Title: Working with Geospatial data

Objective:

1. *Search/locate and download the geospatial Data (Use same dataset if it contains location information)*
2. *To learn how to visualize geospatial data*
    a. *Auto Geo-tagging*
    b. *Custom Geo-tagging*
3. *Apply heat map*
4. *Try various forms of heat maps*
5. *Analyse the visualization and write your interpretation after observation on heat-map*
6. *Interactive filtering over map*
7. *Following maps should be demonstrated*
    a. *Proportional symbol maps*
    b. *Choropleth maps (filled maps)*
    c. *Point distribution maps*
    d. *Density maps (heatmaps)*
    e. *Flow maps (path maps)*
    f. *Spider maps (origin-destination maps)*

Course Outcome:

CO1: Learn how to locate and download datasets, extract insights from that data and present their findings in a variety of different formats.

CO3 Apply data visualization best practices

Books/ Journals/ Websites referred:

Guide to Tableau
Tips for Data Visualisation
Maps for Tableau

Resources used:

Dataset: https://www.kaggle.com/sirpunch/indian-census-data-with-geospatial-indexing
Tableau Documentation
Books
Websites
Educba

Theory:

These visualizations focus on the relationship between data and its physical location to create insight. Any positional data works for spatial analysis. What makes geospatial visualizations unique is the scale. A diagram of circuits on a microchip explores position, but it is not geospatial. It does not map to Earth or another planetary body. A map of the stars is also not considered geospatial, but a map of the surface of Mars is. Geo Visualization overlays variables on a map using latitude and longitude to foster insight.

Definition:

Geospatial visualizations highlight the physical connection between data points. This makes them susceptible to a few common pitfalls that may introduce error:

- Scaling - Changes in the size of the map can affect how the viewer interprets the data
- Auto-correlation - A view may create an association between data points appearing close on a map, even for unrelated data

Heat Maps:

A heat map is data analysis software that uses color the way a bar graph uses height and width: as a data visualization tool.

If you're looking at a web page and you want to know which areas get the most attention, a heat map shows you in a visual way that's easy to assimilate and make decisions from.

A heat map uses a warm-to-cool color spectrum to show you which parts of a page receive the most attention.

Following points should be written by students

1. Observation after plotting data
2. Observation after plotting various forms of maps like based on visualization Que
3. Interpretation of visualized map

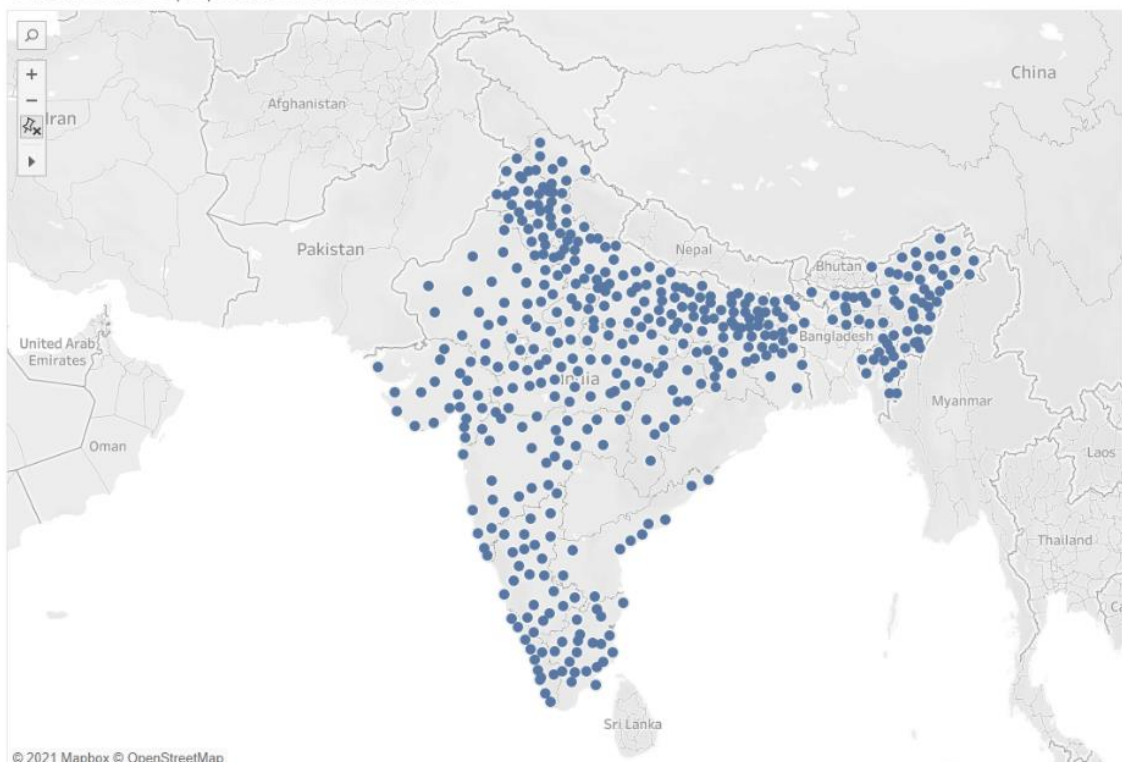Note: Detail observation needed along screenshots wherever required

Dataset: [Indian Census Data with Geospatial indexing | Kaggle](#)
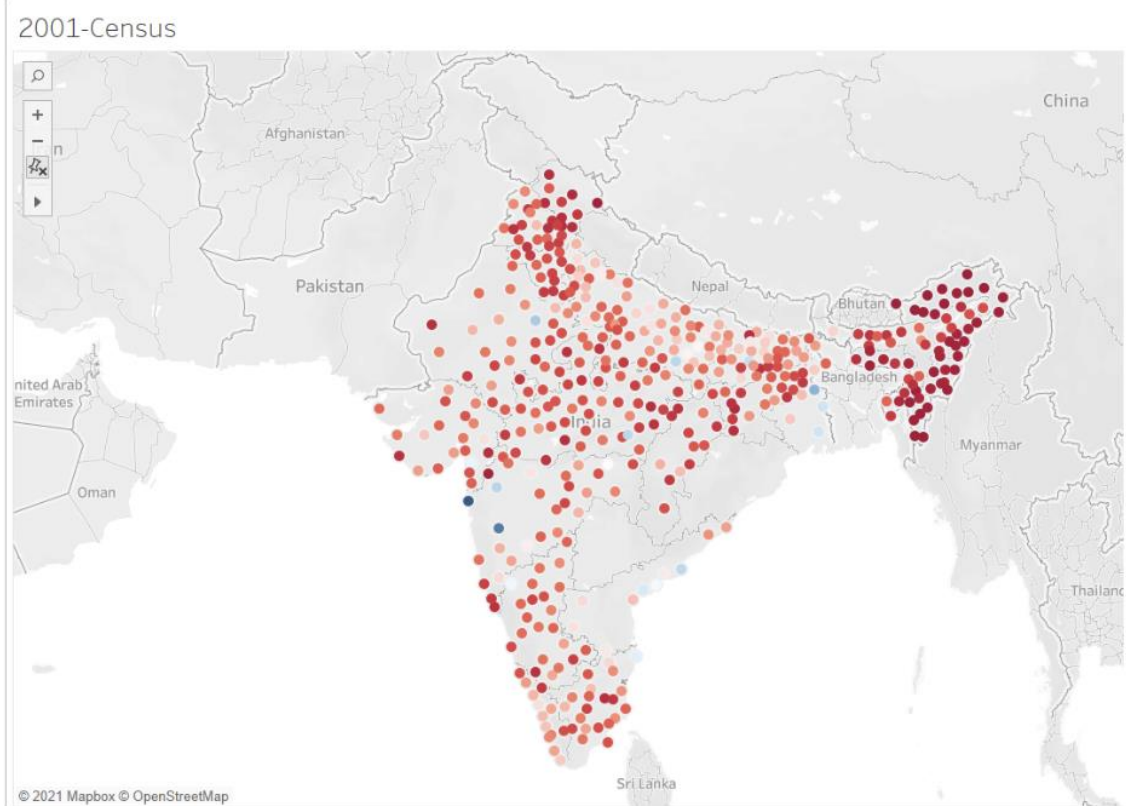**Comparative geospatial study between Census data of the year 2001 and 2011**

Census-2001

Plotted Data:
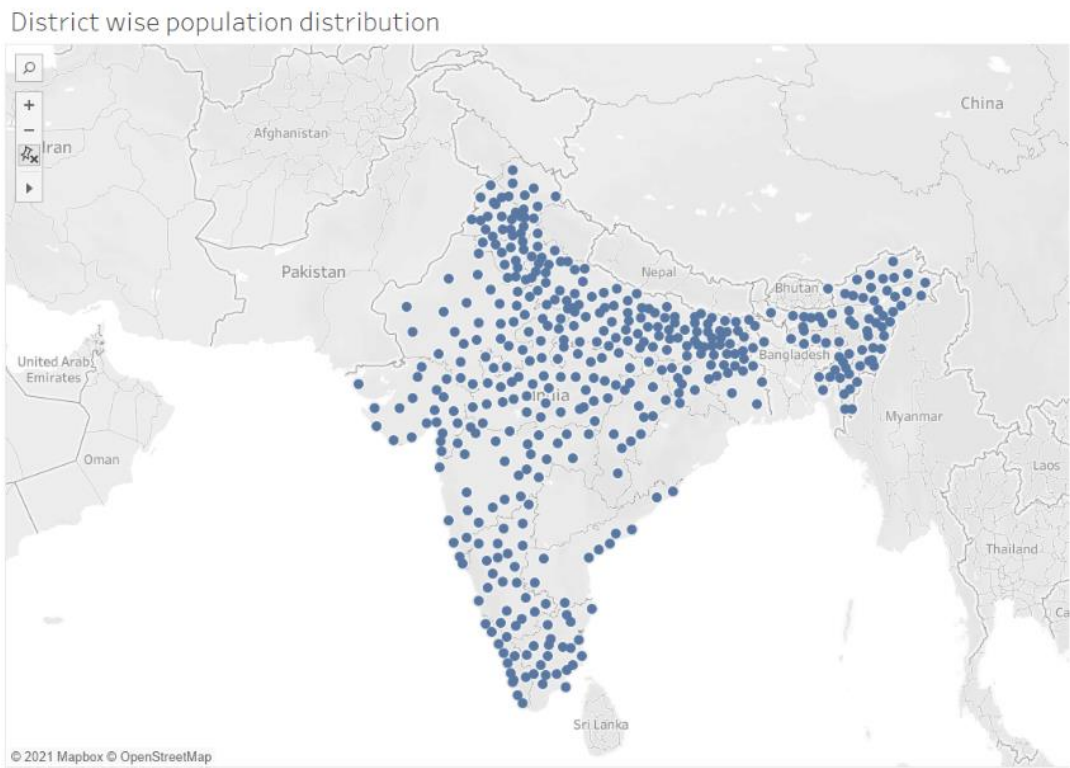
Using Heat maps

2001-Census

The above Heat Map has used colour to differentiate the variation in population. Colour varies on a band:
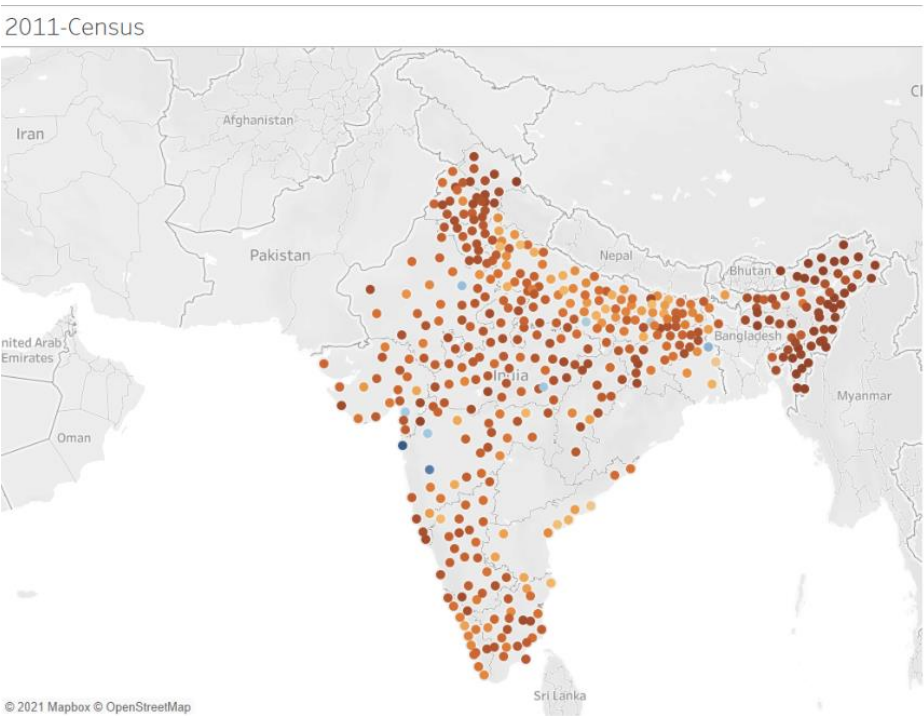
Light Pink for Sparsely Populated Regions

Dark Green for densely Populated Regions

Census-2011

Plotted Data:

District wise population distribution

Heat Map:

2011-Census

The above Heat Map has used colour to differentiate the variation in population. Colour varies on a band:

Brown for Sparsely Populated Regions

Dark Blue for densely Populated Regions

Observation:

Case 1: Thane Maharashtra

Year 2001: Population 81,31,849

Year 2011: Population 1,10,60,148

Drastic increase in population over 10 years.

From 2001 diagram 2, Clearly visible as one of the biggest bubbles in India

Legend Depicting which colour corresponds to which State

State
- Andhra Pradesh
- Arunachal Pradesh
- Assam
- Bihar
- Chandigarh
- Chhattisgarh
- Goa
- Gujarat
- Haryana
- Himachal Pradesh
- Jharkhand
- Karnataka
- Kerala
- Madhya Pradesh
- Maharashtra
- Manipur
- Meghalaya
- Mizoram
- Nagaland
- Punjab
- Rajasthan
- Tamil Nadu
- Tripura
- Uttar Pradesh
- West Bengal

Chloropleth Map for Indian State Population

State-wise Population
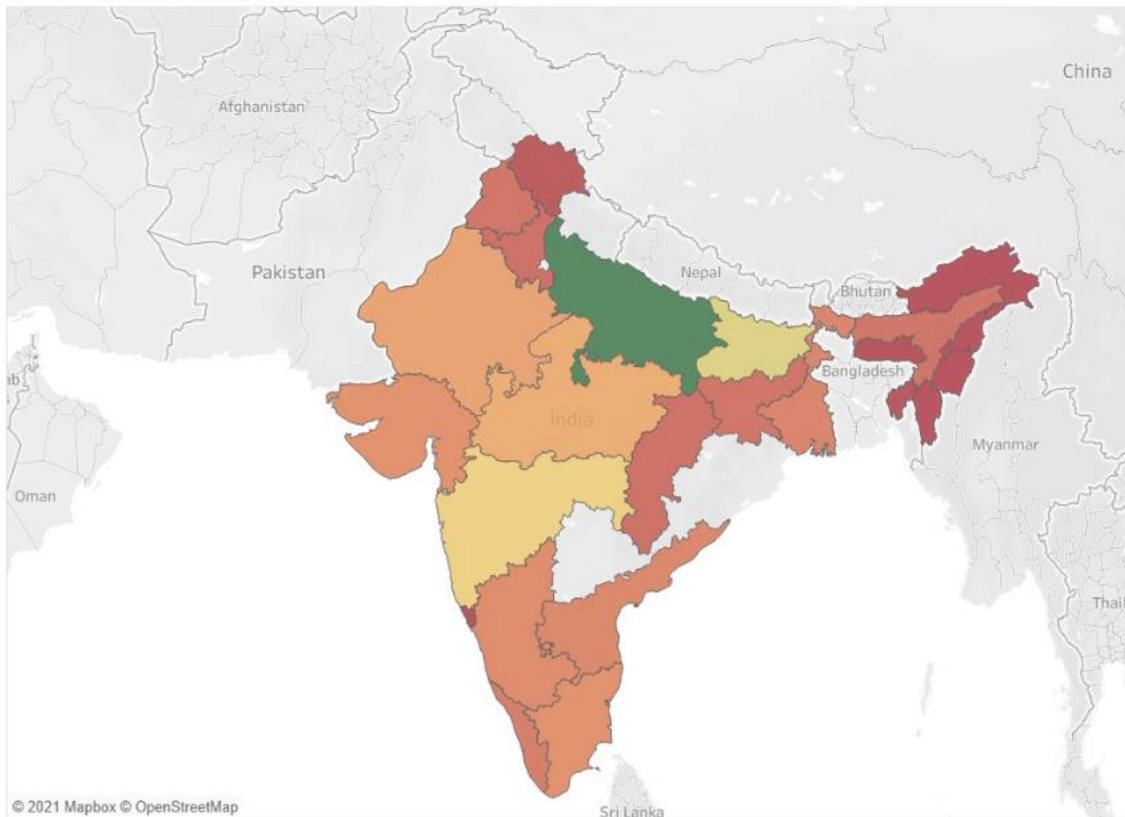
Conclusion:

Created a comparative study between population data from 2001 and 2011 of all major districts in India.

Used Heat Maps to depict sparse and densely populated regions of India.

Sorted them by color and size to enable efficient visualization

District taken for case study was Thane and we saw an exponential rise in population in one of the most densely populated districts in India

Date: _____   **Signature of faculty in-charge**

Post Lab Question:

1. **Explain the Choropleth maps.**

Ans:

Choropleth maps are thematic maps that use different shading patterns and sequential color schemes for geographical areas, based on the statistical data within them.

Data is categorized into different classes, with light colors/shades representing lower numbers and darker colors/shades representing higher numbers.

For example, if you wanted to measure population levels for each state you could assign white to states under 10 million, light blue to states between 10 – 20 million, and dark blue to states over 20 million.

But keep in mind that for these maps to work properly, measure data with equal intervals

Population Density (people per km²)
(Data source: Wikipedia, 2015)

Less than 10   10 - 30   30 - 50   50 - 100   100 - 200   200 - 300   300 - 500   More than 1000

w Data source: https://en.wikipedia.org/wiki/List_of_sovereign_states_and_dependent_territories_by_population_density