

HIS 631: Mapping & Spatial Analysis

Feb 23, 2022

Slides at: go.uncg.edu/r7r0c7



GIS

GIS is...

Geographic Information Systems

Computer systems used to map, analyze, and explore geospatial data.

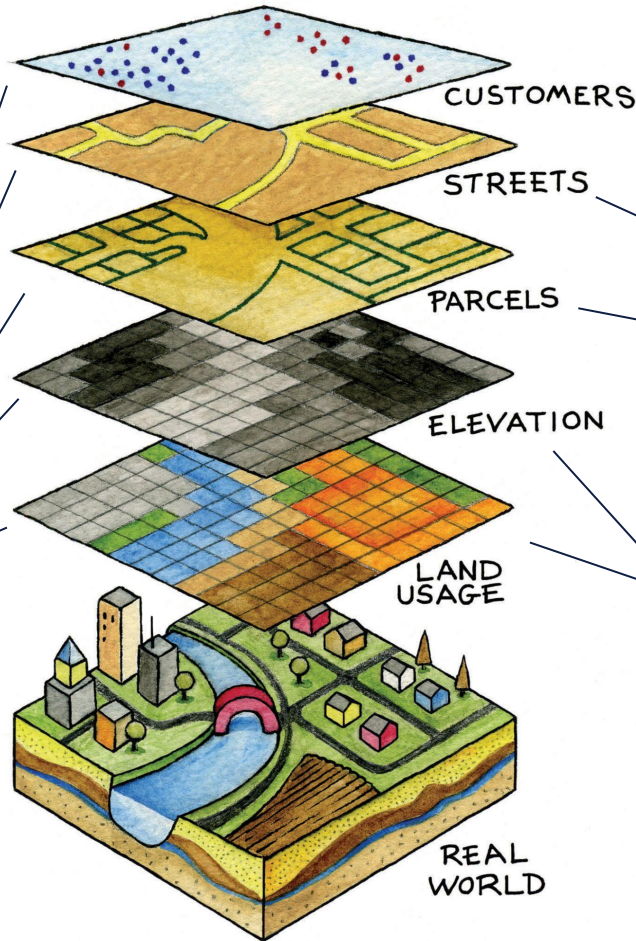
Geographic Information Science

The study of geographic information concepts, including the use of geographic information systems.

...putting places and data onto a digital map

Parts of a digital map

Layers



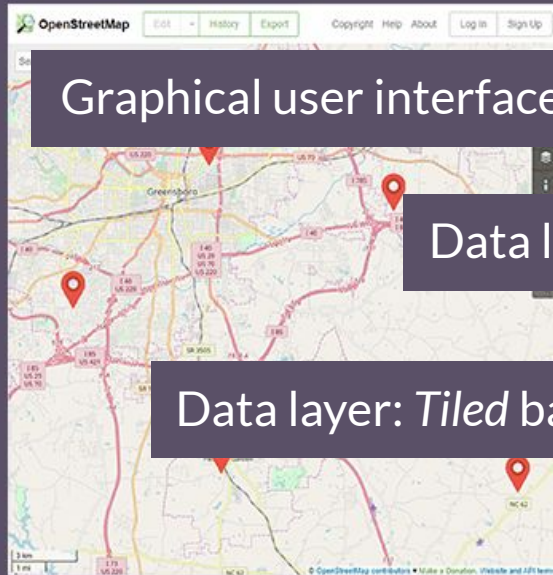
Vector Data

- Geometry-based
 - Points
 - Lines
 - Polygons
- Format: Shapefiles, KML/KMZ, XML, etc.

Raster Data

- Pixel-based
- Basemaps
- Scanned maps
- Format: JPG, TIFF, Geotiff, etc.

Anatomy of a digital mapping tool



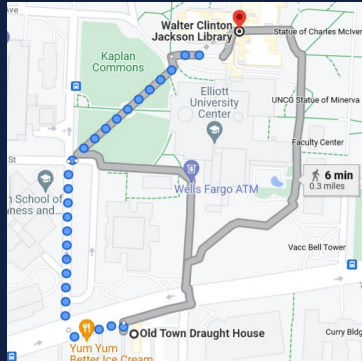
Graphical user interface (GUI or UI)

Data layer: Points

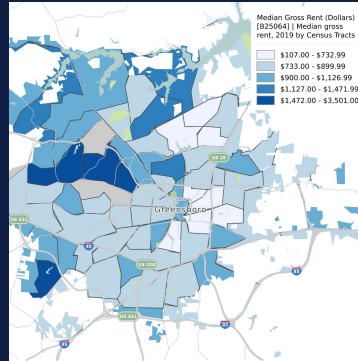
Data layer: *Tiled* basemap



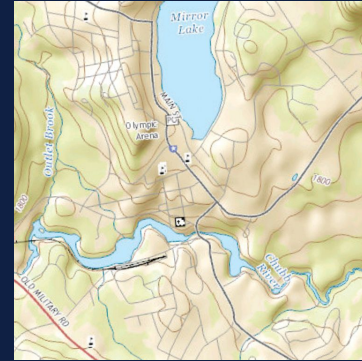
Road Map



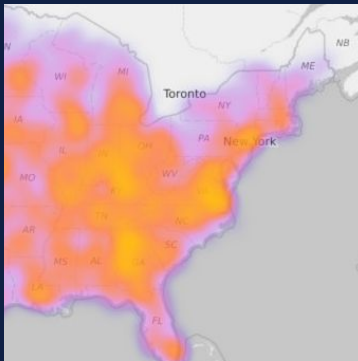
Choropleth



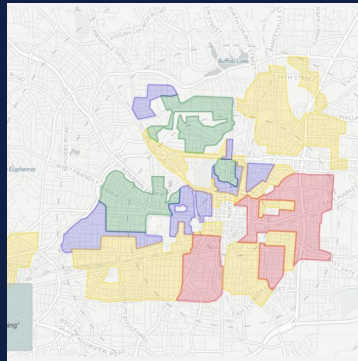
Topography



Heat



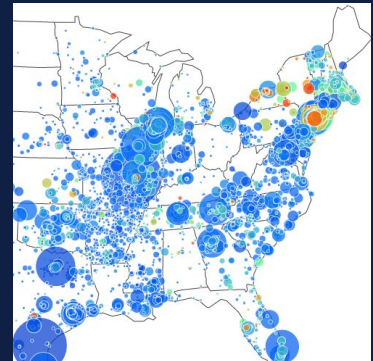
Category



Cluster



Bubble






Story Maps

“A story map is a web map that has been thoughtfully created, given **context**, and provided with **supporting information** so it becomes a stand-alone resource.

It integrates **maps, legends, text, photos, and video** and provides functionality, such as swipe, pop-ups, and time sliders, that helps users **explore** this content.”

Examples

- “A Right to the City” Digital Exhibit. 28 February, 2020. <https://arcg.is/Or40v80>.
 - Pancakes & Silver: Historic Map Reading, Data Extraction, and 3D Visualization. n.d. <https://arcg.is/1bqTL81> (accessed 22 Feb 2022).
 - Books Through Their Pages. 2020. <https://arcg.is/vfDSj>.
- 



What tools
are available?



Library Databases

Access from the
[Library A-Z
Databases page](#)

Tools for discovering and comparing statistics and generating publication-ready maps of existing datasets.

Simply Analytics

Discover and map demographic, consumer spending, psychographic and business data in the US.

PolicyMap

Similar to Simply Analytics, but with more emphasis on city and urban planning, sociology, and other factors in policy.

Social Explorer

Explore and compare US demographic data over time and place. Some international data.

Data Planet

Statistical analysis and discovery tool for social science researchers with a mapping option.

ArcGIS

Full GIS Suite

ArcGIS Desktop

ArcMap^{1,3}

Create & edit maps

ArcCatalog^{1,3}

Manage & organize content

ArcGlobe^{1,3}

Create & edit 3D maps with large global datasets

ArcScene³

Create & edit 3D maps with local datasets

ArcGIS Pro^{2,4}

The newer desktop software. Has the same functionality as the four to the left combined, plus some extra online functionality and other features.

ArcGIS Online²

Story Maps²

ArcGIS StoryMaps

Create interactive story maps with flexible layout options and a single builder.

Classic Story Maps

The old version of StoryMaps with multiple builders by layout; you have to pick a layout first and can't switch between them as easily.

1. Use in [MyCloud](#)

2. Need an account

3. Download from app catalog as ArcGIS Desktop or contact James Nelson (GES)

4. Download from app catalog as ArcGIS Pro or contact James Nelson (GES)

ArcGIS

Full GIS Suite

<https://storymaps.arcgis.com/>

ArcGIS Online²

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Free & Open-Source Alternatives to ArcGIS

QGIS


<https://www.qgis.org>

Free, open source tool with most of the same features as ArcGIS Desktop. Plugins extend functionality. Anyone can contribute plugins.

StoryMapJS

<https://storymap.knightlab.com/>

Point-and-click tool for creating polished story maps with limited customization options (more customization possible with javascript).





Virtual Tour Tools

Google Earth Pro

<https://www.google.com/earth>

Create geospatial data and view satellite imagery and Google's places data. Free, but takes up a lot of space/processing power. [The Bauhaus and the World.](#)

Clio

<https://www.theclio.com>

A collaborative research, interpretation, and map-building project, where you can add or edit entries of landmarks and historic sites and create walking tours or thematic trails.



Web-Based Tools

Google Maps (My Maps)

<https://mymaps.google.com/>

Through the “My Maps” feature, create and share maps with Google’s places data or your own, with some customization options.

Datawrapper

<https://app.datawrapper.de/select/map>

Free, no account needed, point-and-click tool for creating basic interactive maps for publications or presentations.

Leaflet*

<https://leafletjs.com/>

A Javascript library for creating interactive webmaps

A decorative graphic on the left side of the slide featuring a large dark blue circle containing the text 'Free Programming Tools'. Surrounding this central circle are several smaller circles in various colors: orange, teal, red, and grey.

Free Programming Tools

Download for free or access via [MyCloud](#) or app catalog

R and RStudio

<https://www.r-project.org/>

<https://www.rstudio.com/products/rstudio/>

Programming language/software for statistical computing and graphics; packages like sp, sf, and ggmap extend functionality to include geospatial data.

Python

<https://www.python.org/>

Programming language that is similar to R, but less focused on statistics. Libraries and packages extend functionality to include geospatial data.

A dark blue background featuring a large white circle in the center. Surrounding this central circle are several smaller circles of various colors: a large yellow circle at the top right, a medium red circle at the top left, a small yellow circle near the top left, a small white circle near the top left, a medium green circle at the top right, a small white circle near the top right, a medium teal circle at the bottom right, a small yellow circle near the bottom right, a medium blue circle at the bottom right, a large grey circle at the bottom left, a small red circle near the bottom left, and a medium teal circle at the bottom left.

How do I...

...locate places on the map?

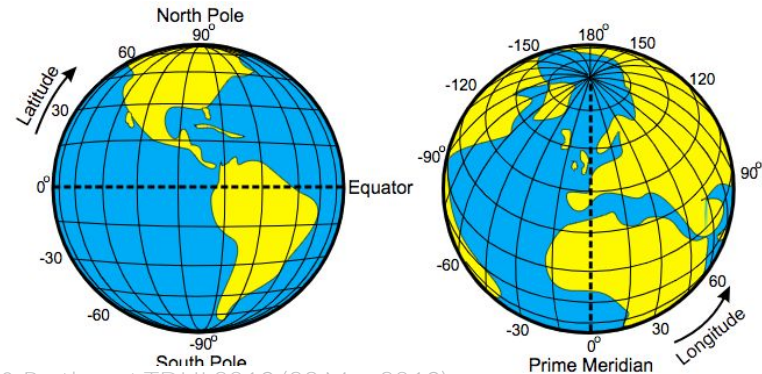
Coordinates (latitude - y, longitude - x)

- Decimal degrees (DD): 36.065697, -79.809798
- Degrees, minutes, and seconds (DMS): 36°03'56.5" N, 79°48'35.3" W
- UTM coordinates : 17N, 607183, 3991890

Coordinate reference systems & map projections

- Mathematical models that transform points on a globe to x and y coordinates on a flat surface.

Data and basemaps should match!



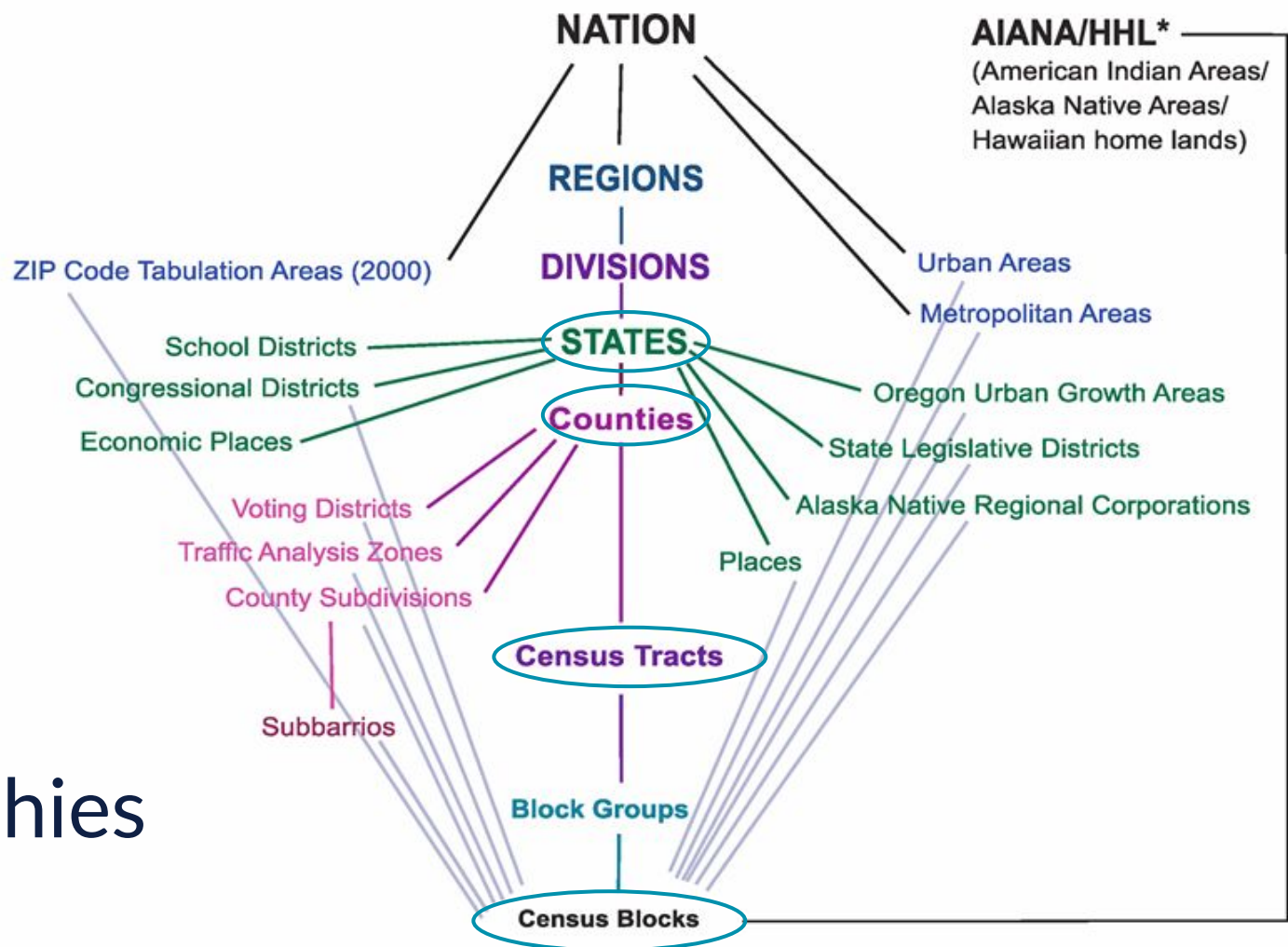
...get addresses onto a map?

Geocoding

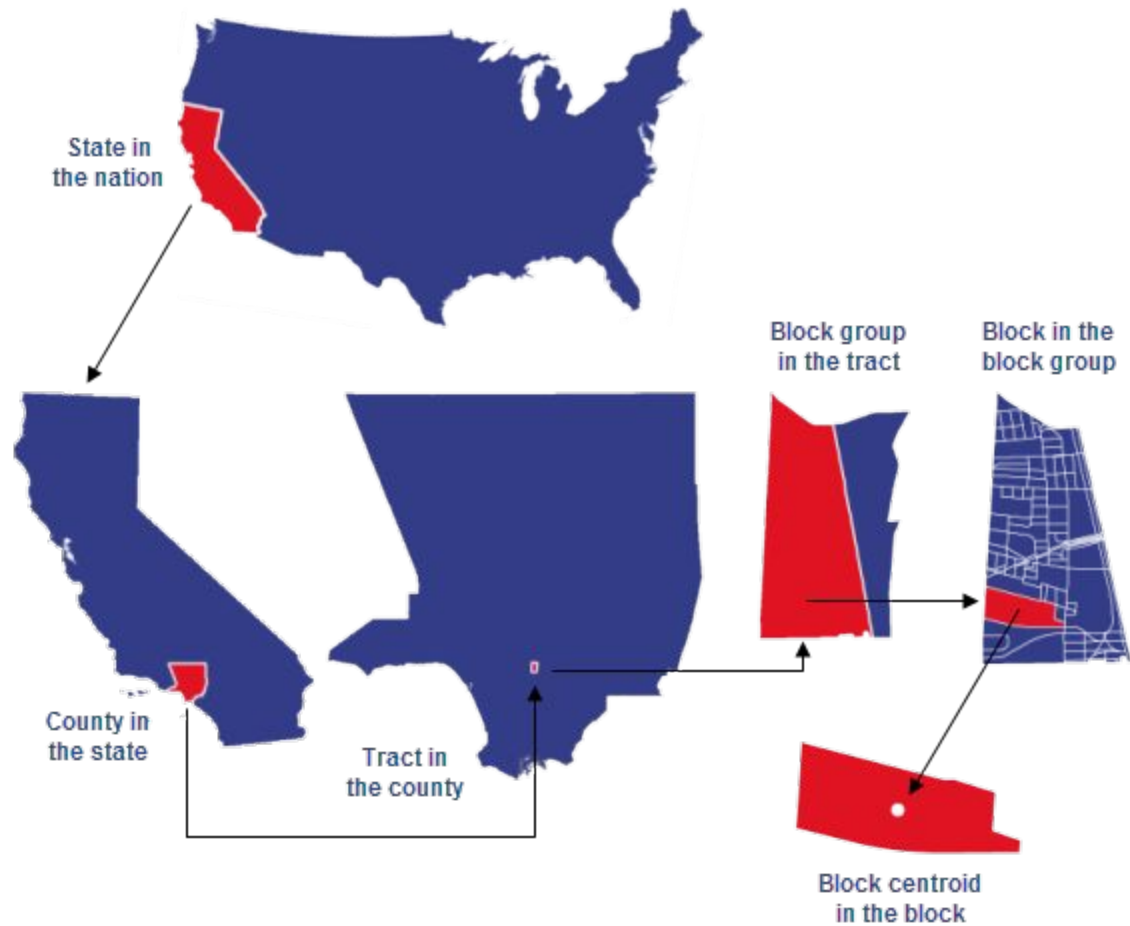
- The process of “matching addresses to geographic locations and entities containing those addresses”
- Generates coordinates to a point

Census Geocoder (<https://geocoding.geo.census.gov/>)

- Matches addresses to the Master Address File (MAF)/TIGER database (mostly residential) and returns approximate (interpolated) location based on an address range along a street/road
- Requires standardized address format with comma delimiters
 - Match types include exact, non-exact, tie, or no match.



Census Geographies



...use a historic map or image as my basemap or as a layer?

Georeferencing

- The process of defining the location of a map that doesn't have geographic coordinates attached.
- Done by assigning geographic coordinates and a coordinate system for the map.

Map Warper (<https://mapwarper.net/>)

- “[Your] contributions and maps are public and available for others to view and use”
 - Copyright rules apply!

...learn more?

- [GIS Resource Guide](#) - the UNCG Resource Guide for GIS tools, tutorials, and other resources.
- How to use a historic map image in Knight Lab's StoryMapJS using QGIS and Mapbox: go.uncg.edu/q9m3bd
- [GIS 101 from GIS Lounge](#) - a lot of great introductory and fun content.
- [Storytelling with Maps on Paper and Screen](#) - best practices and design tips for creating story maps (based on ArcGIS Story Maps but usable in other tools)
- [Esri Academy](#) - Esri's tutorials for all of its products. Select the “free” lessons!

Search online or in the [library catalog](#)! Keywords to search for: “training manual,” “tutorial,” “workbook”

Programming Historian Lessons

Lesson Directory: Mapping

- [Using Geospatial Data to Inform Historical Research in R](#)
- [Geocoding Historical Data using QGIS](#)
- [Geoparsing English-Language Text with the Edinburgh Geoparser](#)
- [Web Mapping with Python and Leaflet](#)
- [Visualizing Data with Bokeh and Pandas](#)



Google Maps & Google Earth

[https://programminghistorian.org/en/lessons/
googlemaps-googleearth](https://programminghistorian.org/en/lessons/googlemaps-googleearth)





Jo Klein (they/he)

GIS & Data Visualization Librarian

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Schedule an appointment with me:
go.uncg.edu/joklein-appt