84	All	Total
4921	India	India	28-02-2022	M	8.11	397057157	39.89	All	Total
4922	India	India	31-03-2022	M	7.57	395969754	39.46	All	Total
4923	India	India	30-04-2022	M	7.83	402949020	40.19	All	Total
4924	India	India	31-05-2022	M	7.12	403981241	39.91	All	Total

4925 rows × 9 columns

1.5 Filter data, add month column and perform statistical process.

❖ Filtering data by date and adding month column for months name in data.:-

```
In [7]: data['Date'] = pd.to_datetime(data['Date'],dayfirst=True)
```

```
In [8]: data['Frequency'] = data['Frequency'].astype('category')
```

'Adding Month Column in the data'.

```
In [9]: data['Month'] = data['Date'].dt.month
```

```
In [10]: data['Month_int'] = data['Month'].apply(lambda x : int(x))
```

```
In [11]: data['Month_name'] = data['Month_int'].apply(lambda x: calendar.month_abbr[x])
```

```
In [12]: data['Year'] = pd.DatetimeIndex(data['Date']).year
```

```
In [13]: data['Region'] = data['Region'].astype('category')
```

```
In [14]: data.drop(columns='Month',inplace=True)  
data.head(3)
```

Out[14]:

	States	Country	Date	Frequency	Estimated_Unemployment_Rate	Estimated_Employed	Estimated_Labour_Participation_Rate	Region	Area	Month_int	M
0	Andhra Pradesh	India	2017-06-30	M	3.36	5116921	40.82	South Eastern	Urban	6	
1	Andhra Pradesh	India	2017-07-31	M	3.04	4980708	39.51	South Eastern	Urban	7	
2	Andhra Pradesh	India	2017-08-31	M	5.73	5025117	40.92	South Eastern	Urban	8	

❖ Performing statistical processes on the data to get mean, min, max and standard deviation of columns & groupby data by region wise :-

'Perform Statistics process on data'.

And get the mean, min, max and standard deviation of Estimated Unemployment Rate, Estimated Employed, Estimated Labour Participation Rate.

```
In [15]: data_stats = data[['Estimated_Unemployment_Rate',  
                          'Estimated_Employed', 'Estimated_Labour_Participation_Rate']]  
  
round(data_stats.describe().T,2)
```

Out[15]:

	count	mean	std	min	25%	50%	75%	max
Estimated_Unemployment_Rate	4925.0	8.90	7.93	0.00	3.68	6.56	11.69	7.674000e+01
Estimated_Employed	4925.0	19230703.97	53474104.46	49420.00	2045761.00	6757814.00	15128954.00	4.104739e+08
Estimated_Labour_Participation_Rate	4925.0	42.32	7.10	13.33	38.05	41.18	45.34	7.808000e+01

1.6 Unemployment Rate State wise and Region wise.

'Statewise Estimated Unemployment Rate in Last Five Year'.

```
In [16]: R = data.groupby(['States'])['Estimated_Unemployment_Rate'].mean().reset_index()
R = round(R,2)
R
```

Out[16]:

	States	Estimated_Unemployment_Rate
0	Andhra Pradesh	6.08
1	Assam	6.19
2	Bihar	12.93
3	Chandigarh	11.55
4	Chhattisgarh	5.44
5	Delhi	11.53
6	Goa	10.36
7	Gujarat	4.14
8	Haryana	23.01
9	Himachal Pradesh	13.99
10	India	7.62
11	Jammu & Kashmir	14.85
12	Jharkhand	13.38
13	Karnataka	3.25
14	Kerala	7.85
15	Madhya Pradesh	4.36
16	Maharashtra	4.96
17	Meghalaya	4.39
18	Odisha	4.22
19	Puducherry	6.68
20	Punjab	8.82
21	Rajasthan	15.78
22	Sikkim	6.01
23	Tamil Nadu	5.13
24	Telangana	4.42
25	Tripura	21.70
26	Uttar Pradesh	7.41
27	Uttarakhand	4.73
28	West Bengal	7.82

❖ Groupby data in regions.

'groupby data by region wise'.

```
In [17]: region_stats = data.groupby(['Region'])['Estimated_Unemployment_Rate','Estimated_Employed','Estimated_Labour_Participation_Rate']
region_stats = round(region_stats,2)
```

region_stats

Out[17]:

	Region	Estimated_Unemployment_Rate	Estimated_Employed	Estimated_Labour_Participation_Rate
0	All	7.62	2.645661e+08	41.32
1	Central	4.90	1.052812e+07	40.77
2	Eastern	9.59	1.399730e+07	41.27
3	North Central	11.53	3.484741e+06	37.16
4	North Eastern	10.24	2.748583e+06	52.32
5	North Western	12.19	8.439884e+06	40.47
6	Northern	12.82	9.687442e+06	38.89
7	South Eastern	5.25	1.082523e+07	46.21
8	South Western	9.07	3.341098e+06	38.84
9	Southern	5.90	8.841074e+06	40.48
10	Western	4.12	1.973446e+07	44.19

1.7 Checking data storage size, data shape how many rows and columns data have and find unique values in data.

'Cheking data size, how many rows and columns are there and unique values'.

```
In [18]: data.size
```

```
Out[18]: 59100
```

```
In [19]: data.shape
```

```
Out[19]: (4925, 12)
```

```
In [20]: data.nunique
```

```
Out[20]: <bound method DataFrame.nunique of
0    Andhra Pradesh  India  2017-06-30    M
1    Andhra Pradesh  India  2017-07-31    M
2    Andhra Pradesh  India  2017-08-31    M
3    Andhra Pradesh  India  2017-09-30    M
4    Andhra Pradesh  India  2017-10-31    M
...
4920      India      India  2022-01-31    M
4921      India      India  2022-02-28    M
4922      India      India  2022-03-31    M
4923      India      India  2022-04-30    M
4924      India      India  2022-05-31    M

    Estimated_Unemployment_Rate  Estimated_Employed  \
0                               3.36             5116921
1                               3.04             4980708
2                               5.73             5025117
3                               8.44             4911744
4                               4.81             5102145
```

❖ Checking not null values, data type of data and how many axes are in this data.:-

'checking not null values, data types of the data and axes in the data'.

```
In [21]: data.notnull
```

```
Out[21]: <bound method DataFrame.notnull of
0    Andhra Pradesh  India  2017-06-30    M
1    Andhra Pradesh  India  2017-07-31    M
2    Andhra Pradesh  India  2017-08-31    M
3    Andhra Pradesh  India  2017-09-30    M
4    Andhra Pradesh  India  2017-10-31    M
...
4920      India      India  2022-01-31    M
4921      India      India  2022-02-28    M
4922      India      India  2022-03-31    M
4923      India      India  2022-04-30    M
4924      India      India  2022-05-31    M

    Estimated_Unemployment_Rate  Estimated_Employed  \
0                               3.36             5116921
1                               3.04             4980708
2                               5.73             5025117
3                               8.44             4911744
4                               4.81             5102145
```

```
In [22]: data.dtypes
```

```
Out[22]: States                object
Country                object
Date                  datetime64[ns]
Frequency              category
Estimated_Unemployment_Rate  float64
Estimated_Employed        int64
Estimated_Labour_Participation_Rate  float64
Region                  category
Area                    object
Month_int               int64
Month_name              object
Year                   int64
dtype: object
```

```
In [23]: data.axes
```

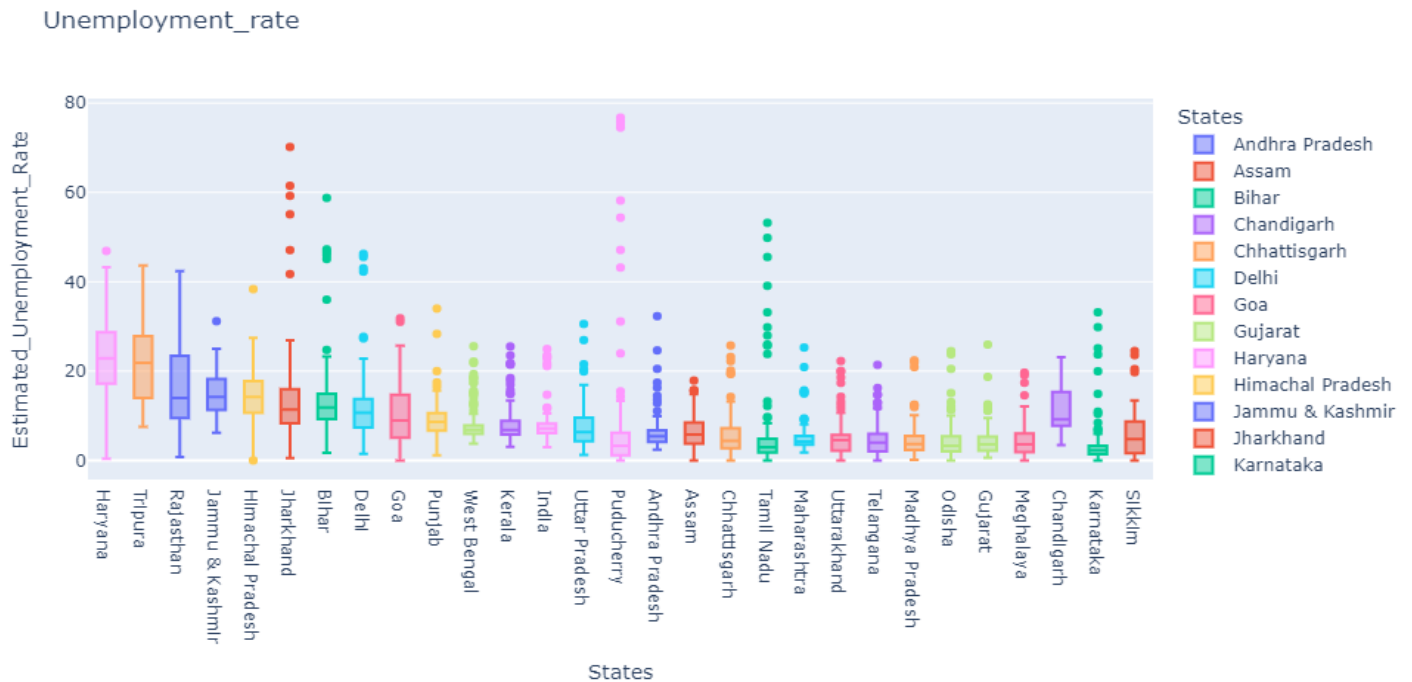
```
Out[23]: [RangeIndex(start=0, stop=4925, step=1),
Index(['States', 'Country', 'Date', 'Frequency', 'Estimated_Unemployment_Rate',
'Estimated_Employed', 'Estimated_Labour_Participation_Rate', 'Region',
'Area', 'Month_int', 'Month_name', 'Year'],
dtype='object')]
```


1.8 & 1.9 Exploratory Data Analysis and Boxplot on State wise Unemployment Rate.

'Exploratory Data Analysis'.

'plot boxplot of Unemployment Rate by Statewise'.

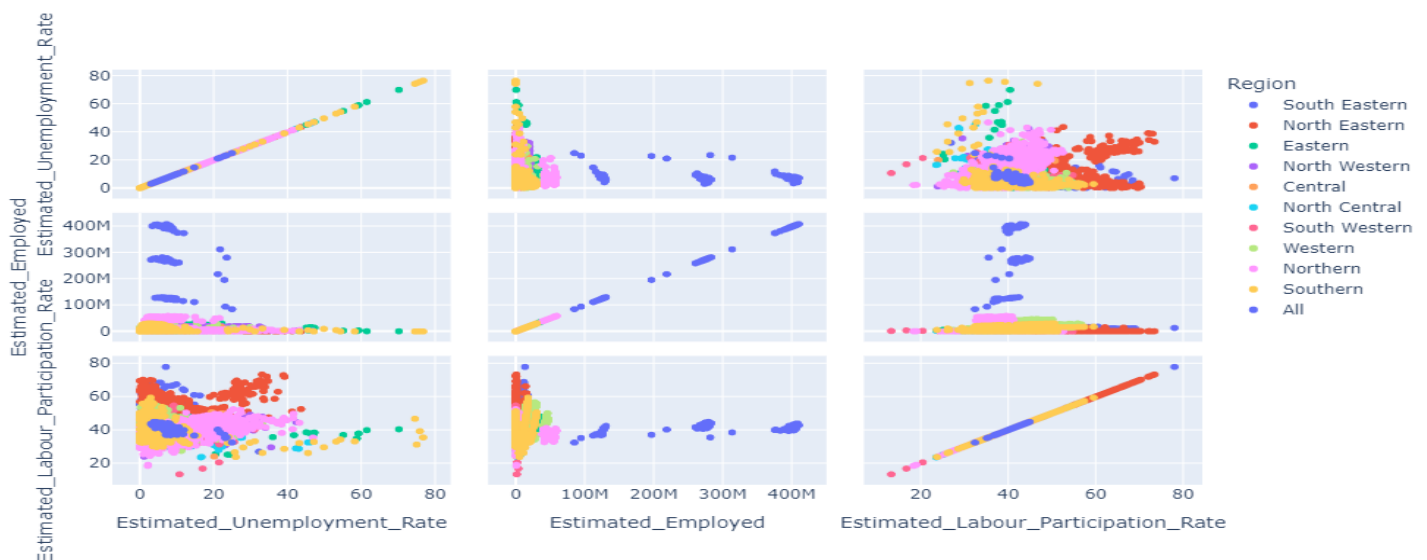
```
In [24]: fig = px.box(data,x='States',y='Estimated_Unemployment_Rate',color='States',title='Unemployment_rate',template='plotly')
fig.update_layout(xaxis={'categoryorder':'total descending'})
fig.show()
```



1.10 Draw Scatterplot between Estimated Unemployment Rate, Estimated Employed and Estimated Labour Participation Rate.

'Draw Scatterplot on the data'.

```
In [25]: fig = px.scatter_matrix(data,template='plotly',
dimensions=['Estimated_Unemployment_Rate','Estimated_Employed',
'Estimated_Labour_Participation_Rate'],
color='Region')
fig.show()
```



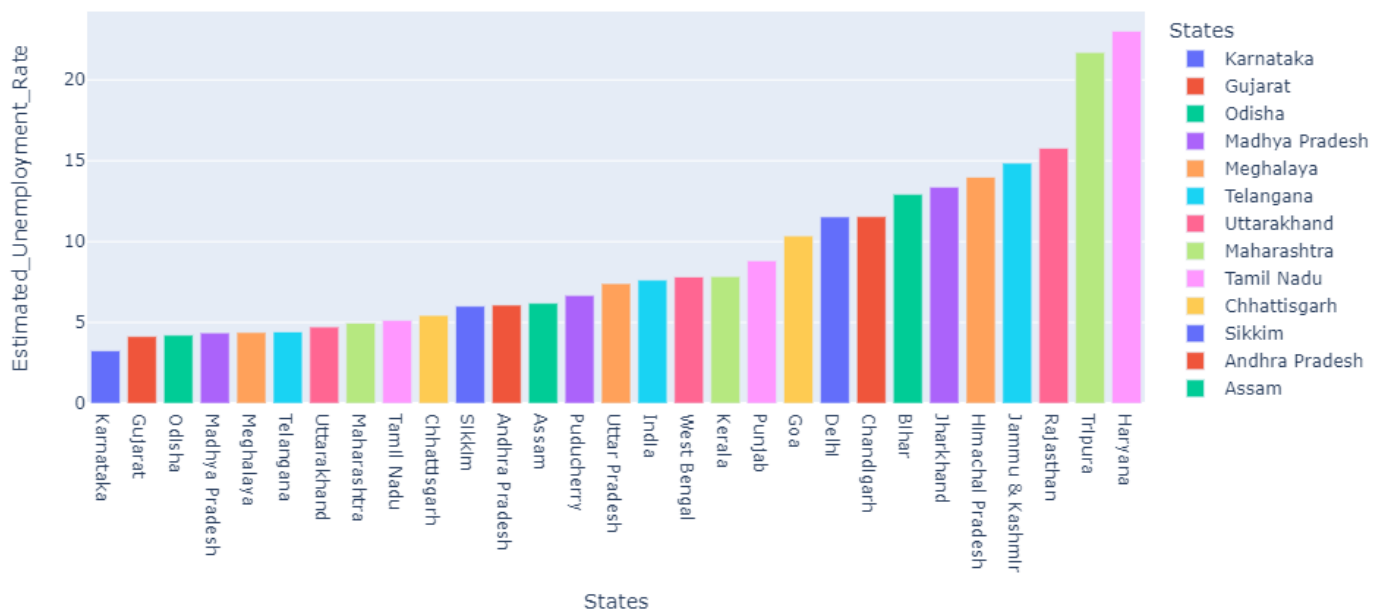
1.11 Draw bar chart for average Unemployment Rate in each state to showing average rate of unemployment rate.

'Draw bar chart for Average Unemployment Rate in each State'.

```
In [26]: plot_ump = data[['Estimated_Unemployment_Rate', 'States']]
df_unemp = plot_ump.groupby('States').mean().reset_index()
df_unemp = df_unemp.sort_values('Estimated_Unemployment_Rate')

fig = px.bar(df_unemp, x='States', y='Estimated_Unemployment_Rate', color='States',
             title='Average Unemployment Rate in each state', template='plotly')
fig.show()
```

Average Unemployment Rate in each state



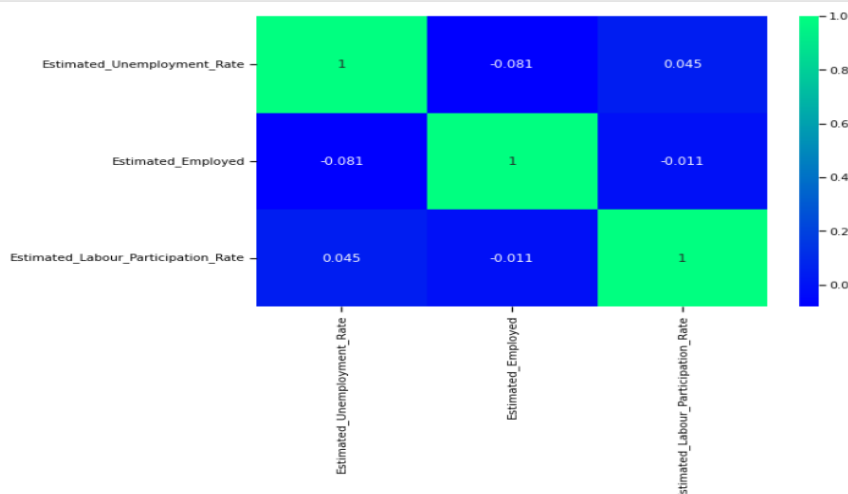
❖ Visualization of the data:-

'Visualization on the Data'.

```
In [27]: #Heatmap.
heat_maps = data[['Estimated_Unemployment_Rate',
                  'Estimated_Employed', 'Estimated_Labour_Participation_Rate']]

heat_maps = heat_maps.corr()

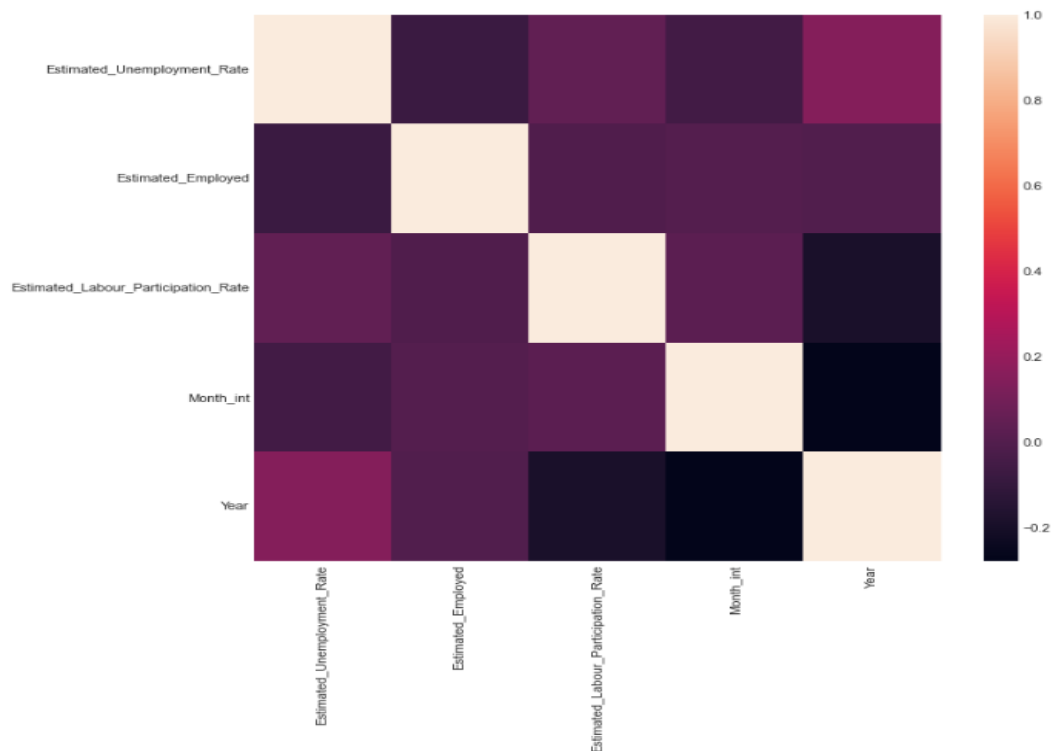
plt.figure(figsize=(10,6))
sns.set_context('notebook', font_scale=1)
sns.heatmap(heat_maps, annot=True, cmap='winter');
```



❖ Now let's have a look at the correlation between the features of this dataset:-

'Show heatmap between entities'.

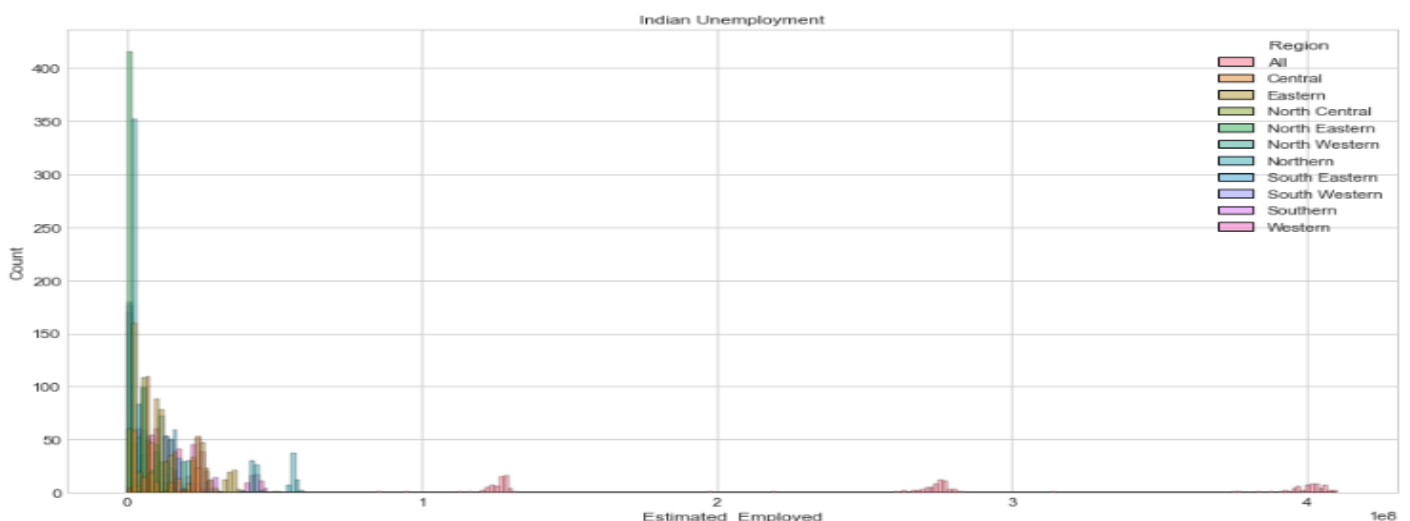
```
In [28]: #Heatmap on two entities.
plt.style.use('seaborn-whitegrid')
plt.figure(figsize=(12, 10))
sns.heatmap(data.corr())
plt.show()
```



1.12 Visualize the data through Hisplot to analyse the unemployment rate. I will first take a look at the estimated number of employees according to different regions of India.

'Hisplot figure on Estimated Employed data by region'.

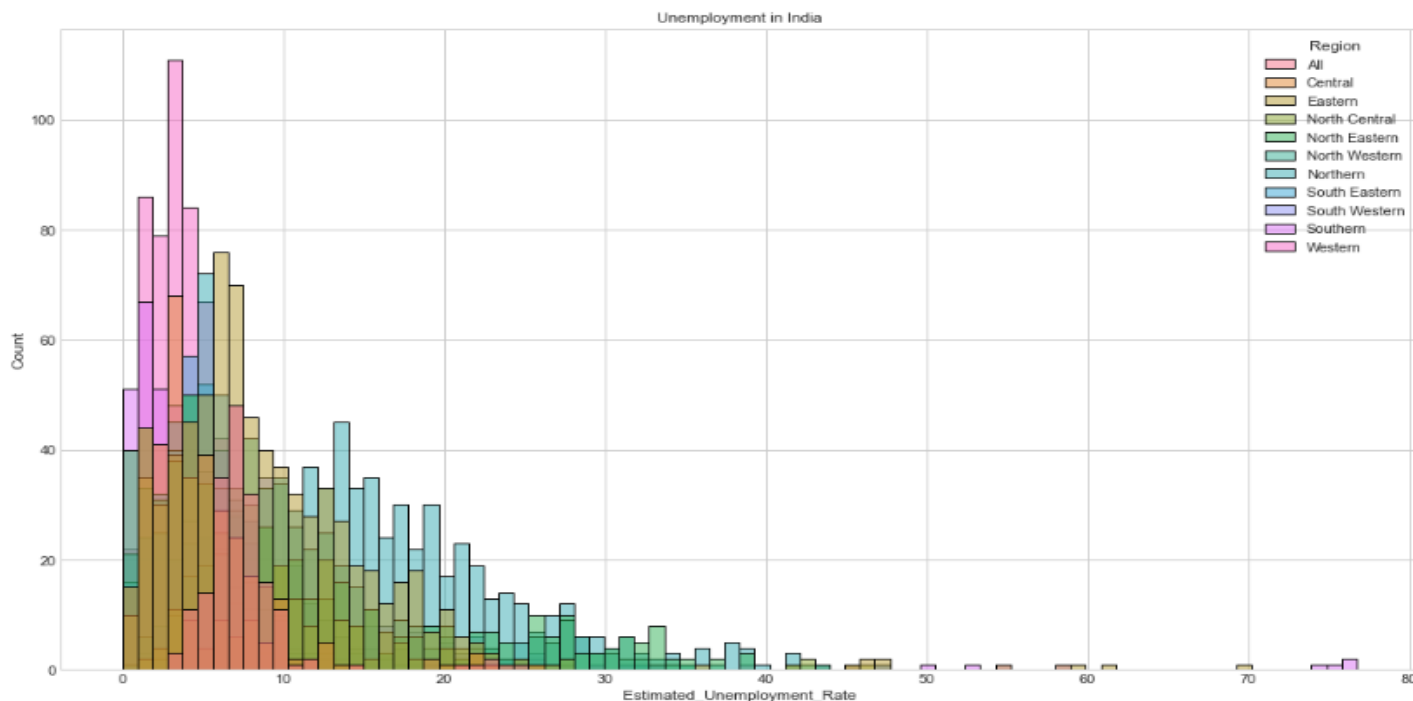
```
In [29]: data.columns = ["States", "Country", "Date", "Frequency",
                        "Estimated_Unemployment_Rate",
                        "Estimated_Employed",
                        "Estimated_Labour_Participation_Rate",
                        "Region", "Area", "Month_int", "Month_name", "Year"]
plt.figure(figsize=(15,8))
plt.title("Indian Unemployment")
sns.histplot(x="Estimated_Employed", hue="Region", data=data)
plt.show()
```



❖ Now let's see the unemployment rate according to different regions of India:-

'Hisplot Figure on Estimated Unemployment Rate by Region'.

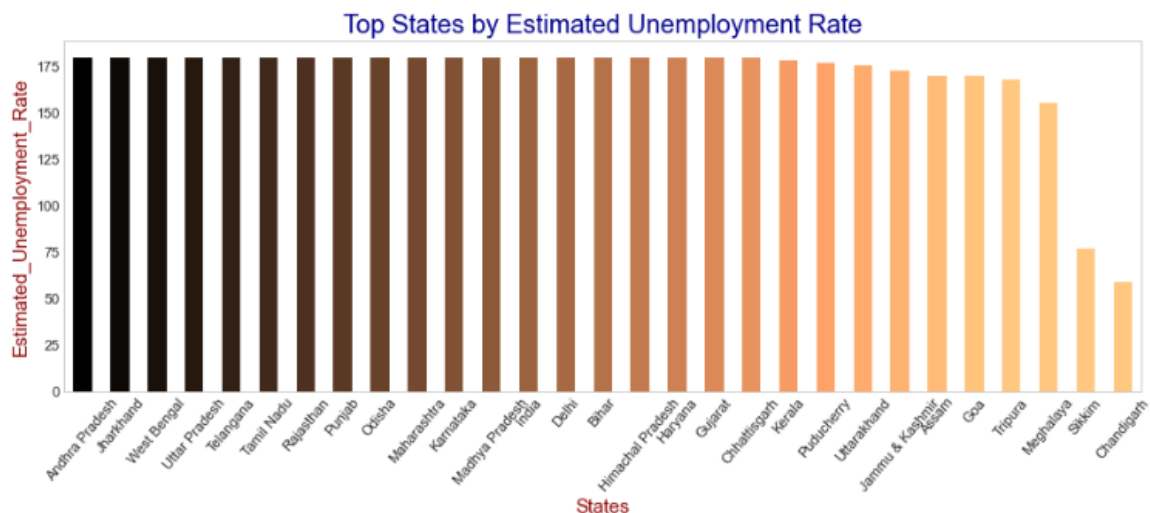
```
In [30]: plt.figure(figsize=(18, 10))
plt.title("Unemployment in India")
sns.histplot(x="Estimated_Unemployment_Rate", hue="Region", data=data)
plt.show()
```



1.13 Top States by Estimated Unemployment Rate in India.

'Top States by Estimated Unemployment Rate in India'.

```
In [31]: plt.rcParams['figure.figsize'] = (15, 5)
color = plt.cm.copper(np.linspace(0, 2, 50))
data['States'].value_counts().head(40).plot.bar(color = color)
plt.title('Top States by Estimated Unemployment Rate', color = 'darkblue', fontsize = 20)
plt.xlabel('States', color = 'darkred', size = 15,)
plt.ylabel('Estimated_Unemployment_Rate', color = 'darkred', size = 15)
plt.xticks(rotation = 50)
plt.grid()
plt.show()
```



1.14 Calculation of Unemployment Rate in India During Covid19 Pandemic.

'Unemployment during covid19 Pandemic'.

"Calculating Unemployment Rate before and after Lockdown".

```
In [32]: lock = data[(data['Month_int'] >= 4) & (data['Month_int'] <= 7)]
bf_lock = data[(data['Month_int'] >= 1) & (data['Month_int'] <= 4)]

In [33]: g_lock = lock.groupby('States')['Estimated_Unemployment_Rate'].mean().reset_index()
g_bf_lock = bf_lock.groupby('States')['Estimated_Unemployment_Rate'].mean().reset_index()

g_lock['Unemployment Rate before lockdown'] = g_bf_lock['Estimated_Unemployment_Rate']
g_lock.columns = ['States', 'Unemployment Rate after lockdown', 'Unemployment Rate before lockdown']

# Show only five states according to alphabetics A to Z.
g_lock.head(5)
```

```
Out[33]:
```

	States	Unemployment Rate after lockdown	Unemployment Rate before lockdown
0	Andhra Pradesh	7.006000	6.456833
1	Assam	6.157818	5.952105
2	Bihar	15.401667	14.764000
3	Chandigarh	11.611053	12.662105
4	Chhattisgarh	5.412000	4.872667

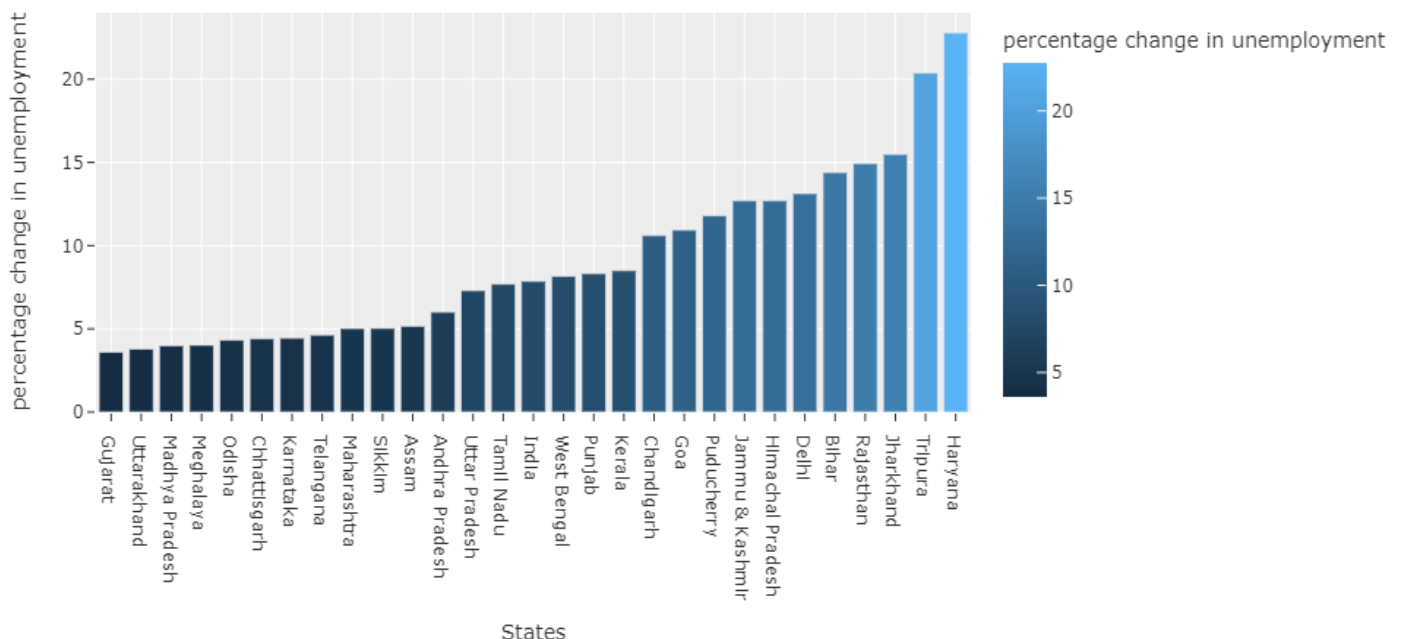
❖ Percentage change in Unemployment in each state after lockdown.:-

```
In [34]: # percentage change in unemployment rate.
g_lock['percentage change in unemployment'] = round(g_lock['Unemployment Rate after lockdown'] - g_lock['Unemployment Rate before lockdown'])

In [35]: plot_per = g_lock.sort_values('percentage change in unemployment')

In [36]: # percentage change in unemployment after Lockdown.
fig = px.bar(plot_per, x='States', y='percentage change in unemployment', color='percentage change in unemployment',
             title='percentage change in Unemployment in each state after lockdown', template='ggplot2')
fig.show()
```

percentage change in Unemployment in each state after lockdown



1.15 Most Impacted States / UT and Impact of lockdown on employment across states in India.

'Most impacted states & Union Territory'.

- Haryana
- Tripura
- Jharkhand
- Rajasthan
- Bihar

'Impact of lockdown on employment across states'.

In [37]: `# function to sort value based on impact.`

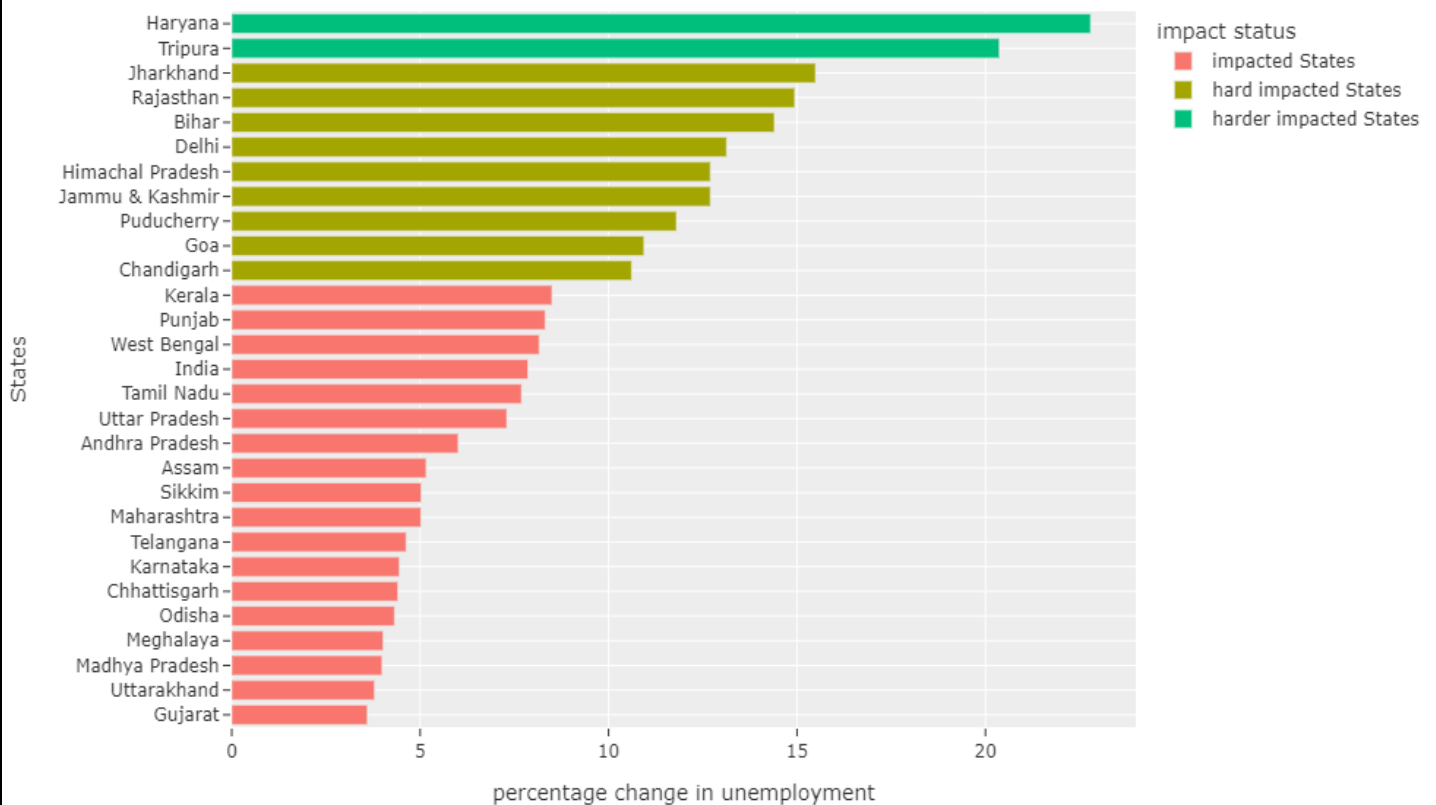
```
def sort_impact(x):  
    if x <= 10:  
        return 'impacted States'  
    elif x <= 20:  
        return 'hard impacted States'  
    elif x <= 30:  
        return 'harder impacted States'  
    elif x <= 40:  
        return 'hardest impacted States'  
    return x
```

In [38]: `plot_per['impact status'] = plot_per['percentage change in unemployment'].apply(lambda x:sort_impact(x))`

In [39]: `fig = px.bar(plot_per, y='States',x='percentage change in unemployment',color='impact status',
 title='Impact of lockdown on employment across states',template='ggplot2',height=650)`

`fig.show()`

Impact of lockdown on employment across states



1.16 Getting Data to get live coordinates of states.

'Getting Data for Mapping coordinates'.

```
In [40]: data2 = pd.read_csv("D:/CSV Files/Unemployment/Unemployment Data 2.csv")
data2
```

Out[40]:

	States	Country	Total Population of Country/State	Date	Estimated Unemployment Rate (%)	Estimated Employed	Estimated Labour Participation Rate (%)	Region
0	Andaman and Nicobar Islands	India	380581	31-05-2022	NaN	NaN	NaN	South Eastern
1	Andhra Pradesh	India	49577103	31-05-2022	4.38	1.597120e+07	37.41	South Eastern
2	Arunachal Pradesh	India	1383727	31-05-2022	NaN	NaN	NaN	North Eastern
3	Assam	India	31205576	31-05-2022	8.24	1.457290e+07	58.13	North Eastern
4	Bihar	India	104099452	31-05-2022	13.26	2.670459e+07	37.04	Eastern
5	Chandigarh	India	1055450	31-05-2022	NaN	NaN	NaN	North Western
6	Chhattisgarh	India	29436231	31-05-2022	0.71	9.128904e+06	39.3	Central

❖ Adding Column for particular state.:-

'Adding Column In Data for geographical use'.

```
In [41]: data2['Location'] = data2['States'] + ", " + data2['Country']
```

❖ Getting Latitude and Longitude for plotting map.:-

'Getting Latitude and Longitude for plotting map'.

```
In [42]: from geopy.geocoders import Nominatim
geocoder = Nominatim(user_agent = 'Rajkumar')
from geopy.extra.rate_limiter import RateLimiter
geocode = RateLimiter(geocoder.geocode, min_delay_seconds = 1, return_value_on_exception = None)
```

```
In [43]: data2['Latitude'] = data2['Location'].apply(lambda x: geocode(x).latitude)
```

```
In [44]: data2['Longitude'] = data2['Location'].apply(lambda x: geocode(x).longitude)
```

```
In [45]: data2
```

Out[45]:

	States	Country	Total Population of Country/State	Date	Estimated Unemployment Rate (%)	Estimated Employed	Estimated Labour Participation Rate (%)	Region	Location	Latitude	Longitude
0	Andaman and Nicobar Islands	India	380581	31-05-2022	NaN	NaN	NaN	South Eastern	Andaman and Nicobar Islands, India	12.611239	92.831654
1	Andhra Pradesh	India	49577103	31-05-2022	4.38	1.597120e+07	37.41	South Eastern	Andhra Pradesh, India	15.924091	80.186381
2	Arunachal Pradesh	India	1383727	31-05-2022	NaN	NaN	NaN	North Eastern	Arunachal Pradesh, India	28.093770	94.592133
3	Assam	India	31205576	31-05-2022	8.24	1.457290e+07	58.13	North Eastern	Assam, India	26.407384	93.255130
4	Bihar	India	104099452	31-05-	13.26	2.670459e+07	37.04	Eastern	Bihar, India	25.644085	85.906508

1.17 Convert data to Final CSV of Results of all of Indians states.

'Final CSV'.

```
In [46]: data2.to_csv("D:/CSV Files/Unemployment/Final Unemployment Data.csv")
```

```
In [47]: data2.columns= ["States","Country","Total Population of Country/State","Date",
                        "Estimated Unemployment Rate",
                        "Estimated Employed",
                        "Estimated Labour Participation Rate",
                        "Region","Location","Latitude","Longitude"]
data2
```

Out[47]:

	States	Country	Total Population of Country/State	Date	Estimated Unemployment Rate	Estimated Employed	Estimated Labour Participation Rate	Region	Location	Latitude	Longitude
0	Andaman and Nicobar Islands	India	380581	31-05-2022	NaN	NaN	NaN	South Eastern	Andaman and Nicobar Islands, India	12.611239	92.831654
1	Andhra Pradesh	India	49577103	31-05-2022	4.38	1.597120e+07	37.41	South Eastern	Andhra Pradesh, India	15.924091	80.186381
2	Arunachal Pradesh	India	1383727	31-05-2022	NaN	NaN	NaN	North Eastern	Arunachal Pradesh, India	28.093770	94.592133
3	Assam	India	31205576	31-05-2022	8.24	1.457290e+07	58.13	North Eastern	Assam, India	26.407384	93.255130
4	Bihar	India	104099452	31-05-	13.26	2.670459e+07	37.04	Eastern	Bihar, India	25.644085	85.906508

❖ Removing rows which contains null values from final CSV.:-

'Removing Null values Rows'.

```
In [48]: data2 = data2.dropna(inplace=False)
print(data2)
```

```

States Country Total Population of Country/State Date \
1 Andhra Pradesh India 49577103 31-05-2022
3 Assam India 31205576 31-05-2022
4 Bihar India 104099452 31-05-2022
6 Chhattisgarh India 29436231 31-05-2022
8 Delhi India 16787941 31-05-2022
9 Goa India 1458545 31-05-2022
10 Gujarat India 60439692 31-05-2022
11 Haryana India 25351462 31-05-2022
12 Himachal Pradesh India 6864602 31-05-2022
13 India India 1352642280 31-05-2022
14 Jammu & Kashmir India 12267032 31-05-2022
15 Jharkhand India 32988134 31-05-2022
16 Karnataka India 61130704 31-05-2022
17 Kerala India 34630192 31-05-2022
20 Madhya Pradesh India 72626809 31-05-2022
21 Maharashtra India 112374333 31-05-2022
23 Meghalaya India 2966889 31-05-2022
26 Odisha India 41974219 31-05-2022
27 Punjab India 27785994 31-05-2022
28 Rajasthan India 74647632 31-05-2022
29 Sikkim India 610850 31-05-2022
30 Tamil Nadu India 72649138 31-05-2022
31 Telangana India 35986999 31-05-2022
32 Uttar Pradesh India 199581477 31-05-2022
33 West Bengal India 91276000 31-05-2022
```

```
In [49]: data2
```

Out[49]:

	States	Country	Total Population of Country/State	Date	Estimated Unemployment Rate	Estimated Employed	Estimated Labour Participation Rate	Region	Location	Latitude	Longitude
1	Andhra Pradesh	India	49577103	31-05-2022	4.38	15971197.0	37.41	South Eastern	Andhra Pradesh, India	15.924091	80.186381
3	Assam	India	31205576	31-05-2022	8.24	14572896.0	58.13	North Eastern	Assam, India	26.407384	93.255130
4	Bihar	India	104099452	31-05-2022	13.26	26704592.0	37.04	Eastern	Bihar, India	25.644085	85.906508
6	Chhattisgarh	India	29436231	31-05-2022	0.71	9128904.0	39.3	Central	Chhattisgarh, India	21.663736	81.840635
8	Delhi	India	16787941	31-05-2022	13.64	5432451.0	37.6	North Central	Delhi, India	28.651718	77.221939

1.18 Now let's create a figure to analyse the unemployment rate of each Indian state by region. For this, I'll use a sunburst plot.

'Plotting Sunburst Figure on whole data to show Specifically Unemployment Rate in India in last Month May 2022'.

```
In [50]: unemployment = data2[["States", "Region", "Estimated Unemployment Rate"]]  
figure = px.sunburst(unemployment, path=["Region", "States"],  
                    values="Estimated Unemployment Rate",  
                    width=700, height=700, color_continuous_scale="RdYlGn",  
                    title="Unemployment Rate in India on 31 May 2022")  
figure.show()
```

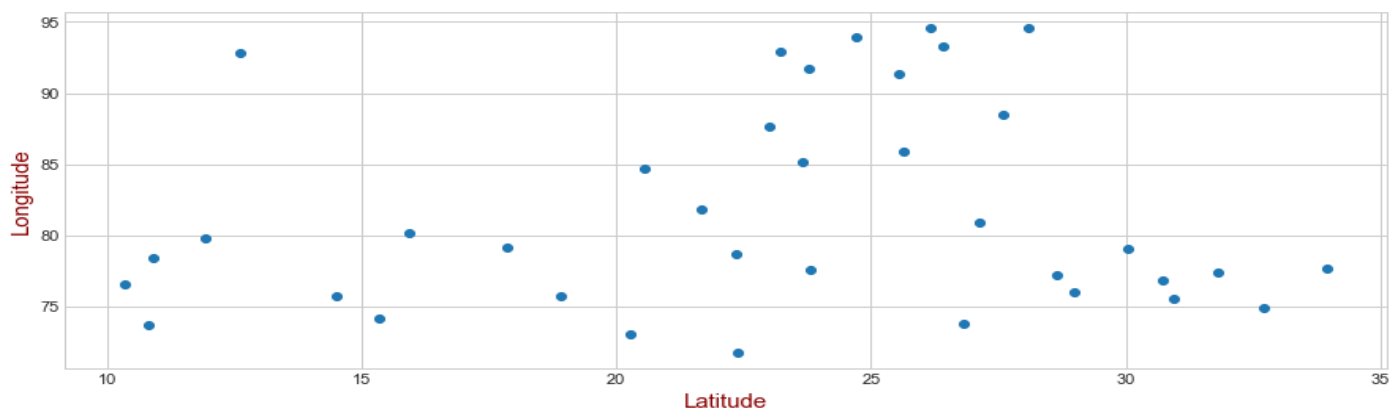
Unemployment Rate in India on 31 May 2022



❖ Scatter Plot between States Latitude and Longitude.

'Scatter plot on latitude and longitude'.

```
In [51]: import matplotlib.pyplot as plt  
  
#get data  
df = pd.read_csv("D:/CSV Files/Unemployment/Final Unemployment Data.csv")  
plt.scatter(x=df['Latitude'], y=df['Longitude'])  
plt.xlabel('Latitude', color = 'darkred', size = 15,)  
plt.ylabel('Longitude', color = 'darkred', size = 15)  
plt.xticks(rotation = 0)  
plt.show()
```



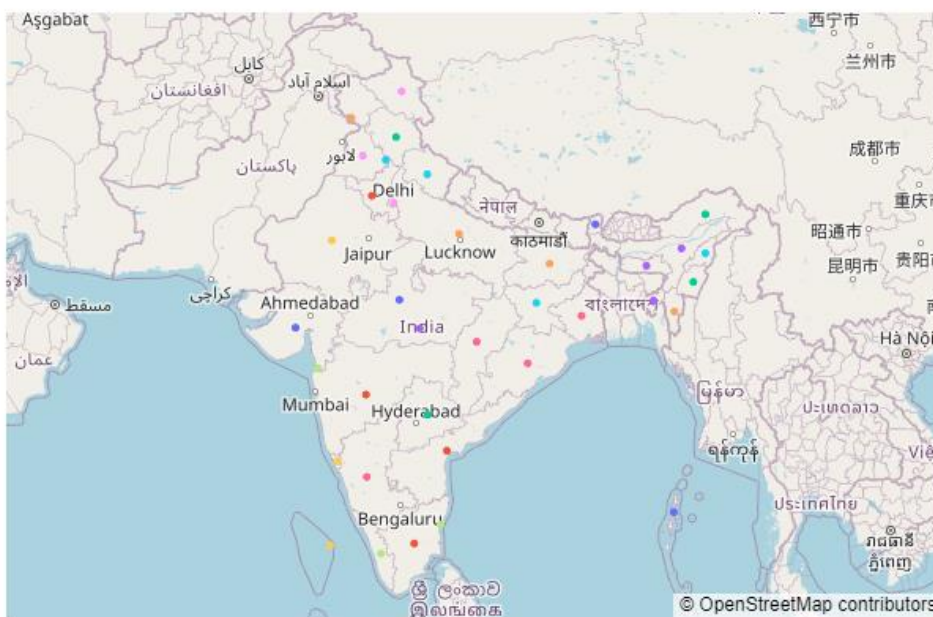
1.19 Map of India showing states using Latitude and Longitude.

'Map of india showing states using latitude and longitude'.

```
In [52]: # import packages
import pandas as pd
import plotly.express as px
import numpy as np

# get data
fd = pd.read_csv("D:/CSV Files/Unemployment/Final Unemployment Data.csv")
fd.head()

# two-line code
fig = px.scatter_mapbox(fd, lat=fd['Latitude'], lon=fd['Longitude'], color='States', zoom=3, mapbox_style='open-street-map')
fig.show()
```



- States
- Andaman and Nicobar Islands
 - Andhra Pradesh
 - Arunachal Pradesh
 - Assam
 - Bihar
 - Chandigarh
 - Chhattisgarh
 - Dadra and Nagar Haveli Daman and Diu
 - Delhi
 - Goa
 - Gujarat
 - Haryana
 - Himachal Pradesh
 - India
 - Jammu & Kashmir
 - Jharkhand
 - Karnataka
 - Kerala
 - Ladakh

1.20 Show whole python file running time duration.

'Get the whole running time duration of this project'.

```
In [53]: end_time=dt.now()
print('Duration: {}'.format(end_time-start_time))

Duration: 0:01:29.688770
```

“CHAPTER :- 2 Research on Unemployment in India”.

2.1 Types of Unemployment in India.

❖ Disguised Unemployment

- This situation is when the number of employed individuals is more than needed.
- This is common in agricultural sectors.
- Even the unorganized sector of India faces the same problem.

❖ Seasonal Unemployment

- This type of unemployment is according to different seasons of the year.
- An example would be farmers working in harvest season only.
- The agricultural laborers in India face this problem every year.

❖ Structural Unemployment

- This is a situation that arises when the employment opportunities available don't match with an Individual's skill.
- An example would be the availability of a bank manager post but the individual only possesses marketing skills.
- This may be because of a lack of education or training in India.

❖ Cyclical Unemployment

- This is common in a capitalist economy and thus not a case in India.
- This is a citation when the employment increases in a recession and falls during the growth of the economy.

❖ Technological Unemployment

- This is a classic example of what happened during the Industrial revolution
- The machines replaced manual labor and thus led to unemployment.
- This kind of unemployment is due to changes in technology.
- Like the World Bank's assumption of India losing 69% of jobs due to automation.

❖ Frictional Unemployment

- It is the search for unemployment where the individual is unemployed for some time only.
- This may be between job hunts or between graduation and job positioning.
- This is voluntary as they are making their own decision to leave and join.

❖ Vulnerable Employment

- This is a situation when there is no legal proof to back up job security.
- This is common in wage workers where there is no record of them working thus they are unemployed.
- India faces this at large as the number of people in unorganized sectors is high.

2.2 Measurement of Unemployment in India.

The Ministry of Statistics and Programme Implementation monitors the National Sample Survey Office. They follow certain approaches to measure unemployment in India. They are :–

- 1. Usual Status Approach** – This approach only considers individuals unemployed who have been majorly not working during the 365 days before the survey date.
- 2. Weekly Status Approach** – This approach considers individuals unemployed if they have not been working for hours or a day before the survey date.
- 3. Daily Status Approach** – This approach considers an individual unemployed even if he did not work for an hour on a particular day.

2.3 Causes of Unemployment in India.

- The increasing population of the country.
- Low emphasis on educational and vocational skills of the working class.
- Less government support with legal complexities and low infrastructure.
- Less financial and market support to small scale industries.
- A large amount of workforce working in unorganized sectors.
- Lack of educational skills for relevant employment.
- More focus on theoretical knowledge than practical knowledge.
- Complex licensing on business and lower investments.
- Low productivity of the agricultural sector which is the backbone of the Indian economy.
- Less participation of women in the workforce.

2.4 Impact of Unemployment in India.

- There is a direct connection of poverty to unemployment in the country.
- Indulgence in illegal activities due to money shortage and thus increase in crime.
- They become antisocial elements and start losing faith in the government.
- Loss of human resources of the nation.
- Falling of GDP due to an imbalance between the demand and supply in the market.
- Increasing the socio-economic cost of the state government by bearing their expenses.

2.5 Here are some of the reasons why there is unemployment in India.

1. There are employment opportunities in India, but the rising population problem creates the unemployment. If the population grows in the same rate the next generation will face more problems of unemployment. If there is vacancy for 1 position 100 or 1000 apply for the position and only one gets the job and others remain unemployed.
2. Inflation
3. Indians don't take jobs which are below their grades. Many find it difficult to work at the below qualification level job.
4. Low wages or salary below the market rate.
5. Many big industries look for the skilled candidate only, for their company.
6. Recession
7. Many Employers give preference to the experienced candidates only and not the fresher.
8. Not enough or new jobs: The number of new government jobs is decreasing every year. Government is not able to create enough jobs keeping in mind the Indian population.
9. Slow business expansion
10. Advanced Technology: Earlier for a task of hundreds or thousand people were required to do a work but now due to the advanced technology only one person can do many people's works. With the advanced technology companies are hiring few persons to operate the machine. Give a command on computer and the work is done this has cut off the employment of many.
11. Corruption: In Government sector and in some private sector people get the job by giving the bribe. Even though the candidate is not that qualified but if he gives the **bribe**, he gets the job. So, to get a government job give a bribe. The qualified candidate remains unemployed as no money to give the bribe.

2.6 Problems caused due to unemployment.

- Unemployment and Poverty goes side by side. The problem of unemployment gives rise to the problem of poverty.
- Young people after a long time of unemployment find the wrong way to earn money.
- To get rid from the unemployment stress, they accept alcohol or drugs.
- Unemployed youths are accepting suicide as the last option of their life
- Lower economic growth
- Increase rate in Crimes. As the employed youth don't have anything to do they start doing robbery, murder etc.
- Health issues i.e it affects mentally as well as physically

2.7 Solutions to the unemployment in India.

1. The very first solution for the unemployment is to control the rising population of our country. Government should motivate people to have small families. Indian government has started initiatives to control the population but still the population is rising.
2. The quality of Indian education should be improved. The current education system is not upto the level. Government should keep a strict watch on the education system and try to implement new ways to generate skilled labour force. Government should select a committee to look after the schools and universities. The syllabus taught is of no use to the industries so the education should be as per the current requirements of the industries. Before completing the Education as well practical knowledge should be given.
3. Also today's youth should join the institute or select the course where proper training is given and the course is as per the current industries requirements. Take the course as per your interest and which will bright your future.
4. Government should encourage and develop the industries based on agriculture in rural areas so that the rural candidates don't migrate to the urban areas. More employment should be generated in rural areas for the seasonal unemployment people.
5. Rapid Industrialization should be created.
6. Development of the rural areas will stop the migration of the rural people to the urban cities and this will not put more pressure on the urban city jobs.
7. Government should allow more foreign companies to open their unit in India, so that more employment opportunities will be available.

“CHAPTER :- 3 Conclusion”.

3.1 Result.

“I perform many visualization methods to explain the unemployment in India with estimated employed and estimated labour participation rate. At the end of the project we got the exact Recent Unemployment rate of all states. In this project we got live latitude and longitude of all states this is only for understanding . I categorised states and union territories by region wise and also calculate the rate region wise. Mainly I use sunburst plot for checking unemployment rate for each states and region also, with the help of sunburst plot we can click on any particular region to check their states unemployment rate. I also did some theoretical research on unemployment in India also get Impact of unemployment on India, Reasons of unemployment, problems caused by unemployment, and solutions for unemployment”.

3.2 Project Summary.

So this is how you can analyse the unemployment rate by using the Python programming language. Unemployment is measured by the unemployment rate which is the number of people who are unemployed as a percentage of the total labour force.

In this project I use five years of current data on unemployment rate in India and I elaborate it by using many statistical techniques and visualization techniques like bar plot, sunburst, boxplot etc. and I also describe the situation of unemployment in India during covid19 and before and after situation also. And also describes the Impact of covid19 on Employment in India.

I show the Estimated Employment Rate and Employment Rate with the help of many graphs, plot and map.

...“Thanking Note for Teacher cum Mentor”...

“Dear Honourable Sir”

Mr. Vandit Hedau Sir,

Professor & Placement Officer

I wanted to let you know how much of an impact you made while you were my **“Post Graduation (Master’s)”** teacher. You taught me how to persevere when I was struggling with my course load, and how to exceed even my own expectations, you taught me how to learn new things quickly, how to face interviews and how to improve skills for being Successful in the field of **“Data Science”**. With your help, I started to explore other possibilities and opportunities. Without all your care and Attention I never would have found the confidence to move forward and find my passion in **“Data Science”** field.

You selected me for the position of placement coordinator of M.Sc. in Data Science and Analytics Batch 2020 – 2022. In this responsibility I learned many things which is more helpful to my career, mainly I got the leadership skill from this position.

I have no words to express how grateful am that I have teachers like you. Without your daunting efforts, I could never have made it.

Thank you for everything you’ve done!

Sincerely,

Rajkumar Choudhary

M.Sc. in Data Science and Analytics

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...“References & Links”...

-:Personnel Details & Portfolio’s:-

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GitHub:- <https://github.com/Crajk2000>

...“Project Refrences”...

Government Website for Unemployment Dataset :- [...Click Here...](#)

Employment National Portal :- [...Click Here...](#)

Times of India Article :- [...Click Here...](#)

“THANK YOU”

Regards

Rajkumar Choudhary

M.Sc. Data Science and Analytics

Batch 2020-2022