

GEO 309 – Intro to GIS

Joe Blankenship
Department of Geography
University of Kentucky

Topics

- Discussion – Shin
- Advanced GIS Topics
 - Data Services
 - Algorithms
 - Code
 - PyQGIS
 - ArcPy

Coming Up

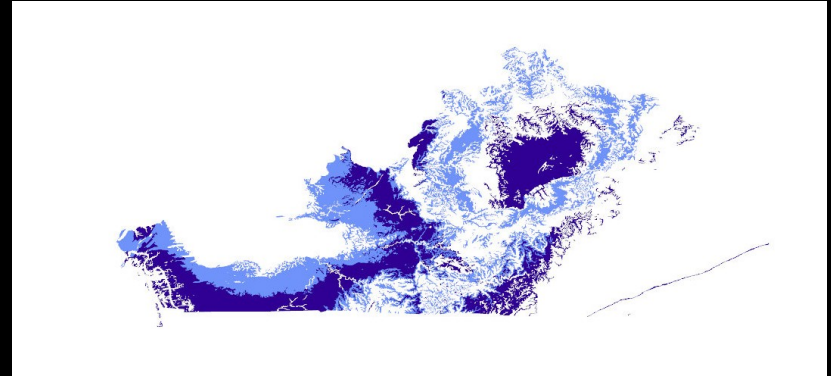
- Quiz 2
 - April 4th
 - Class not meeting; lab is available
 - 3 to 5 questions
 - Until 11:59 PM on the 4th to complete

Discussion – Shin

- Shin, M.E. (2009). Democratizing electoral geography: Visualizing votes and political neogeography. *Political Geography*, 28: 149-152.

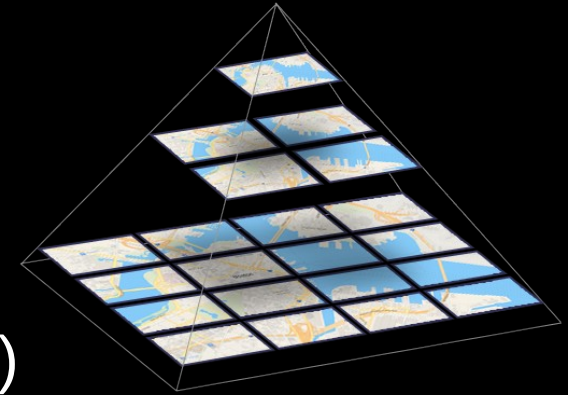
Data Services

- Web Map Service (WMS)
 - Map image service
 - Raster tiles - PNG, JPG, GIF
 - Vector - SVB, WebCGM
 - Metadata about layers, styles, legend
 - Supported by
 - QGIS, ArcGIS, Google Earth, others
 - Example

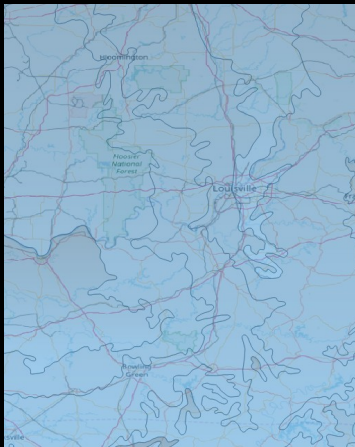


Data Services

- Web Map Tile Service (WMTS)
 - Georeferenced, cached map tiles
 - Encodings
 - REST (Representational state transfer)
 - SOAP (Simple object access protocol)
 - KVP (Key-value pair)
- Tile Map Service (TMS)
 - Tiled web maps, usually URI- & REST-based



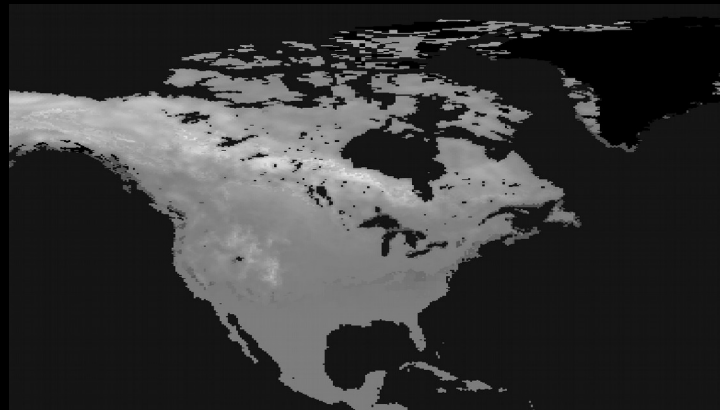
Data Services

- Web Feature Service (WFS)
 - Geographic feature + attribute information
 - Queries
 - Create
 - Modify
 - Delete
 - GML (GET, POST), KVP
 - Non-RESTful RPC (XML, JSON, SOAP)
 - Example
- 



Data Services

- Web Coverage Service (WCS)
 - Analysis and modeling
 - Space-time phenomena
 - Multi-dimensional data
 - Services
 - CRS, Scaling, Interpolation
 - GML, KVP
 - GetCapabilities, DescribeCoverage, GetCoverage
 - Example



Data Services

- Web Processing Service (WPS)

- Online APIs for GIS tools
- XML- or URL-encoded requests

- Get, Describe, Execute

- Options

- Locally, Server, SaaS
- OpenLayers, PyWPS

- Example

The screenshot shows the 'CF-Conventions File Checker: inputs' page of the CEDA OGC Web Services. The page has a blue header with the logo and navigation links: Home, Processes, Jobs, Login. Below the header, there's a section titled 'CF-Conventions File Checker: inputs' with a 'Show news' link and a 'Go to news page' button. The main content area contains a 'Process Abstract' and a 'Please complete the form below to submit a request to run the CFChecker process. Note that some processes are restricted to registered users only. Click the 'Submit' button to submit your request.' section. The form has two columns of input fields. The left column has four fields: 'Check Against CF Version' (with a dropdown menu set to 'AUTO'), 'URL to your NetCDF file', 'Upload a NetCDF file' (with a '+ Select file...' button), and 'File path to NetCDF file'. The right column has three fields: 'Please select an item from the list shown.', 'This input is optional. Please insert a value of type: string.', and 'This input is optional. Please insert a value of type: string.'. At the bottom of the form, there are 'Reset form' and 'Submit' buttons.

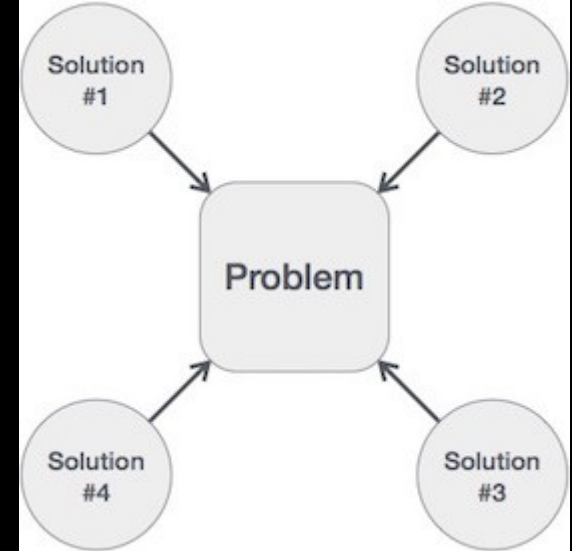
Data Services

- PostGIS
 - PostgreSQL spatial extension
 - Data manipulation
 - Spatial queries
 - Data management
 - Supported by
 - QGIS, ArcGIS
 - Tools
 - PGAdmin 3 or 4, CLI



Algorithms

- Steps taken to do something
 - Correctness and efficiency
 - Doesn't have to be on a computer, but frequently is
- GIS Analysts
 - Vector and Raster Analysis
 - Geostatistical Analysis
 - Modeling
- GIS Developers
 - Tools

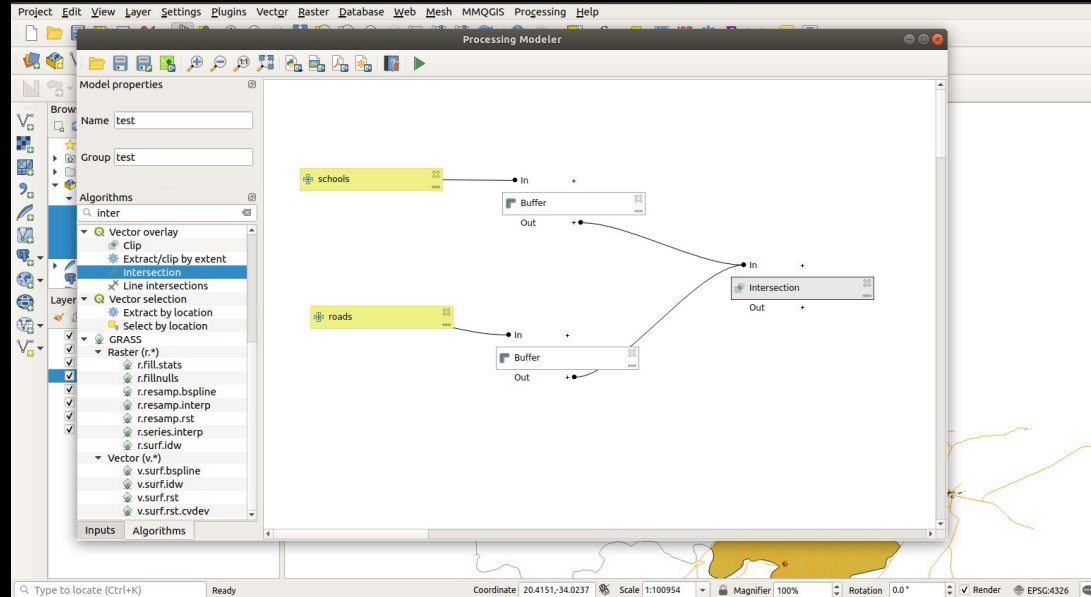


Algorithms

- General types
 - Search
 - Sort
 - Insert
 - Update
 - Delete
- Characteristics
 - Clear definition
 - I/O
 - Finite # of steps
 - Can be accomplished
 - Works without code

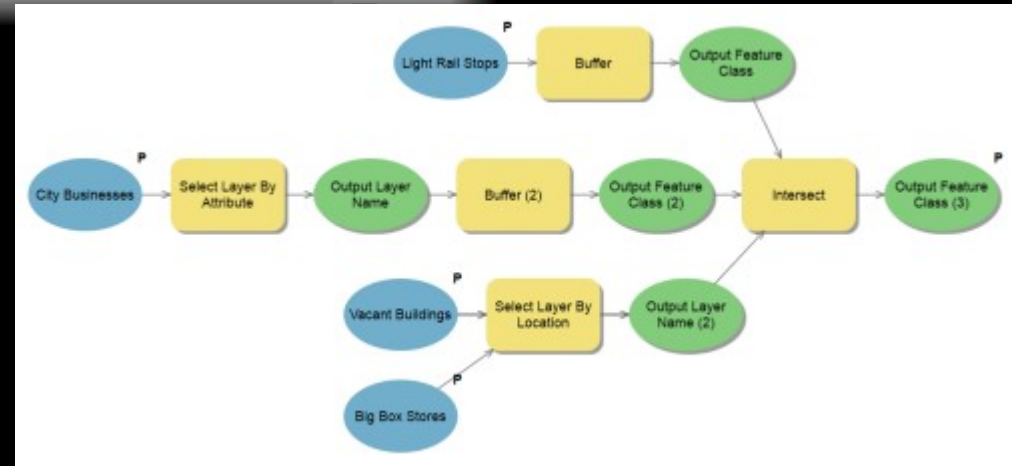
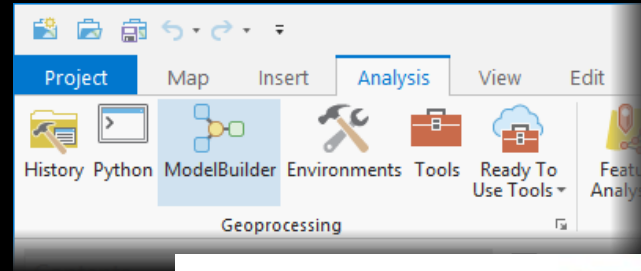
Algorithms

- In QGIS
 - Processing Modeler
 - Processing >
 - Graphical Modeler
 - Connect
 - Inputs
 - Algorithms
 - Save & reuse models
 - Export to script



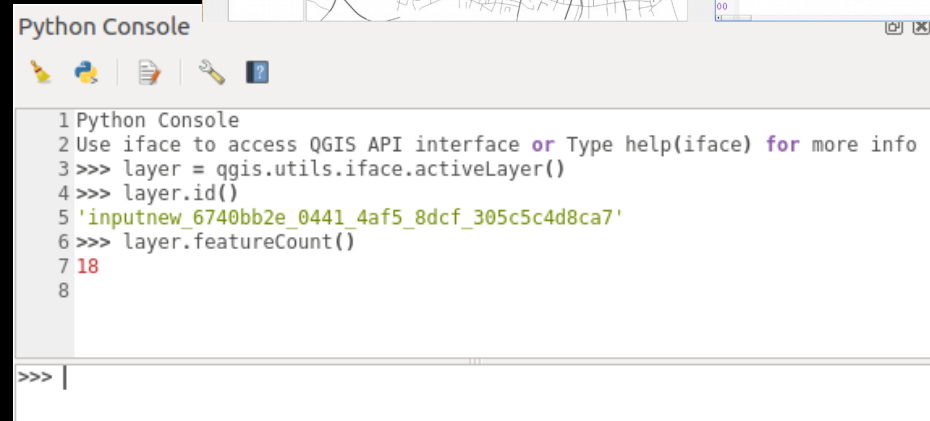
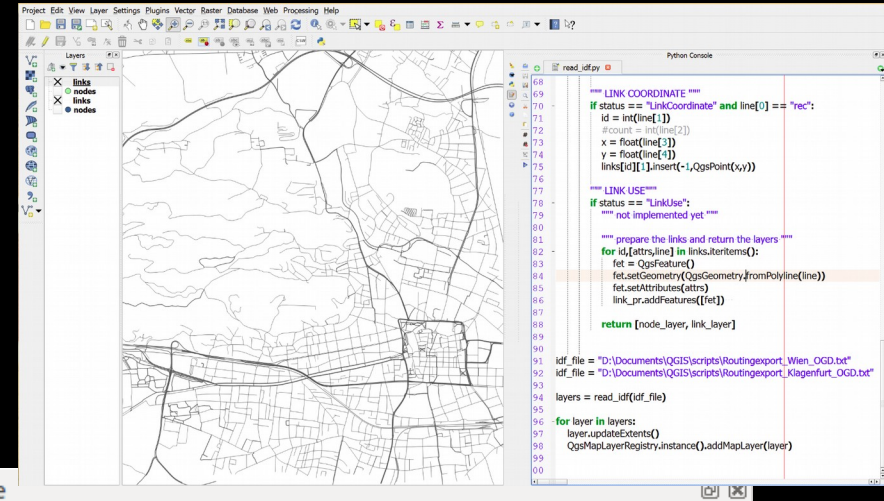
Algorithms

- In ArcGIS
 - Model Builder
 - Analysis >
 - ModelBuilder
 - Connect
 - Inputs
 - Algorithms
 - Save & reuse models
 - Export to script



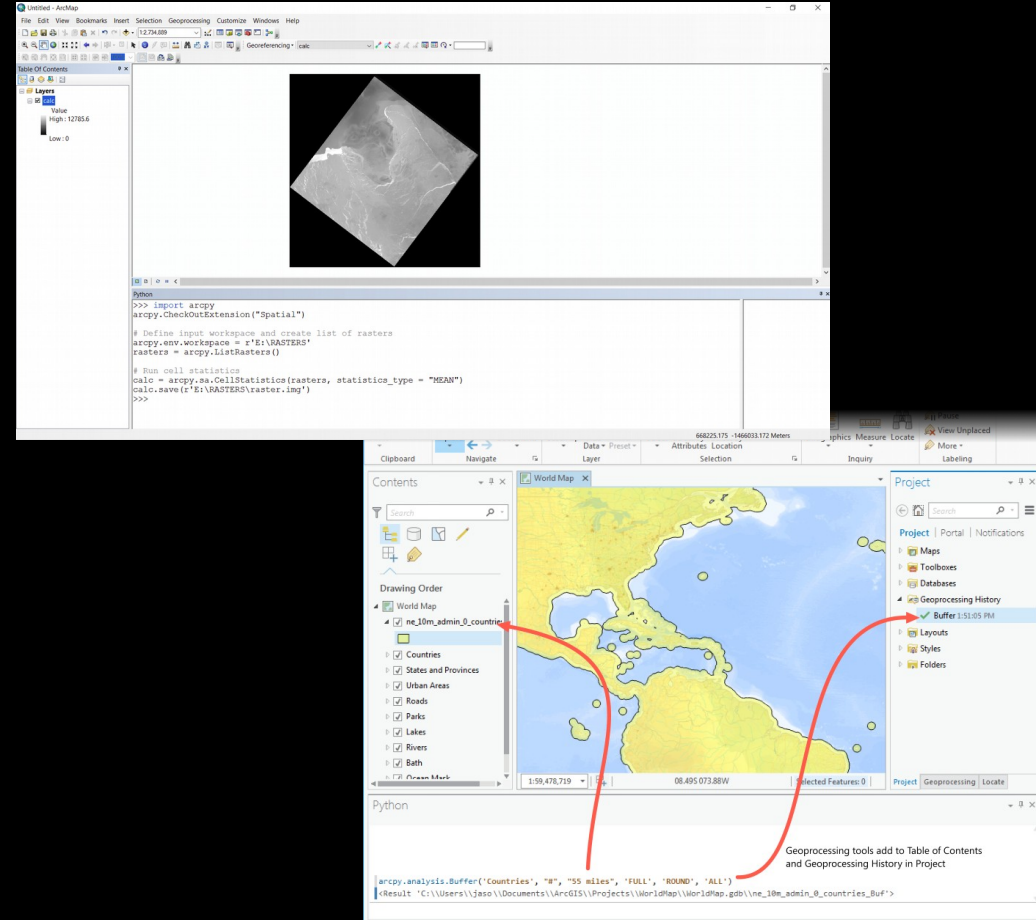
Code

- PyQGIS
 - QGIS built with Python
 - All tools have a Python API
 - Uses
 - Python Console
 - Build Plugins
 - Build Applications
 - Automation



Code

- ArcPy
 - ArcGIS Python library
 - In Pro and Desktop
 - Uses
 - Data analysis
 - Data conversion
 - Data management
 - Automation



Resources

- [OGC Standards for Web Services](#)
- [Intro to PostGIS](#)
- [What are Algorithms?](#)
- [GIS Algorithms](#)
- [PyQGIS Cookbook](#)
- [ArcPy API](#)