



Forensic Geography
Lab: Mapping Crime Data
using ArcMap 10 and
Google Docs

Background

Geocoding is the process by which address data (streets and/or ZIP codes) are translated into X/Y or latitude /longitude coordinates and placed on a map. Geocoding is an important tool in the spatial analysts bag of tricks; but geocoding itself can prove tricky because there are several different strategies for accomplishing this most basic of geographic transformations.

You may have some experience with geocoding. This lab is designed to help you identify and troubleshoot common issues.

Skills

1. You will demonstrate an understanding of the several main strategies used by software packages to translate address data into latitude and longitude coordinates.
2. You will geocode a data set using ArcMap 10, using ESRI’s online geocoder
3. You will geocode a dataset using Google Doc’s geocoding service
4. You will import and process the Google Doc/Excel data in ESRI, in order to create a map of addresses.

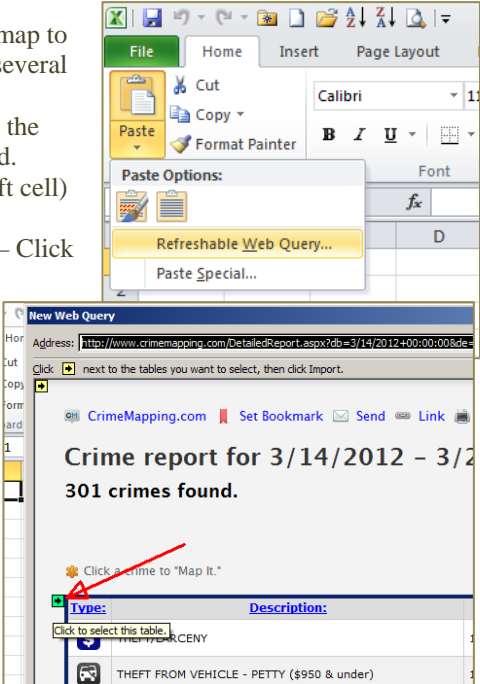
Your Task: Geocode a dataset using Google Docs and map this data using ArcMap 10.

Step 1: Get data from Crime Mapping .com website into Microsoft Excel

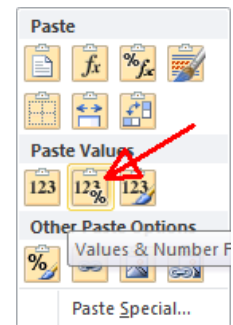
1. Point your browser to the following link. It should open a map criminal activity in the the eastern San Fernando Valley:
http://www.crimemapping.com/map.aspx?ll=-13177989.98807435,4055137.420215933&z=12&mc=ve_roads&cc=AR,AS,BU,DP,DR,DU,FR,HO,VT,RO,SX,TH,VA,VB,WE&db=3/14/2012&de=3/20/2012

***Note the parameters built into the URL above. You can change date ranges and get the same geographic coordinates...data consistency!*

2. Click on the Detailed Report button on the toolbar just above the map to open a table of the crimes depicted on the map. There should be several hundred at least.
3. Highlight the entire page with by pressing Ctrl+A. Everything on the page will highlight. Press Ctrl+C to put the data on your clipboard.
4. Open Microsoft Excel and place your cursor in cell A1 (the top left cell)
5. Because the software will recognize that you have data in your clipboard, you can do a cool little trick to import the data cleanly – Click on the down arrow below the word “Paste” on the Excel toolbar. Several paste options should appear. Select “Refreshable Web Query” (see image to the right)
6. A dialog window will appear, displaying the very website (with table of data) that you’ve just copied.
7. Look for the little yellow arrow pointing to the table of data that you want to import. Click on it, it will turn green indicating that you’ve selected a viable table, then click “Import” (in the lower right corner of this window).
8. After a moment (and some good luck –this tool is a bit unreliable still), a table from the website will appear in your spreadsheet.



9. Save the spreadsheet with the name ESFV_crimes. Inspect your data.
10. Note that most of the address are approximations. This is done to hide the exact identity of victims, etc. So we may want to modify those addresses to better suit our needs.
11. Note that you also have data from 3 or 4 different law enforcement agencies as well and that each agency has slightly different strategies for reporting crime data to the public.
12. Delete the empty row 2 if you have an empty row.
13. The data needs to be copied to a new sheet, so Ctrl+A to highlight the data in this table (this data *should* be refreshable, so you want to get a static copy of this week's data).
14. Paste the data in sheet 2 using the Paste Special/ Values and Number formatting option.
15. Rename sheet 2 using the date range, e.g., Jan10_17.



Step2: Prepare your data to be geocoded in Google Docs.

16. Copy the location and agency columns (D & E) to adjacent free columns (G & H).
17. Rename the new location column "Street" and the new agency column "City"
18. Highlight the Street data and press Ctrl+H to activate the find and replace tool. Type in the word "BLOCK" in the find window. Leave the replace with window blank. Click Replace All.
19. Repeat this technique, but replace all slashes "/", with " and"...make sure to include a space before and after the word "and". This helps Google Docs' geocoding tool better understand the notion of intersection.
20. In the City column, highlight the data and repeat the find/replace procedure again, this time replacing the word "Police" with ", CA". Save your work.
21. Look it over to make sure that you don't have irregular data (from the LA County Sheriff's office, etc.)

Step 3: Open Google Docs

22. Each student at CSUN has access to Google Docs. It's a cloud computing set of applications that allow you to manipulate and store data on a distant server. No local memory is necessary.
23. Open a browser and google "Docs" and open the Google Docs website. You may have to sign in with your "my csun" account or your own gmail account.
24. Click the "Create" button, and chose spreadsheet from the drop down menu choices. A spreadsheet with many of the same shortcuts, options and functionality of MS Excel will appear in your browser window.
25. Copy and paste the first 50 addresses, plus the column headers out of your Excel file into your Google Doc. You will have two (maybe three) columns of data.
26. Next paste the following command into the first column header that is blank (cell C1 or D1):
<http://maps.google.com/maps/geo?&=1600+Amphitheatre+Parkway,+Mountain+View,+CA&output=csv&q=>
27. Concatenate the URL command line above with each of the cells that make up your address.
 (=CONCATENATE(\$C\$1,A4,B4)... where \$C\$1 is the url command and the A4, B4, are the address cells in row 4, columns A and B. You may want/need more columns of address parts (for ZIP codes, etc)...or maybe you'll have everything in 1 column. Press Enter.
 - *NOTE: You may want or need to put commas such as " ," into the formula above if your address data does not already contain commas separating the data in each cell of data.e.g:
 (=CONCATENATE(\$D\$1,B4, " , ",C4)
28. In the cell to the right of the concatenate formula type "=importdataC4" , where C4 is the cell containing the concatenation formula you just entered. Several new cells will appear to the right of this formula. Name the columns above these new cells "HTTP Status", "Accuracy", "Latitude", "Longitude". Spelling is important....spell them out completely.
29. Next you can copy and paste these new cells and formulas to the next 50 rows. Google only permits you to import their data in 50-at-a-time batches.
30. You should have 50 addresses and 50 lat/long sets, along with an Accuracy score for each address that has geocoded. [An accuracy score of 7-10 is good. Lower than that and you're in the danger zone.](#) These may need to be removed or further researched for accuracy.
31. Copy and paste your *results* back into your Excel sheet in the blank cells to the right of your data. Make sure your latitude / longitude data is in the row corresponding to the correct address!

32. Now copy and paste your next 50 addresses from Excel over to your Google Doc, but this time paste over the first 50 addresses that you completed. New results will appear in the Accuracy, Latitude and Longitude columns. Copy those NEW results back into Excel in the cells to the right of the addresses you just geocoded. Repeat this step until you've geocoded all of your data and pasted all your responses back into Excel.
33. Save your work (ESFV_crimes.xlsx) in a folder where you can find it.

Step 4: Map your addresses in ArcMap 10

34. Launch ArcMap and load the following project: Y:\courses_sgraves\Forensic\Geocode2\geocodeG.mxd
35. It's in the Y drive under courses_sgraves in the Forensic folder in the subfolder Geocode2.
36. You've been provided with a base map with a layer or two.
37. To add your addresses that you saved in Excel, click the Add Data button on the top tool bar. Find the proper file. IF you saved your Excel file in a folder that you haven't yet used this semester, then you may have to connect to that folder (click on the folder with a plus sign to connect to that)...or just move your Excel file to your Z drive.
38. Once you have added this data, you must next right click on this layer in the Table of Contents.
39. Select from the drop down menu "Display X, Y data"...like you did in the Getis-Ord Gi* lab BUT...you'll do something a bit different.
40. The base map is still in the NAD_1983 State Plane projection, but Google Docs gives you data in Latitude/Longitude format right? So you'll have to let ArcMap know this important bit of information.
41. To ensure that your Google-geocoded data is properly placed on the map, you must EDIT the Coordinate System Input. Click on the Edit... button, and a new window appears. Click on the Select button in the next window.
42. In the Browse for Coordinate System window, double click on the folder "Geographic Coordinate Systems". A list of folders will appear. The bottom one, "World" is the one you want. Double click on it.
43. A list of world wide coordinate systems will appear. The last one, "WGS1984" is the one that Google uses. Double click it. Click OK and OK.
44. Your crime points will appear on the map and an "event" layer will appear in the table of contents.
45. Recall that this is an EVENT file. It's like a ghost file, so you need to make it solid.
46. Right click on ESFV_crimesEvents layer in the Table of Contents and chose Data>Export Data.
47. Rename the file Crimes_ESFV.shp and save it in your Z drive.
48. You can remove your EVENTS file at this point if you'd like.
49. If you zoom OUT you may notice a few misplaced points. This is problematic and you may eventually want to remove these points. This is an indication that Google geocoding service "thought" it found the correct point and gave you an accuracy score that wasn't so accurate!
50. Zoom in and you may find hyper-accurate placement of other

For Credit:

1. Make a thematic map of the crimes you have mapped by the type of crime reported.
2. See if you can identify a hotspot of a particular type of crime (I found a rash of "Burglary from Vehicle" crimes in one specific neighborhood.
3. Zoom in on it and grab a screen capture. Paste that screen capture into a word document and write a brief description of what is displayed on your map.
4. Send the file as an attachment to your instructor.
5. Name the file Geography497_geocode2_YOURLASTNAME