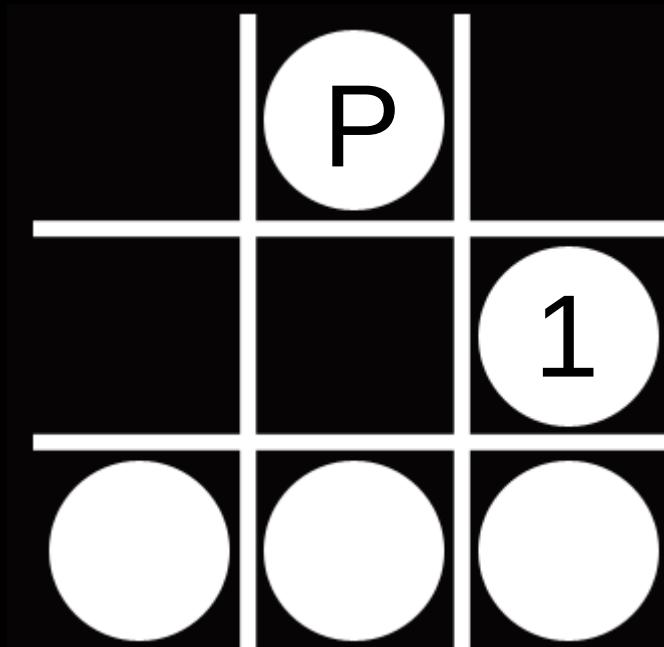




Geography for Hackers



Prepared by Joe Blankenship
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www.cgrii.org



Agenda

20th Century Geography
Concepts
Cartography
Types of Maps
Other Courses
Resources

<https://github.com/joeblankenship1>



20th Century Geography

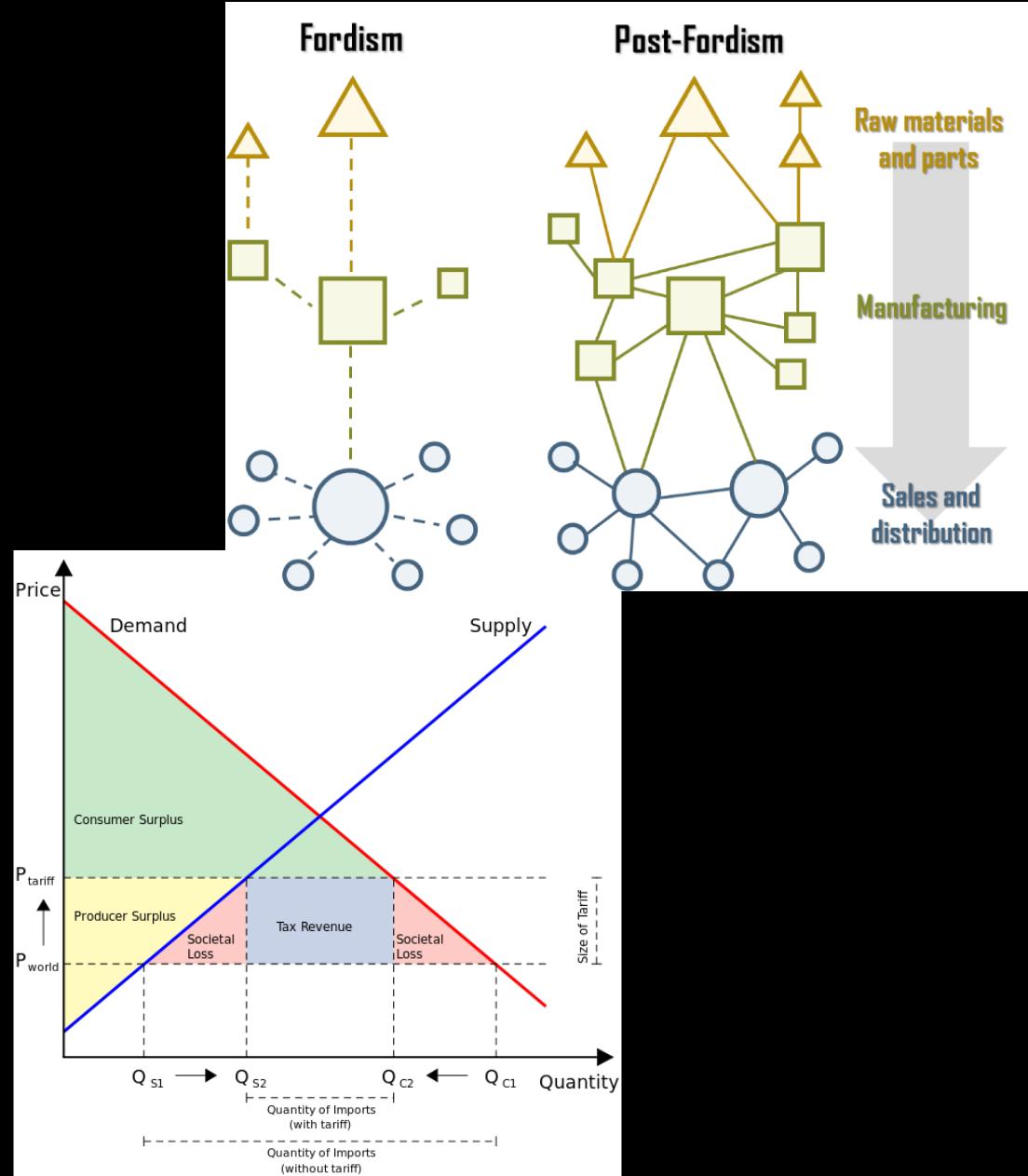
- Halford Mackinder
 - Heartland, World Island
- Karl Haushofer
 - Geopolitik
- Nicholas Spykman
 - Rimland
- Erwin Raisz
- Arthur Robinson





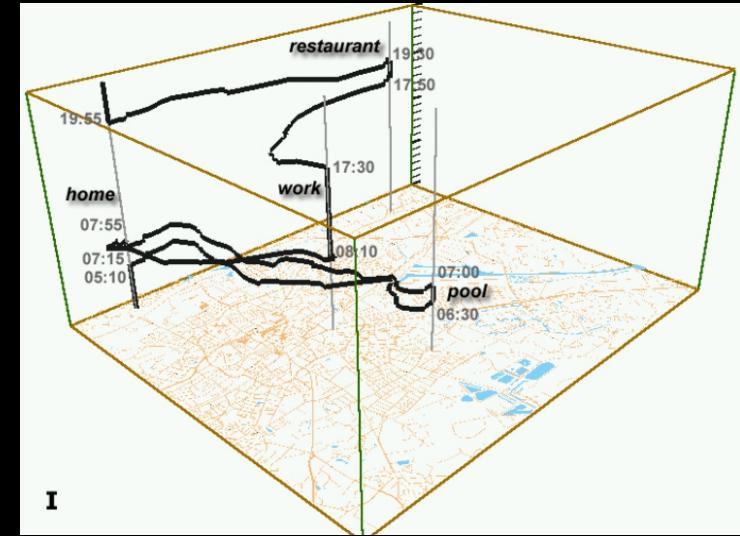
20th Century Geography

- Fordist Model
 - Keynes
- Austrian School
 - Hayek
- Breton Woods
- Globalization
 - Neoliberalism



Concepts

- Geography
 - Space
 - Place
 - Scale
 - Time



- Why do you need Geography?
 - Spatial relationships
 - Spatial practices
 - Scalability of space and place
 - Mutual production of space/time

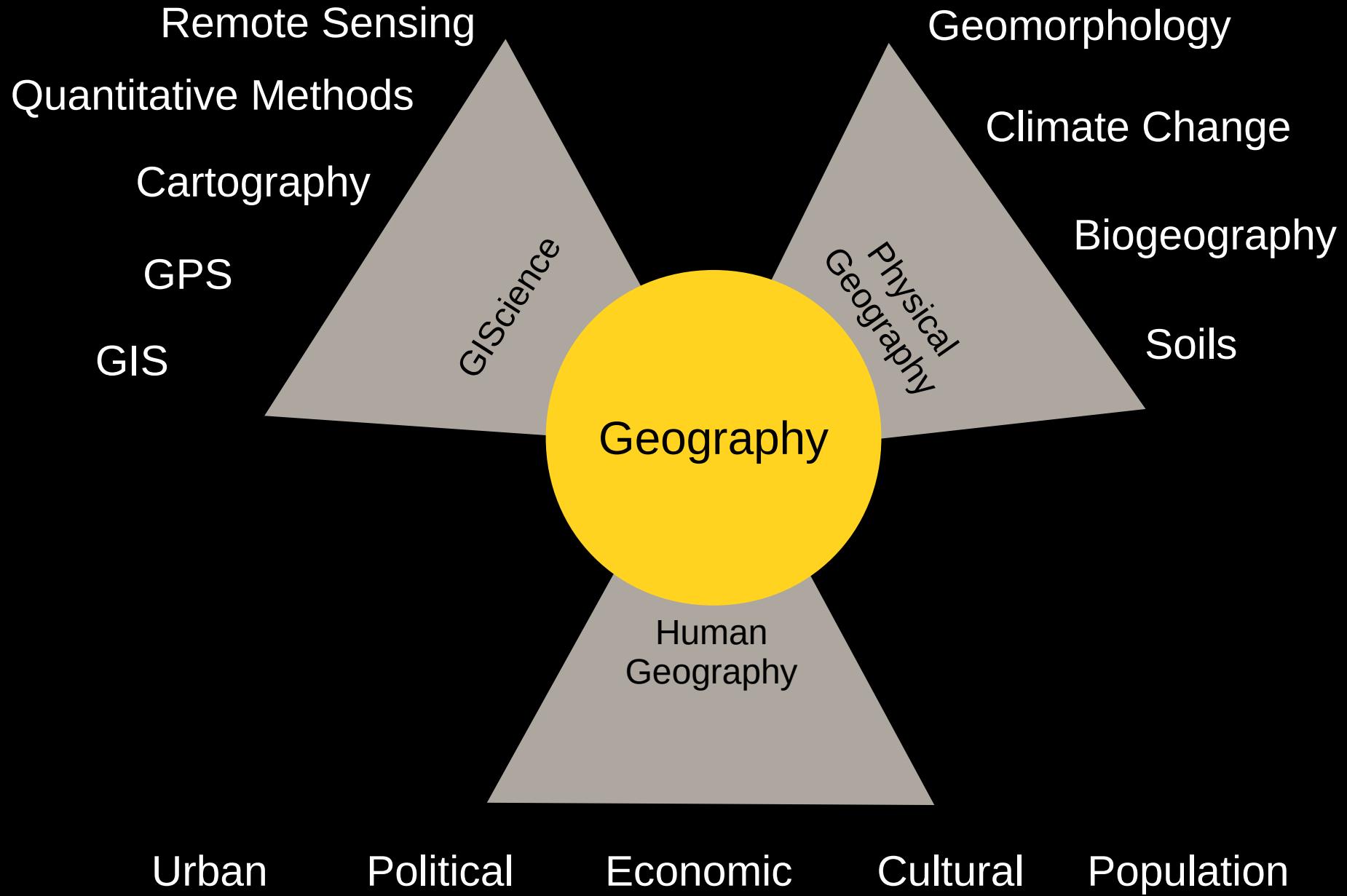


Concepts

- Unique to Geography
 - There are no absolutes
 - If it exists, there is a geographic study of it
 - Maps are a product of geography
 - Cartography
 - Geovisualizations
 - Visual representation of spatial data
 - Can be a map, but does not have to be
 - Geography and hacking go together
 - It is understanding how things work where they are



Concepts





Concepts

- Physical Geography
 - Study of the planet as it “naturally” persists, varies, and evolves
 - Divisions between human and non-human worlds
 - Natural Resources
 - Inequalities in Access
 - Environmental Hazards, Land Use, the Commons





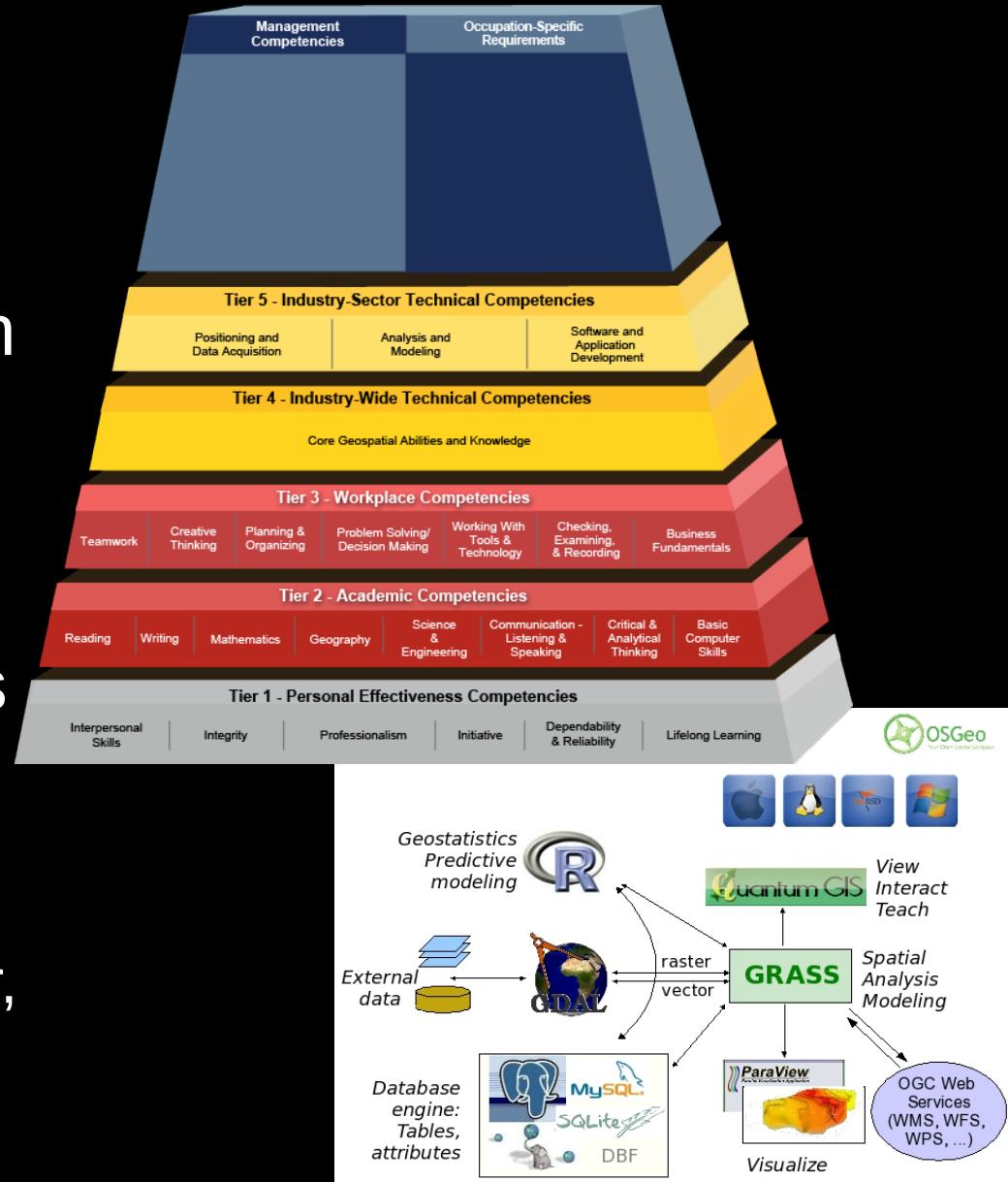
Concepts

- Human Geography
 - Study of how humans produce space and place
 - People, politics, economics, power
 - Spatial arrangements and relationships
 - Urban-Rural Aspects
 - Uneven Development



Concepts

- GIScience
 - Use of geospatial technologies to examine problems in human and physical geographies
 - Geographic Information Systems (GIS)
 - Numerous platforms
 - Mobile, client, server, distributed systems





Concepts

?

Questions



Cartography

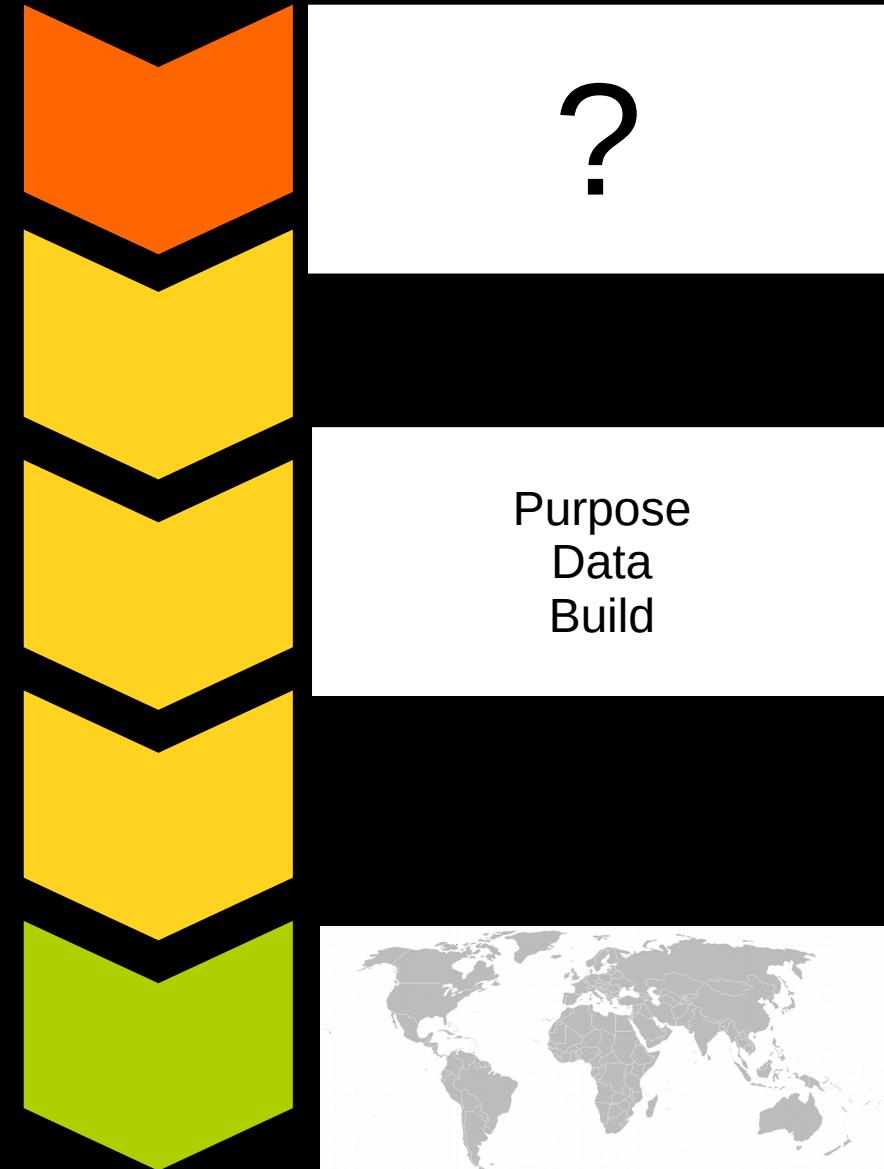
- Definition
 - The art and science of making maps (and other spatial visualizations)
- Types of maps
 - General Reference Maps
 - Thematic Maps
- Data will indicate what type of map is possible
 - Indicates the possible theme





Cartography

- Consider real-world scale of problem
- Determine purpose and users of the map
- Collect data for purpose
- Design and build the map
- Determine if the users found the map useful
 - Add and revisit steps as needed





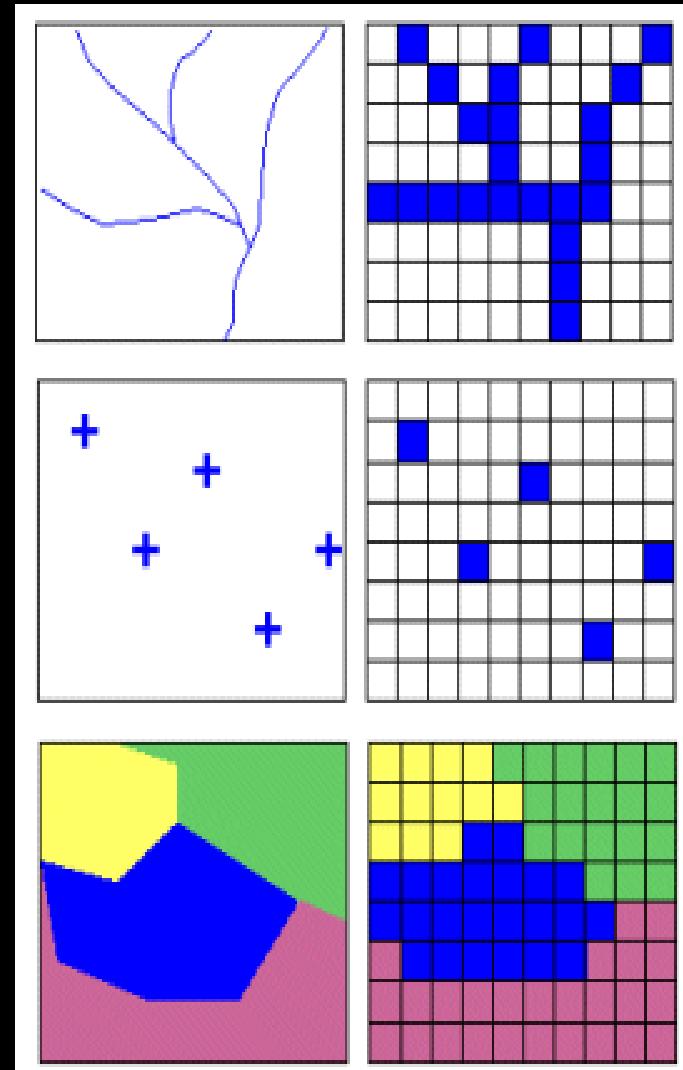
Cartography

- Data
 - Document Everything!
 - Transformation
 - Normalization
 - Standardization
 - Qualitative and Quantitative
 - Both can be mapped
 - Nominal, ordinal, interval, ratio
 - Scale: Large vs. Small
- Data Management
 - Provenance
 - Metadata
 - Time stamp
 - Storage
 - Folders
 - Database
 - Relational
 - Non-relational
 - Graph
 - Security
 - Encryption?
 - Backups!



Cartography

- Vector
 - Discrete data w/ 1+ values
 - Points, Lines, Polygons, Volumes
 - Referenced at X,Y intersect
- Raster
 - Continuous data w/ 1 value
 - Cells of varying shape and size
 - Referenced at center or corner of cell





Cartography

- Data Classification
 - Unclassified Data == uncategorized data
 - Common Class methods
 - Equal interval
 - Quantile
 - Mean/Standard Deviation
 - Max breaks
 - Natural break (Jenks)
- File Types
 - Flat files
 - CSV, TXT, JSON
 - WKT (well-known text)
 - Shapefiles
 - SpatiaLite
 - XML (KML, KMZ)
 - Geodatabases
 - HDFS (Hadoop)
 - So many others



Cartography

- Datum
 - Geodesy
 - An applied mathematic reference system to establish where things are
 - WGS84
 - World Geodetic System
 - 1984; at sea level
 - NAD83
 - North American Datum
 - 1983; Meades Ranch Triangulation Station
- Coordinate Systems
 - Used to determine where a point or object is in space
 - Global vs. Projected Coordinate Systems
 - Graticules
 - Latitude, Longitude, Elevation
 - Degrees, minutes, seconds
 - Decimal degrees
 - UTM (universal transverse Mercator)



Cartography

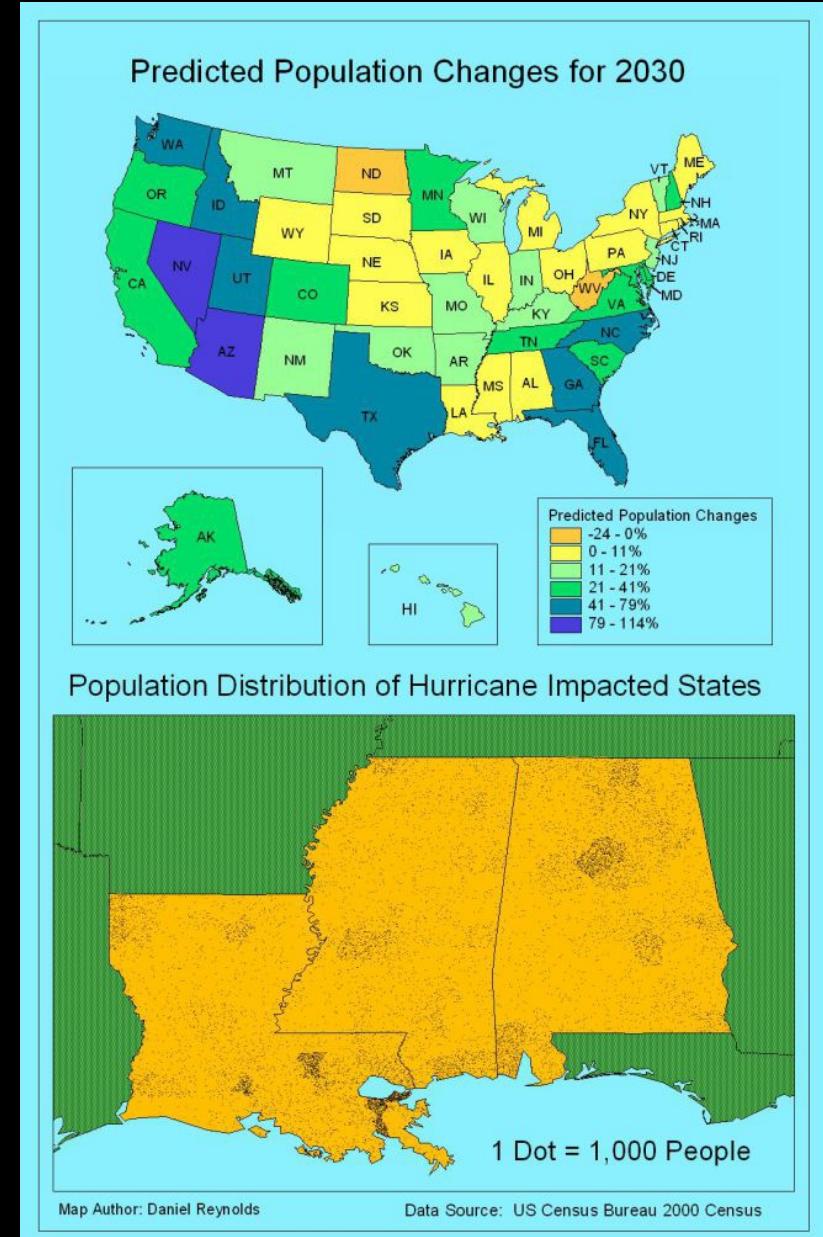
- Projections!
 - How we get from 3D to 2D
 - Class
 - Conic, Cylindrical, Planar, Mathematical
 - Case
 - Tangent, Secant
 - Aspect
 - Polar, Equatorial, Oblique
- EPSG
- Map purpose determines projection(s) used
 - Area (Equal Area)
 - Shape (Conformal)
 - Distance (Equidistant)
 - Direction (Azimuthal)
 - Mathematical





Cartography

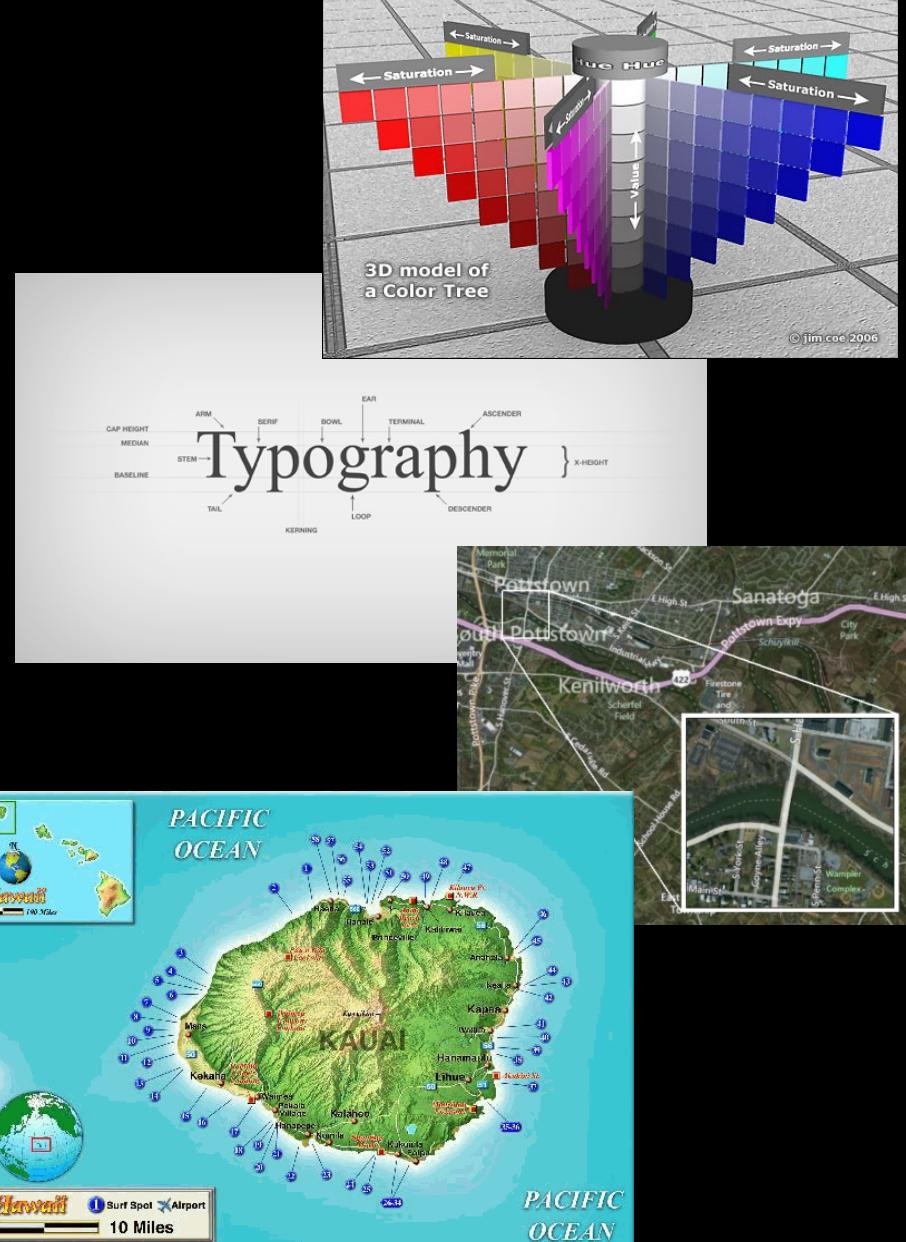
- Map Components
 - Title (subtitles)
 - Legend
 - Compass
 - Scale Indicator
 - Sources
 - Author
 - Other elements applicable for the purpose
- Essential for reproducibility and reference





Cartography

- Color, Typography, Insets, Design
 - Purpose of Map
 - Cartographic Standards
 - Robinson/Raisz
 - Slocum et al.
 - Culture/People
 - Medium of Publication
 - Intellectual/Visual Hierarchy
 - Balance, contrast, figure-ground
- Emphasize the most important facets!





Cartography

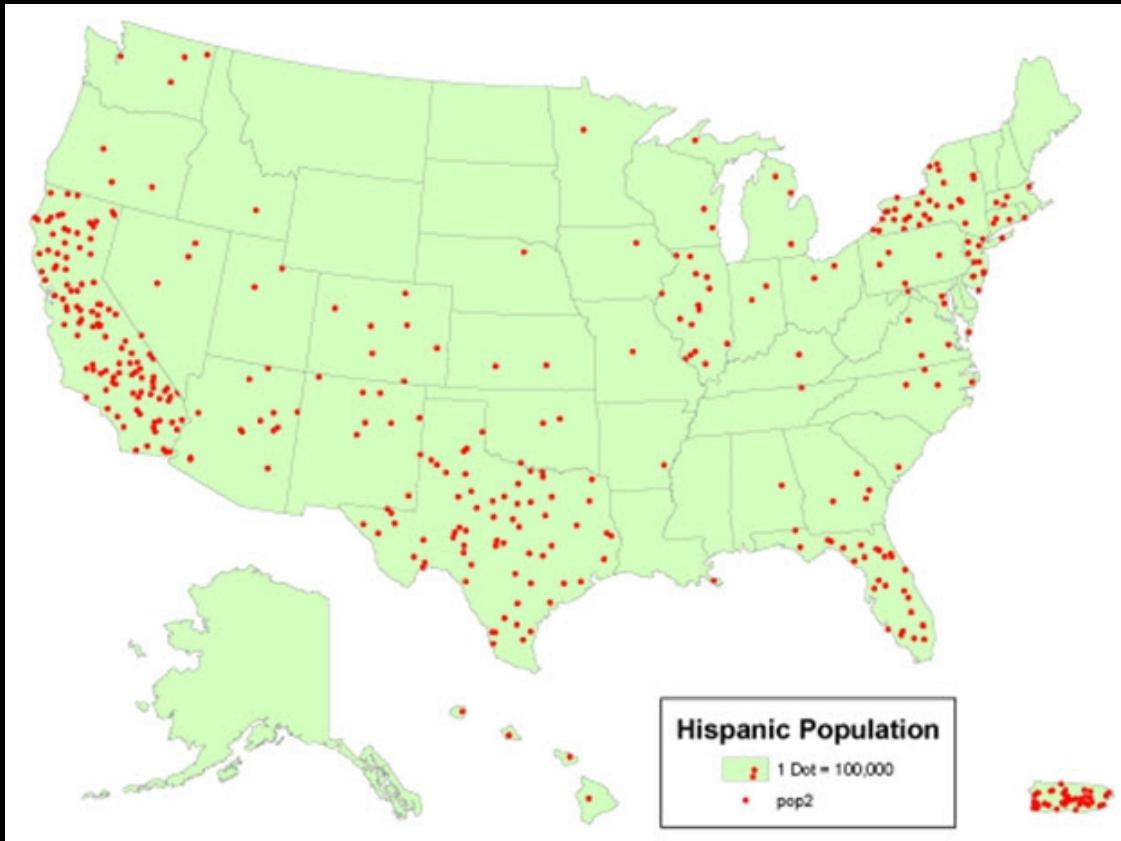
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Questions

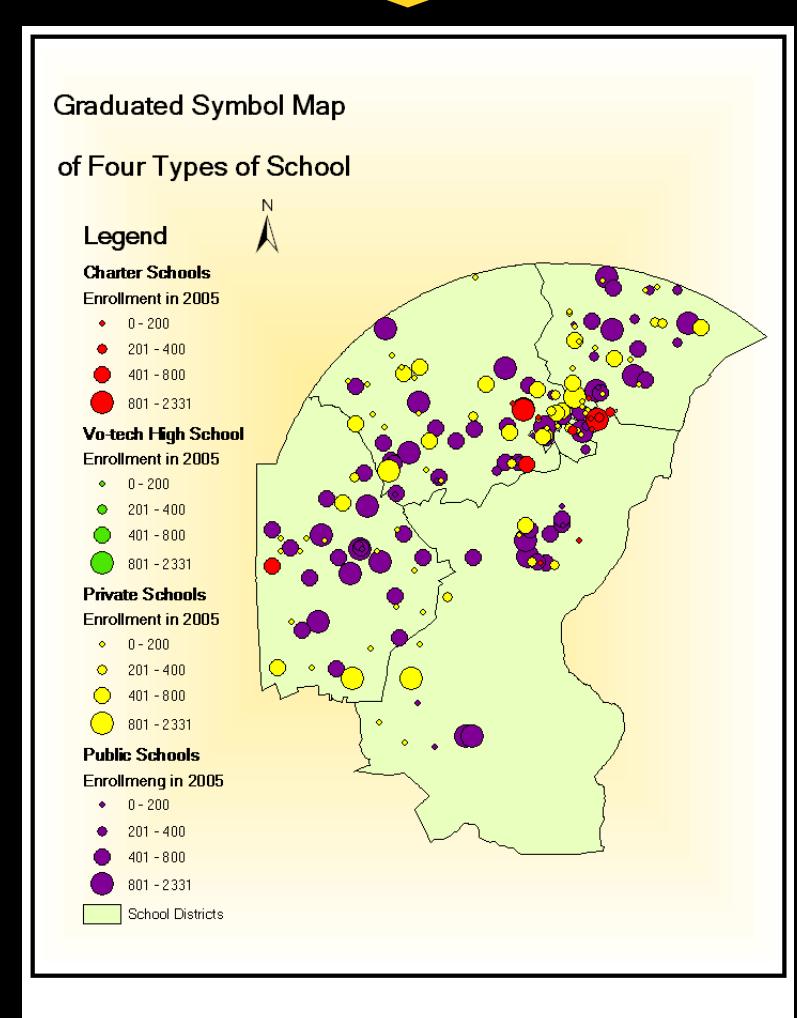


Types of Maps

Proportional Symbols



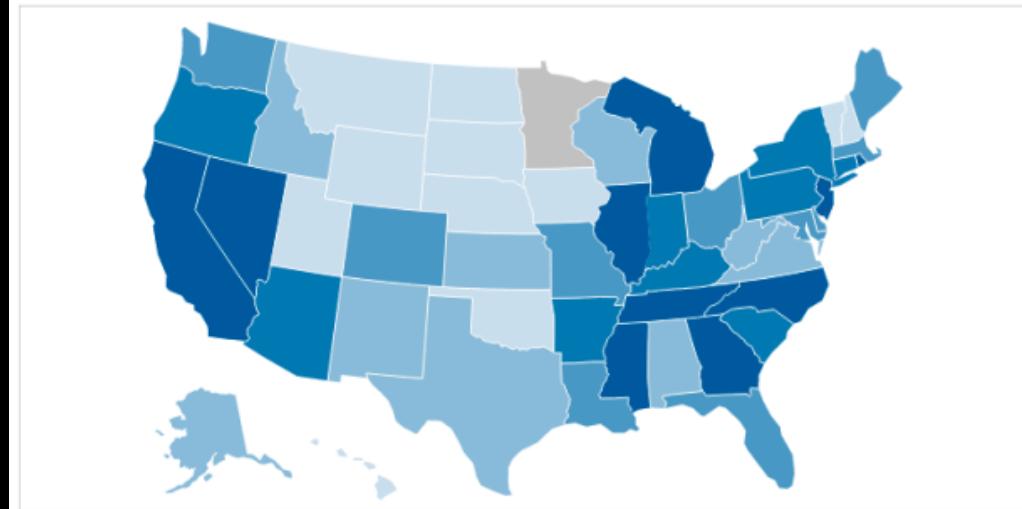
Dot





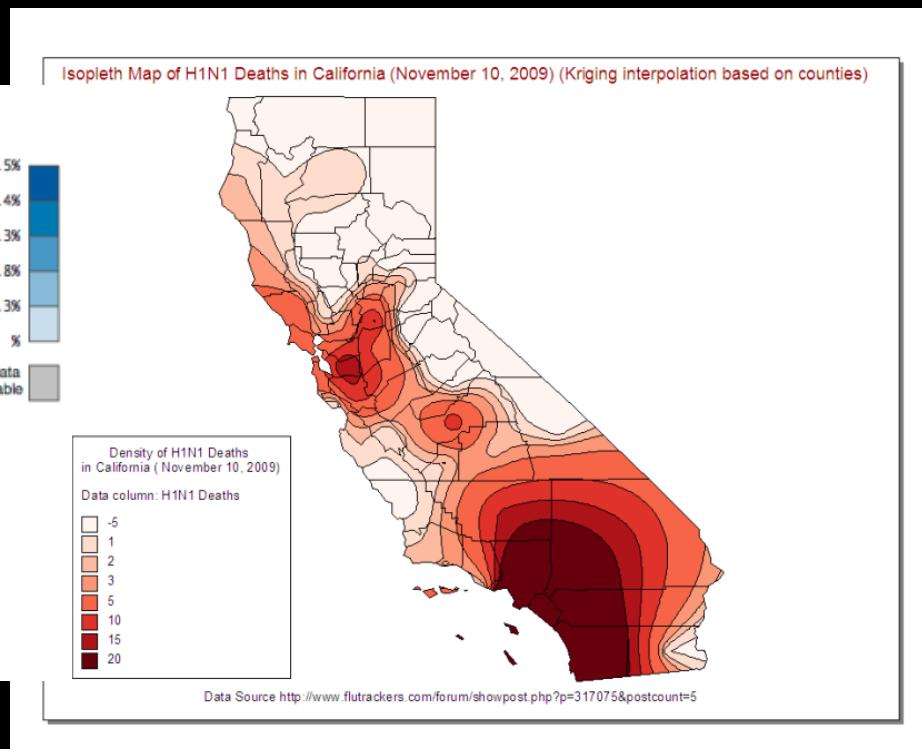
Types of Maps

Unemployment Rate (by State)
Month: Aug 2013 Seasonal Adjustment: Seasonally Adjusted Units: %



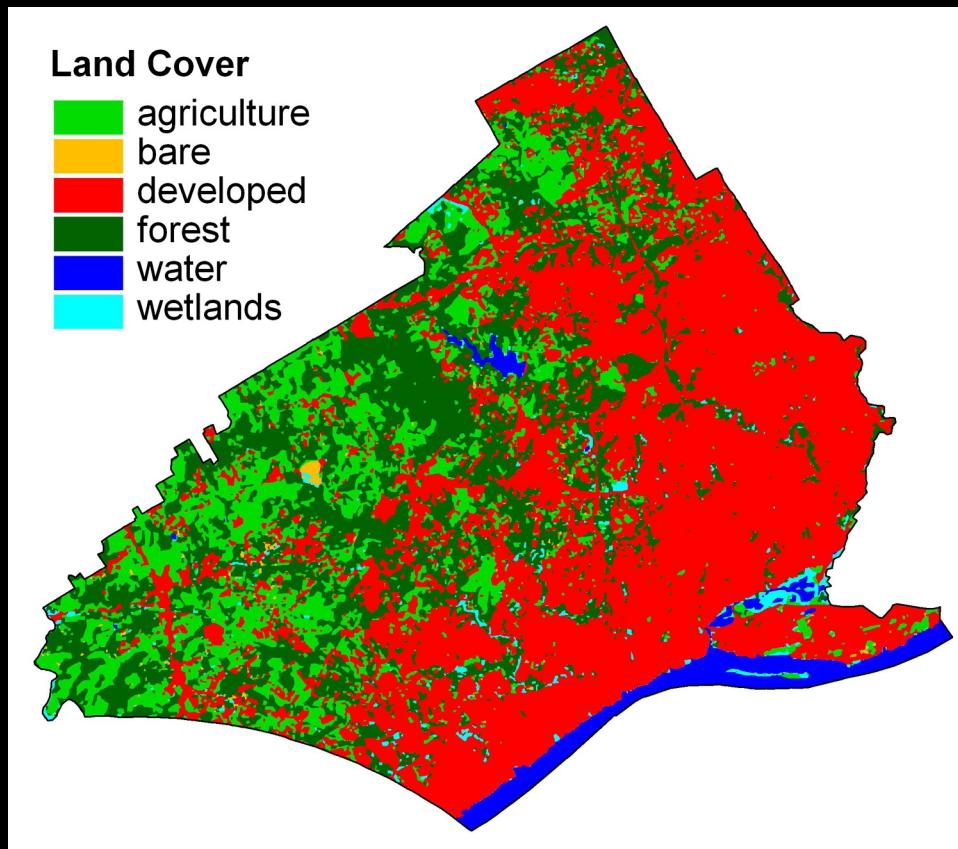
Choropleth

Isopleth

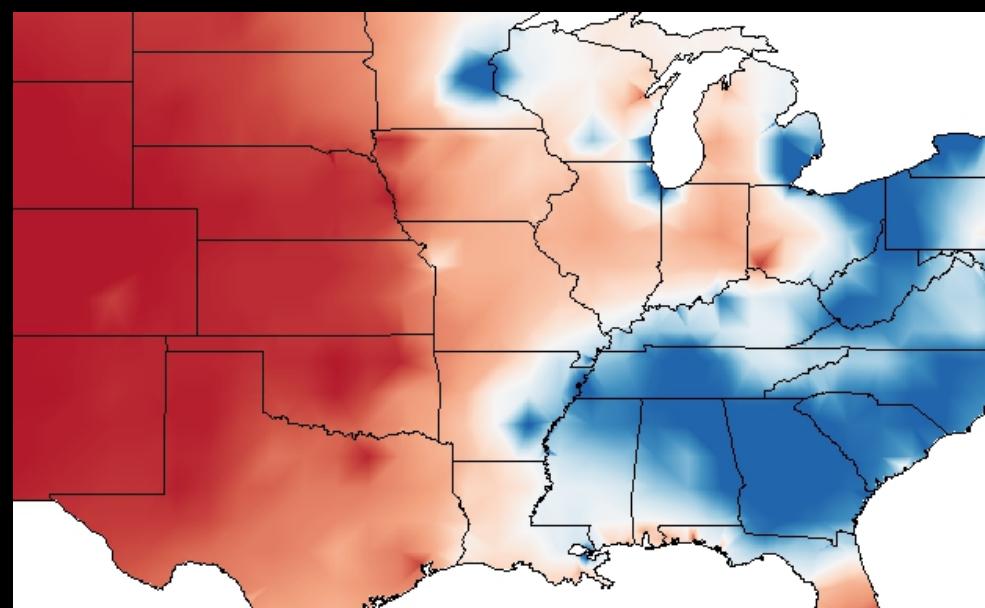




Types of Maps



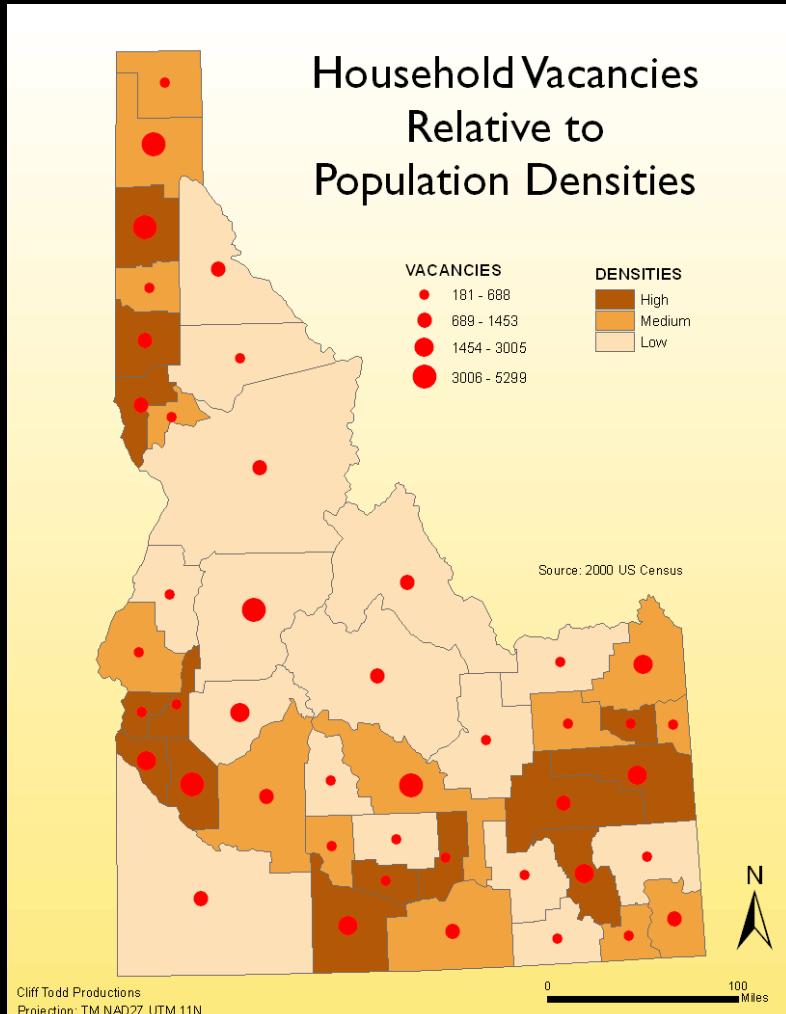
Isarithmic



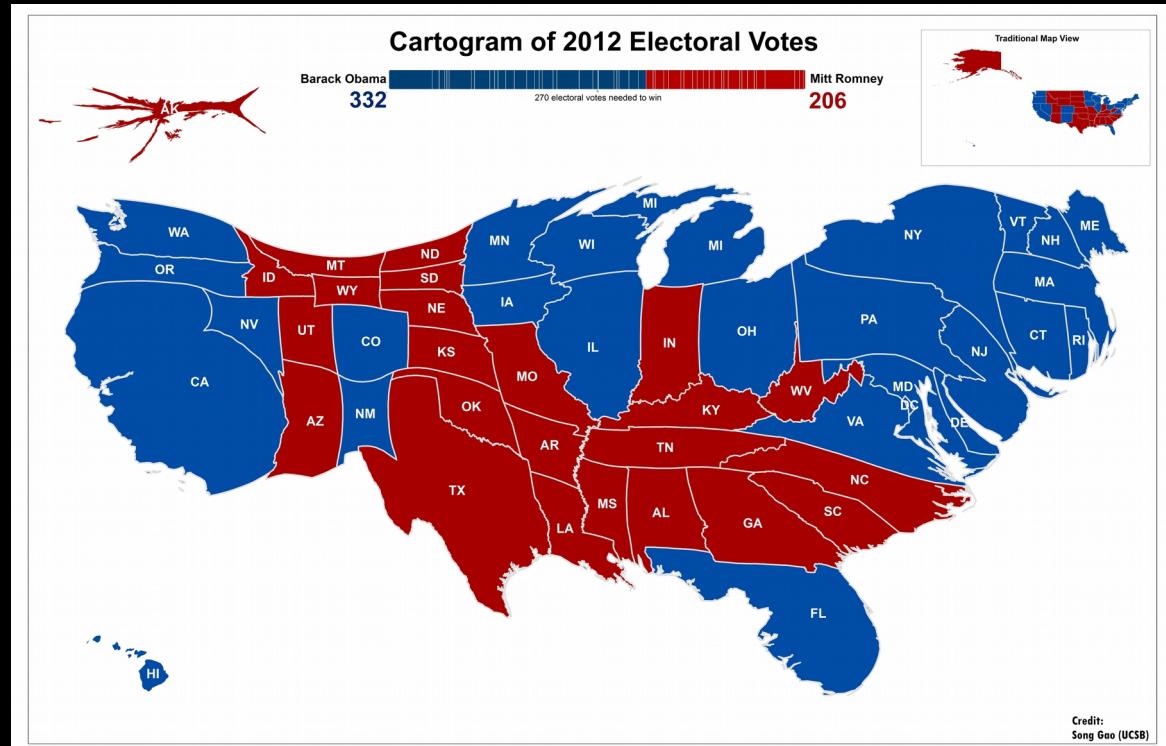
Dasymetric



Types of Maps



Cartogram

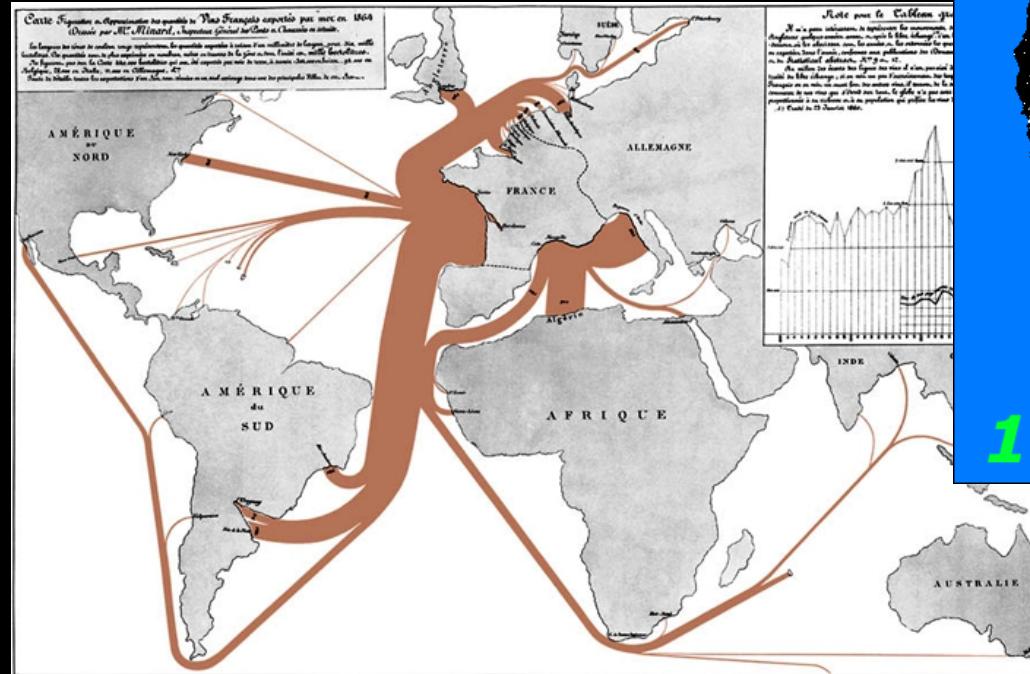


Multivariate



Types of Maps

Animated



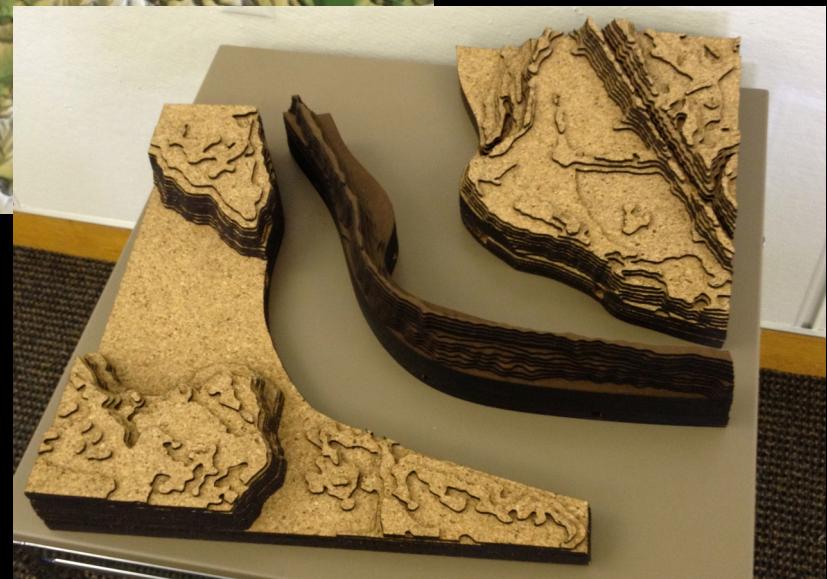
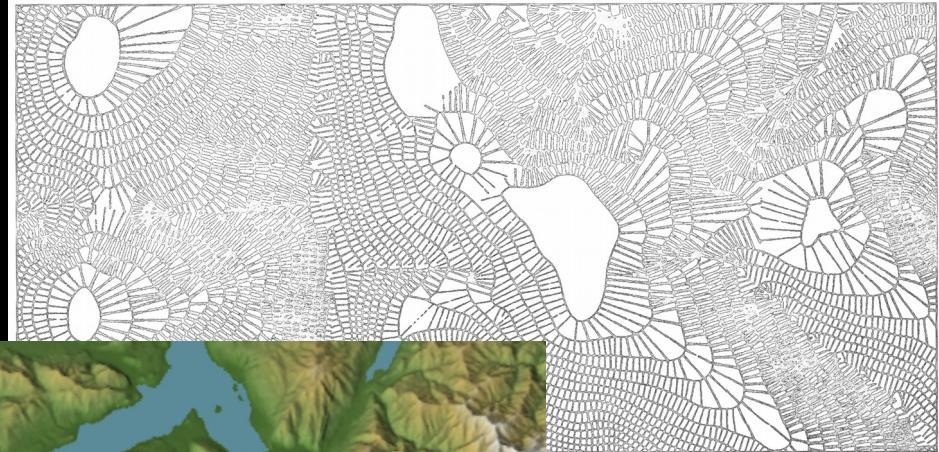
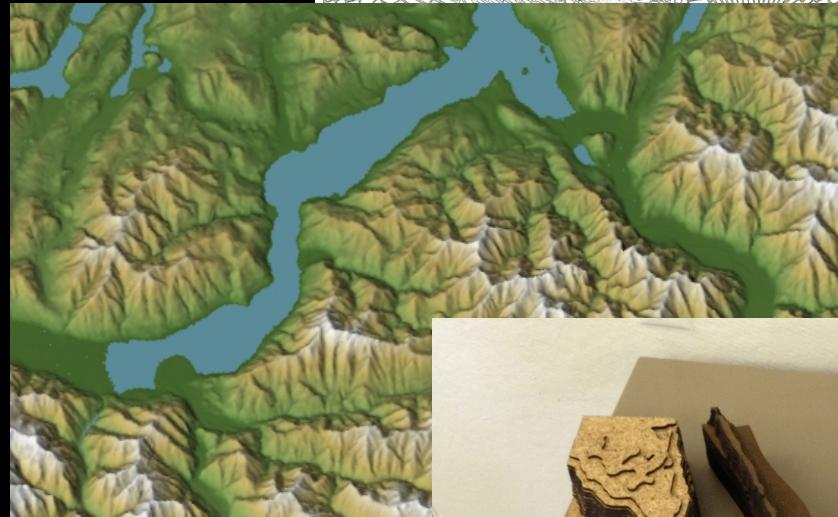
1910

Flow



Types of Maps

- Terrain Maps
 - Vertical View
 - Hachure
 - Contour
 - Shaded Relief
 - Oblique View
 - Draped Images
 - Panorama
 - Block Diagram
 - Physical Model





Types of Maps

- Web Maps
 - Geovisualizations
 - Data Exploration
 - Uncertainty
 - Spatial Statistics
 - Virtual Environments
 - Augmented Reality
 - Art Maps
 - Many Others





Types of Maps

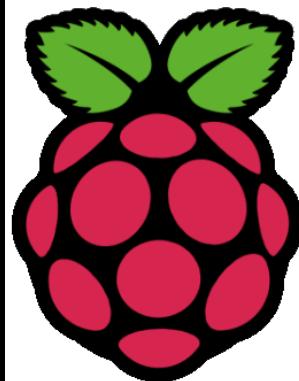
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Questions



Other Courses

- Spatial Analysis with QGIS
- WebGIS with OpenGeo Suite
- Python Programming with PyQGIS
- Remote Sensing for Hackers



Raspberry Pi





Resources

- QGIS
 - <http://www.qgis.org/en/docs/index.html>
- Boundless
 - <http://boundlessgeo.com/>
- Python
 - <https://www.python.org/>
- R
 - <https://www.r-project.org/>
- Books
 - Thematic cartography and geovisualization (3rd ed) by Slocum, McMaster, Kessler,& Howard
 - Elements of cartography (6th ed) by Arthur H. Robinson
 - The PyQGIS Programmer's Guide: Extending QGIS with Python by Gary Sherman
- FOSS4G GeoAcademy
 - <http://spatialquerylab.com/foss4g-academy-curriculum/>
- ColorBrewer
 - <http://colorbrewer2.org/flash/index.php>
- TypeBrewer
 - <http://typebrewer.org/>



That's all folks!

Thanks!

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