Formatting data to attach to existing features in ArcMap 10

This tutorial will demonstrate how to format tabular data in preparation for joining attributes to existing features (shapes, including points, lines, and polygons). It is very generic in scope but covers the basics of formatting and joining.

Attaching external data requires that you understand the relationship between the records in your data table (external data) and your features (feature attribute table). This relationship may be **one to one** (each record in the external data corresponds to one record in the feature attribute table); **many to one** (multiple records in the external data correspond to one record in the feature attribute table); or **one to many** (each record in the external data corresponds to multiple records in the feature attribute table). When you have a **many to one** or a **one to many** relationship you must use a **relate**.

This tutorial assumes your record relationship is **one to one**. A **join** is performed between the external data and the features when this relationship exists.

One important point: in order to join external data to an existing feature file, there must be a **common field in both the external** (spreadsheet) data **and the feature file** (GIS layer). This can be something as simple as a plot ID, census tract FIPS code, or county code.

Steps
1. Format your data for use with GIS

ArcMap can read text (comma- or tab-delimited format), DBF (dBASE format), Microsoft Access, or INFO data files. As spreadsheet data are ubiquitous this exercise will use Excel to properly format the worksheet before adding it to ArcMap and joining it to a GIS layer. You could also use a Google Docs spreadsheet or even a text editor in a pinch. Always work on a COPY of your external data so you have a backup (just in case).

A natural first step is to eliminate unnecessary data. If you have any columns in your spreadsheet you will not need, delete them.

Your spreadsheet must be formatted with a single header row, i.e., the first row in the worksheet should consist of descriptions for each field. These descriptions should contain no spaces, nor any characters other than letters, numbers, or underscores.

Each record of data must be in a single row. The format of the worksheet should be as follows:

ID	DATA1	DATA2	DATA3	DATA4
100	47	3	62	1429
101	55	17	59	1333
105	84	11	96	1337
...				

The number of columns, number of rows, and header descriptions will be different for every application. You should use field headers that make sense to you (something more descriptive than DATA1 DATA2...).

Click File→ Save As to save the changes you've made in your worksheet. Choose the file type CSV (Comma

Delimited) (*.csv) You may need to expand your options (small arrow at bottom of list) to see the CSV option.
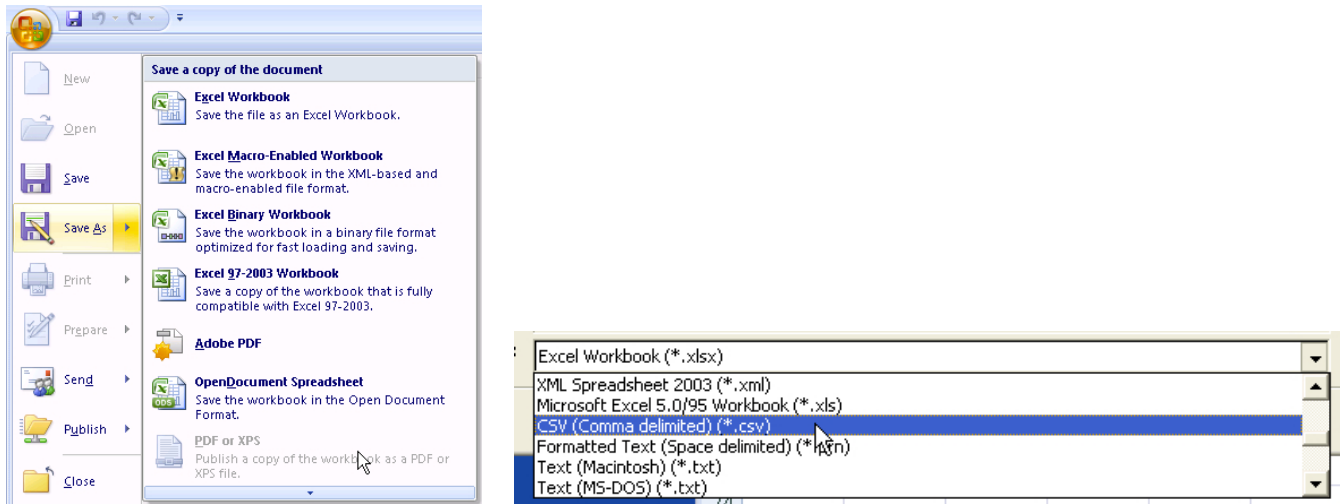
Click Continue past the single worksheet and Excel formatting warnings that come up. Close Excel. You can preview your file in a text editor or reopen it in Excel to verify it is formatted correctly.

The following suggestions will help you get rid of the excess header rows and end up with a GIS-ready dataset in the future.

- You will need to rename the headers so that they make sense to you, but be sure to keep the following rules in mind when naming your headers:
  - They cannot start with a number
  - They cannot include figures other than text, numbers, or underscores
  - They cannot include spaces
- ArcGIS will allow you to use longer field names in a join from Excel, however if you choose to save a shapefile to include your new data it will truncate the field names to 10 characters, therefore you may wish to limit your header rows to 10 characters now
- Make sure you do not have any empty header cells, or multiple cells with the same name

- You may wish to create a codebook (list) for decoding your new headers in the future

- Once you are satisfied with your header row, select the unused header rows using the column on the left (1,2,3,4) and right click Delete

2. Join the tabular data to the GIS layer

Once all of your data is formatted properly you can add your CSV file and join it to your Shapefile layer.
   a.   Click 'Add Data'
   b.   Navigate to your edited .csv'file (You may have to use the 'connect to folder' button if you saved this files in a location that has not previously been accessed from ArcMap)
   c.   Select the file in the 'Add data' window and click 'Add'
   d.   You will now see your worksheet in the Table Of Contents below your feature class layer

**Note: When you add a worksheet, the Table of Contents view switches from 'Drawing Order' to 'Source'. You can change the view using the icons directly below the words 'Table of Contents'. 'Drawing Order' is a nicer and more functional view, but will not show your worksheet.*

e.   Right click the feature class layer name and select 'Joins and Relates→ Join'

f.   In the 'Join Data' dialogue box, choose the ID Field that has the same unique identifiers as those in your external data in field 1, the name of your CSV worksheet in field 2, and the common ID field in field 3

g.   Click 'OK' to complete the Join

h.   To ensure that the Join worked properly, right click the name of the feature layer in the Table of Contents and select 'Open Attribute Table'

i.   Scroll to the right in the table and you should see your data to the right of the table

j.   If the cells contain values (as opposed to reading <null>) your join was successful

k.   Close the table when finished

3. View your data

Now for the fun part. Once you have joined your data to the GIS Layer, it is time to create a map!

a.   Right click the feature class Layer name in the Table of Contents and select 'Properties'

b.   Select the 'Symbology' tab

c.   Select the 'Quantities' option under 'Show:'

d.   Select the a numeric variable in the 'Value' field

e.   Select a color in the 'Color Ramp' pull down menu

f.   Click 'OK'

g.   Your data will now be displayed on the map

h.   Go wild with your GIS and Cartography skills to add a legend, title, all the things a proper map should have. The census tracts you downloaded are in unprojected (geographic) coordinates, so you may want to apply a projection to the data frame to make your map appear less 'squashed'.

4. Save your data

You may wish to save a copy of the layer that includes your joined data. This will make your data easier to share or use in multiple map projects without relying on an Excel sheet and a join.

a.   With your data still joined, right click your feature class layer in the Table of Contents and click 'Data→Export Data'

b.   Choose a name and location for your new dataset under 'Output Feature Class'

c.   Click OK and ArcMap will export a copy of your shapefile that includes the external data that you joined.