China Data Institute

Center for Geographic Analysis
Harvard University

社会地理计算联合研究中心
Geocomputation Center for Social Science

A Comparative COVID-19 Study of Brazil and India

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He Jin, University of south florida

06-15-2020

Outline

- ❑ Background
- ❑ Data Sources
- ❑ Data Depository
- ❑ Data Workflows
- ❑ Results
- ❑ Discussion
- ❑ References

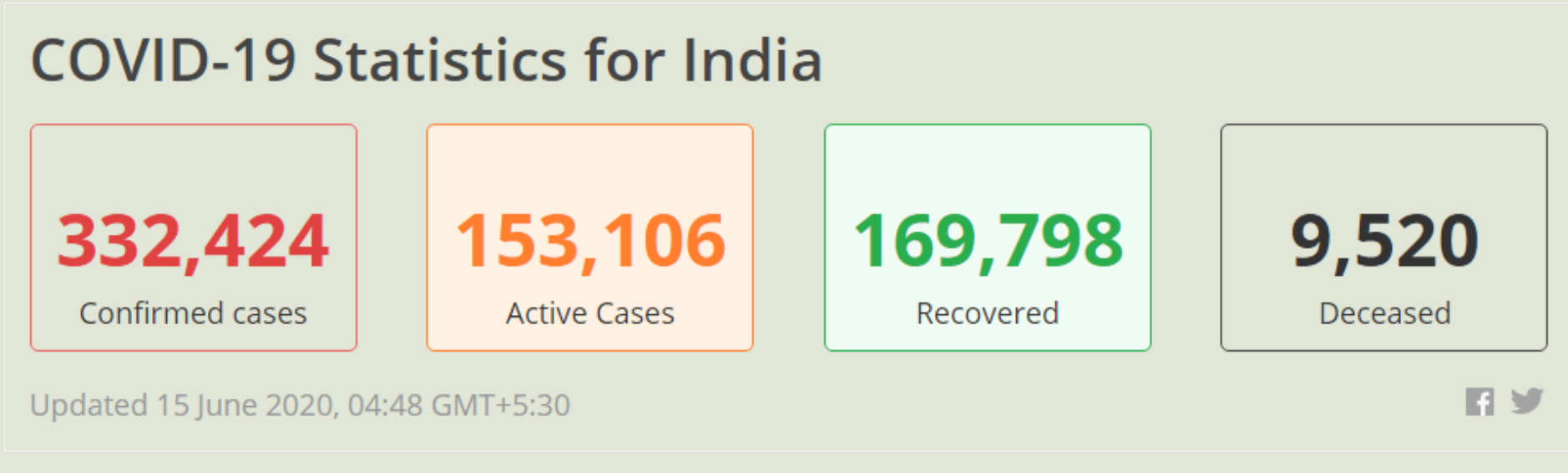
Background

- Coronavirus positive cases in India continue to rise on a daily basis despite implementation of social distancing measures and extension of nationwide lockdown. As per the recent health ministry data, Maharashtra, Tamil Nadu, Gujarat and Delhi(马哈拉施特拉邦、泰米尔纳德邦、古吉拉特邦和德里) continue to remain the worst-affected states by the Covid-19 pandemic.

state	中文名	Total	Active	Recovered	deaths	死亡百分比	治愈率
Maharashtra	马哈拉施特拉邦	90,787	44,860	42,638	3,289	3.62%	46.96%
Tamil Nadu	泰米尔纳德邦	34,914	16,282	18,325	307	0.88%	52.49%
Delhi	德里	31,309	18,543	11,861	905	2.89%	37.88%
Gujarat	古吉拉特邦	21,014	5,336	14,365	1,313	6.25%	68.36%

Source:https://www.hindustantimes.com/coronavirus/coronavirus-outbreak-in-india-covid-19-pandemic-latest-updates/ 《印度斯坦时报》(Hindustan Times)

Background



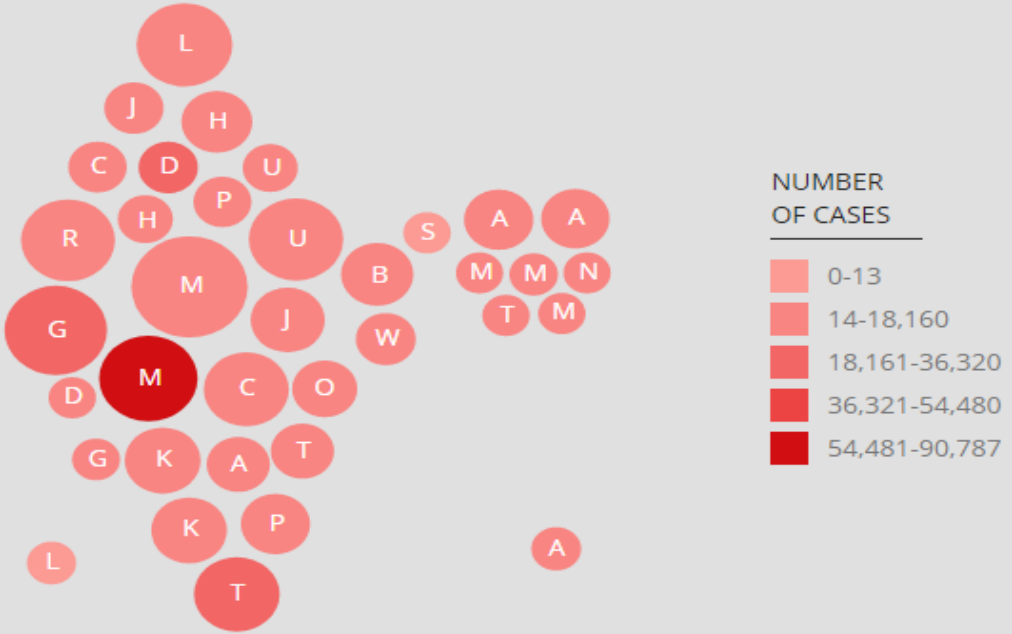
Source:https://www.hindustantimes.com/coronavirus/coronavirus-outbreak-in-india-covid-19-pandemic-latest-updates/ 《印度斯坦时报》(Hindustan Times)

Background

India

COVID -19 Cases

TOTAL	ACTIVE
276,583	133,632
RECOVERED	**DEATHS**
135,206	7,745



Source:https://www.hindustantimes.com/coronavirus/coronavirus-outbreak-in-india-covid-19-pandemic-latest-updates/

《印度斯坦时报》(Hindustan Times)

Background

VID-19 cases top 5
不安全 | chinadaily.com.cn/a/202006/01/WS5ed4771ca310a8b241159e5f.html
CHINADAILY.COM.CN
Global Edition ASIA
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HOME CHINA WORLD BUSINESS LIFESTYLE CULTURE TRAVEL WATCHTHIS SPORTS OPINION REG
World Asia-Pacific Americas Europe Middle East Africa China-US China-E
Home / World / Americas
Brazil's COVID-19 cases top 500,000, death toll nears 30,000
Xinhua | Updated: 2020-06-01 11:33

Brazil Covid19_百度搜索 | Brazil overtakes Britain with se | Coronavirus pandemic: Brazil | Coronavirus pandemic: Brazil
smh.com.au/world/south-america/brazil-stops-publishing-tally-of-coronavirus-deaths-infection-20...

Brazil stops publishing tally of coronavirus deaths, infection

For our free coronavirus pandemic coverage, learn more here.

By **Roland Oliphant**
June 8, 2020 — 7.00am

A A A

London: The Brazilian government has stopped publishing total rates of death and infection from coronavirus, sparking accusations that it is covering up the scale of the country's epidemic.

On Friday, the Federal Health Ministry closed the webpage showing daily, weekly and monthly figures on infections and deaths in Brazilian states.

The move came as Brazilian President Jair Bolsonaro, who has previously dismissed the deadly virus as "a little flu," claimed that the official count was "not representative" of the country's situation and threatened to pull Brazil out of the World Health Organisation.

Brazil overtakes Britain with second-highest COVID-19 death toll

Xinhua | June 13, 2020

The country's health ministry on late Friday confirmed 909 new deaths over the last 24 hours, taking the total deaths to 41,828.

Brazil has overtaken Britain to be the country with the second-highest death toll of COVID-19 in the world, according to data from the Brazilian Health Ministry.

The ministry on late Friday confirmed 909 new deaths over the last 24 hours, taking the country's total deaths to 41,828, while the death toll in Britian is 41,566.

Background

Brazil had recorded over 42,720 deaths from COVID-19 (June 14, 2020), the *Second-highest* in the world after the US. It had 850,514 confirmed infections, the second-highest behind the US.

Data Sources

- Base Map data
  - Harvard Dataverse
- Virus data and demographic data

Region	Source	Link	Start Date	Update
Brazil	Harvard Dataverse	https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/YB2S7D	2/26/2020	6/7/2020
Brazil	Wikipedia	https://en.wikipedia.org/wiki/States_of_Brazil	2019 (Estimate)	
India	Harvard Dataverse	https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/9QZGZB	3/10/2020	6/7/2020
India	Wikipedia	https://en.wikipedia.org/wiki/Demographics_of_India#cite_note-58	2011 (Census)	

Data Classification

Brazil

- Virus data by administrative units:
  - State/Federal District
- Virus data by categories:
  - Confirmed cases
  - Death cases
  - Recovered cases
- Demographic data by administrative units:
  - Population
  - Density (per Km2)

India

- Virus data by administrative units:
  - States/Union Territories
- Virus data by categories:
  - Confirmed cases
  - Death cases
  - Recovered cases
- Demographic data by administrative units:
  - Population
  - Density (per Km2)

Data Depository: dataverse.harvard.edu

The Dataverse® Project

Open source research data repository software

Researchers

Enjoy full control over your data. Receive *web visibility, academic credit,* and *increased citation counts.* A personal dataverse is easy to set up, allows you to display your data on your personal website, can be branded uniquely as your research program, makes your data more discoverable to the research community, and satisfies data management plans. Want to set up your personal dataverse?

Journals

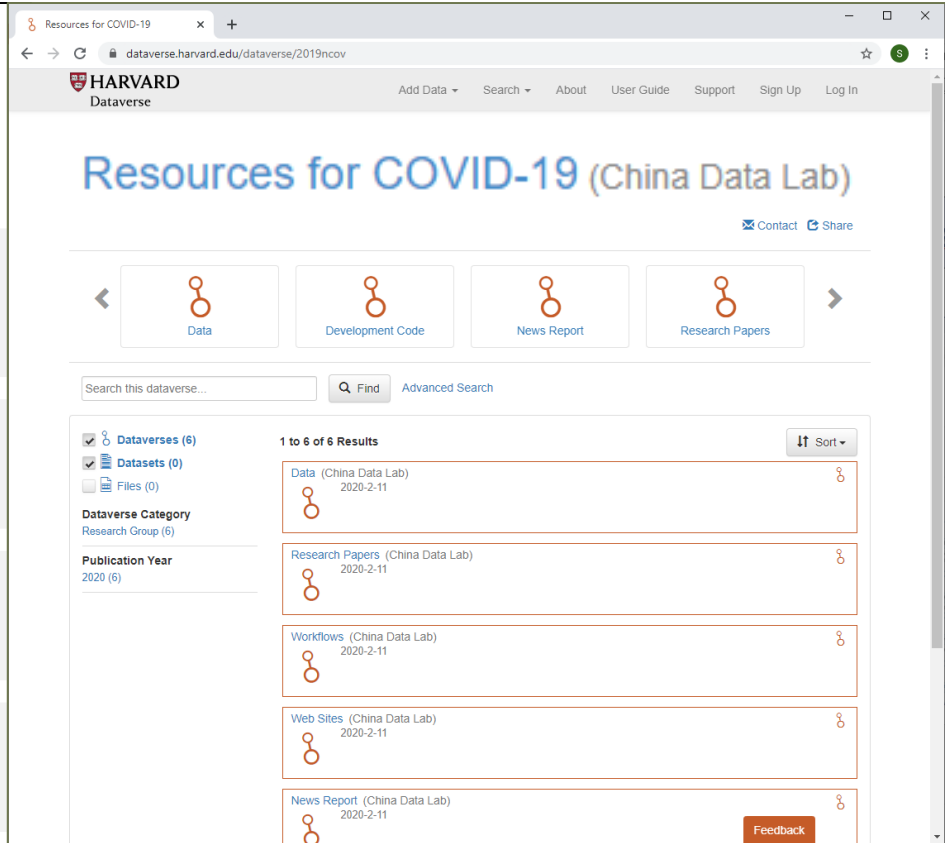
Seamlessly manage the submission, review, and publication of data associated with published articles. Establish an *unbreakable link* between *articles in your journal* and *associated data.* Participate in the open data movement by using Dataverse as part of your journal data policy or list of repository recommendations. Want to find out more about journal dataverses?

Institutions

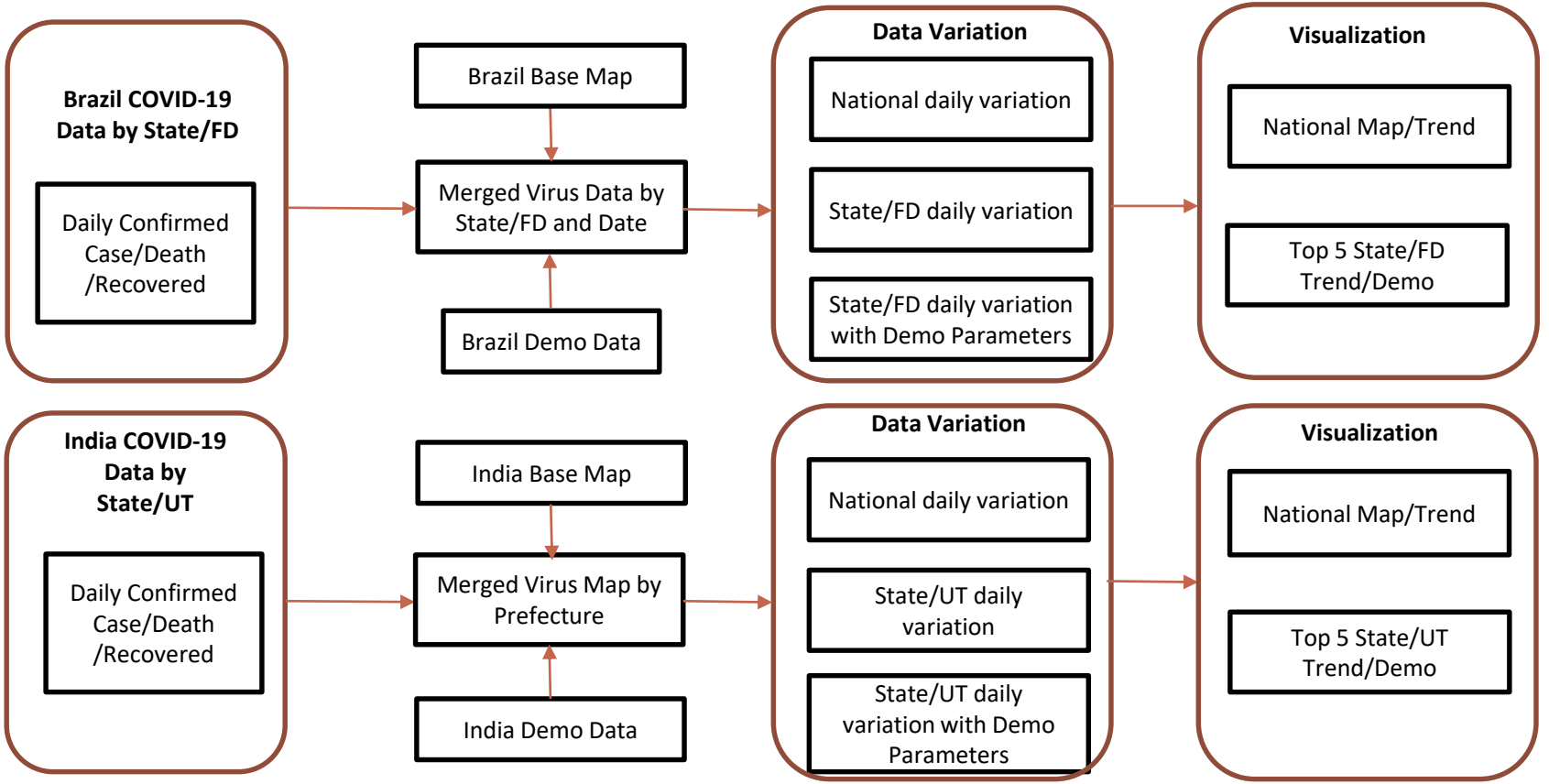
Establish a research data management solution for your community. Federate with a growing list of Dataverse repositories worldwide for increased discoverability of your community's data. Participate in the drive to set norms for sharing, preserving, citing, exploring, and analyzing research data. Want to install a Dataverse repository?

Developers

Participate in a vibrant and growing community that is helping to drive the norms for sharing, preserving, citing, exploring, and analyzing research data. Contribute code extensions, documentation, testing, and/or standards. *Integrate research analysis, visualization* and *exploration tools,* or other research and data archival systems with Dataverse. Want to contribute?

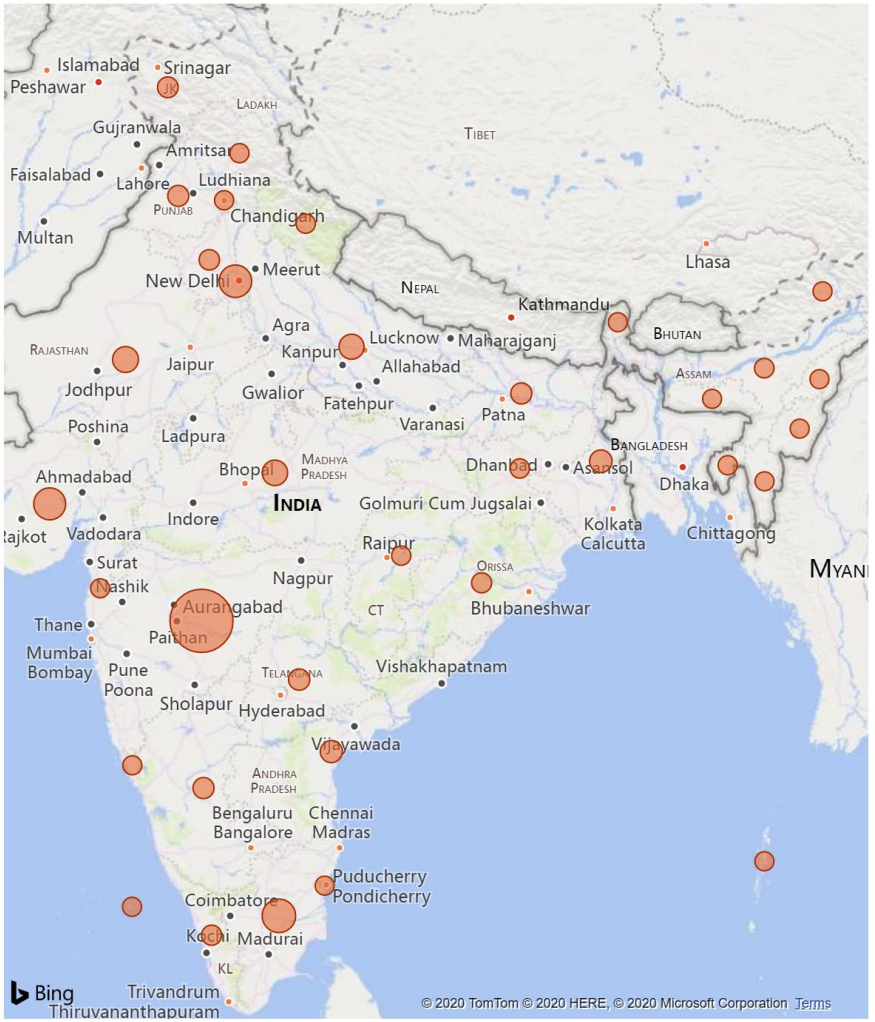


The Flowchart for Data Integration & Visualization (Power BI)

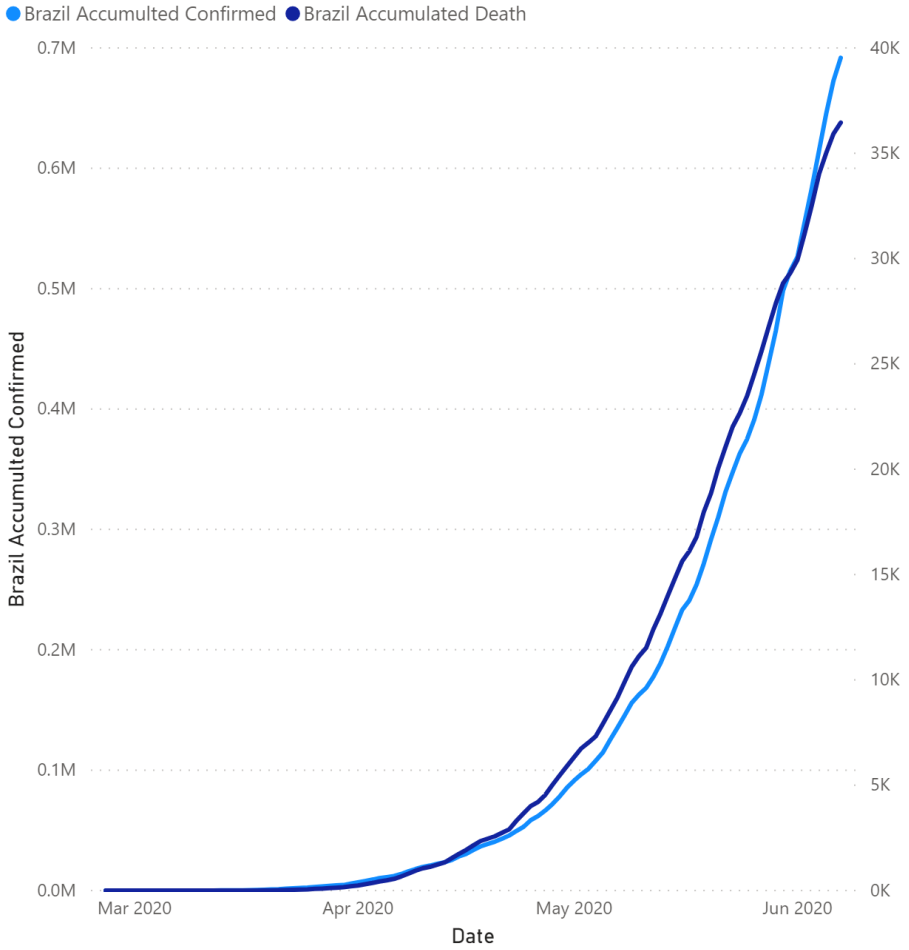


Brazil Accumulted Confirmed by Brazil State/FD

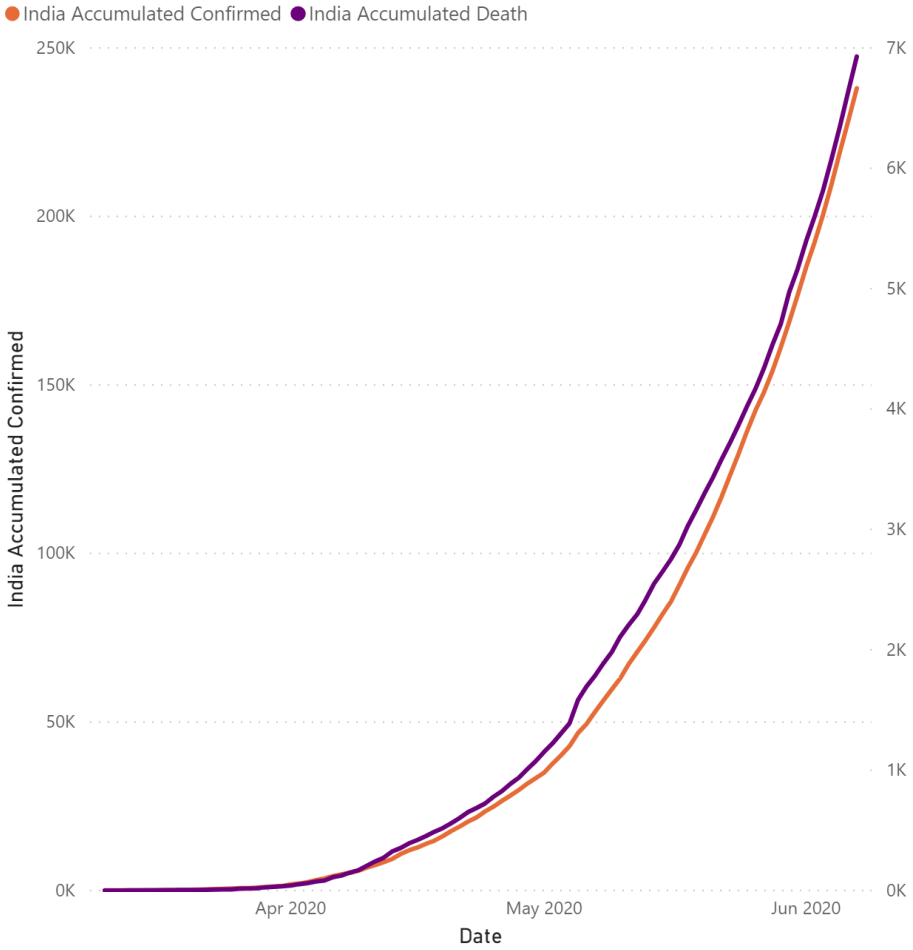
India Accumulated Confirmed by India State/UT



Brazil Accumulted Confirmed and Brazil Accumulated Death by Date



India Accumulated Confirmed and India Accumulated Death by Date



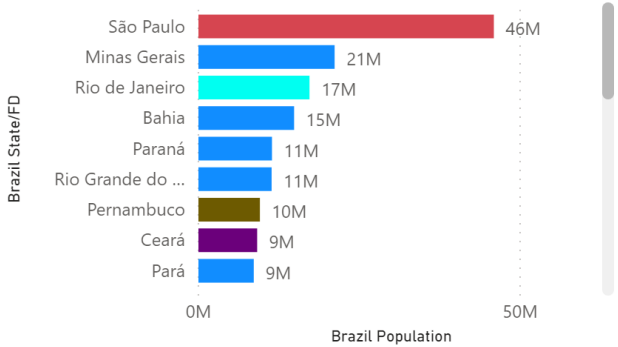
Timeline and Response of outbreak in Brazil

- **25 February:** The first case of COVID-19 in Brazil.
- **17 March:** Brazil's first coronavirus-related death was confirmed.
- **20 March:** State health departments reported almost a thousand confirmed cases across 23 of 26 states and also in the Federal District.
- **18 March:** Rio de Janeiro and five other municipalities—São Gonçalo, Guapimirim, Niterói, Nova Iguaçu, and Mesquita—in the state of Rio de Janeiro had declared a state of emergency. Other states followed.
- **3 May:** Brazil confirmed more than a hundred thousand cases; the number of cases had doubled in less than 10 days.
- Jair Bolsonaro, the President of Brazil, views that the risk posed by coronavirus has been exaggerated. State governors have openly disagreed, imposing lockdowns measures in their own states.

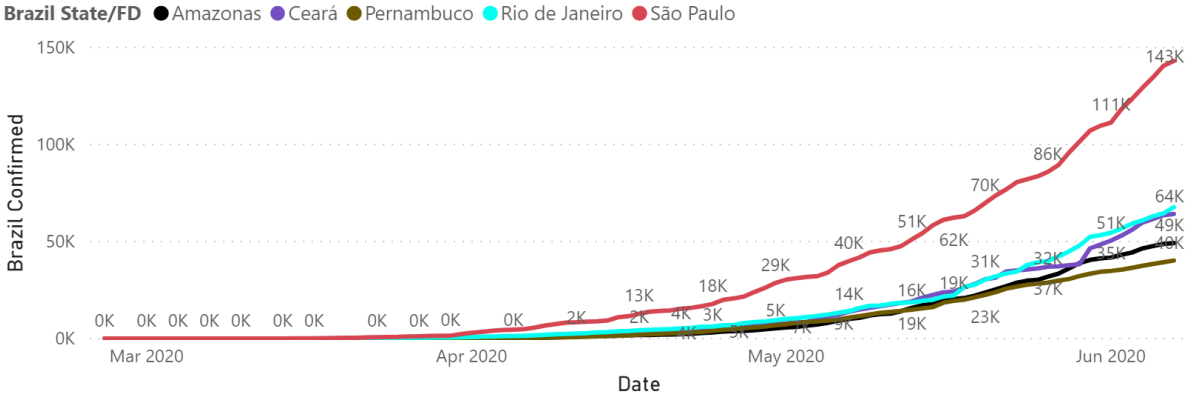
Timeline and Response of outbreak in India

- On 30 January, India reported its first case of COVID-19 in Kerala.
- On 17 March, the Government of India issued an advisory, urging to all Indian states to take social distancing measures as a preventive strategy for implementation till 31 March.
- Over March, multiple states across the country began shutting down schools, colleges, public facilities such as malls, gyms, cinema halls and other public places to contain the spread.
- On 22 March, the Government of India announced complete lockdown in 82 districts in 22 states and Union Territories of country where confirmed cases were reported.
- April, Major Indian cities and many states made wearing facial masks compulsory.

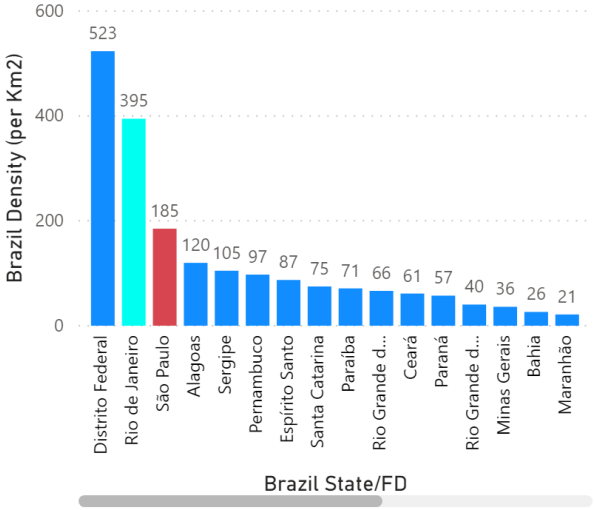
Brazil Population by Brazil State/FD



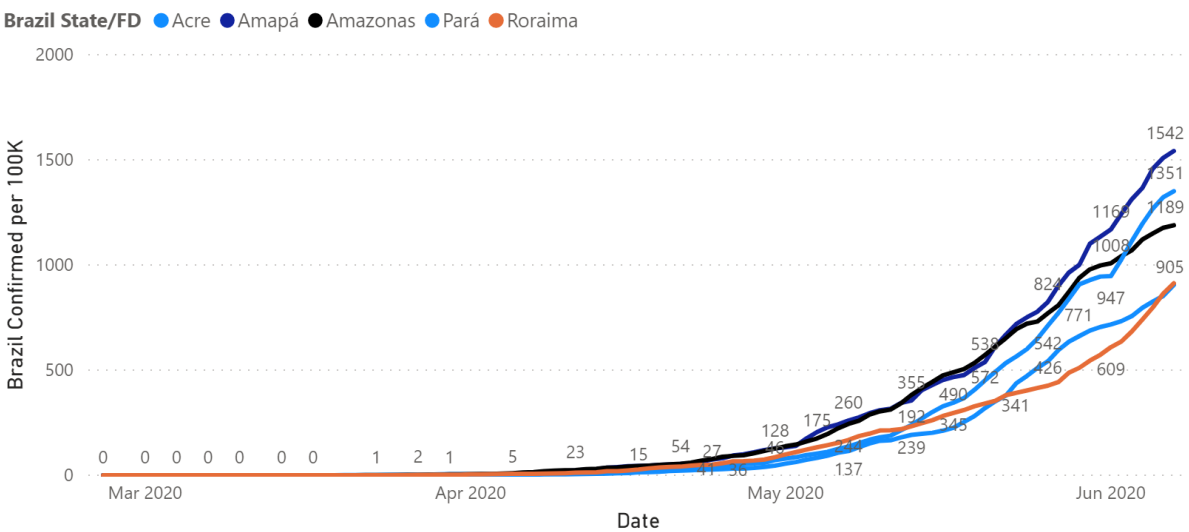
Brazil Confirmed by Date and Brazil State/FD



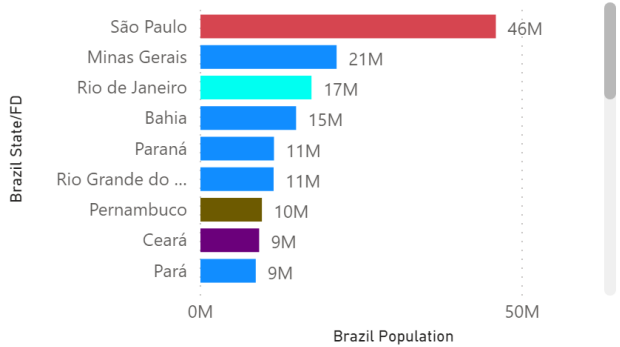
Brazil Density (per Km2) by Brazil State/FD



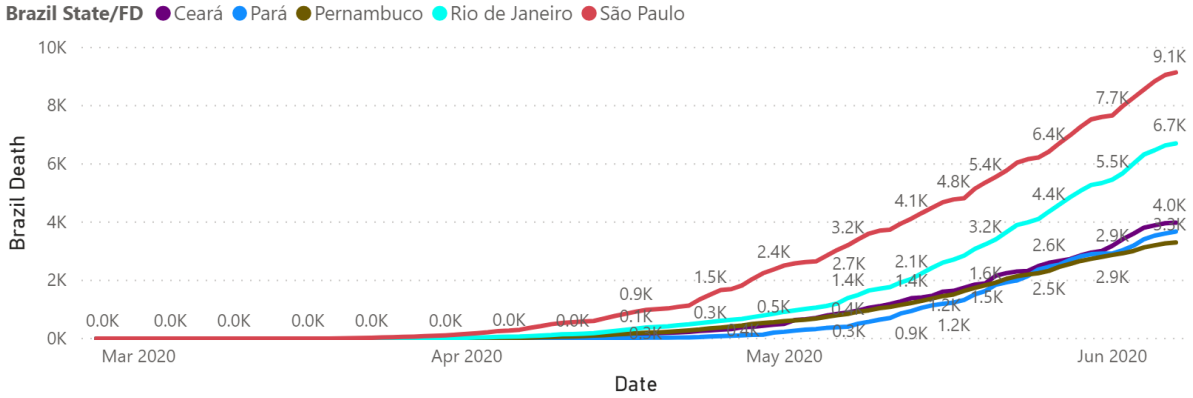
Brazil Confirmed per 100K by Date and Brazil State/FD



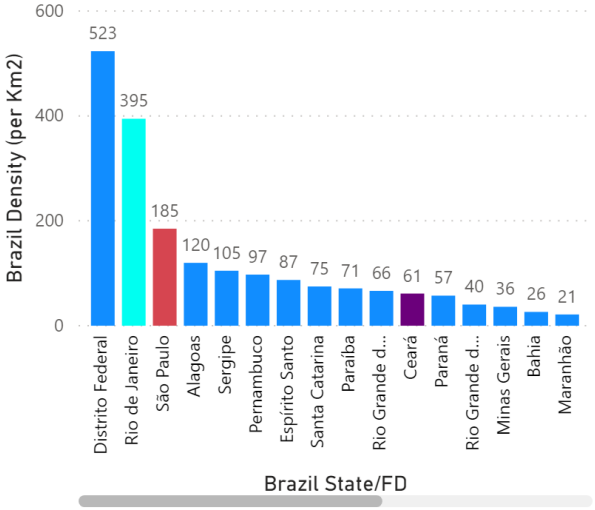
Brazil Population by Brazil State/FD



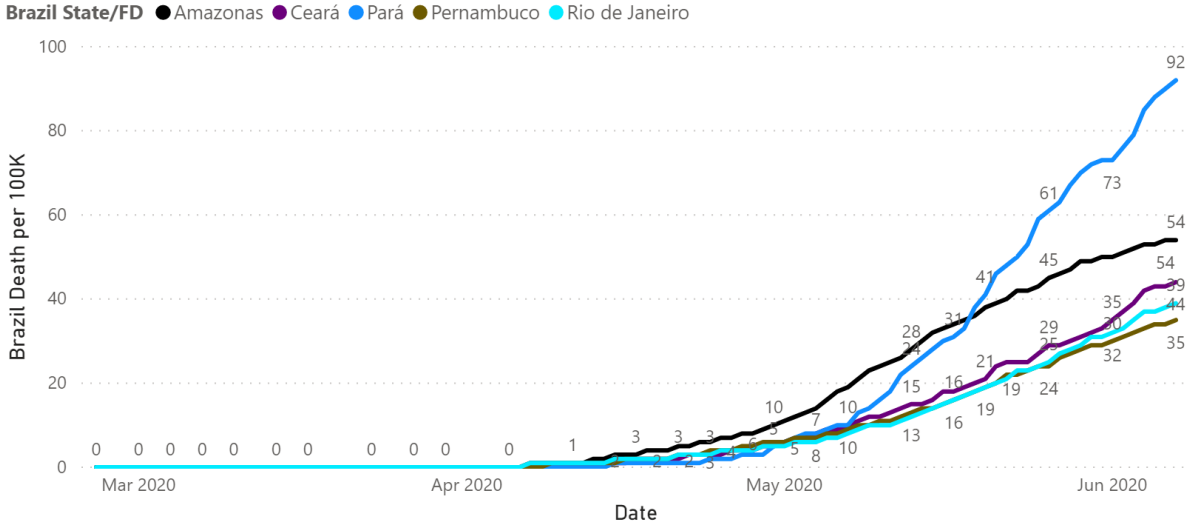
Brazil Death by Date and Brazil State/FD



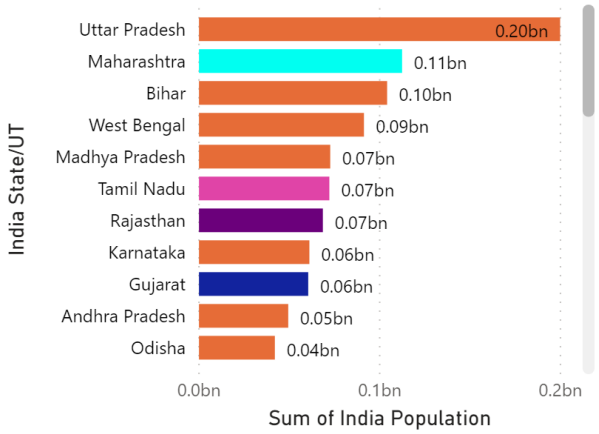
Brazil Density (per Km2) by Brazil State/FD



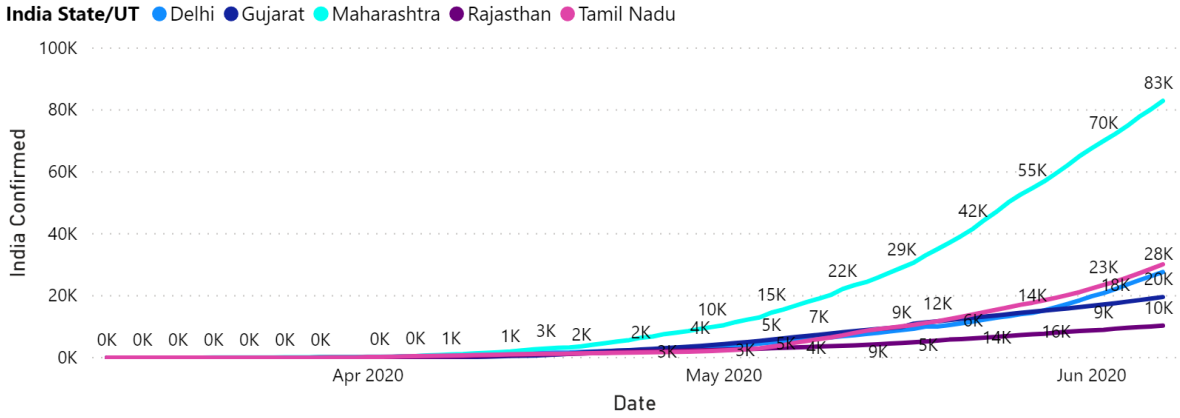
Brazil Death per 100K by Date and Brazil State/FD



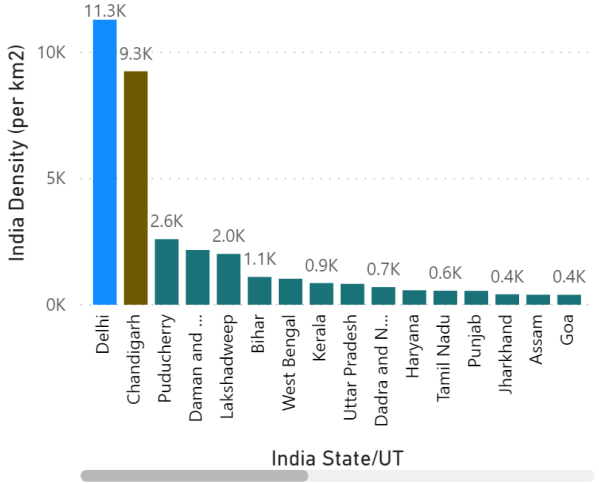
Sum of India Population by India State/UT



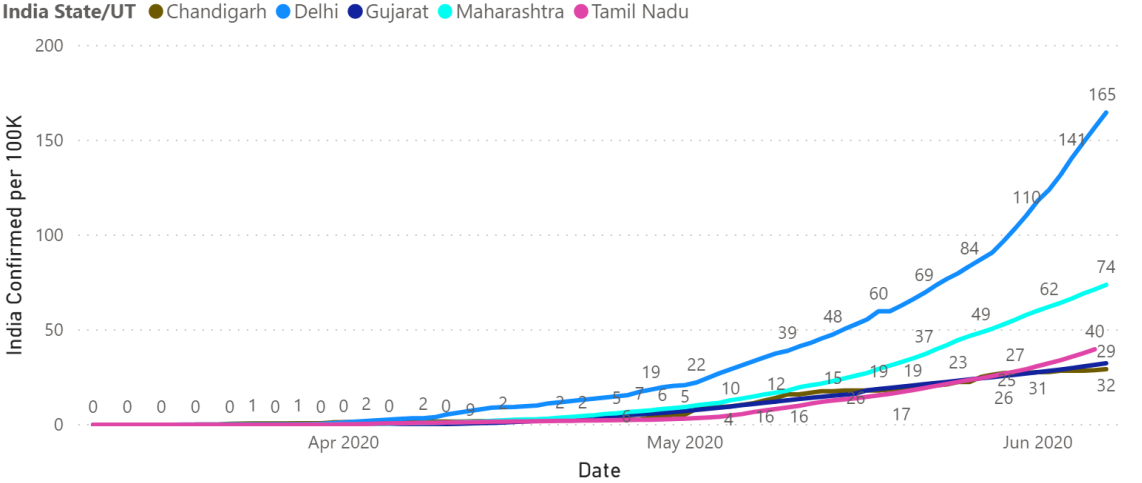
India Confirmed by Date and India State/UT



India Density (per km2) by India State/UT



India Confirmed per 100K by Date and India State/UT



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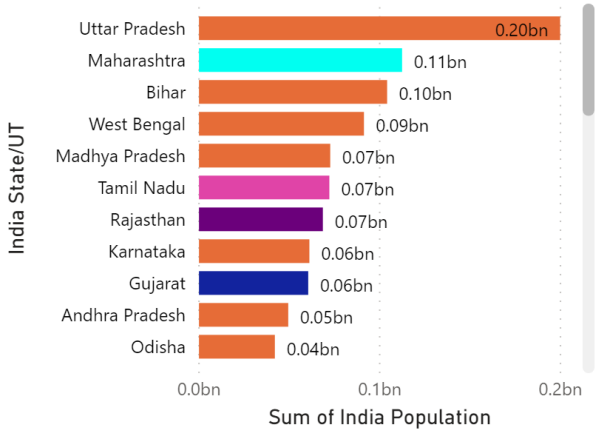
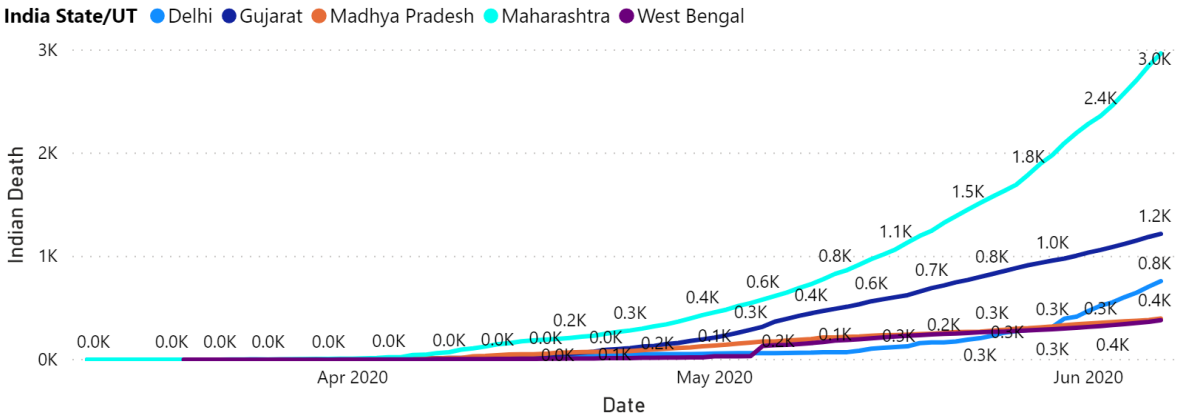


Indian Death by Date and India State/UT



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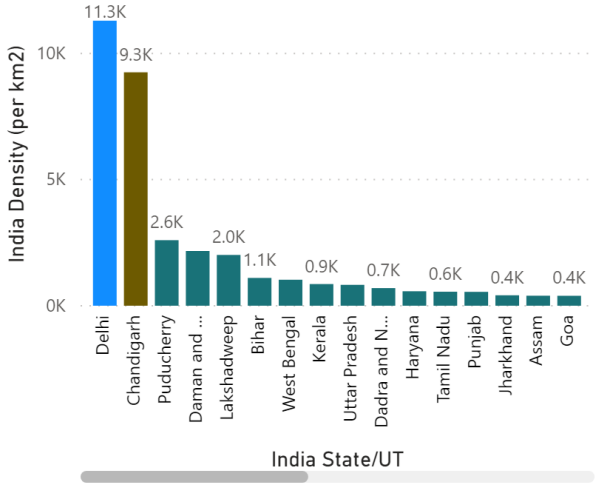
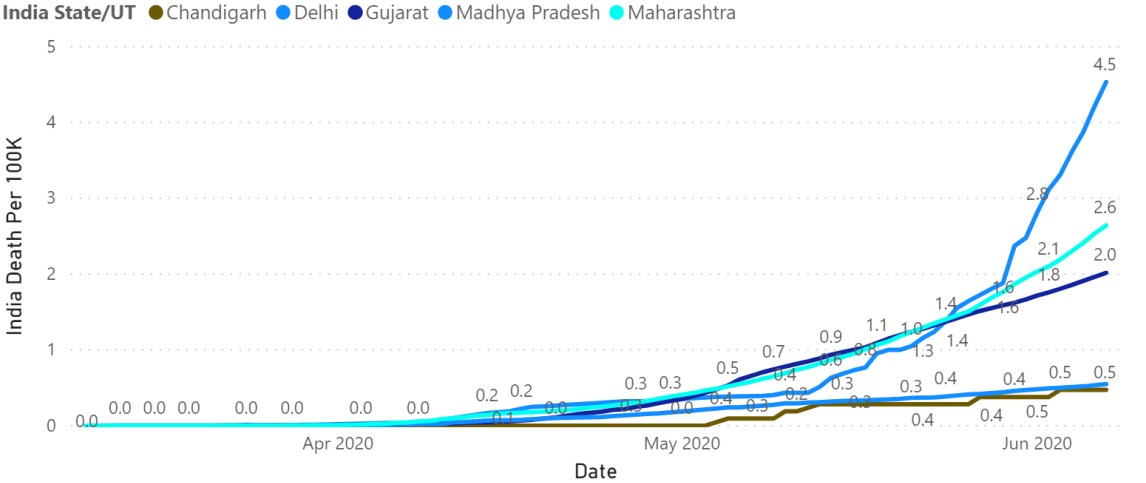
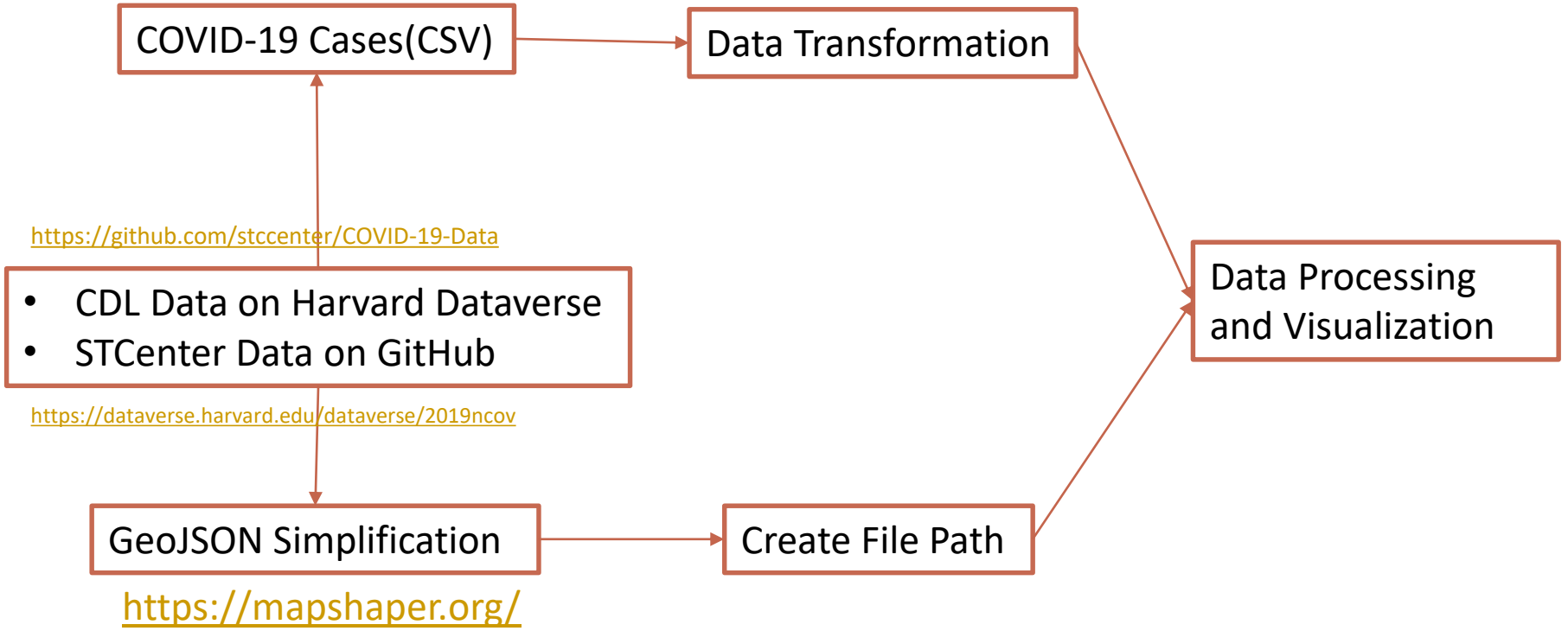


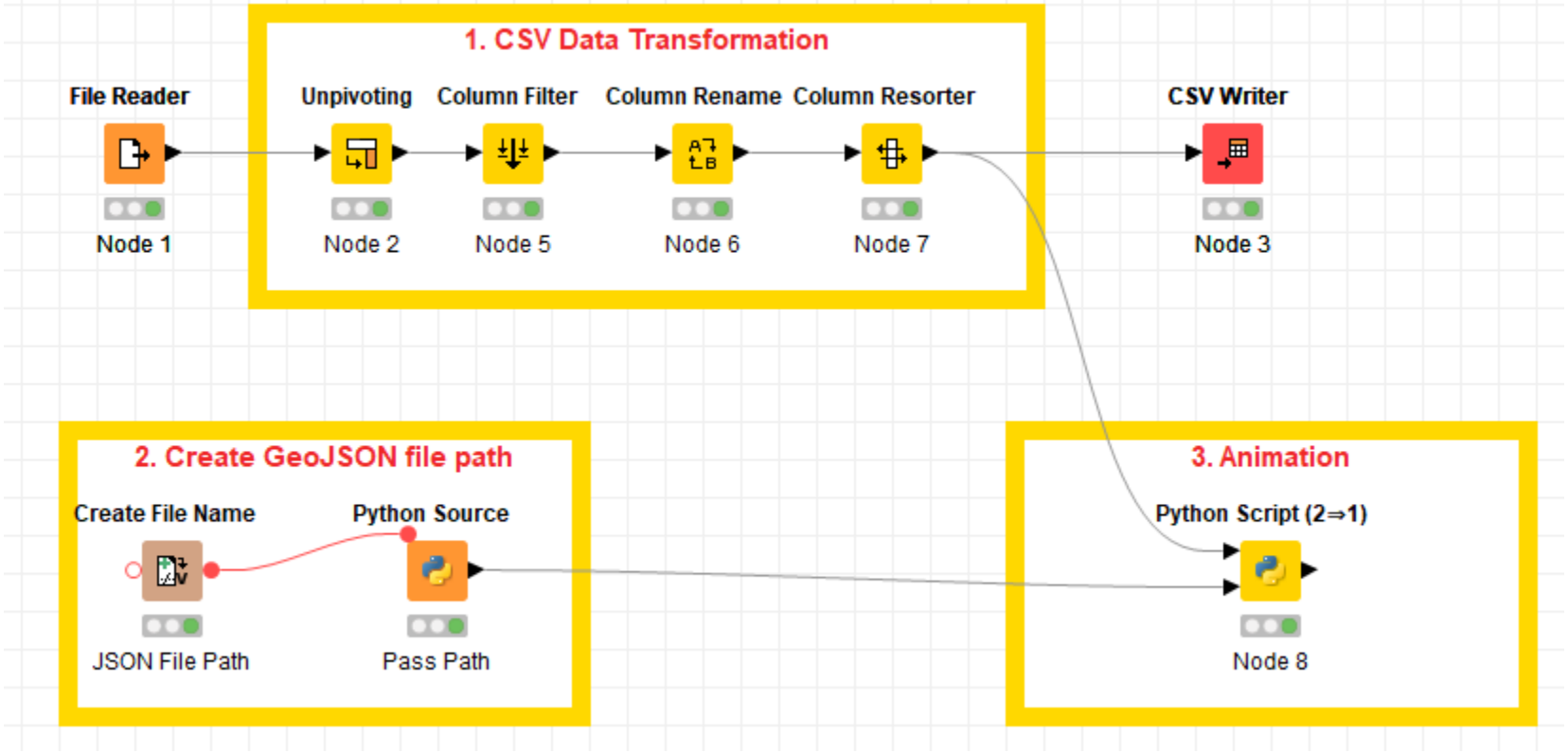
India Death Per 100K by Date and India State/UT



Workflow for COVID-19 Cases Visualization



Workflow for COVID-19 Cases Visualization



Workflow for COVID-19 Cases Visualization

Step 1. Find data from STC

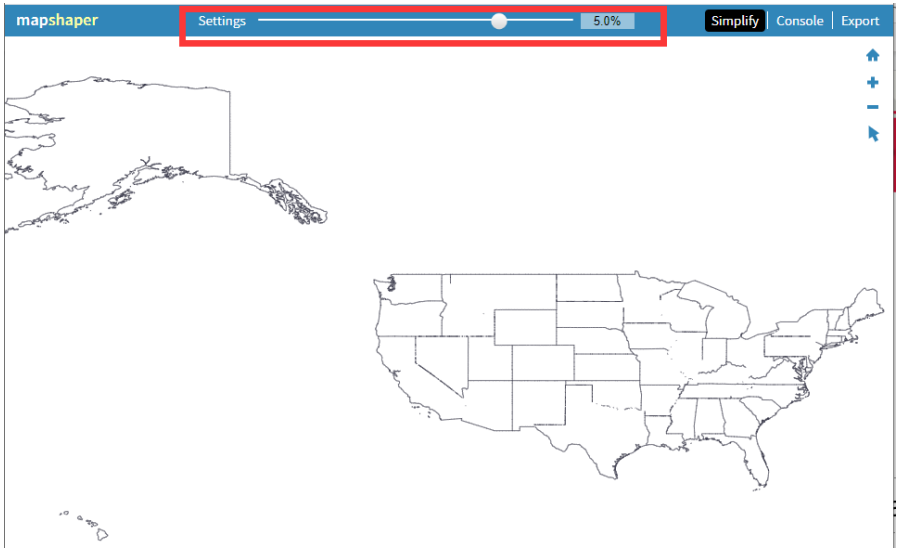
https://github.com/stccenter/COVID-19-Data

Australia	auto push at 2020-06-15 22:56:24
Austria	auto push at 2020-06-15 22:56:24
Brazil	auto push at 2020-06-15 22:56:24
Canada	auto push at 2020-06-15 22:56:24
Chile	auto push at 2020-06-15 22:56:24
China	auto push at 2020-06-15 22:56:24

China_basemap	add basemaps for countries
Province_level_daily	auto push at 2020-06-15 22:56:24
Province_level_summary	auto push at 2020-06-15 22:56:24

Step 2. Simplify the GeoJSON file

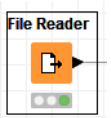
https://mapshaper.org/

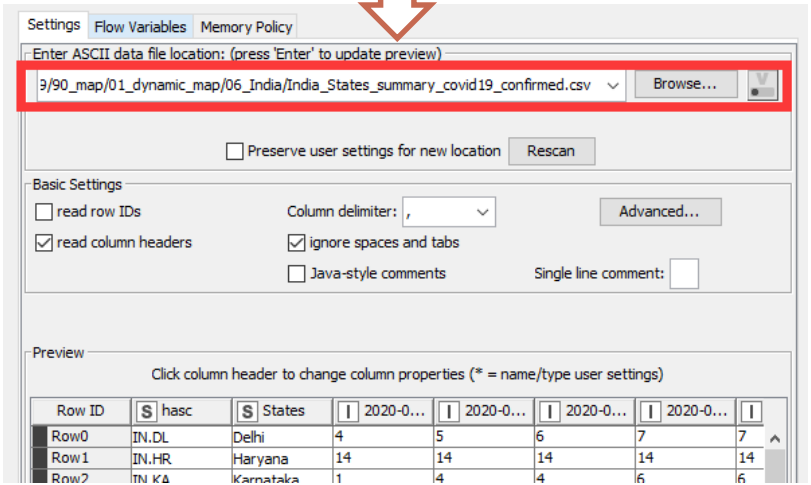


Set the simplification value to 5%

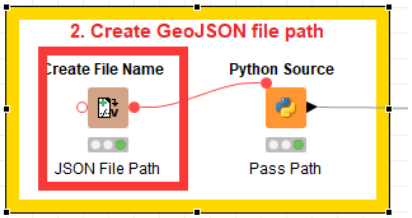
Workflow for COVID-19 Cases Visualization

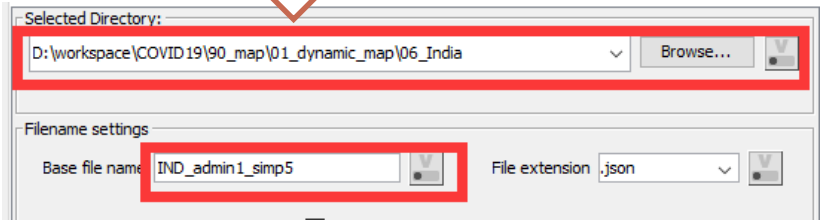
Step 3. Change the CSV file location in the workflow





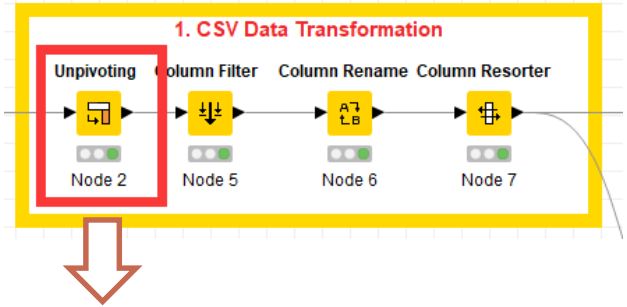
Step 4. Change the GeoJSON file location





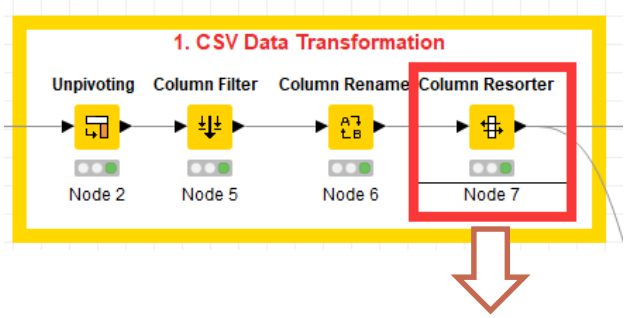
Workflow for COVID-19 Cases Visualization

Step 5. Check the “Unpivoting” result



RowIDs	ColumnNames	ColumnValues	hasc	States
Row0	2020-03-10	4	IN.DL	Delhi
Row0	2020-03-11	5	IN.DL	Delhi
Row0	2020-03-12	6	IN.DL	Delhi
Row0	2020-03-13	7	IN.DL	Delhi
Row0	2020-03-14	7	IN.DL	Delhi
Row0	2020-03-15	7	IN.DL	Delhi
Row0	2020-03-16	7	IN.DL	Delhi
Row0	2020-03-17	8	IN.DL	Delhi
Row0	2020-03-18	10	IN.DL	Delhi
Row0	2020-03-19	12	IN.DL	Delhi
Row0	2020-03-20	17	IN.DL	Delhi
Row0	2020-03-21	26	IN.DL	Delhi
Row0	2020-03-22	29	IN.DL	Delhi

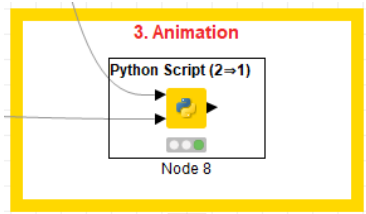
Step 6. Check the “Resorter” result



Row ID	hasc	date	case	States
Row0	IN.DL	2020-03-10	4	Delhi
Row1	IN.DL	2020-03-11	5	Delhi
Row2	IN.DL	2020-03-12	6	Delhi
Row3	IN.DL	2020-03-13	7	Delhi
Row4	IN.DL	2020-03-14	7	Delhi
Row5	IN.DL	2020-03-15	7	Delhi
Row6	IN.DL	2020-03-16	7	Delhi
Row7	IN.DL	2020-03-17	8	Delhi
Row8	IN.DL	2020-03-18	10	Delhi
Row9	IN.DL	2020-03-19	12	Delhi
Row10	IN.DL	2020-03-20	17	Delhi

Workflow for COVID-19 Cases Visualization

Step 7. Check the center and output path



Dialog - 11:8 - Python Script (2⇒1)

File

Script | Options | Templates | Flow Variables | Memory Policy

Columns: hasc, date, case, States, json_path

Flow variables: knime.workspace, filePath

```
import plotly.express as px

# 1. read geojson
with open(str(input_table_2['json_path'][0])) as f:
  states = json.load(f)

# 2. read covid-19 cases csv file and create dataframe
dt = {'hasc': input_table_1['hasc'], 'date': input_table_1['date'], 'case': input_table_
df = pd.DataFrame(data=dt)

# 3. create animation
fig = px.choropleth_mapbox(df, geojson=states, locations='hasc', featureidkey="propertie
                           color_continuous_scale="Viridis",
                           range_color=(0, 102000),
                           mapbox_style="carto-positron",
                           zoom=3
                           center = {"lat": 21.3416202, "lon": 73.5954145},
                           opacity=0.5, animation_frame = "date",
                           labels={'hasc':'Confirmed Cases'}
                          )
fig.update_layout(margin={"r":0,"t":0,"l":0,"b":0})

# 4.show the animation
fig.write_html("D:\\workspace\\COVID19\\90_map\\01_dynamic_map\\06_India\\india_map.html
fig.show(renderer= browser )
```

Name	Type	Value
knime...	module	
INT_S...	int	-214...
LONG_...	int	-922...
flow_...	Order...	Orde...
input...	DataF...	...
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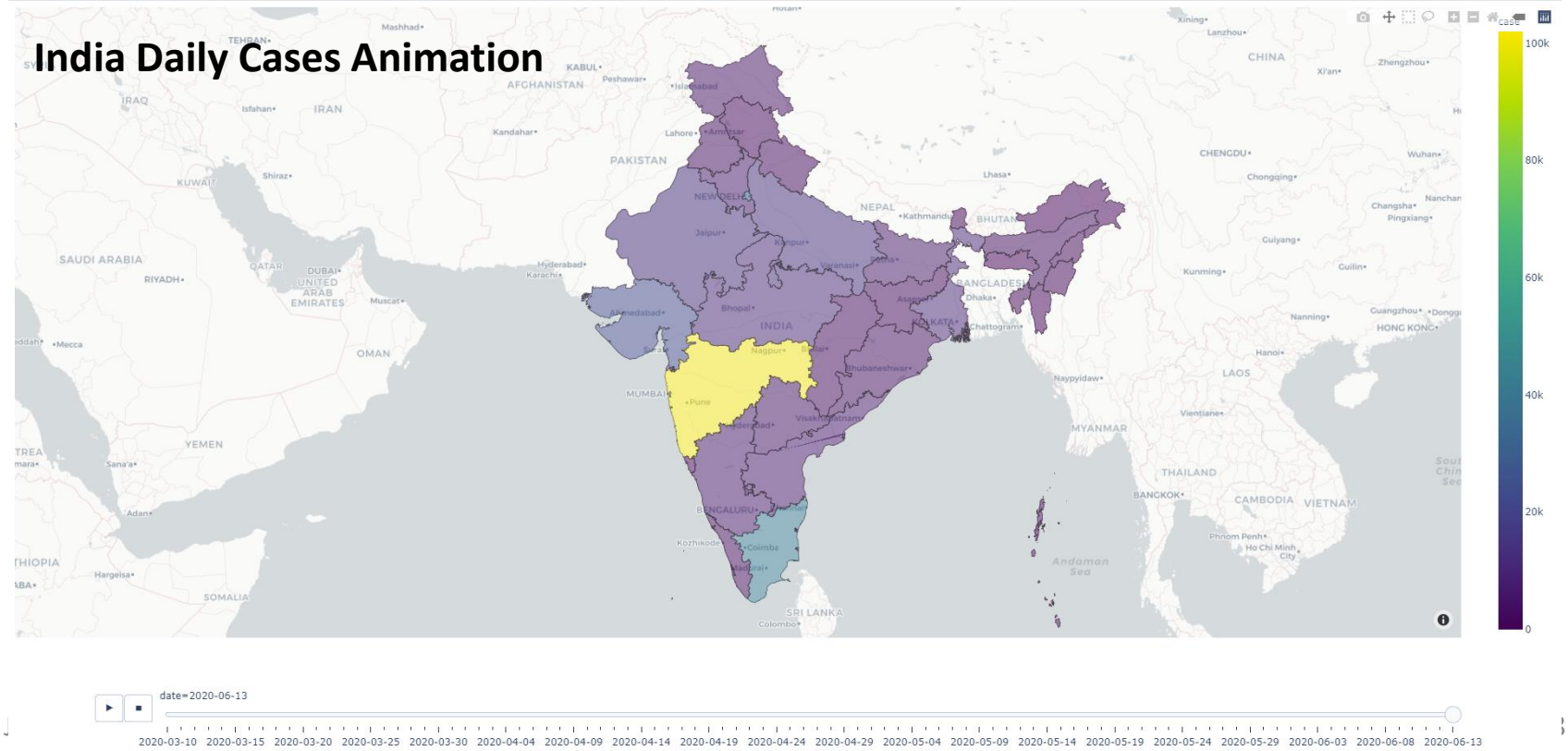
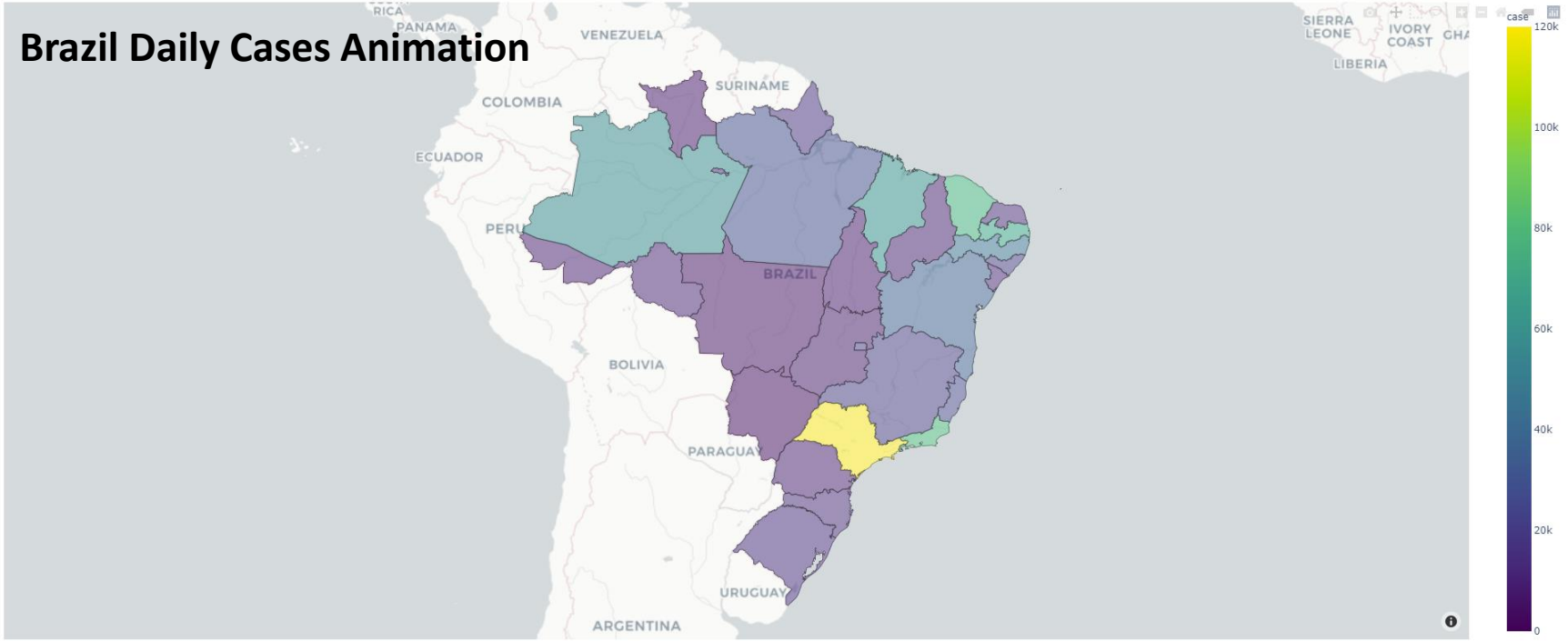
Execute script | Execute selected lines | Reset workspace

Workflow for COVID-19 Cases Visualization



Workflow for COVID-19 Cases Visualization



Preliminary Results of the Analysis: Brazil Vs India

- Confirmed cases have increased significantly since around mid of April 2020 in both countries, and are showing continuous uptrend;
- Hot spots of confirmed cases appear in the most populous states in both countries, but confirmed cases per 100k population showed different patterns in Brazil and India.

Discussion

Possible impacts of the following factors on the analysis:
Time points of population data are different

Possible explanations for the patterns in Brazil and India
Policy, political leadership, test capacity (The New York Times, 2020; Tony Kirby, 2020)

Amazonas states in Brazil has the highest confirmed and data cases/100k;
Possible reason: under-resourced health system (Tony Kirby, 2020)

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