Visualizing Census Data in GIS

Andrew Rowan, Ph.D.
Director, NJ Office of GIS
Outline

• VERY accelerated cartography primer
• Software choices
• Demos/how-to
  • ArcGIS Desktop (formerly ArcView)
  • ArcGIS Online
• Notes on data prep
• Q&A
Map Types

Mental
- Reference

Tangible
- Thematic
  - Qualitative
  - Quantitative

Virtual

Source: Maantay and Ziegler, via Wiggins
Types of Visualizations
Graduated Color (Choropleth)

- Areas shaded by value
- Values MUST be independent of polygon size to produce accurate presentation – counts must be normalized by area or percentage
- Choose data classification method carefully
Dot Density

- Appropriate for count data, not ratios
- Each dot represents a fixed number of people
- Easy to understand, portrays spatial pattern, but provides no concrete numbers to the reader
Proportional/Graduated Symbol

- Can be suitable for both count and ratio
- Use care not to overwhelm the reader’s ability to perceive the message
- Best for relatively few values
Multiple Variables (Quantity, Category)

- Be careful not to get too complex
- Consider multiple maps instead
Classification Methods

Common methods for grouping values into classes (colors or symbol sizes on map)

• Natural breaks: algorithm looks for clustering in the data
• Equal interval: 0-10, 10-20, etc.
• Quantile: equal number of polygons in each class
Software Options
Desktop GIS

• ArcGIS Desktop
  • By far the most common choice
  • “Basic” version more than adequate
  • Takes some time investment to learn

• MapInfo
• GeoMedia
• QGIS and other free software
Free, Lightweight?

• Google Earth not meant for thematic maps. Add-ons exist that enable thematic maps, but core product does not do them.

• ArcGIS Explorer – free desktop s/w from Esri, can only do thematic maps if layers are prepared first in ArcGIS.
ArcGIS Online

- Cloud-based, software as a service from Esri
- Rapidly growing library of data and maps shared by users
- Subscription version starts at $2500/yr for 5 users
- Free accounts exist, some limitations on capabilities (click “sign in” and then click “create public account”)
- Some data prep in ArcGIS will be necessary
Data Preparation
Obtaining Data

- Geographic data (shapefiles) and statistical data published separately
- Geographic data: www.census.gov > geography > TIGER, or njgin.nj.gov
- For statistical data, many and varied choices
- Must use the geography that corresponds to the summary level of your statistical data
- You will need “GEOID” field in both files to define one-to-one match to join the two together
- GEOID always in TIGER files, but you may have to create it for statistical tables
Creating a GEOID

- Unique ID for each polygon
- Combination of codes for state and lower divisions
- Content varies depending on what geography you use

<table>
<thead>
<tr>
<th>Area</th>
<th>Fields needed to create join id</th>
</tr>
</thead>
<tbody>
<tr>
<td>County subdivision (NJ - Municipalities, aka Minor Civil Divisions)</td>
<td>STATE + COUNTY + COUSUB</td>
</tr>
<tr>
<td>Cenus Tract</td>
<td>STATE + COUNTY + TRACT</td>
</tr>
<tr>
<td>Block Group</td>
<td>STATE + COUNTY + TRACT + BLKGRP</td>
</tr>
<tr>
<td>Block</td>
<td>STATE + COUNTY + TRACT + BLKGRP + BLOCK</td>
</tr>
<tr>
<td>Congressional District (111th Congress)</td>
<td>STATE + CD</td>
</tr>
<tr>
<td>State Legislative District (Upper Chamber, same as lower in NJ)</td>
<td>STATE + SLDU</td>
</tr>
<tr>
<td>School District (Elementary)</td>
<td>STATE + SDELM</td>
</tr>
<tr>
<td>School District (Secondary)</td>
<td>STATE + SDSEC</td>
</tr>
<tr>
<td>School District (Unified)</td>
<td>STATE + SDUNI</td>
</tr>
<tr>
<td>Voting District</td>
<td>STATE + COUNTY + VTD</td>
</tr>
<tr>
<td>Place</td>
<td>STATE + PLACE</td>
</tr>
<tr>
<td>American Indian Area</td>
<td>AIANNH + AIHHTLI</td>
</tr>
</tbody>
</table>
Data Prep for QGIS

- QGIS reads shapefiles (and others) for spatial data
- For tabular data, Comma-Separated Values in a text file (.csv, can export from excel)
- Need to prepare extra .csvt file to define field types or numbers will be treated as text
- For more details, see http://qgis.spatialthoughts.com/2012/03/using-tabular-data-in-qgis.html
Using Excel Files in ArcGIS

- Access is a better suited tool, but many people find Excel easier to use/learn
- Add a single worksheet to your map, not a whole workbook
- First row: field names
- Data begins on row 2
- Field types determined by values in row 2
- No extra blank lines