

GEO/EVS 423 / EVS 523

Exercise 3: Heads-up Digitizing and Data Input

It is important to know how to add data of your own to a GIS map. As indicated in the lecture, this involves one or more variants of digitizing. In this exercise, you will do two of the most widely-used techniques for data input – heads-up digitizing and conversion of an ASCII point file to a shapefile.

Heads-up Digitizing

From the P: drive, copy the geodatabase named ClevelandStateUniversity.glb to your X: drive, and open it. It contains a natural-color image of the area of Cleveland that includes most of the University. Open the catalog window. Navigate to your X: drive, and right-click on the geodatabase. Choose New -> and then click on Feature Class. You will actually be adding two feature classes, one for the buildings and the other for building entrances. Pick one or the other of these and enter an appropriate name (no spaces in the name!). The feature class containing buildings will be a polygon feature class; that containing the entrances will be a point feature class. The new-feature-class wizard should be mostly self-explanatory. The one step that may not be obvious is that when you're asked for a coordinate system you should click on Import and choose to import the coordinate system from the ClevelandState raster image. Choose the default values for the XY tolerance and keyboard. When you get to a description of the new feature class (figure 1) add a single field name – the building name for the buildings feature and the type of entrance for the entrances feature. In both cases, the data type will be Text. When you have finished adding the feature classes, you should see them both in the catalog window and in your Table of Contents window. Obviously, since you haven't add any features to your feature classes your map will include only the aerial photograph of CSU.

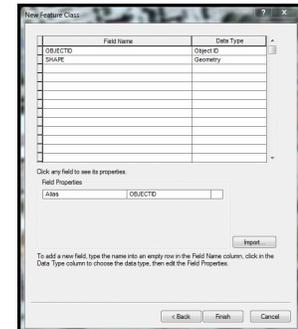


Figure 1 - Feature Description Box

You're ready to begin to add information! If the editor toolbar isn't already available to you (and it probably isn't), click on Customize -> Toolbars -> Editor. You can move it anywhere convenient, or you can dock it in the header area above your map. On the editor toolbar, click Editor -> Start Editing. The Create Features and Construction Tools windows open. Click on the name of your Buildings feature class. When you move the cursor back to the map, it becomes a crosshair. Click on the corner of a building. Move to the next corner and click. Then to the next, and so forth until you have covered an entire building. To complete a building, double-click. Continue to digitize buildings until you've digitized enough to satisfy yourself. Don't worry if you screw up a building or two; you will be able to delete your errors and do other neat stuff. When you're done click Save Edits on the Editor drop-down if you're reasonably satisfied. If you're totally discouraged you can click on Stop Editing and indicate that you do not want to save your edits when prompted.

Again click on Editor -> Start Editing on the editor toolbar. Instead of digitizing more buildings, however, click on the Edit tool; it's the small black triangular thing on the left-hand side of the editor icons. Click on one of your buildings to select it. Now click on it again, but hold the mouse button down and drag the building somewhere else. Note that if you want to you can move the University Administration building into the middle of the freeway. Don't you wish you could do that in real life? If you now hit the delete button on your keyboard the polygon will disappear. You can now redigitize the building and do it right. Note that the edit button will stay life until you click on an appropriate construction tool (most likely Polygon) in the Construction Tools window. You should experiment with different construction tools in digitizing your buildings. When you're all done, save your edits.

If you are like most people, you've drawn some polygons that need to be edited. The most likely edit you want to make is to move a vertex from wherever you clicked the mouse button to where it should be. Click on the building you want to edit to select it. Then click on the Edit Vertices icon – it's the 7th icon

from the left on the Editor toolbar. When you click on a particular vertex in your digitized layer you can move it. Try this with at least 8 buildings.

What do you do if you got the shape of a building wrong? Double-click inside a polygon. Grab handles appear at the existing vertices of the polygon and the small Edit Vertices toolbar appears. Click on the Add Vertex icon – it's the thing that looks like the triangle with a +. When you click on the boundary of the polygon, it will add a new vertex at the location of the cursor. You can now drag that new vertex wherever you want. Try it. If you want to delete a vertex, you do the same thing – except you use the Delete Vertex icon (the thing that looks like the triangle with a -). If you want to verify that your edits are what you think they are, click anywhere on your map.

What if you want to insert a shape of a particular size? Click on the polygon tool in the Construction Tools window. Next, click on the Straight Segment tool on the editor toolbar (it's the third icon from the left), and click on your map where you want to begin your shape. Move the cursor a bit and right-click the map; choose Length. Insert the length of the first leg of your shape, and hit Enter. Right-click again; choose Direction. Put in an azimuth (well, almost; in Arc, 0° is due east instead of north, and the numbers go counter-clockwise instead of clockwise), and hit Enter. Move the cursor a little more and right-click again to add the length and direction of the second leg of your shape. Continue until your shape is complete; then double-click to end your drawing.

This last bit may seem a bit strange. But what if you wanted to locate all buildings within 500 feet of the E 24th street HealthLine stop. Choose the Circle from the Construction Tools window and click on the E 24th street HealthLine stop. Now move the cursor a little, right-click, and choose Radius. Enter 500 and hit Enter.

Now let's add the names of the buildings. You should be sure that you save the buildings and not your more fanciful editing efforts. Go to the editor tool bar and start editing. Open the attribute table of your buildings layer. The "name" column will contain the word Null. Click on the first building in the "name" column and add the building's name. Continue until the attribute table includes the names of all of the buildings. Save your edits and stop editing.

Now hit the Editor -> Start Editing buttons again, but choose to edit the Building Entrances layer. Since you defined this as a point feature, the Construction Tools window includes a point tool as the default. Click on the entrances for each of the buildings you've identified. When you're done, open the attribute table, and identify the entrances as Main entrances or Secondary entrances (or any other classification you wish). Save your edits.

Finally, turn on Labels on your Buildings layer and set placement to Straight. On the Entrances layer, use a different symbol for main entrances and secondary entrances. Print the resulting map.

Editing of this sort can be very complex. ArcGIS will allow you to do a great many adjustments to your digitization that this exercise hasn't covered, but this is probably enough for now.

Inputting an ASCII Point File

Take a hard-copy USGS topographic map of some area of interest to you – the only proviso is that it is easiest if you choose a map in which the UTM coordinate system is completely gridded. Find about 5-6 points on the map which are of interest to you, and estimate their UTM coordinates.

Your first step is to make a table of the eastings and northings of these coordinates. You can use Crimson Editor or Notepad to make a raw ASCII table, or you can do it in LibreOffice or some other spreadsheet. If you do the former, you will need to read your table into the spreadsheet. In either case, your first row should include the names of the fields in your data set (e.g. Easting and Northing or X and Y), and it should probably include a description of the point in question. Regardless of how you enter your data, you should save them from the spreadsheet as a DBF (dBase) file.

Open ArcMap, and add your DBF file to your layout. Then create the Event file. There are two ways to do this.

The first is the one given in the lecture. Click on File -> Add Data -> Add XY Data. In the dialog window, insure that the easting corresponds to the X field and that the northing corresponds to the Y field. In the box below labeled "Coordinate System of Input Coordinates," you will need to specify the coordinate system to which your data points correspond (i.e. UTM). Click on Edit, and then "Projected Coordinate System," followed by whichever coordinate system to which your data correspond (i.e. UTM or State Plane, NAD 1927 or NAD1983). When you're finished, click "OK." An event file will open, showing your data points.

For the second, right-click on the DBF file in the Table-of-Contents window. Choose "Display XY Data." The same dialog window described in the previous paragraph will open; you fill in the appropriate information in the same way, and click "OK." Again, an event file will open, showing your data points.

There is a difference between an event file and a shapefile. An event file disappears when you exit ArcMap. A shapefile doesn't. You need to convert your event file into a shapefile. To do that, right-click on the name of the shapefile in the Table-of-Contents window, and choose Export -> Export Data. Choose to export all data in the same coordinate system as the event file, and insure that your shapefile is destined for a location you desire with an appropriate name. Click OK.

Print the map showing your points, and include the table you used to generate them.

Portfolio

- 3-1 Map showing the Cleveland State University campus, showing at least 8 University buildings and the points at which these buildings can be entered. It should also show which of those buildings are within 500 feet of the E 24th Street HealthLine bus stop.
- 3-2 Map showing the points you generated from an ASCII table, along with the table used to generate those points.