Investigating World Demography Using GIS

ArcGIS Version

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Unit: Introduction to GIS spatial and tabular querying in a GIS.

Skills:
1. Spatial querying, zooming, panning.
2. Tabular querying and sorting.
3. Using real-world data to solve spatial problems and make decisions.

Data Management

Create a folder on your computer where you will store the data.

Click **here to download the data** that you will need for this lab exercise. The data was compiled by ESRI, Inc.

This file is named worlddemographylesson.zip and totals approximately 2.7 MB.

After downloading, unzip the file using the Winzip program.

 You now should have the following **16** files:

cntry95.dbf
cntry95.sbn
cntry95.sbx
cntry95.shp
cntry95.shx
demog.dbf
pol_org.dbf
unhivaid.dbf
W_census.dbf
W_newswk.dbf
W_prb94.dbf
world30.dbf
world30.sbn
world30.sbx
world30.shp
world30.shx

The shp is the "shape file" containing the map of world countries.

This could be thought of as the "G" in GIS.

The .dbf is the database containing identifiers or attributes of world countries.
This could be thought of as the "I" in GIS. The "S" or system brings them together.

1) Which is the largest file of the above?

2) Based on the sentences above, why are your .shp files larger than the .dbfs?

Using ArcView

Access ArcMap within ArcGIS.

Begin a new map document.

Add data to the data frame: world30   and cntry95

Make the layers visible by checking on the box to the left of the layer name. The first theme drawn is the last theme in the list. Practice moving themes up and down in the list by single-clicking on the theme name and dragging the names up and down.

3) What feature does the "world30.shp" file show?

===========edited to here 17 Feb 2004 ===============

Make the cntry95 theme active.

Hide the legend. Theme --> Hide Legend.

Practice zooming in , zooming out , and panning .

Click on the Identify button   (far left on the button bar) and click on a country.

4) What does this function do?

Try zooming in and out by clicking and dragging a box for faster performance.

Note the coordinates in the upper right as you move around the view with your mouse.

5) What coordinate system is the data in?

Save the project: File--Save Project As - and name it "world.apr" in your folder.

Investigating World Data

Make View1 active.

Go to the View--> Properties pull-down menu.

Change the name of View1 to "World Countries"

Open the theme table for cntry95. Access the "open theme table" button

or go to Theme-->Table.

6) How many records, or countries, are in this table?

7) How many fields, or columns, are in this table? [A]

Click on the field "pop_cntry." Access the menu: Field-->Statistics.

8) What is the sum total of population for the world, according to this database?

9) Note the 2 "sort" buttons in the button bar. What do these 2 buttons do?

10) What is the 4th most populous country in the table?

11) What is its population?

Note the -99999 values in the table, usually used in GIS databases to indicate missing data. Sometimes, <null> is used as well to indicate missing data.

12) What is the least populous country in the table?

13) What is its population?

Click on record in the table for the least populous country.

Make the "World Countries" view active.

Use the tool "zoom to selected" to zoom to this country.

Zoom out using the button that looks like a negative magnifying glass. Drag a box to zoom out faster.

14) What ocean is this country in?

15) Clear your selection and re-open the table. What is the largest country in area in the world?

16) What is its area in square kilometers?

17) What is the smallest country in area?

Clear the selection by clicking on the button that looks like a blank piece of notebook paper.

Make the world countries view the active window by clicking on the window bar.

Zoom to the full extent of all themes by clicking on the tool that is an arrow pointing into a stack of layers.

Access the legend editor by double-clicking on the theme name "cntry95.shp" in the World Countries view.

Change the legend type from "single symbol" to "graduated color." Access the pull-down menu.

18) How many fields can you select from for a graduated color map?

Change the classification field to "pop_cntry". Apply.

19) What happened in your view?

The default classification is "natural breaks" with 5 categories.

20) What range of values is the lowest category of the 5?

Click on the null sign in the legend editor. [zero with a line through it]

Enter the correct value (that you noted above) as the null value.

21) What is the new lowest value in the lowest category?

22) Why?

Click on the query builder (hammer with question mark).

You want to find countries with over 95 million people. Enter this expression by double-clicking on the field name and single-clicking on the Boolean operator, and typing in the value. Your expression should look like the following:

([Pop_cntry] > 95000000)

Then select "new set."

23) What happened in your view?

Access the table.

24) How many countries in your selection are in Africa?

25) What is the name of this (these) country (countries)?

See the answer to [A] above when you noted the number of fields you can map in this table. In GIS analysis, you typically want to access additional information that is not part of the original database. One way to access this information is to join additional tables to your original database.

Make your view active. Clear your selection with the blank piece of notebook paper tool.

Make your World.apr (the project window) active.

Go to "tables" and select "add".

Navigate to your folder.

Add the "demog.dbf" table.

Open your demog.dbf table.

26) How many records are in this table?

27) Is this more, less, or the same number of records as the cntry95 table?

28) What is the name of the equivalent field with FIPS codes in this table?

[B]

Open your "attributes of cntry95" table.

Note the field that contains FIPS (Federal Information Processing Standard) codes for countries.

29) What is the name of this field?

[C]

You are now ready to join the 2 tables. It is very important to do the join in the correct order. You want to join **FROM** the table you just added (demog.dbf) **TO** the table associated with the map (cntry95 table). Be careful not to click inside the table and inadvertently select any records in the table. If you did this, you'd only merge these selected records, rather than the entire table.

Click on the field you indicated in [B] above in the table "demog.dbf".

Next, click on the field you indicated in [C] above in the table "Attributes of cntry95" table.

Click on the "Join Tables" button. (looks like 2 tables with an arrow joining them) ⬚. See screen image below for more detail.
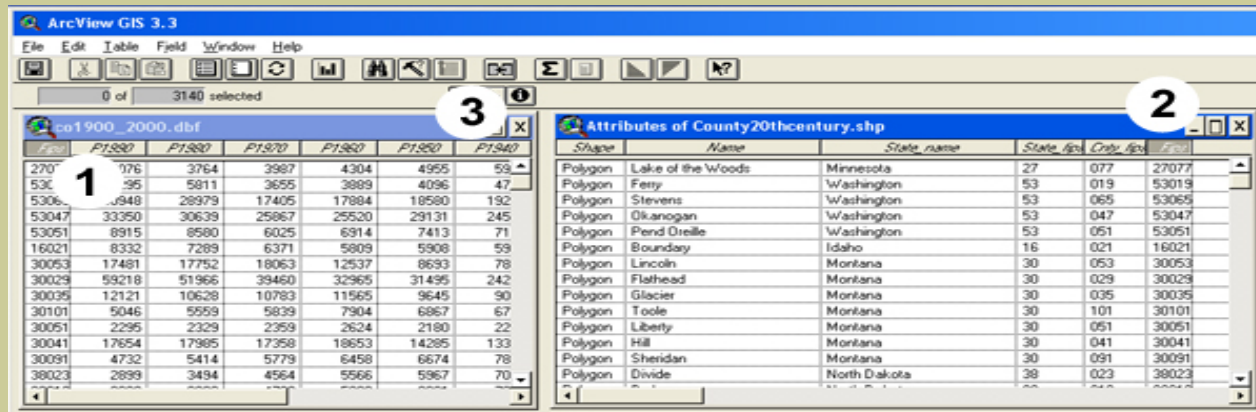
Now, examine your attributes of cntry95 table.

30) Compare the number of fields to your answer in [A} above. What happened to the original width of the table in terms of its size?

You noted above that the 2 tables contained a different number of records.

31) What happened to records in attributes of cntry95 where there was no matching data in the demography table?

Double-click the cntry95 shape file to access the legend editor. Access the "classification field" pull-down menu.

32) What has happened to the number of fields you can now map?

Your tables are joined, but not permanently. Make it a permanent join:

Make sure you clear any selections first! 🔲

Then, in the Theme pulldown menu, select "Convert to shapefile."

Name the shapefile "country.shp" and place it in **your folder.**

Add the new shapefile into your view.

Make sure that this shapefile has the same number of records and fields as the one you have just been working with.

Make cntry95 the active theme by single-clicking on it.

Now, delete the cntry95 theme. Edit-->Delete theme.

33) Why are you safe in deleting this theme?

Change the legend and make maps first of total fertility and then life expectancy.

34) What country has the highest total fertility?

35) What country has the lowest life expectancy?

36) What is the overall relationship between total fertility and life expectancy?

Say you work for the UN Environmental Programme (UNEP). You need to test a new program in a country that meets certain criteria of age, growth rate, and income. Use the query tool to find the country that satisfies these criteria:

1) Percentage of population between 0 and 14 years is greater than or equal to 40
2) GNP per capita is less than or equal to 500
3) Growth Rate is less than 3%

37) How many countries meet these criteria?

38) What are their names?

Clear the selected set.

Save your project, close your project, and exit ArcView.

39) Summarize in a few sentences what you have learned about world demography, in this lesson.

40) Summarize in a few sentences what you have learned about ArcView GIS in this lesson.

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