

GEO 447 PRINCIPLES OF GIS

- Metadata
- Data Input
 - Methods & Devices
- Socioeconomic
 - Examples & Sources
- Environmental
 - Examples & Sources
- Web-based Materials

Created by JDG 2000

Class slides are based on readings, the current NCGIA Core Curriculum for GIS(ystems) and GIS(cience), Kemp & Goodchild (1991), the NCGIA Core Curriculum Project at UBC, and Foote & Heubner's *The Geographer's Craft*

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Metadata

- Like a “nutrition fact” label on food
- Data about data
 - who created it
 - how was it created
 - what scale was it created at
 - what was the source material
 - source software package
 - plus another 60 or so odd bits of information
- Essential for creating & cataloging quality data
 - FGDC: NSDI

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Data

- Real World Information Must Be Made Digital
- Input Comprises 95+% of GIS Experience
 - Accounts for major ‘bottlenecks’
 - Labor Intensive
 - Memory Intensive (not so much so today)
- Locational Data encoded as Coordinates
 - Vector (X,Y point)
 - Raster (X,Y cell)
- Attribute Data encoded as a table

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Input Methods

- Keyboard
 - Primarily Attribute, but also X,Y
- Digitizing
 - “rough” via eyeball
 - “precise” using puck & tablet
- Image & Photo
 - Raster (LANDSAT Image)
- Scanning
 - Bed Scanner (imprecise & inefficient)
 - Drum Scanner (high precision)
- Digital Conversion
 - Importing Digitized Data (CAD, TIGER, DIME, GPS, DEM)
 - Vectorization of Digital Images

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Criteria for Input Method

- the type of data source
 - images favor scanning
 - maps can be scanned or digitized
- Database model of the GIS Application
- Density of data
- End-use of GIS

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Digitizing Closer Up

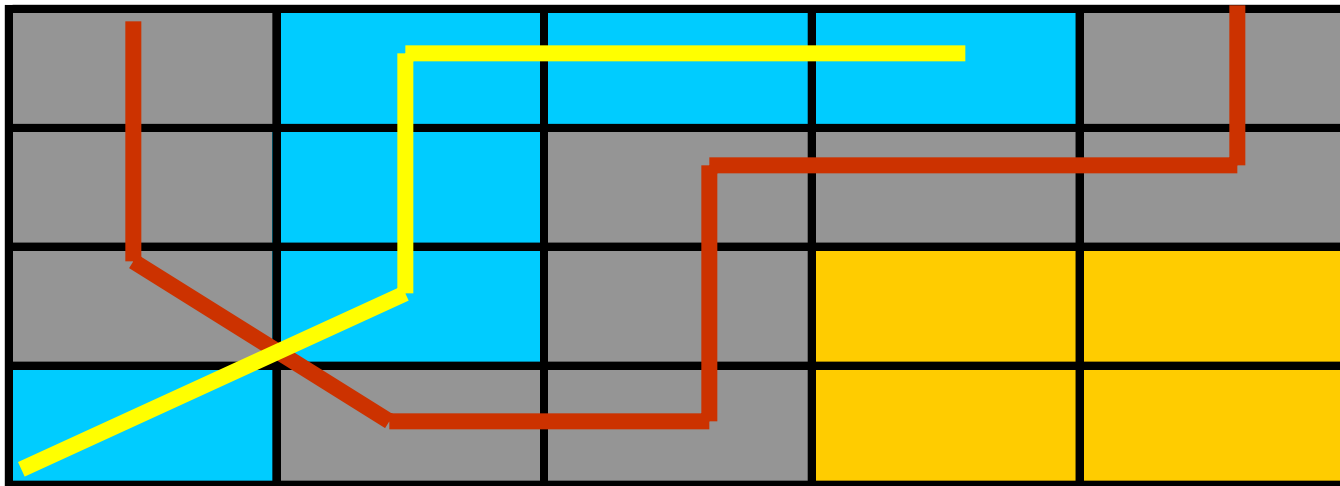
- Map Attached to Tablet
 - A solid state system of interlocking X & Y wires
- Reference/Control Points Are ‘Tic-ed’
 - At-least 3, but hopefully more
- Problems
 - Edge matching
 - Maps were not designed for digitizing
 - soil maps are already finessed through interpolation
 - images are blurred based on cell resolution
- Costs
 - Rule of thumb is 1 boundary per minute

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Vectorization of Line Layer *General Idea*



↑
How Do I draw this line?

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Socio-Economic Data

- Sources
 - field survey
 - government statistics
 - government records
 - secondary data (non-government)
 - commercial
 - Geography
 - DIME & later TIGER

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Socio-Economic Data

- Consider:
 - Why was the data created?
 - Have census boundaries changed?
 - Census boundaries changed every 10 years
 - TIGER files change or are update every 4-5 years
 - Level of Aggregation?
 - Spatial Context
 - do you really want ‘home’ or ‘work’ information
 - housing v. manufactures
 - Temporal Characteristics?
 - Census 1-10years
 - Manufactures 1-5 Years

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Census of . . .

- Agriculture (annual crop data)
- Population & Housing (10 years)
- Economic (5 years ending in 2 & 7)
 - services, manufactures, etc...
- Labor Force Statistics (produced monthly)
- Parcel Data (real time updates?)
- Infrastructure Inventories (vary)

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TIGER

- Topologically Integrated Geographic Encoding and Referencing
- Created to by Census with USGS assistance to identify and map data for enumeration districts/reporting zones
- Hierarchically arranged
- Contain additional data besides census districts
 - roads, rivers, lakes, major landmarks, political boundaries, congressional districts, zip codes

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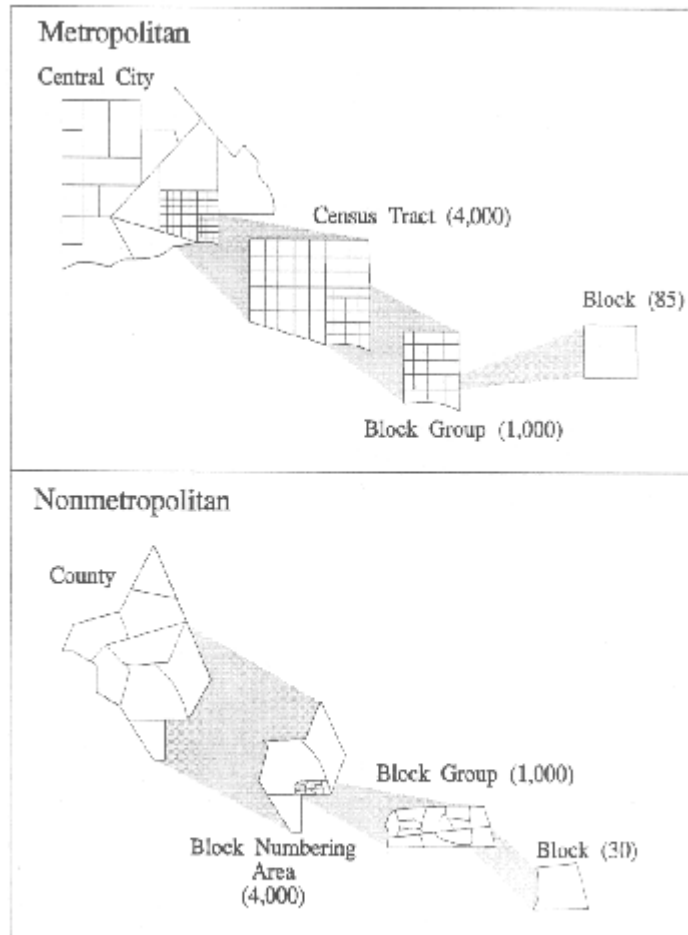
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Linking Census Attribute & TIGER

- Federal Information Processing Standards (FIPS) Code
- Every census boundary has a specific code
- The code is hierarchical
 - For example:
 - 01001 = 01 Alabama 001Autauga County
 - 0106700124 Abbeville, Henry County, AL
 - 13057090200 Census Tract, Cherokee County, Georgia

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Each unit has a nested FIPS code to link attribute to geography

Hierarchy of Census Areas, 1990

(Values in brackets indicate average population)

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Environmental Data

- Obvious Types
 - geology
 - vegetation
 - hydrology
 - soil
- Not So Obvious Types
 - roads
 - logging roads
 - management unit boundaries
 - Forest Service Areas

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Environmental: Purposes

- Management & Marketing of Resources
- Inventory of Resources
- Visualizing Spatial Relationships
- Decision Support

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Environmental: Spatial Management Units

- Environmental Applications & Management has historically been based on pseudo-raster cells
 - spatial management units are based on 40x40 acre parcels
 - 40s are subdivided into tens
 - 40s can be groups into 'sections (640 Acres/1 square mile) or townships (6x6 miles)
- Applications Tend to be Space Filling
 - Although, vector can provide more 'realistic' representation

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Environmental: Data Types

- Thematic
 - soils
 - geology
 - land use
- Topographic
 - traditional topos
 - DEM
- Remote Sensing
 - urban/rural, vegetation, crops, surface geology, land use
 - LANDSAT, SPOT, TM

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Web-based Sites

- NSDI Clearing House Nodes
- ESRI Data Hound
 - best site for packaging TIGER & related files as ESRI shape files
- USGS
- Census
 - TIGER
 - Attribute
- State GIS Tech Centers: Ohio's OGRIP
- Commercial Data Resources
- County Auditors Offices

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