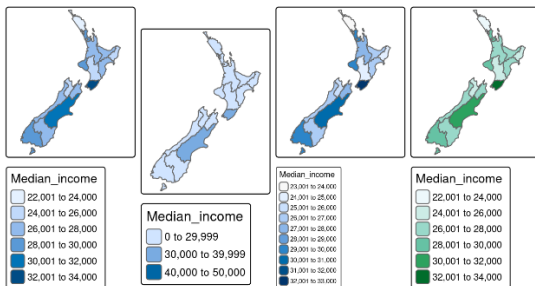


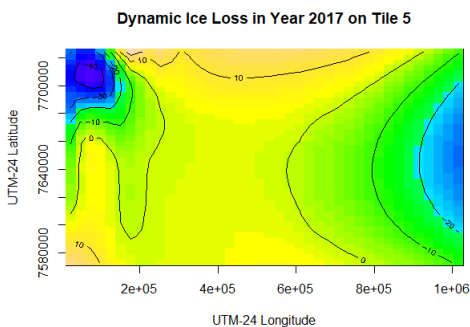
Spatial Data and Spatial Visualizations, Maps

When conducting exploratory data analysis (EDA) on spatial data, the goal is to understand and gain insights into the spatial patterns, relationships, and characteristics of the data. Spatial data refers to data that has a geographic or spatial component, such as coordinates or polygons. Here are some common exploratory analysis techniques used for spatial data:

1. **Maps and Spatial Visualization:** Create maps to visualize the spatial distribution of the data. This can include point maps, choropleth maps, heat maps, or density plots. Mapping techniques help identify spatial patterns, clusters, or outliers.

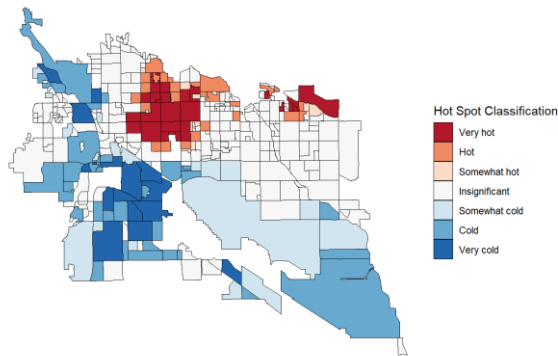


2. **Descriptive Statistics:** Calculate descriptive statistics such as mean, median, standard deviation, and range for spatial attributes. Analyze summary statistics to gain insights into the distribution and variation of the data across different spatial units or regions.
3. **Spatial Autocorrelation:** Assess spatial autocorrelation to understand if there are significant patterns of similarity or dissimilarity among neighboring locations. Techniques such as Moran's I or Geary's C can measure spatial autocorrelation and indicate the presence of clustering or spatial dependence.
4. **Spatial Clustering:** Apply clustering techniques such as k-means clustering, hierarchical clustering, or DBSCAN to identify natural groupings or clusters within the spatial data. Clustering helps reveal areas of similar characteristics or spatial patterns.
5. **Spatial Interpolation:** Use spatial interpolation techniques, such as kriging, inverse distance weighting (IDW), or spline interpolation, to estimate values at unobserved locations. Interpolation helps fill gaps in the data and create smooth continuous surfaces.

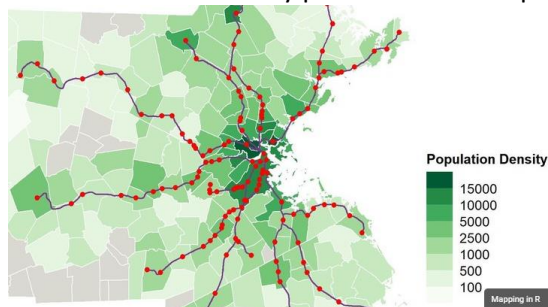


6. **Hotspot Analysis:** Perform hotspot analysis, also known as spatial clustering analysis, to identify statistically significant spatial clusters of high or low attribute values. Techniques like Getis-Ord G_i^* or Local Moran's I can identify hotspots or coldspots in the data.

Tree Equity Hot Spots in Tucson



7. Network Analysis: If your spatial data involves connectivity or network relationships, analyze network properties such as centrality, shortest paths, or network density. Network analysis helps understand connectivity patterns and transportation or flow dynamics.



8. Geospatial Join and Overlay: Conduct geospatial joins or overlays to combine spatial data with other attribute data. This allows for analysis and visualization of the relationships between spatial and non-spatial attributes.
9. Spatial Data Exploration Tools: Utilize specialized tools and packages designed for spatial data exploration, such as the sf package, sp package, or the tmap package in R. These packages offer functionality for data manipulation, visualization, and analysis of spatial data.
10. Exploratory Spatial Data Analysis (ESDA): ESDA techniques, such as spatial correlograms, spatial regression, or local indicators of spatial association (LISA), provide a comprehensive framework for analyzing spatial patterns and spatial relationships in the data.

These are some common techniques used in exploratory data analysis for spatial data. The choice of techniques depends on the nature of the spatial data, the research question or objective, and the available tools and software. It's important to leverage appropriate spatial analysis techniques to gain insights into the spatial patterns, dependencies, and characteristics of the data.

Resources:

1. <https://rspatial.org/>
2. <https://r-spatial.org/r/2018/10/25/ggplot2-sf.html>
3. <https://r.geocompx.org/adv-map>
4. <https://www.geeksforgeeks.org/making-maps-with-r/>
5. <https://eriqande.github.io/rep-res-web/lectures/making-maps-with-R.html>
6. <https://www.paulamoraga.com/book-spatial/spatial-data-in-r.html>
7. <http://gis.humboldt.edu/OLM/r/Spatial%20Analysis%20With%20R.pdf>
8. <https://libguides.wustl.edu/R/spatial>
9. <https://r-spatial.org/book/12-Interpolation.html>
10. https://pages.cms.hu-berlin.de/EOL/gcg_quantitative-methods/Lab14_Kriging.html

11. <https://geobgu.xyz/r/spatial-interpolation-of-point-data.html>
12. https://rpubs.com/heatherleeleary/hotspot_getisOrd_tut
13. https://aseemdeodhar.com/project/mapping_tutorial/