Assignment 5: Geocoding tabular data in ArcGIS

Part I. Geocode to Zip Codes

You will begin your initial analysis by developing and "**Address Locator**" that will use your Wake County Zip Code layer as a reference layer to geocode the attendee data. NOTE: Many retail stores commonly ask their patrons for their zip codes during checkout (or when using supermarket discount cards) to assess market penetration.

A. Familiarize yourself with assignment data:

1. Copy the assignment data to a folder titled Wake_geocode.

2. Start ArcMap and add the Wake County zip code layer **(Wake_ZipCodes_2009_08**) to your Table of Contents. Open the attribute table and review the attributes.

3. Next add the **attendees.xls** database to your map. Review the table attributes/fields.

   NOTE: In general be sure to review the attribute tables of all of your map layers.

B. Setting up an Address Locator

4. Open **ArcCatalog** and **right click** (RT-CLK) the **Wake_Geocode** directory folder where you unzipped your data to select it. (Remember ArcCatalog is just a side tab in ArcGIS 10)

5. From the pop-up menu, select: **New -> Address Locator**

6. In the **Create Address Locator** dialog, select the **US Address - ZIP 5-Digit** style: *at this point we only are interest in geocoding our attendee data to Wake County zip codes (reference layer).*

C. Link your new Address Locator to Reference Layer

7. For **Reference Data** from the dropdown menu select **Wake_ZipCodes_2009_08.shp (not the folder),** click **Add**.

8. Edit the following in the Field Map properties:

   Feature ID: ObjectID

ZIP: ZIPNUM
Additional Field: <None>

9. In the **Output Address Locator** (you may need to enlarge the dialog to see this setting), set the directory where you would like to save the address locator (it is suggested to save it in the directory where your data is located).

   Name the newly created address locator - **Name: WakeZipCodes5** and **Save**

10. Click **Ok**

    ArcCatalog will now create your new Address Locator based on the properties you selected in the above steps - See the progress bar/text at the bottom of the ArcMap Window.

11. You may now close **ArcCatalog** Tab

D. Activate your new Address Locator

12. Activate Geocoding tools: In ArcMap, **Customize > Toolbars** check **Geocoding** tool.

13. In the Geocoding dialog **WakeZipCodes5** will be in the list. *Notice the asterisk in front of your address locator. This shows the Address Locator in your list that is now active for your map.* If this is not the case, from the dropdown list select **Manage Address Locators**.

    - In the "**Address Locator Manager**" dialog, click **Add**, and then browse to your **WakeZipCodes5** address locator, click **Add**. WakeZipCodes5 will be added to the list and will have an *asterisk in front of it.*
    - **Close** the Address Locator Manager

E. Batch Geocoding Process

14. Now prepare the attendees layer for geocoding: In the ArcMap Table of Contents: RT-CLK the **attendees database** layer **-> Geocode Addresses -> *WakeZipCodes5** will be highlighted (if not select it) then **-> OK**

15. In the "**Geocode Addresses**" dialog, select the following properties:

Address Table: *database$*
Address Input Field > ZipCode: *ZIP_CODE*

Output to shapefile or feature class: …browse to your Wake_Geocode directory and name your output: ***WakeAttendeeZIP.shp***

16. Click **Save**, and then **OK** to run your address locator.

<u>Question 1</u>. In the "Geocoding Addresses…" results dialog, what are the number of geocoded locations that were matched, tied, and unmatched?

<u>Question 2</u>. What do the tied locations in your results represent? From a marketing perspective, why would this information be valuable?

<u>Question 3</u>. What do the unmatched locations in your results represent? Why would this information be important?

F. Review and edit Batch Geocoding results

17. **Close** the "Geocoding Addresses…" dialog. ArcMap now displays **a new point shapefile** of the addresses that successfully were batch matched to your reference data.

18. Review your matched and unmatched zip codes: Open your new **WakeAttendeeZip** layer's attribute table and examine the attributes in the "Status" field (M = Matched, T = Tied, U = Unmatched). **Close** the attribute table when you are done.

19. **Fix and Rematch** zip codes by opening the "Interactive Rematch" dialog: Highlight the **WakeAttendeeZip** layer in the TOC then in the Geocoding toolbar click the **Review/Rematch Addresses button** (the last button ).

20. Select **FID 4** whose address value is **101 South Smithfield Road, Knightdale, NC.** This record's Zip Code value is blank and should be changed to 27545.

   a. In the **Address window**, type **27545** as the ZIPCode, click the **Search** button, and choose one of the candidates in the "Candidates" property field that has the highest match score (i.e., 100% or one of the highest) and click **Match**. *NOTE: The potential match location is highlighted in your map display as you select the identified records in the candidate field.*

   <u>Question 4</u>. What are your new matched, tied, and unmatched values?

21. Now use the U.S. Postal Service's ZIP Code Lookup (http://zip4.usps.com/zip4/welcome.jsp) to get the missing ZIP codes for records with **FID** values **8, 14, 53**, and **193**. Enter the ZIP codes that you find in the Interactive Rematch window and match those records.

    Question 5. What are your new matched, tied, and unmatched values (after you finish step #21)**? Are any additional records fixable based on the information you have? Why yes or why not? (**Note: If additional records are fixable, you do not need to try to fix them, just provide your opinion about this.)

    Make a screen capture image of your matched results (i.e., the upper right-hand corner of the "Interactive Rematch" dialog that displays Green, Yellow, and Red match results) before closing the dialog. (*Note: The image should not show the entire screen*)

22. Click **Close** and Save your Map Document.

23. Prepare a map layout with the title "**Attendees Geocoded by Zipcode**" and export a copy of this map layout as a jpeg file named: "**P1_Attendees_Geocoded_by_ZipCode.jpg**"). Include in your map layout the screen capture image you saved of your match results (i.e., the upper right-hand corner of the "Interactive Rematch" dialog that displays Green, Yellow, and Red match results).

    Question 6. Based on your preliminary analysis of last year's event data what would be a big weakness of relying on only the geocode matching to zipcode for providing your event sponsor an accurate analysis of patronage?

Part II. Geocode to Street data

A. Setting up an Address Locator

1. Add layers "**Wake_Boundary_2010_01**" and "**Wake_Streets_2011_04**" to your Table of Contents. Open the attribute tables and review the attributes.

2. Open ArcCatalog, and setup a new address locator in the Wake_Geocode directory as you did in steps 4 through 6 of Part I.

3. In the "Create Address Locator" dialog, this time select the **US Address – Dual Ranges** style, and then click **OK**. (Note: In ArcGIS 9.3.1 the corresponding address Locator style is: the **US Streets with Zone** style)

4. For the **Reference Data** entry, browse and select **Wake_streets_2011_04.shp**

5. In the **Field Map** set the following parameters (the fields with asterisks are required) and click **OK** to close:

Field name:

Feature ID:	FID
From Left	FRLEFT
To Left:	TOLEFT
From right:	FRRIGHT
To Right:	TORIGHT
Prefix direction:	DIR_PRE
Street Name:	STNAME
Suffix direction:	DIR_SUF
Left City or Place:	L_ZIPNAME
Right City or Place:	R_ZIPNAME
Left ZIP Code:	ZIP_L
Right ZIP Code:	ZIP_R

NOTE: The address field options added above from your reference layer (*Wake_Streets_2011_04.shp*) represent the industry standard for address data.

6. In the **Output Address Locator** (you may need to enlarge the dialog to see this setting), set the directory where you would like to save the address locator (it is suggested to save it in the directory where your data is located).

   Name the newly created address locator - **Name: WakeStreets** and **Save**

7. Click **Ok**

   ArcCatalog will now create your new Address Locator based on the properties you selected in the above steps in a directory you had specified - See the progress bar/text at the bottom of the ArcMap Window.

8. You may now close **ArcCatalog** Tab

B. Activate your new Address Locator

9. In the **Geocoding** toolbar dialog, the newly created **WakeStreets** address locator will be selected. If it is not:

   - From dropdown list select **Manage Address Locators**.

- In the "**Address Locator Manager**" dialog, click **Add**, and then browse to your **WakeStreets** address locator, click **Add**. WakeSteets will be added to the list - *Notice the asterisk in front of your address locator. This shows the Address Locator in your list that is now active for your map.*

- **Close** the Address Locator Manager.

C. **Interactively locate addresses**

10. Interactively locate addresses by doing the following in ArcMap:
    a. Click the **Find** button on the Tools toolbar. 
    b. In the "Find" dialog, click the **Locations** tab and set up **Choose Locator** to **WakeStreets.** For **Full Address:** type **5601 Tryon Rd.**

    c. Click **Find**

    d. Right-click the potential address shown near the bottom of the "Find" dialog box and click **Add Labeled Point**.

    e. Now, using the **Find** tool, locate the following addresses and add a labeled point to each location on your map:

        - 638 Walnut St
        - 101 South Smithfield Road
        - 120 West Main Street

D. Batch Geocoding Process

11. Prepare the attendees layer for geocoding: In the ArcMap Table of Contents: RT-CLK the **attendees database** layer **-> Geocode Addresses -> WakeStreets** and **Click OK.**

12. In the "**Geocode Addresses**" dialog, select the following properties:

Address Table: *database$*

Address Input Fields:
Street or Intersection: Street
City or Placename: City
State: State
ZIP Code: ZIP_CODE

Output to shapefile or feature class: …browse to your Wake_Geocode directory and name your output: **WakeAttendeeStreets.shp**

Click the **Geocoding Options** Button:
Set **Output Options: Side Offset: 5 Feet**
Set Minimum Match Score: 85 (default)

Click OK, then again **OK** to run your address locator (expect to receive an error message).

<u>Question 7.</u> Why do you think the procedure did not run successfully? What might be the problem?

13. Click **Ok** to close the **Error message**.

E. **Modify the Attendees table to re-run the Batch Geocoding Process**

14. **US Address - Dual Ranges** style requires the address table to store the street address in a single field. If it is stored in multiple fields (for example, if the house number is in a different field from the street name, as it is in the case of the Attendees table), you need to concatenate values using the **Field Calculator.** Next, you will create a new field that contains both the number and the street name.

15. In ArcMap, open the **Attendees database** table.

16. From Table Options (first button) select **Export**. In the Export dialog, make sure that you export **All records**. Click the **Browse** option for **Output Table**. Set the **Save as type** to **dBASE table** and name the output table as **Attendees_addresses.dbf**. Click **Save**, **OK**, and then **Yes** to add the table to the current map.

17. In ArcMap TOC open the newly added table **Attendees_addresses**. From **Table Options** select **Add Field**. Set the following:

    Name: **Address**
    Type: **text**
    Field Properties > Length: **254**

18. RT_CLK the newly added field **Address** and select **Field Calculator**. In the dialog below **Address =** type the following:

    [STNUMBER] + " " + [STREET]

Note, there is a space between the two quotation marks
Click **Ok**. The new field will contain both the number and the street name information.

19. Repeat the steps for **Batch Geocoding** (i.e., steps, 12 and 13) with the following parameters:

    In the ArcMap Table of Contents: RT-CLK the **Attendees_addresses** table **-> Geocode Address -> WakeStreets** and **Click OK.**

    In the "**Geocode Addresseses**" dialog, select the following properties:

    Address Table: Attendees_addresses

    Address Input Fields:
    Street or Intersection: Address
    City or Placename: City
    State: State
    ZIP Code: ZIP_CODE

    Output to shapefile or feature class: …browse to your Wake_Geocode directory and name your output: **WakeAttendeeStreets2.shp**

    Click the **Geocoding Options** Button:
    Set **Output Options: Side Offset: 5 Feet**
    Minimum Match Score: 85 (default)

    Click **Ok**, then again **OK** to run your address locator.

    Question 8. In the "Geocoding Addresses…" results dialog, what were the number of geocoded locations that were matched, tied, and unmatched?

F. **Review and edit Batch Geocoding results (Interactive Matching) –** A number of the addresses in the attendees table were not matched to the streets layer, possibly because of spelling errors, incomplete data, addresses outside the county area, etc. Resolving these issues requires intensive investigation to identify the nature of the problem and make the necessary corrections.

Interactive Matching may resolve some matching issues.

In ArcMap make sure **Geocoding results: WakeAttendeeStreets2** layer is highlighted.

On the **Geocoding** toolbar, click **Review/Rematch Addresses** button **.**

20. **Review the matching scores:** sort the **Score** field and review the matching scores. Majority of the records have a score of 100. However a few records have a score below 100 and some of these are unmatched. You could review those and try to improve their score.

21. In the **Interactive Rematch** dialog, **sort ascending** the **Address** field, and select the following record/address:

Address: 1010 Nicholwood Dr.

This record's Zip Code value is incorrect and should be changed to 27605 (it is 27777). In the **Address** dialog, edit the entry for **ZIP Code** to **27605**. Click the **Search** button, and choose one of the candidates in the "Candidates" property field that has the highest match score and click **Match**.

22. In the **Interactive Rematch** dialog, select the following record/address:

Address: 1900 Pleasant Union Ch Rd.

This record's street name is abbreviated and should be changed. In the **Address** dialog, edit the entry for **Street or Intersection** to the following: **1900 Pleasant Union Church Rd.** Click the **Search** button, and choose one of the candidates in the "Candidates" property field that has the highest match score and click **Match.**

Make a screen capture image of your matched results (i.e., the upper right-hand corner of the "Interactive Rematch" dialog that displays Green, Yellow, and Red match results) before closing the dialog, to include it in the final map. (*Note: The image should not show the entire screen*)

<u>Question 9</u>. What are your new matched, tied, and unmatched values after the interactive matching? (after you finish step #22)

23. Click **Close** and save your **Map Document**. Export a copy of this map layout with the title "**Attendees Geocoded by Streets**" (export this map as a jpeg file named: "**P2_Attendees_Geocoded_by_Streets.jpg**"). Include in your map layout the screen capture image you saved of your matched results (i.e. the upper right-hand corner of the "Interactive Rematch" dialog that displays Green, Yellow, and Red match results).

Question 10. Based on this second gecoding analysis of last year's event data how does or how doesn't the geocoding by street analysis overcome the weakness identified in Question 6?

Answer the following Questions:

Part I. Geocode to Zip Codes

Question 1. In the "Geocoding Addresses…" results dialog, what are the number of geocoded locations that were matched, tied, and unmatched?

Question 2. What do the tied locations in your results represent? From a marketing perspective, why would this information be valuable?

Question 3. What do the unmatched locations in your results represent? Why would this information be important?

Question 4. What are your new matched, tied, and unmatched values?

Question 5. What are your new matched, tied, and unmatched values? Are any additional records fixable based on the information you have? Why or why not?

Question 6. Based on your preliminary analysis of last year's event data what would be a big weakness of relying on only the geocode matching to zipcode for providing your event sponsor an accurate analysis of patronage?

Part II. Geocode to Street data

Question 7. Why do you think the procedure did not run successfully? What might be the problem?

Question 8. In the "Geocoding Addresses…" results dialog, what were the number of geocoded locations that were matched, tied, and unmatched?

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Question 10. Based on this second gecoding analysis of last year's event data how does or how doesn't the geocoding by street analysis overcome the weakness identified in Question 6?