# GIS: Mapping Census Data

Presented by:

The Center for Family and Demographic Research

BGSU Center for Family and Demographic Research

# What is GIS?

- Geographic Information Systems
- Many of the mapping software programs are developed through ESRI
  - http://www.esri.com/
  - ESRI website has data sets, free GIS programs, and information on which GIS system would be best for you

# Why Would We Use GIS?

- Model neighborhoods and social behavior
- Numerous fields of study use GIS
  - Biologists, land use planners, humanitarian assistance
  - Crime statistics – model information on burglaries, robberies, sex crimes, other major incidents
- Key for sociologists may be finding the patterns
  - GIS looks at distribution of features on a map instead of just an individual feature – which allows us to see if patterns emerge

# Types of GIS Programs

- Google Earth
  - Fun to try, lots of different possibilities
    - Explore space, sea, just about anything
    - Unfortunately, free version does not allow us to import data. Therefore, we cannot analyze census data.
    - But if you have access to the professional version, this is a nice user friendly program.
      - Example
- ArcGIS
  - ESRI system
    - Probably considered the leader in GIS software

# Census Data

- Geographical hierarchy of the census
- U.S.
  - Region
    - Division
      - State
        - » County
        - » County Subdivision
        - » Place
        - » Census tract
        - » Block Group
        - » Census Block

# Census Data

- Short Form
  - Household relationships, sex, race/Hispanic origin, age, tenure (home owned or rented)
  - Everyone gets this form
- Long Form
  - Social characteristics, marital status, place of birth/citizenry/year of entry, educational attainment, labor force status, occupation
  - About one in six people get the long form, but this varies depending on size of area

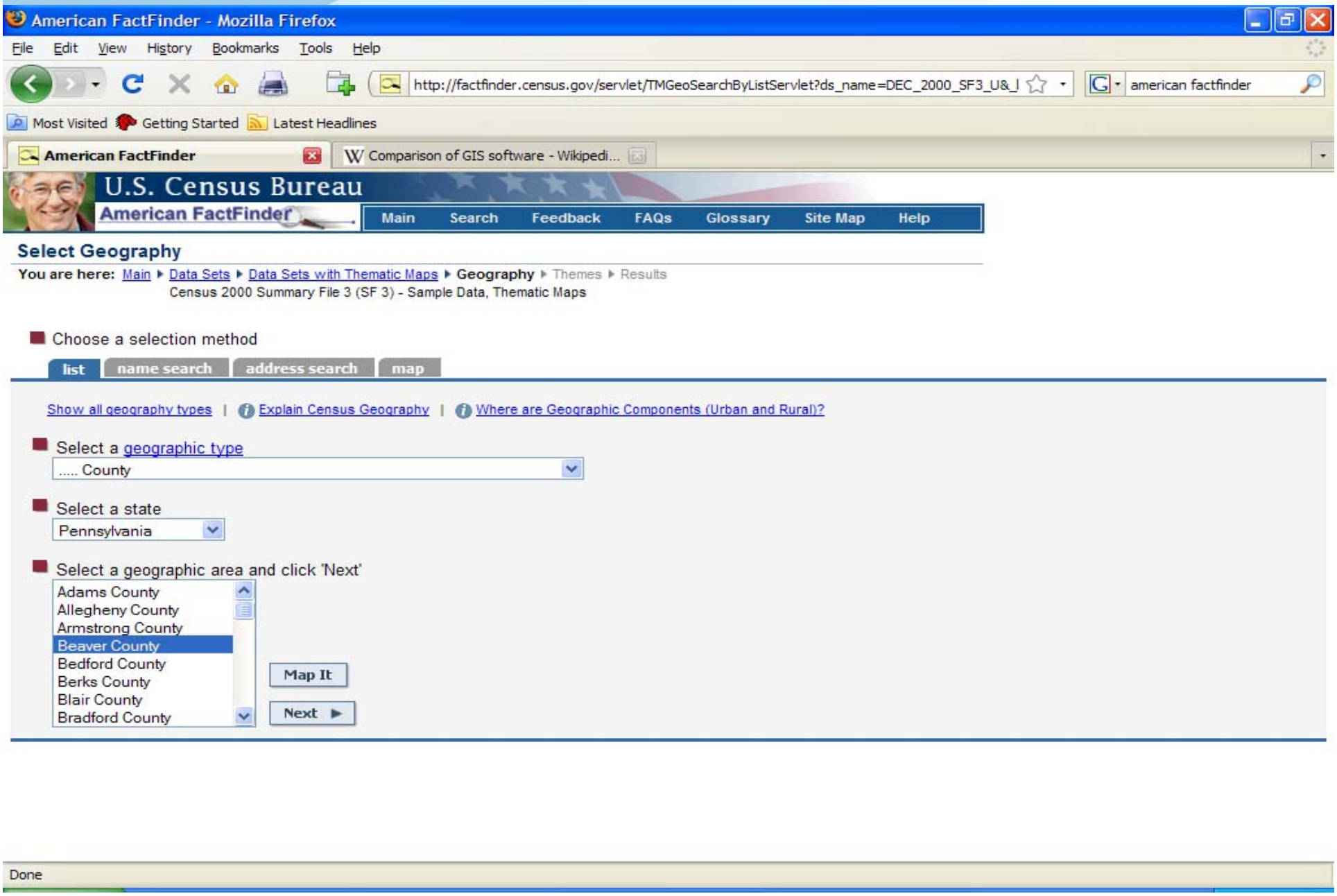
# American FactFinder Maps

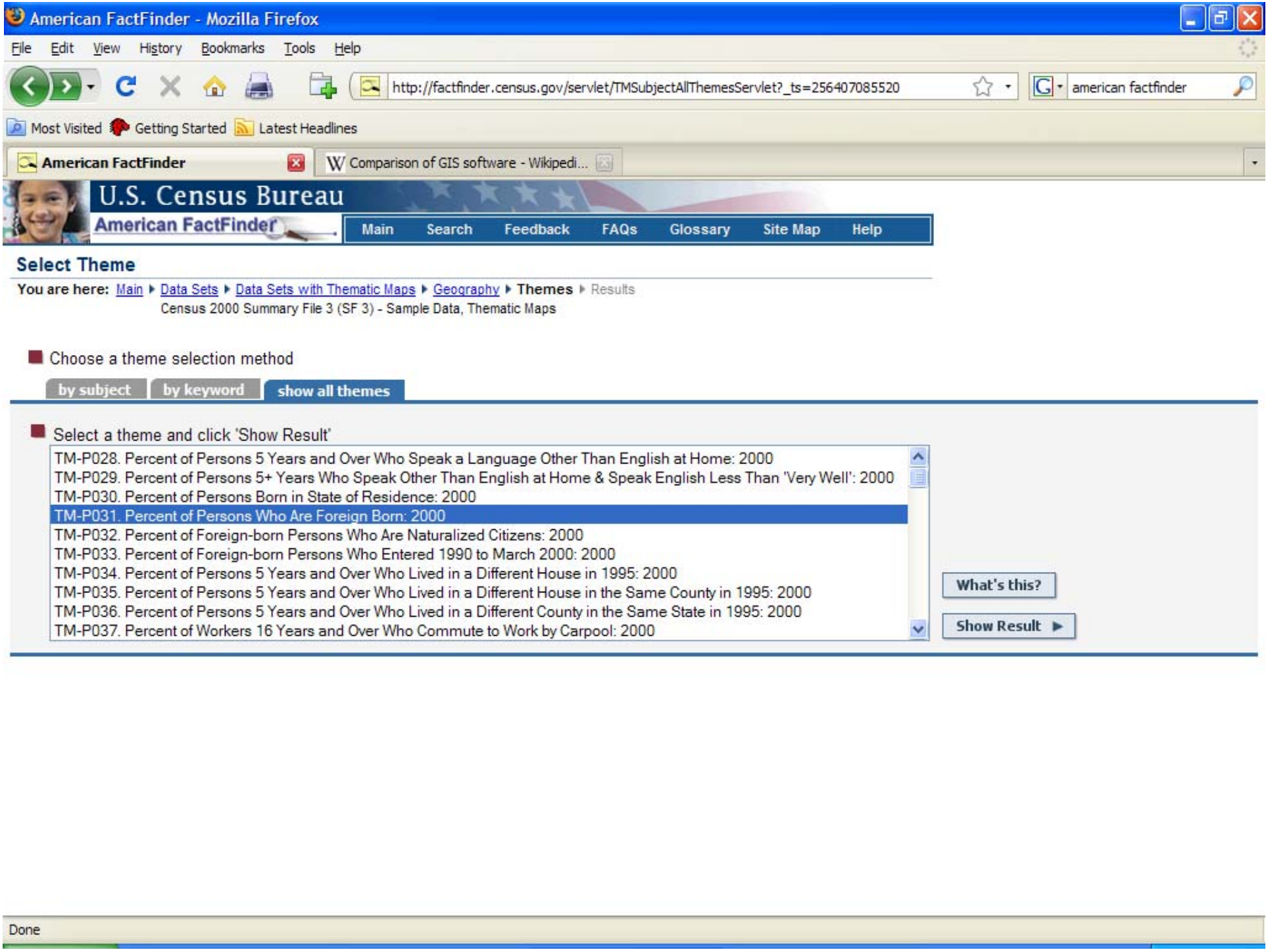
- One of the simplest ways to map census data is through American Fact Finder
- http://factfinder.census.gov/home/saff/main.html?_lang=en
- Drawback is limited to specific characteristics

# American FactFinder Maps

- How to make the map
  - Select Data Sets on left hand side of AFF website
  - Select your dataset, here I will use the Decennial Census
  - Select the type of summary file you would like to use
  - Select Thematic Maps
  - Then select your geographic type

# American Fact Finder




American FactFinder - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://factfinder.census.gov/servlet/TMSubjectAllThemesServlet?_ts=256407085520
american factfinder
Most Visited Getting Started Latest Headlines
American FactFinder
Comparison of GIS software - Wikipedi...
U.S. Census Bureau
American FactFinder
Main Search Feedback FAQs Glossary Site Map Help
Select Theme
You are here: Main ▸ Data Sets ▸ Data Sets with Thematic Maps ▸ Geography ▸ Themes ▸ Results
Census 2000 Summary File 3 (SF 3) - Sample Data, Thematic Maps
Choose a theme selection method
by subject
by keyword
show all themes
Select a theme and click 'Show Result'
TM-P028. Percent of Persons 5 Years and Over Who Speak a Language Other Than English at Home: 2000
TM-P029. Percent of Persons 5+ Years Who Speak Other Than English at Home & Speak English Less Than 'Very Well': 2000
TM-P030. Percent of Persons Born in State of Residence: 2000
TM-P031. Percent of Persons Who Are Foreign Born: 2000
TM-P032. Percent of Foreign-born Persons Who Are Naturalized Citizens: 2000
TM-P033. Percent of Foreign-born Persons Who Entered 1990 to March 2000: 2000
TM-P034. Percent of Persons 5 Years and Over Who Lived in a Different House in 1995: 2000
TM-P035. Percent of Persons 5 Years and Over Who Lived in a Different House in the Same County in 1995: 2000
TM-P036. Percent of Persons 5 Years and Over Who Lived in a Different County in the Same State in 1995: 2000
TM-P037. Percent of Workers 16 Years and Over Who Commute to Work by Carpool: 2000
What's this?
Show Result ▸
Done

Beaver County, Pennsylvania by County Subdivision - TM-P031. Percent of Persons Who Are Foreign Born: 2000 - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://factfinder.census.gov/servlet/ThematicMapFramesetServlet?_bm=y&-context=tm&-PANE

american factfinder

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Beaver County, Pennsylvania by ... | Comparison of GIS software - Wikipedi...

- A street address or ZIP code
- A latitude and longitude
- The selected geography

Quick tips

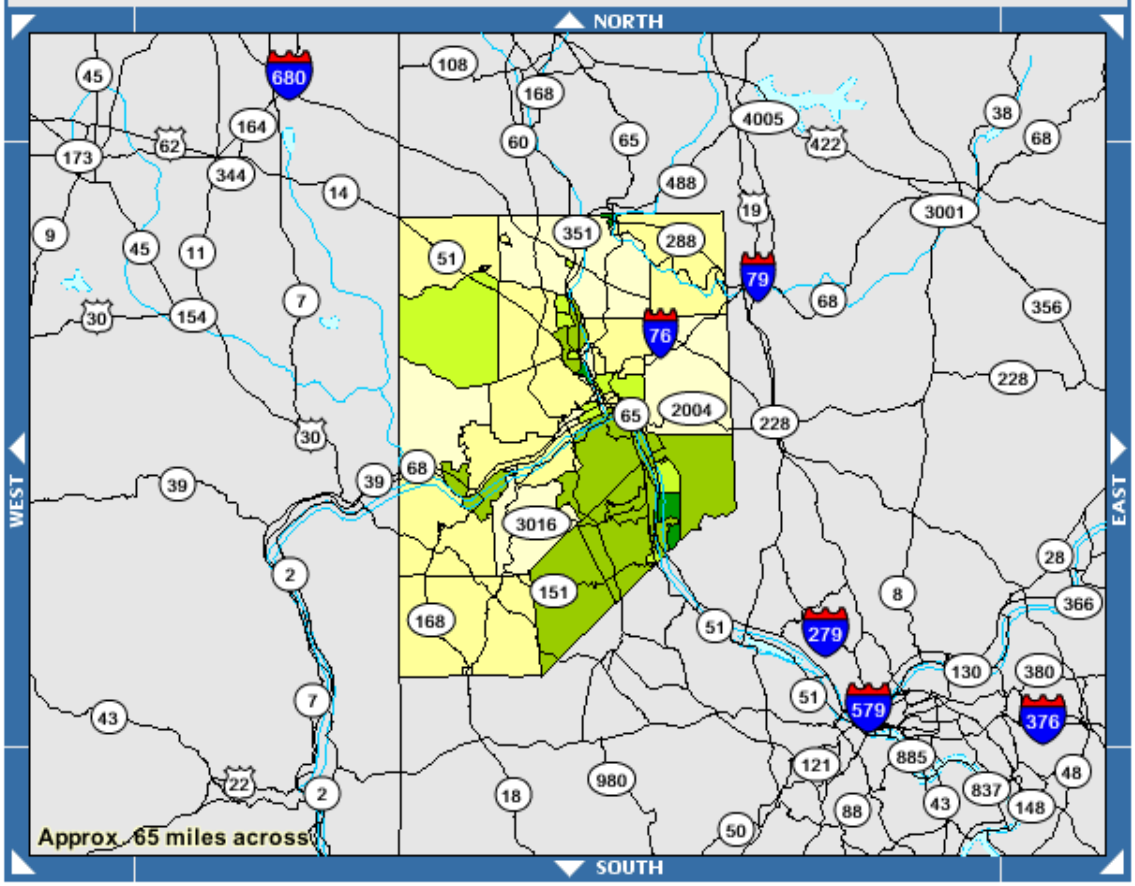
Identify - geo name and data value

Click map to:

65 miles across

Zoom: U.S. Street

Display map by: County Subdivision




Legend

Data Classes

Percent

0.0 - 0.6

0.7 - 1.2

1.4 - 1.9

2.0 - 2.9

3.3 - 4.4

Features

Major Road

Street

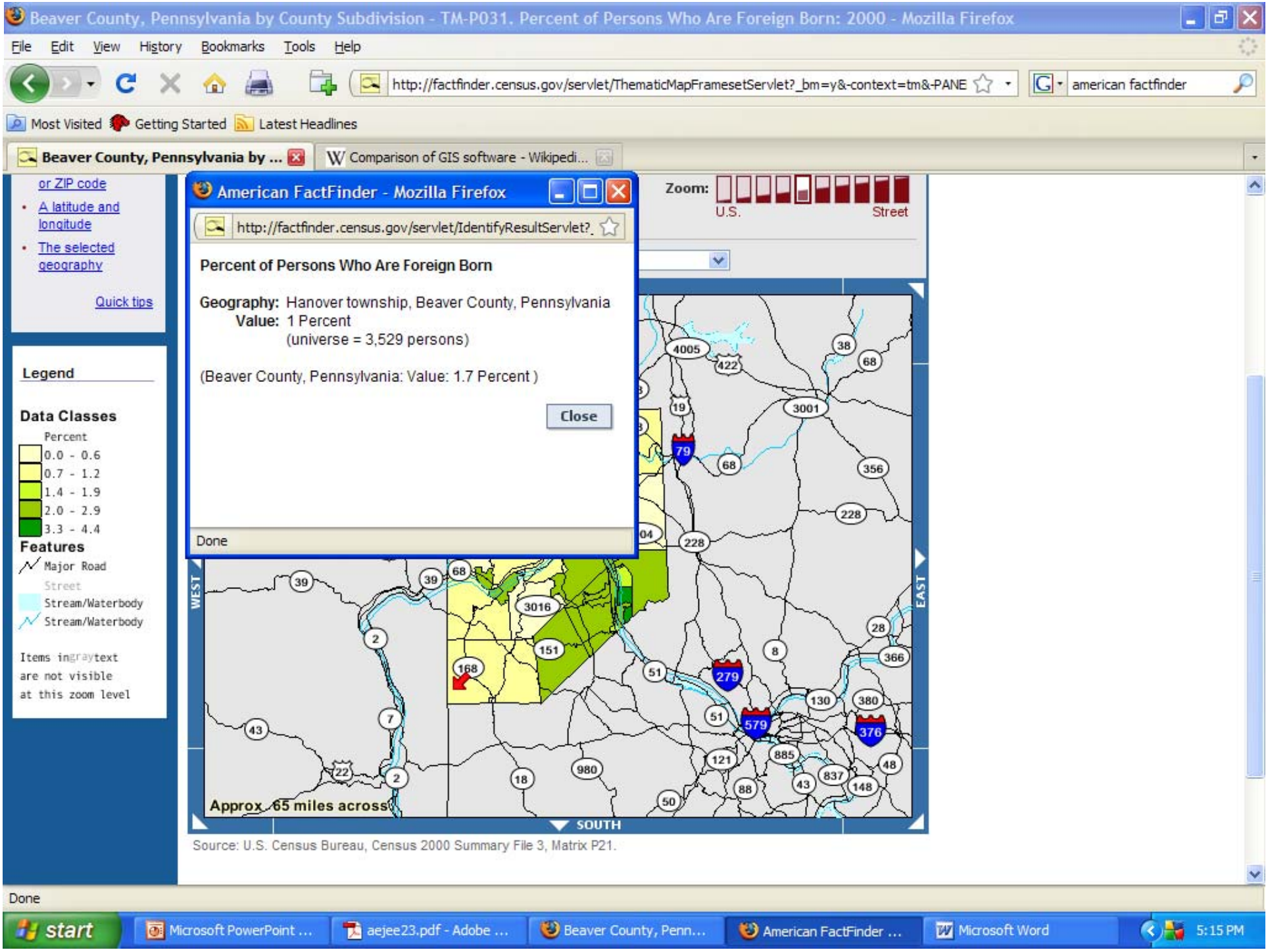
Stream/Waterbody

Stream/Waterbody

Items ingraytext are not visible at this zoom level

Source: U.S. Census Bureau, Census 2000 Summary File 3, Matrix P21.

Done


Beaver County, Pennsylvania by County Subdivision - TM-P031. Percent of Persons Who Are Foreign Born: 2000 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://factfinder.census.gov/servlet/ThematicMapFramesetServlet?_bm=y&-context=tm&-PANE
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Beaver County, Pennsylvania by ...
Comparison of GIS software - Wikipedi...
or ZIP code
A latitude and longitude
The selected geography
Quick tips
Legend
Data Classes
Percent
0.0 - 0.6
0.7 - 1.2
1.4 - 1.9
2.0 - 2.9
3.3 - 4.4
Features
Major Road
Street
Stream/Waterbody
Stream/Waterbody
Items ingraytext are not visible at this zoom level
American FactFinder - Mozilla Firefox
http://factfinder.census.gov/servlet/IdentifyResultServlet?
Percent of Persons Who Are Foreign Born
Geography: Hanover township, Beaver County, Pennsylvania
Value: 1 Percent
(universe = 3,529 persons)
(Beaver County, Pennsylvania: Value: 1.7 Percent )
Close
Done
Zoom:
U.S.
Street
WEST
EAST
SOUTH
Approx. 65 miles across
Source: U.S. Census Bureau, Census 2000 Summary File 3, Matrix P21.
Done
start
Microsoft PowerPoint ...
aejee23.pdf - Adobe ...
Beaver County, Penn...
American FactFinder ...
Microsoft Word
5:15 PM

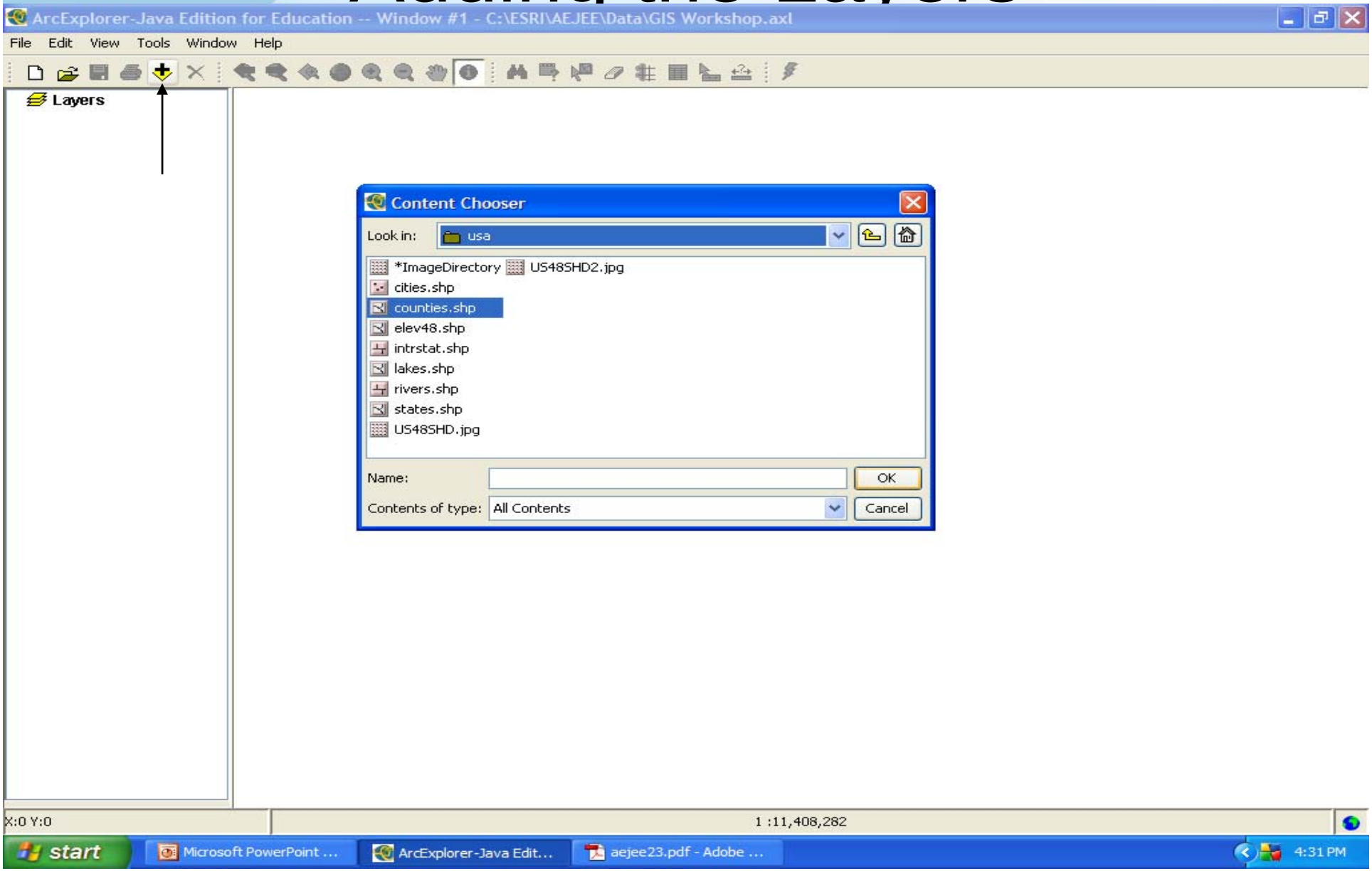
# ArcExplorer – Education Edition

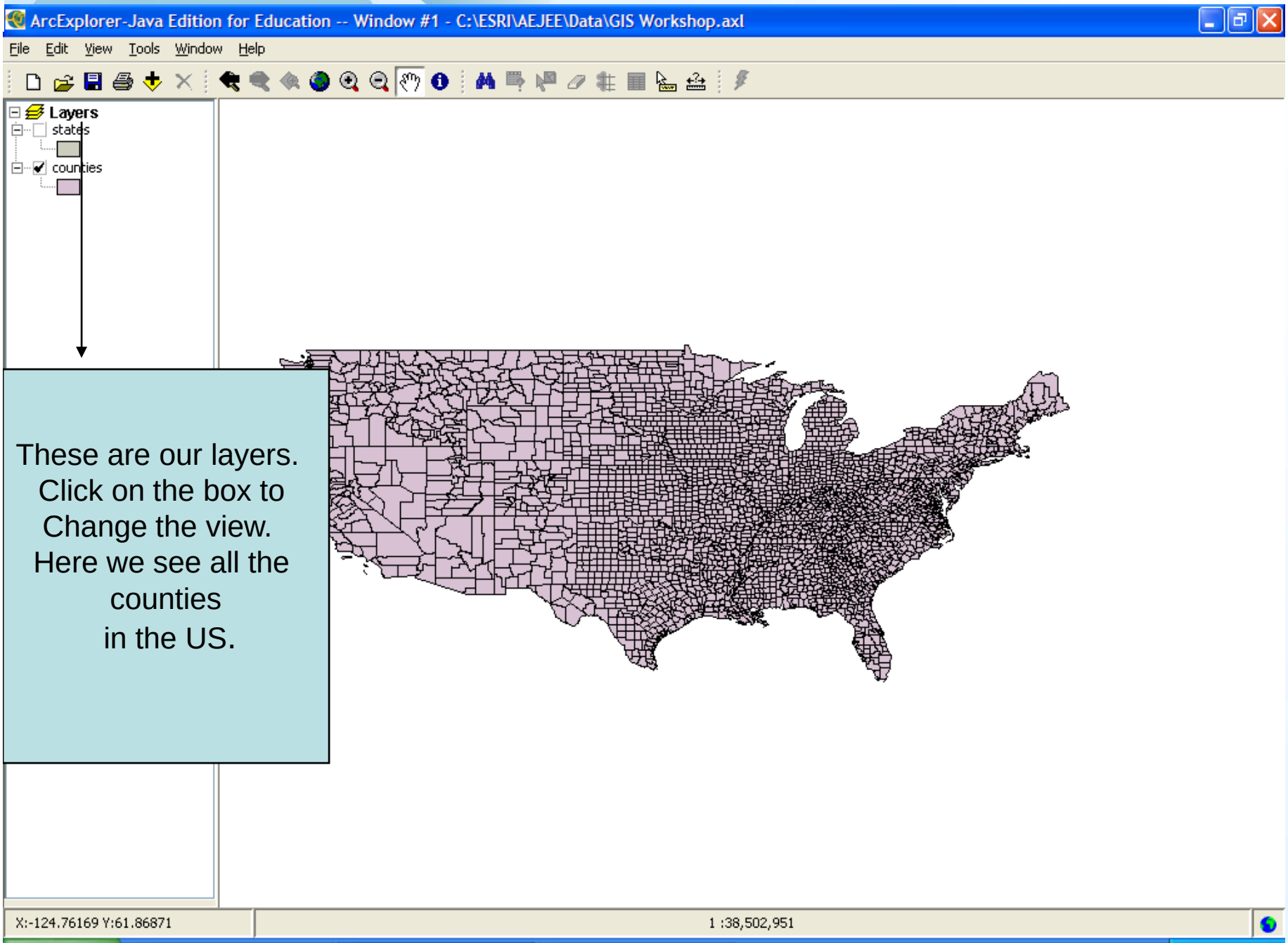
- Numerous GIS programs
  - ArcExplorer has free versions of GIS programs
  - Software can be downloaded at http://www.esri.com/software/arcexplorer/download-education.html
- Data Sources
  - Stored data from ESRI
    - Examples for today's workshop came from the Education Edition of ArcExplorer
    - Data can be found in data folder of the program file. This is good data to practice on as it has census information already acquired through the ESRI system.
  - Data you acquired from external datasets

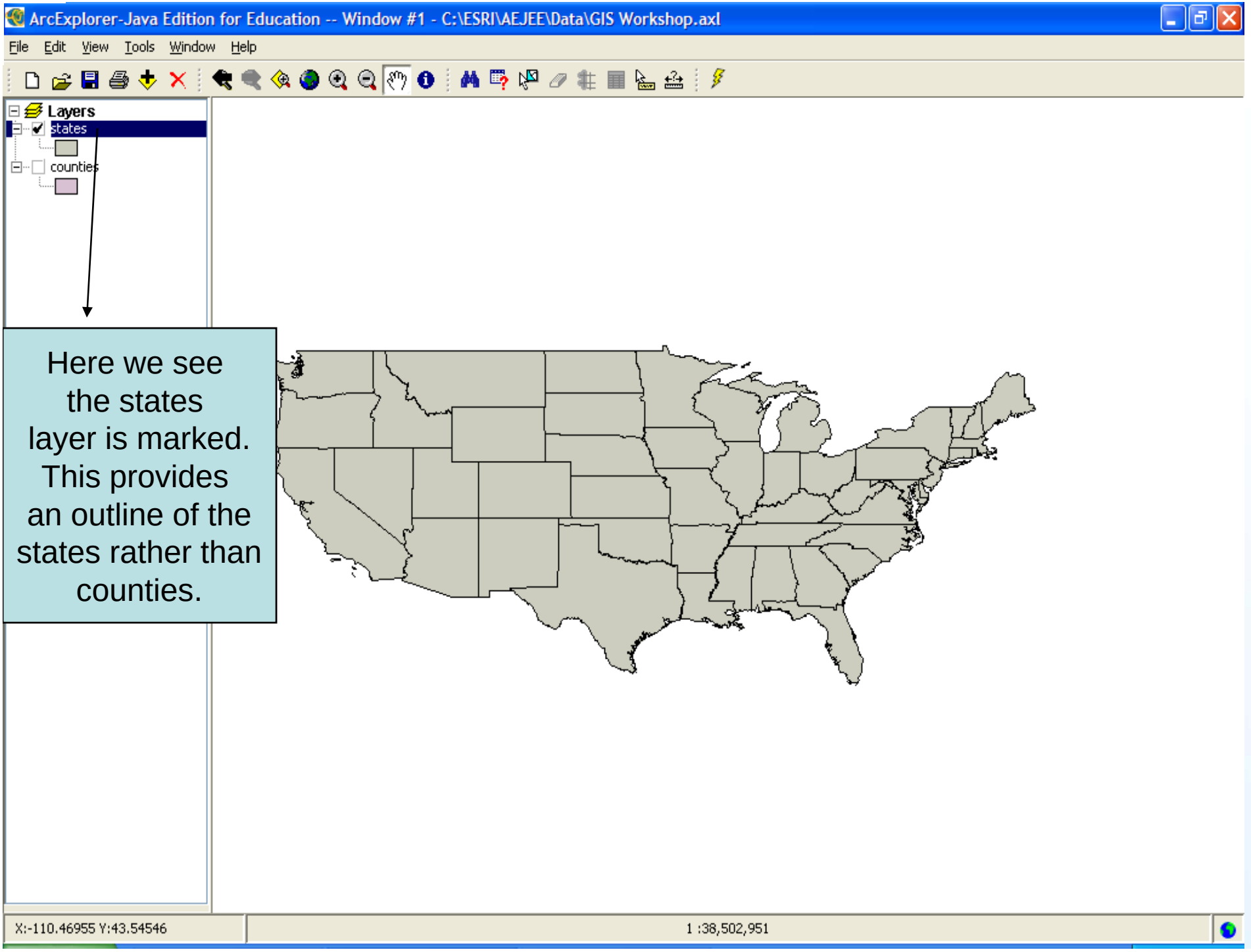
# Creating Layers

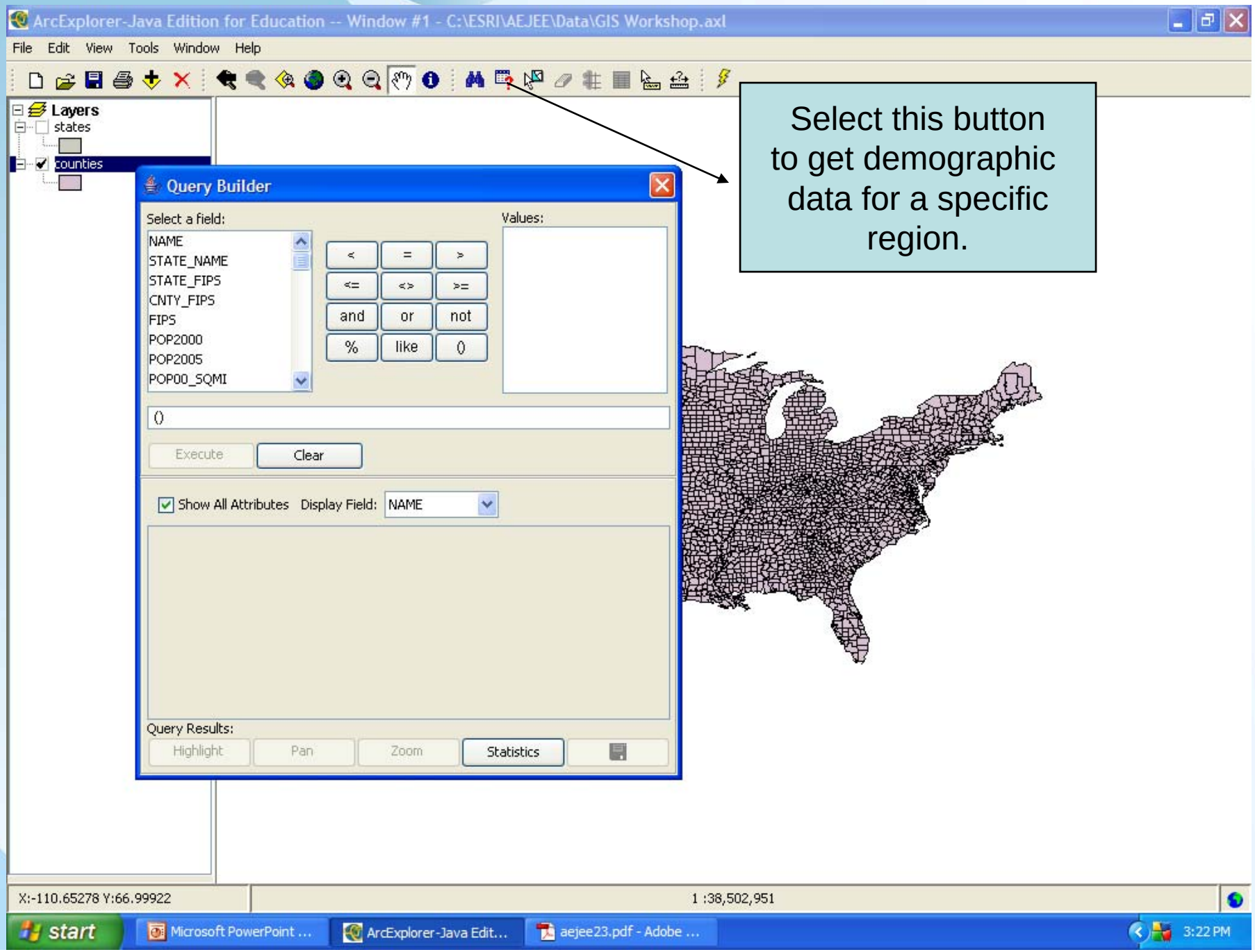
- Create a new layer for each geographical location you want to analyze.
- Your amount of layers depends on the type of data you have available.
- Our examples will use layers from the state level and the county level

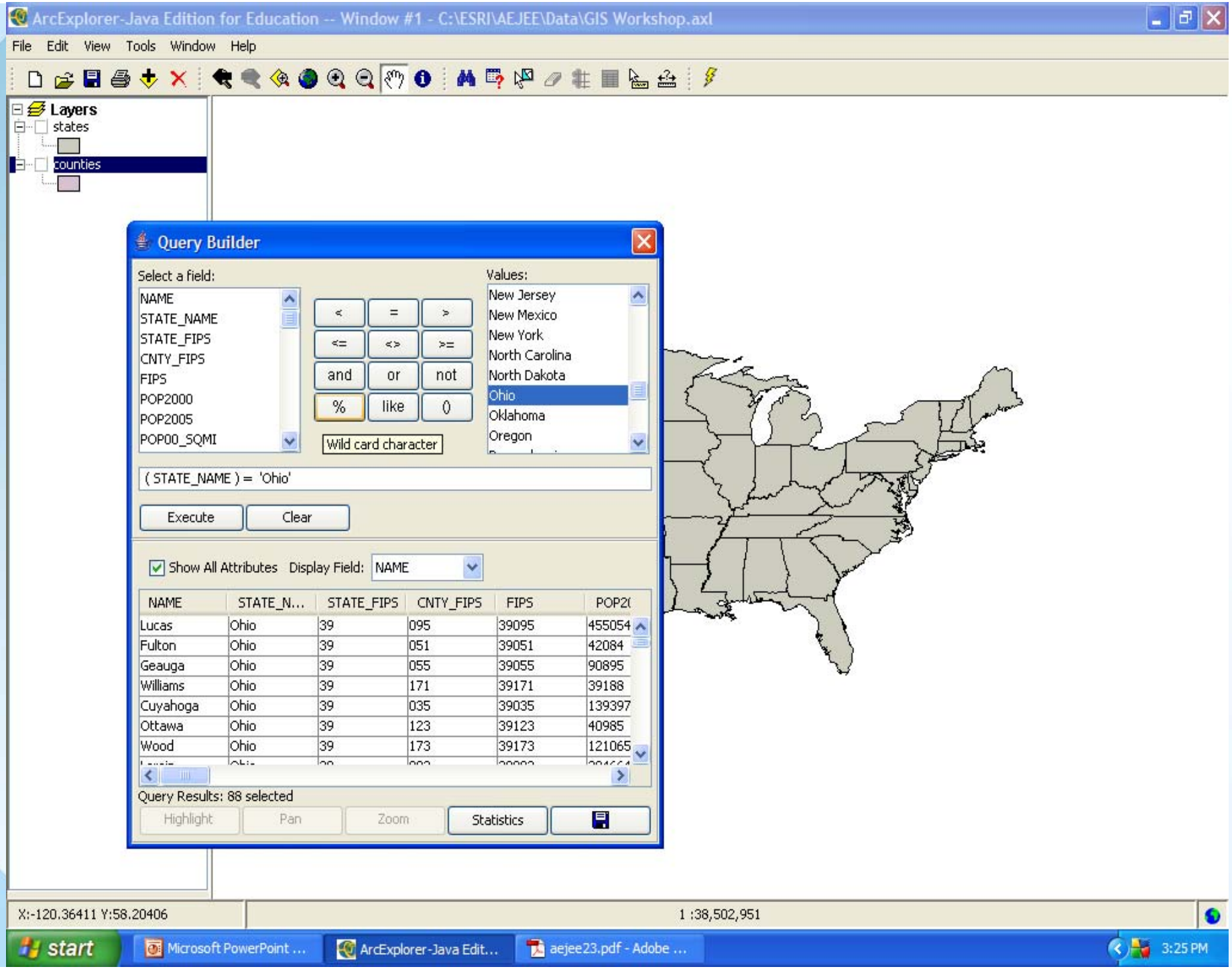
# Adding the Layers

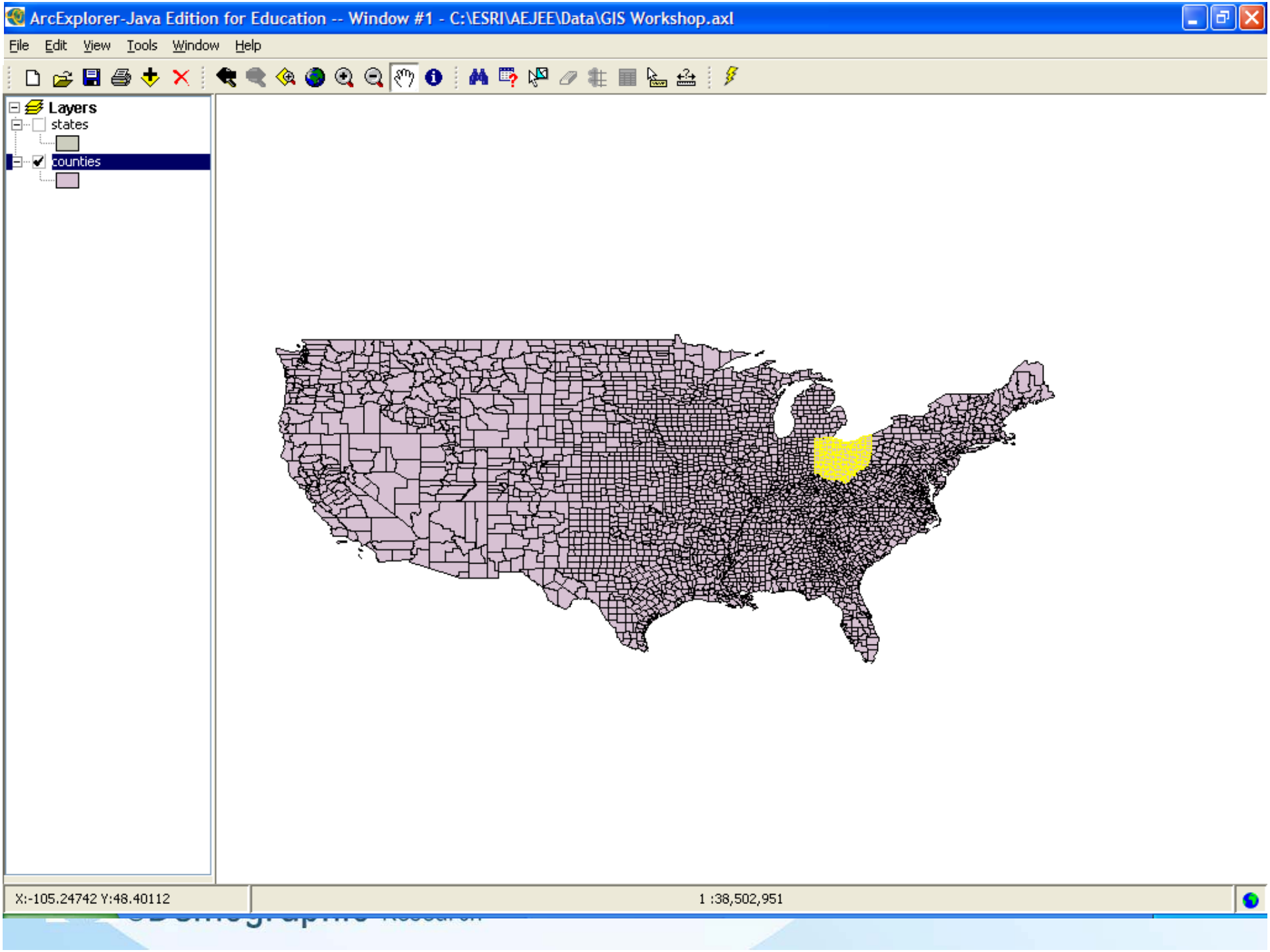


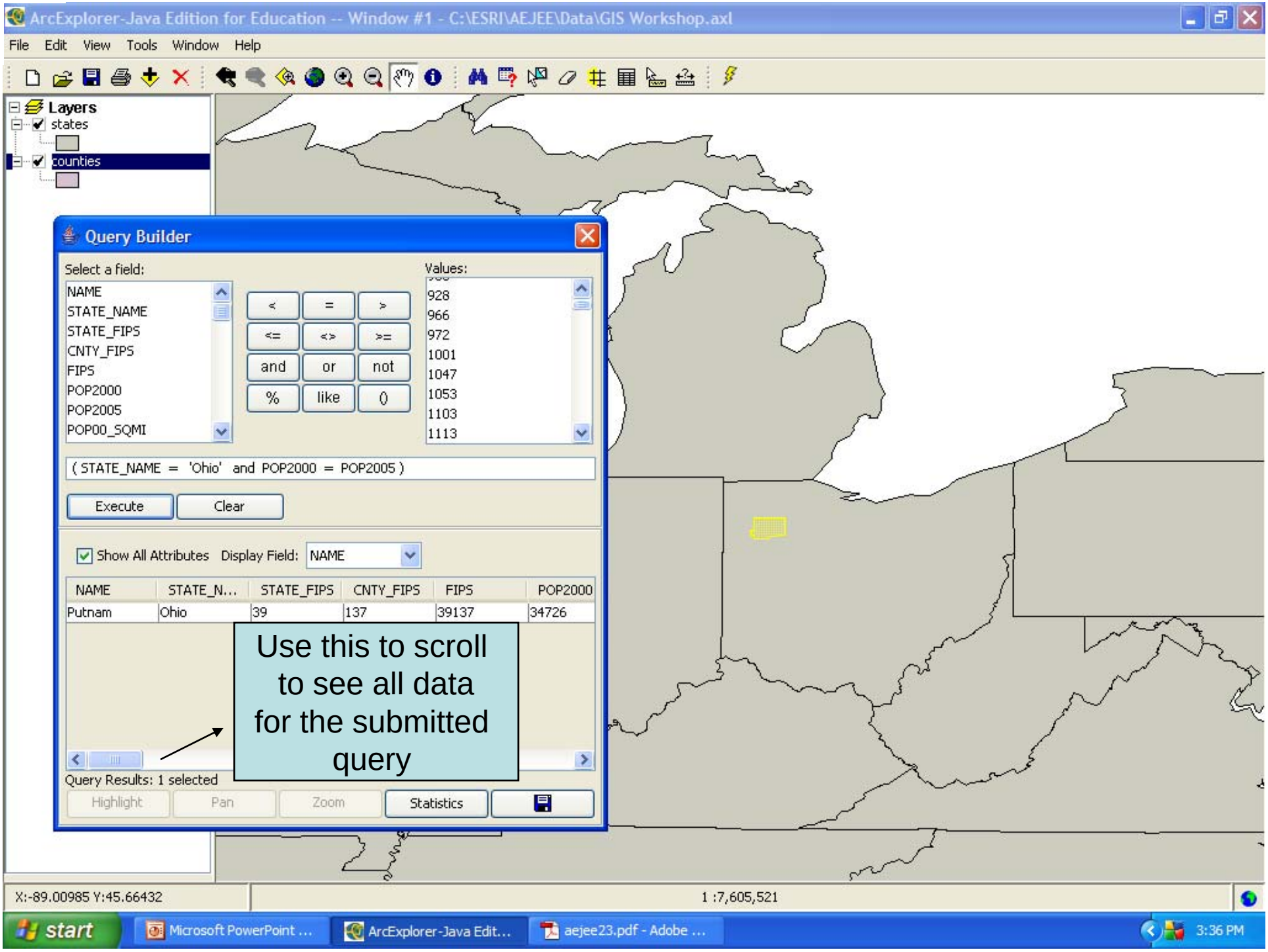

ArcExplorer-Java Edition for Education -- Window #1 - C:\ESRI\AEJEE\Data\GIS Workshop.axl
File Edit View Tools Window Help
Layers
states
counties
These are our layers. Click on the box to Change the view. Here we see all the counties in the US.
X:-124.76169 Y:61.86871
1 :38,502,951

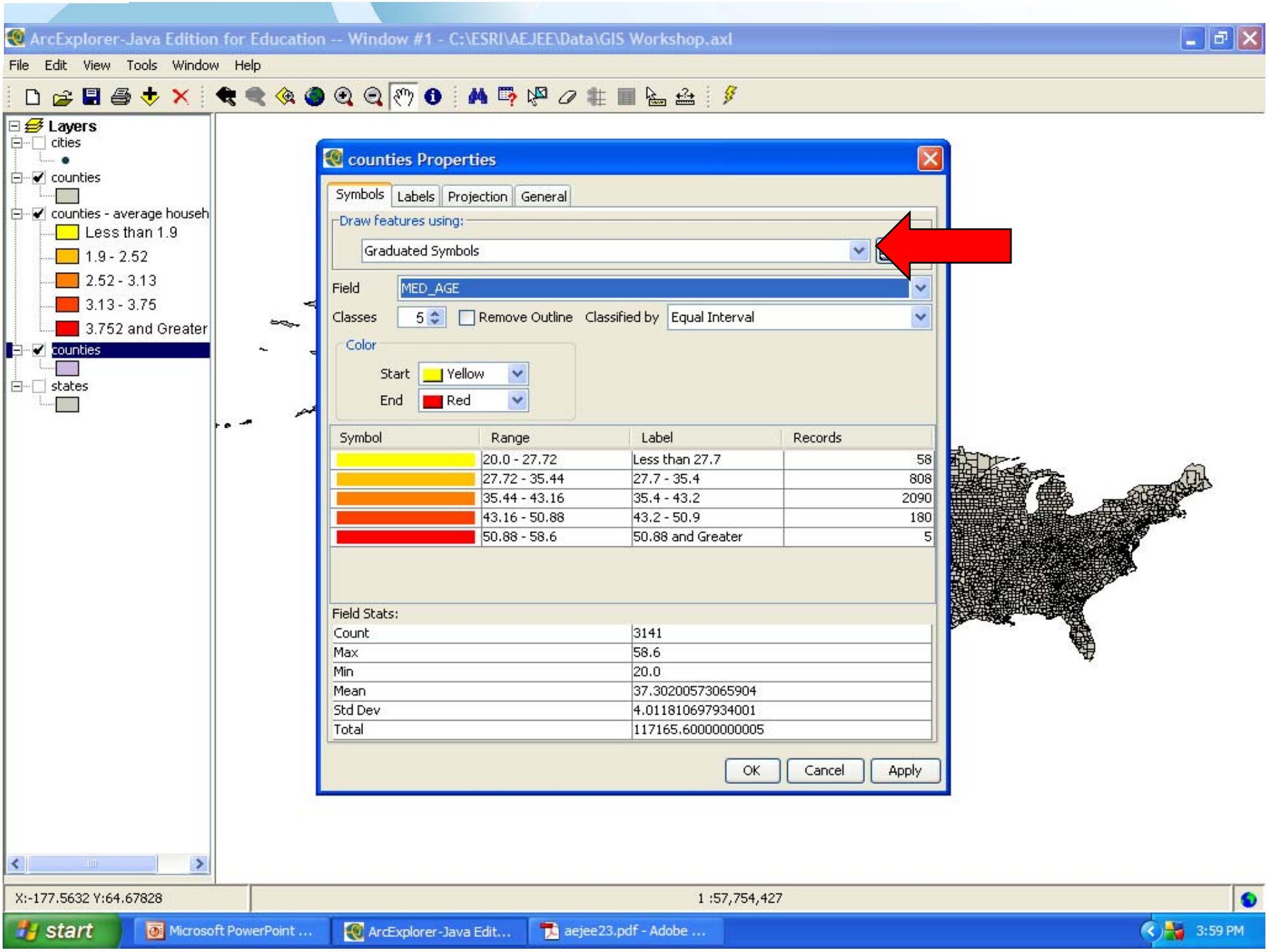

ArcExplorer-Java Edition for Education -- Window #1 - C:\ESRI\AEJEE\Data\GIS Workshop.axl
File Edit View Tools Window Help
Layers
states
counties
Here we see the states layer is marked. This provides an outline of the states rather than counties.
X:-110.46955 Y:43.54546
1 :38,502,951

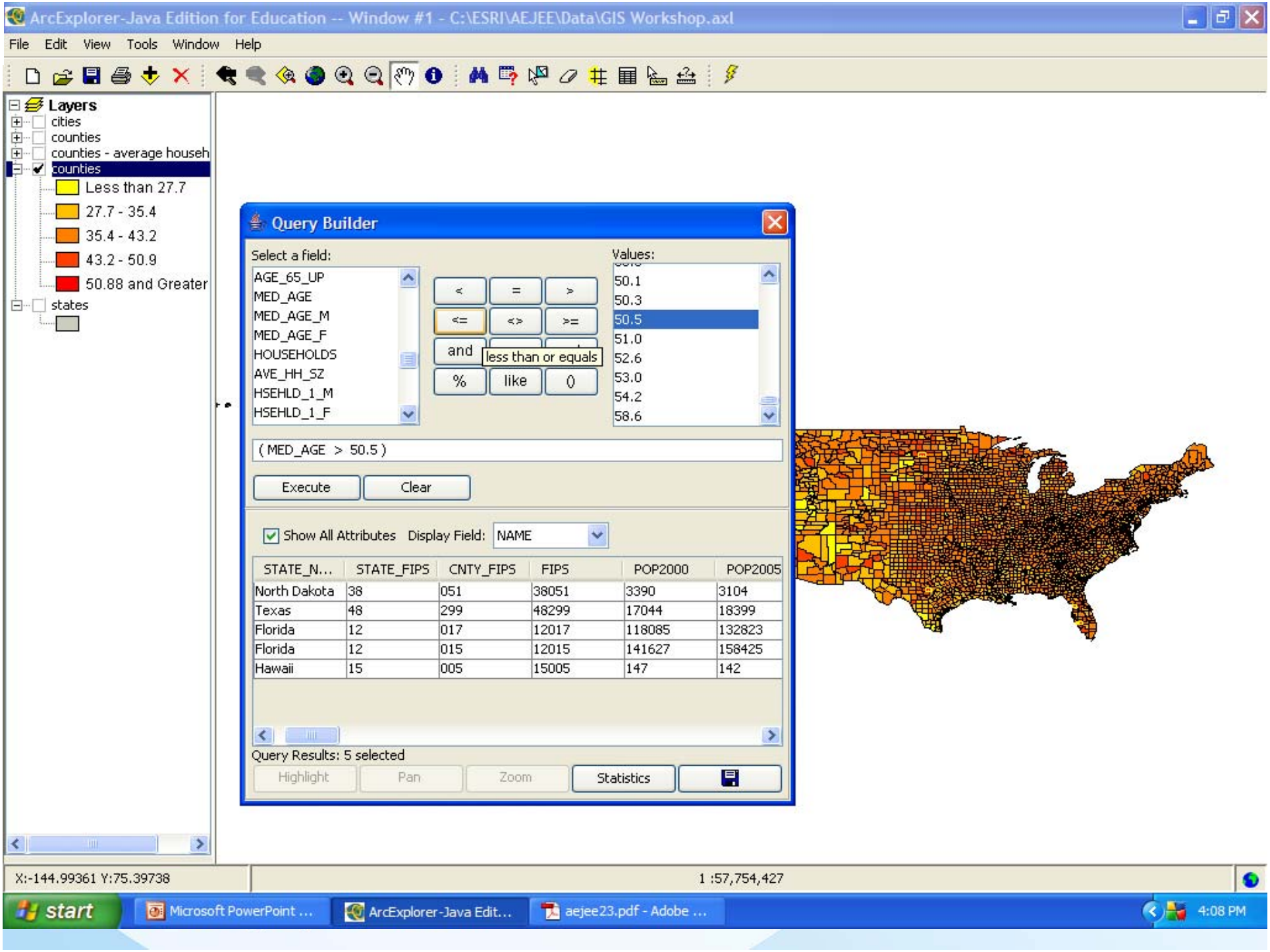

ArcExplorer-Java Edition for Education -- Window #1 - C:\ESRI\AEJEE\Data\GIS Workshop.axl
File Edit View Tools Window Help
Layers
states
counties
Query Builder
Select a field:
NAME
STATE_NAME
STATE_FIPS
CNTY_FIPS
FIPS
POP2000
POP2005
POP00_SQMI
Values:
< = >
<= <> >=
and or not
% like ()
()
Execute
Clear
Show All Attributes
Display Field: NAME
Query Results:
Highlight
Pan
Zoom
Statistics
Select this button to get demographic data for a specific region.
X:-110.65278 Y:66.99922
1 :38,502,951
start
Microsoft PowerPoint ...
ArcExplorer-Java Edit...
aejee23.pdf - Adobe ...
3:22 PM


ArcExplorer-Java Edition for Education -- Window #1 - C:\ESRI\AEJEE\Data\GIS Workshop.axl
File Edit View Tools Window Help
Layers
states
counties
Query Builder
Select a field:
NAME
STATE_NAME
STATE_FIPS
CNTY_FIPS
FIPS
POP2000
POP2005
POP00_SQMI
< = >
<= <> >=
and or not
% like ()
Wild card character
Values:
New Jersey
New Mexico
New York
North Carolina
North Dakota
Ohio
Oklahoma
Oregon
( STATE_NAME ) = 'Ohio'
Execute
Clear
Show All Attributes
Display Field: NAME
NAME STATE_N... STATE_FIPS CNTY_FIPS FIPS POP2(
Lucas Ohio 39 095 39095 455054
Fulton Ohio 39 051 39051 42084
Geauga Ohio 39 055 39055 90895
Williams Ohio 39 171 39171 39188
Cuyahoga Ohio 39 035 39035 139397
Ottawa Ohio 39 123 39123 40985
Wood Ohio 39 173 39173 121065
Query Results: 88 selected
Highlight
Pan
Zoom
Statistics
X:-120.36411 Y:58.20406
1 :38,502,951
start
Microsoft PowerPoint ...
ArcExplorer-Java Edit...
aejee23.pdf - Adobe ...
3:25 PM


ArcExplorer-Java Edition for Education -- Window #1 - C:\ESRI\AEJEE\Data\GIS Workshop.axl
File Edit View Tools Window Help
Layers
states
counties
X:-105.24742 Y:48.40112
1 :38,502,951


ArcExplorer-Java Edition for Education -- Window #1 - C:\ESRI\AEJEE\Data\GIS Workshop.axl
File Edit View Tools Window Help
Layers
states
counties
Query Builder
Select a field:
NAME
STATE_NAME
STATE_FIPS
CNTY_FIPS
FIPS
POP2000
POP2005
POP00_SQMI
Values:
928
966
972
1001
1047
1053
1103
1113
( STATE_NAME = 'Ohio' and POP2000 = POP2005 )
Execute
Clear
Show All Attributes
Display Field: NAME
NAME STATE_N... STATE_FIPS CNTY_FIPS FIPS POP2000
Putnam Ohio 39 137 39137 34726
Use this to scroll to see all data for the submitted query
Query Results: 1 selected
Highlight
Pan
Zoom
Statistics
X:-89.00985 Y:45.66432
1 :7,605,521
start
Microsoft PowerPoint ...
ArcExplorer-Java Edit...
aejee23.pdf - Adobe ...
3:36 PM


ArcExplorer-Java Edition for Education -- Window #1 - C:\ESRI\AEJEE\Data\GIS Workshop.axl
File Edit View Tools Window Help
Layers
cities
counties
counties - average househ
Less than 1.9
1.9 - 2.52
2.52 - 3.13
3.13 - 3.75
3.752 and Greater
counties
states
counties Properties
Symbols Labels Projection General
Draw features using:
Graduated Symbols
Field MED_AGE
Classes 5 Remove Outline Classified by Equal Interval
Color
Start Yellow
End Red
Symbol Range Label Records
20.0 - 27.72 Less than 27.7 58
27.72 - 35.44 27.7 - 35.4 808
35.44 - 43.16 35.4 - 43.2 2090
43.16 - 50.88 43.2 - 50.9 180
50.88 - 58.6 50.88 and Greater 5
Field Stats:
Count 3141
Max 58.6
Min 20.0
Mean 37.30200573065904
Std Dev 4.011810697934001
Total 117165.60000000005
OK Cancel Apply
X:-177.5632 Y:64.67828
1 :57,754,427
start
Microsoft PowerPoint ...
ArcExplorer-Java Edit...
aejee23.pdf - Adobe ...
3:59 PM


ArcExplorer-Java Edition for Education -- Window #1 - C:\ESRI\AEJEE\Data\GIS Workshop.axl
File Edit View Tools Window Help
Layers
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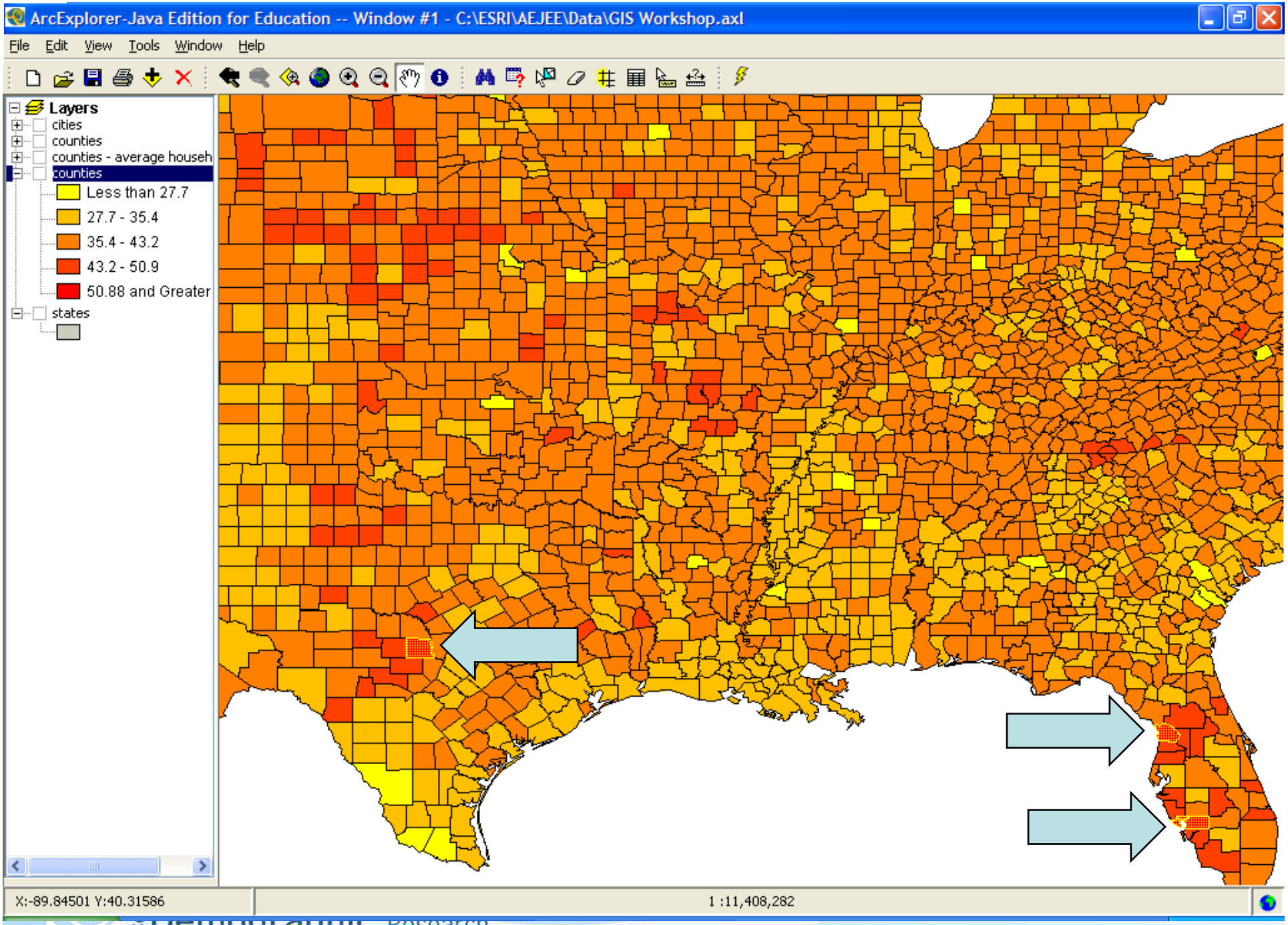
Less than 27.7
27.7 - 35.4
35.4 - 43.2
43.2 - 50.9
50.88 and Greater
states
Query Builder
Select a field:
AGE_65_UP
MED_AGE
MED_AGE_M
MED_AGE_F
HOUSEHOLDS
AVE_HH_SZ
HSEHLD_1_M
HSEHLD_1_F
< = >
<= <> >=
and
less than or equals
% like ()
Values:
50.1
50.3
50.5
51.0
52.6
53.0
54.2
58.6
( MED_AGE > 50.5 )
Execute
Clear
Show All Attributes
Display Field: NAME
STATE_N... STATE_FIPS CNTY_FIPS FIPS POP2000 POP2005
North Dakota 38 051 38051 3390 3104
Texas 48 299 48299 17044 18399
Florida 12 017 12017 118085 132823
Florida 12 015 12015 141627 158425
Hawaii 15 005 15005 147 142
Query Results: 5 selected
Highlight
Pan
Zoom
Statistics
X:-144.99361 Y:75.39738
1 :57,754,427
start
Microsoft PowerPoint ...
ArcExplorer-Java Edit...
aejee23.pdf - Adobe ...
4:08 PM


ArcExplorer-Java Edition for Education -- Window #1 - C:\ESRI\AEJEE\Data\GIS Workshop.axl
File Edit View Tools Window Help
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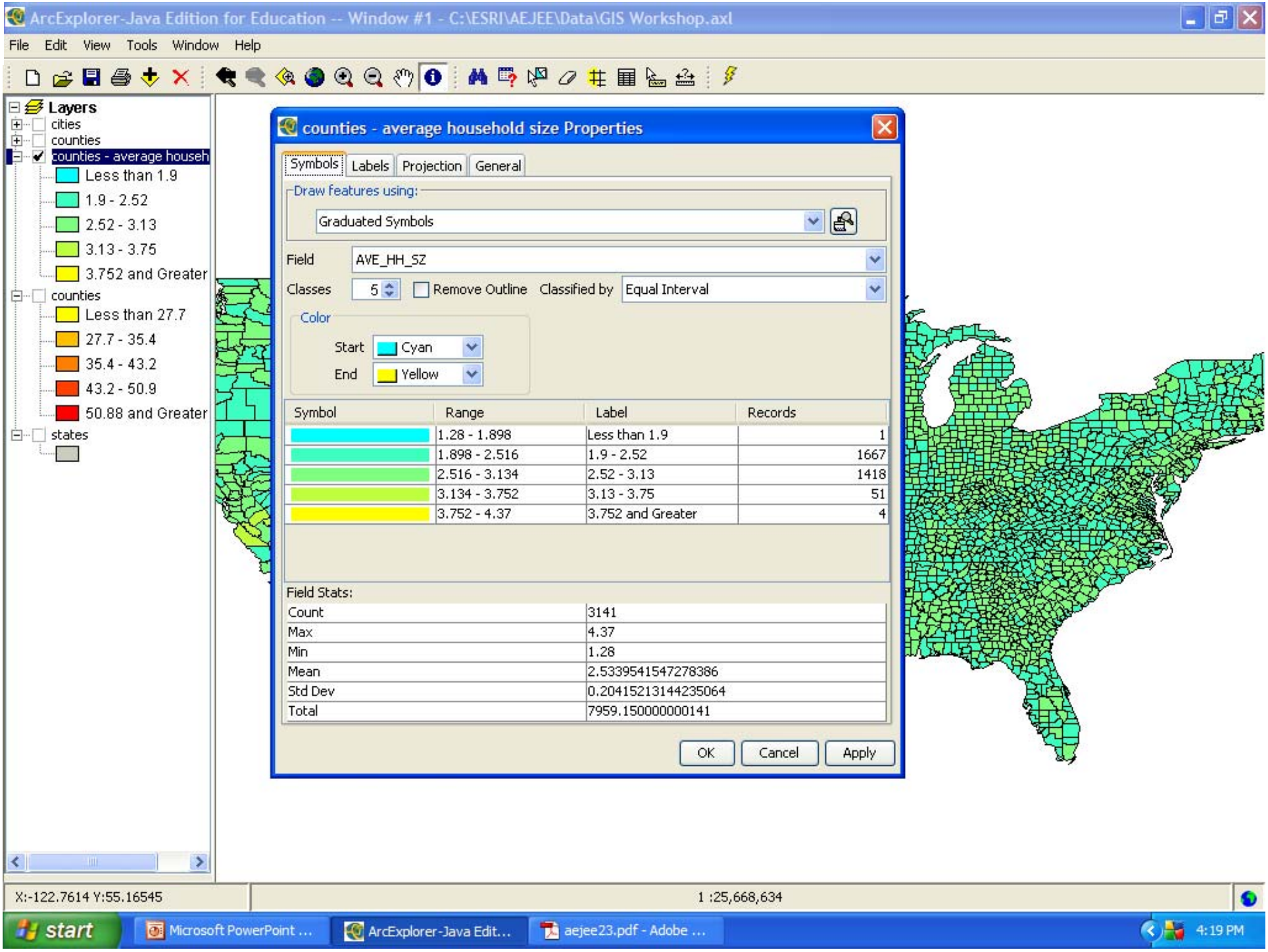
27.7 - 35.4
35.4 - 43.2
43.2 - 50.9
50.88 and Greater
states
X:-89.84501 Y:40.31586
1 :11,408,282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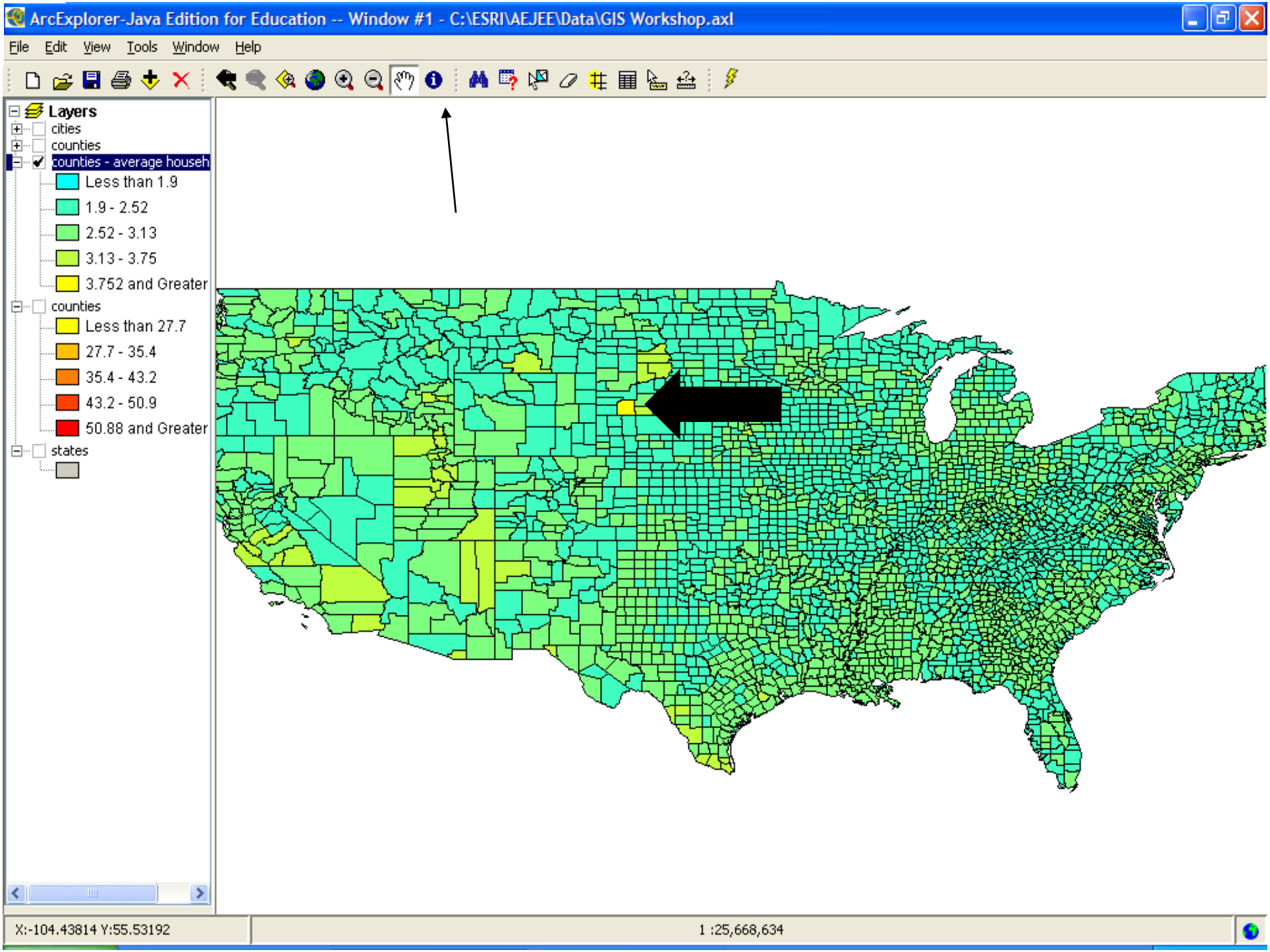
1.9 - 2.52
2.52 - 3.13
3.13 - 3.75
3.752 and Greater
counties
Less than 27.7
27.7 - 35.4
35.4 - 43.2
43.2 - 50.9
50.88 and Greater
states
counties - average household size Properties
Symbols Labels Projection General
Draw features using:
Graduated Symbols
Field AVE_HH_SZ
Classes 5 Remove Outline Classified by Equal Interval
Color
Start Cyan
End Yellow
Symbol Range Label Records
1.28 - 1.898 Less than 1.9 1
1.898 - 2.516 1.9 - 2.52 1667
2.516 - 3.134 2.52 - 3.13 1418
3.134 - 3.752 3.13 - 3.75 51
3.752 - 4.37 3.752 and Greater 4
Field Stats:
Count 3141
Max 4.37
Min 1.28
Mean 2.5339541547278386
Std Dev 0.20415213144235064
Total 7959.150000000141
OK Cancel Apply
X:-122.7614 Y:55.16545
1 :25,668,634
start
Microsoft PowerPoint ...
ArcExplorer-Java Edit...
aejee23.pdf - Adobe ...
4:19 PM


ArcExplorer-Java Edition for Education -- Window #1 - C:\ESRI\AEJEE\Data\GIS Workshop.axl
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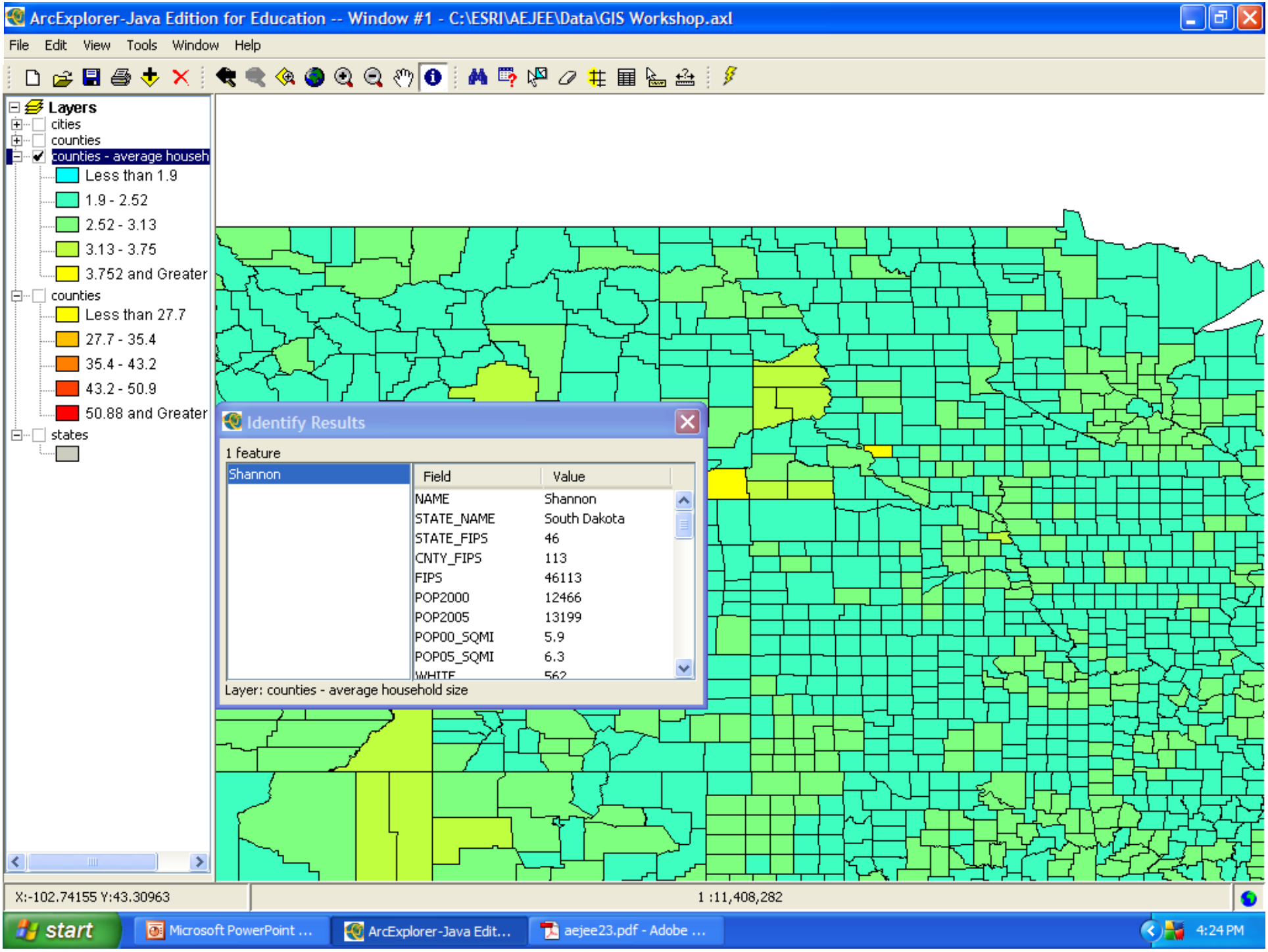
1.9 - 2.52
2.52 - 3.13
3.13 - 3.75
3.752 and Greater
counties
Less than 27.7
27.7 - 35.4
35.4 - 43.2
43.2 - 50.9
50.88 and Greater
states
X:-104.43814 Y:55.53192
1 :25,668,634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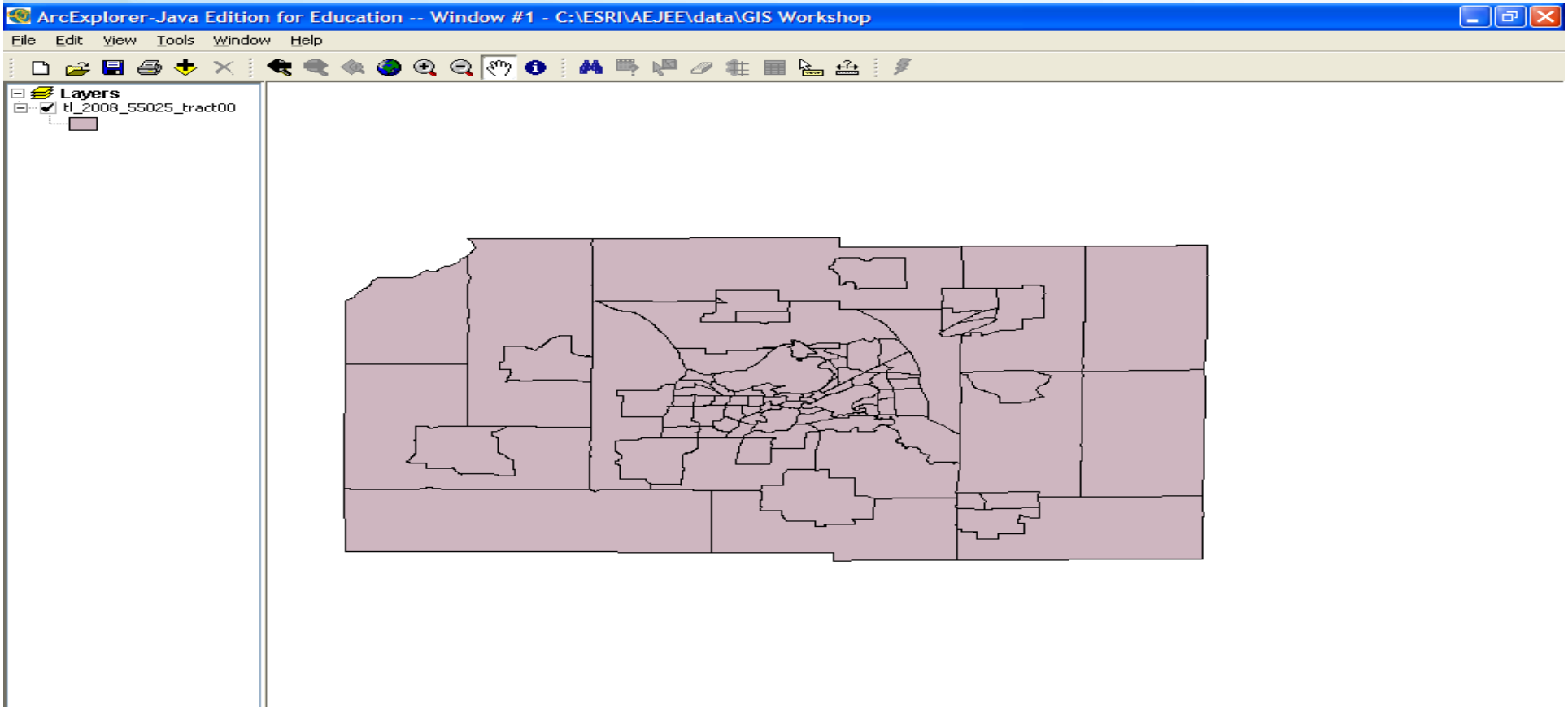
counties - average household
Less than 1.9
1.9 - 2.52
2.52 - 3.13
3.13 - 3.75
3.752 and Greater
counties
Less than 27.7
27.7 - 35.4
35.4 - 43.2
43.2 - 50.9
50.88 and Greater
states
Identify Results
1 feature
Shannon
Field
Value
NAME Shannon
STATE_NAME South Dakota
STATE_FIPS 46
CNTY_FIPS 113
FIPS 46113
POP2000 12466
POP2005 13199
POP00_SQMI 5.9
POP05_SQMI 6.3
Layer: counties - average household size
X:-102.74155 Y:43.30963
1 :11,408,282
start
Microsoft PowerPoint ...
ArcExplorer-Java Edit...
aejee23.pdf - Adobe ...
4:24 PM

# Obtaining Data

- Census TIGER files
  - Provide Shape File



# Obtaining Data

- Demographic Information
  - American Fact Finder
    - This is more complex – have to link this data with the TIGER shape file.