Objectives

Build a GIS for Geocoding
Address Match Offense Data
Geocode Offense Points with Grid IDs
Build a Crime Space/Time Series Table
Build a Master Crime Point File

CrimeMapTutorial 2: Geocoding Police Data

Introduction

This second tutorial will get you started on building a crime mapping system from the ground up. You will use a commercially-available street map to place police data on pin maps. You will then count up police events (offenses) by area (square grid cells), time interval (months), and crime type (burglaries). You will also compute differences in crime counts by area (April 1998 burglaries minus March 1998 burglaries) to make change maps. These tasks lay the foundations for your crime mapping system. Data preparation is the hardest part of what you have to do!
Preliminaries

Launch ArcView and Create a New View

1. Click the **Start** button on the windows taskbar.
2. Click **Programs** on the Start menu.
3. Click **ESRI** on the resulting menu, **ArcView GIS 3.2** on the next sub-menu, and **ArcView GIS 3.2** again on the next Programs submenu.

   Depending on how you have installed ArcView, you may be navigating to a different menu. The menu selection that launches ArcView will have the ArcView magnifying glass icon beside it. Note: ArcView versions 3.0 or 3.1 will also work fine with this tutorial.

4. Click **OK** in the Welcome to ArcView GIS window to create a new project with a new view.
5. Click **Yes** in the Add data window.

   The Add Theme window opens.

6. Navigate to the **c:\CrimeMapTutorial\MapsBase** folder, hold down the **shift key**, and click on **grids2000cells.shp**, **sections.shp**, and **streets.shp** to highlight those rows (themes).

7. Click **OK** in the Add Theme window.

   A new view is created, including the selected three themes. If you were not successful in adding all three needed themes, click **View**, **Add Theme...** on the main horizontal menu, and complete steps 6 and 7. If you added an extra theme and want to delete it, click on the theme in the table of contents, and click **Edit**, **Delete Themes**. The deleted theme still exists in your files. Only the reference to it in this project is deleted.

8. Maximize the **ArcView GIS 3.2** window, move the **View 1** window to the right of the untitled project window, and adjust the size of the **View 1** window to fill the screen to the right of the Untitled project window.

   Click on the dark blue top of the View 1 window, hold your mouse button down, drag the window to the right, and release where desired. Move your mouse over a corner of the View 1 window until the cursor turns into a white, double-headed, diagonal arrow. Click and hold down your mouse button, and drag the corner of the window to resize it.
Click OK

Click on these rows

View with three added themes
Build a GIS for Geocoding

Symbolize the New View

1. Click the small embossed square to the left of the Sections.shp label in the View 1 table of contents.
   
   The Sections.shp theme turns on. Shown are the six sections or precincts of the Rochester, NY Police Department.

2. Double click the color-coded key for Sections.shp in the View 1 table of contents.
   
   The Legend Editor window opens.

3. Double click the color-coded key under the Symbol label in the Legend Editor.
   
   The Palette window opens.

4. Click the bucket icon in the Legend Editor to open the Fill Palette.
   
   Note that the pencil icon is for changing line styles and the push pin icon is for changing point marker shapes.

5. Click the open square icon to eliminate the color fill in Sections.shp.

6. Click the drop list arrow at the bottom of the Fill Palette for the Outline and click “2”.

7. Click Apply in the Legend Editor.
   
   Section.shp now has no fill color, but has a heavier, number 2-width line for boundaries.

8. Close the Legend Editor and Fill Palette windows by clicking the small “x” buttons in their upper right corners.

Practice:

Do the same steps for the Grid2000cells.shp theme: turn it on and eliminate its fill color. Leave the outline width at its default, original (do not change it to a 2 width). Turn off the Grid2000cells.shp theme when done. Leave this theme as is when finished, with three themes on, for the next steps in the tutorial.
Small embossed square
Color-coded key
Bucket icon
Color-coded key
Open square
Drop list arrow

Result of steps 1-8 for Section.shp and practice for Grid2000cells.shp
Symbolize Streets.shp

1. Double click the Streets.shp key ("N"-shaped line) in the table of contents of View 1.

   The Legend Editor appears.

2. Double click the same key in the Legend Editor

   The palette opens.

3. Click the paintbrush icon in the palette

   A palette of color chips opens

4. Click the lightest gray paint chip (top row, third from left) and click Apply in the Legend Editor window.

   Click Streets.shp on in View 1 to take a look at them if you wish, but turn them back off. You are zoomed too far out for the streets to look good. Always make themes like streets, that provide spatial context, shades of gray. Leave the bright colors to the crime data.

5. Close the Color Palette and Legend Editor windows

Change Theme Properties

1. Click the Streets.shp legend in the View 1 window to make it Streets.shp the active theme.

2. Click Theme, Properties...

3. Delete .shp in the Theme Name field so that Streets is the Theme Name.

   This will make the streets label more readable in View 1. The next step is just for your information, nothing will be changed.

4. Click the Geocoding button on the left side of the Theme Properties window.

   This so-called TIGER street theme is already set up to address-match streets using the US Streets format, including street direction prefix or suffix (N, E, S, W), street number, street name, and street type (St, Ave, Rd, etc.). Note: If you serve a multiple town jurisdiction, you need to use US Streets with Zone format and use municipality name as the tie-breaker for streets with the same name in different municipalities.

5. Click the Definition button in the Theme Properties window and then OK to close the Theme Properties Window.

Practice:

Change the theme name of the Sections.shp theme to Sections, and that of the grid2000cells.shp to Grid.
Change the Home Directory for Your Project

1. Click the **Untitled project** window to make it active.
2. Click **Project, Properties...**
   
   The Project Properties window opens.
3. Key in `c:\CrimeMapTutorial` in the Work Directory field to replace $HOME and click **OK**.
   
   When you browse for files, ArcView will start you out in the CrimeMapTutorial folder. First you have to save the project, close it, and reopen it for this to work.

Save Your Work

1. Click **File, Save Project As...** on the menu bar at the top left of your screen.
   
   The Save Project As window opens

2. Navigate to `c:\CrimeMapTutorial`, key in **geocode.apr** as your file name, and click **OK**.
   
   Your work is saved as an ArcView project, with the .apr extension. The project file can be opened and used again. Indeed, it will serve as a template for geocoding police incident data, whenever this task needs to be done.

3. Click **File, Exit**.

4. Click the **Start** button on the windows taskbar.

5. Click **Programs** on the Start menu.

6. Click **ESRI** on the resulting menu, **ArcView GIS 3.2** on the next sub-menu, and **ArcView GIS 3.2** again on the next Programs submenu.

   The Welcome to ArcView GIS window opens.

7. Click the **Open an existing project** radio button and **OK**.

8. Navigate to `c:\CrimeMapTutorial` and double click **geocode.apr**.

   Your project reopens. Now when you use a browser, it will first look in `c:\CrimeMapTutorial`. 
Change View Properties

1. Click View, Properties... on the menu bar.
2. Key in Address Matching in the Name field to replace View 1 of the View Properties window.
3. Click the drop list arrow of the Map Units field and select feet.
4. Click the drop list arrow of the Distance Units field and select feet.
   If you use the measurement tool, it will yield distances in feet.
5. Click OK to save properties and close the View Properties Window.
   If your map disappears in the Address matching view, click the Zoom to Full Extent button, which always returns you to your full map.

Add Offense Data to the Project

1. Click the Tables button in the left side of the Geocode project window.
2. Click the Add button in the project window, navigate to the c:\CrimeMapTutorial\DataIncident folder, click the off199803.dbf file, and click OK.
   This imports the police offense data for March 1998 into the Geocode.apr project. Your records management system would have to export such data, either as a dbase file as here or as a text file.
3. Scroll far to the right in the off199803.dbf window to see values in the inci_addr field.
   The next steps will find the same addresses on the streets map and place corresponding points on the map.
4. Close the off199803.dbf window.

Practice (you must do this for the following steps):
Add the off199804.dbf table to the project.
**Offense Address**

<table>
<thead>
<tr>
<th>Group</th>
<th>Incx_addr</th>
<th>Incx_qnt</th>
</tr>
</thead>
<tbody>
<tr>
<td>BURGLARY</td>
<td>69 POPLAR ST</td>
<td>P</td>
</tr>
<tr>
<td>ASSAULT</td>
<td>216 LEXINGTON AV</td>
<td>A</td>
</tr>
<tr>
<td>ROBBERY</td>
<td>2970 HENRIETTA RD W</td>
<td>R</td>
</tr>
<tr>
<td>DISTURBANCE</td>
<td>131 WOODWARD ST</td>
<td>D</td>
</tr>
<tr>
<td>TRESPASS</td>
<td>132 CHAMPLAIN ST</td>
<td>C</td>
</tr>
<tr>
<td>ASSAULT</td>
<td>368 PORTLAND AV</td>
<td>A</td>
</tr>
<tr>
<td>ASSAULT</td>
<td>118 LEXINGTON AV</td>
<td>UP</td>
</tr>
<tr>
<td>DRUGS</td>
<td>819 CLINTON AV N</td>
<td>U</td>
</tr>
<tr>
<td>DISTURBANCE</td>
<td>169 ST PAUL ST</td>
<td>D</td>
</tr>
<tr>
<td>DISTURBANCE</td>
<td>400 FERNWOOD AV</td>
<td>H</td>
</tr>
<tr>
<td>ASSAULT</td>
<td>369 PORTLAND AV</td>
<td>A</td>
</tr>
<tr>
<td>ASSAULT</td>
<td>68 EDGECLIFF ST</td>
<td>A</td>
</tr>
</tbody>
</table>
Address Match Offense Data

1. Click the **Address Matching** view window to make it active.
2. From the menu bar, click **View, Geocode Addresses...**
   The Geocode Addresses window opens with many field selections already made by ArcView. You have to make a few more selections. If the off1999803.dbf table is not listed as the Address Table, then click the browser button to the right of that field, navigate to off1999803.dbf in the DataIncident folder, and select it as the Address table.
3. Click the **drop list arrow** in the Address field, scroll down, and click **inci_addr**.
4. Key in **20** in the Offset Distance field.
   Incident points will be located 20 feet from the street centerline, on the proper side of the street, left or right.
5. Click the **file browser** button to the right of the geocoded theme field, double click the **MapsIncident** folder, key **off199803** into the File Name field, and click **OK**.
6. Click the **Batch Match** button in the Geocode Addresses window.
   Ninety-four percent of the police records match addresses in the street theme and are placed on the map. This is an very high match rate, because the Rochester Police Department requires a street address for all incidents (no place names are allowed) and checks entered addresses against a master list for the city. Note that the TIGER-style street theme has only beginning and ending street numbers for a block (both right and left sides) and thus interpolates locations for addresses. Also note that it is OK to use place names, but then you need an alias table to turn them into addresses.
7. Click the **Done** button in the Re-Match window.
   The off199803.shp theme is automatically added to the View table of contents.
8. Click the **small embossed square** in the table of contents to turn on the off199803.shp theme to see the address matched points. Then turn it back off.

*Practice (you must do this for the following steps):*
Address match the off199804.dbf table. Get the Address Table from the DataIncident folder. You will see that for the 1984 incident data, 99% are address matched successfully.
New themes
Geocode Offense Points with Boundary IDs

1. Click File, Extensions...
   The Extensions window appears. Extensions provide additional menu options for various special tasks.

2. Scroll down in the Available Extensions panel, click on Geoprocessing, and click OK.

3. Click View, GeoProcessing Wizard...
   The GeoProcessing Wizard option was what you just added. You will use it to geocode.

4. Click the Assign data by location (Spatial Join) radio button and click Next.
   You will assign each data point in the off199803.shp theme the ID of the grid cell in which it lies. Then we can count offenses by grid cell to create area maps.

5. Click the drop list arrow in the Select a theme to assign data to field and click off199803.shp.

6. Click the drop list arrow in the select a theme to assign data from field, click Grid, and click Finish.
   You will see the effects of this step next.

7. Click on the legend of the off199803.shp theme in the table of contents to make it the active theme (placing an embossed square around the legend for that theme).

8. Click the Open Theme Table button.
   The Attributes of Off199803.shp table opens.

9. Scroll to the right in this table and see that the grid2000_i field has been added.
   This is the key for identifying specific cells in the Grid theme.


**Practice (you must do this for following steps):**

Do the spatial join for the off199804.shp theme, starting with step 3 above.
**Extensions**

Available Extensions:

- Dialog Designer
- Digizer
- Geoprocessing
- Grids and Measured Grids
- IMAGINE Image Support
- JPEG (JFIF) Image Support
- Legend Tool

About:

[Image of a dialog box showing various extensions]

**GeoProcessing**

Choose a GeoProcessing operation, then click the Next button to choose options.

- Dissolve features based on an attribute
- Merge themes together
- Clip one theme based on another
- Intersect two themes
- Union two themes
- Assign data by location

About Assign Data By Location

This operation joins only the data for features of Theme2 to the features of theme1 which share the same location.

[Image of a spatial join operation]

About Assign Data By Location

Assigning data by location is also called Spatially Joining data. A join is made if the specified spatial relationship is detected.

1) Select a theme to assign data to:
   ![Layer1].

2) Select a theme to assign data from:
   ![Layer2].

Data will be assigned based on whether it is inside

[Image of a spatial join operation]

About Assign Data By Location

This operation joins only the data for features of Theme2 to the features of theme1 which share the same location.

[Image of a spatial join operation]

About Assign Data By Location

[Options for cancel, help, and next]
Query a Theme to make a New Theme

1. Click the legend of the `off199803.shp` theme in the Address Matching view to make it the active theme.
2. Click **Edit, Copy Themes**.
3. Click **Edit, Paste**.
   
   Now you have an additional copy of the Off199803.shp theme. (Actually, you just have another reference to the theme.)
4. Click the legend of the new copy of the `off199803.shp` theme in the Address Matching view to make it the only active theme.
5. Click **Theme, Properties**...
   
   The Theme Properties window opens.
6. Change the Theme Name to **Burglaries 199803**.
   
   You will next query this copy of the theme to limit it to burglaries. Do not close the Theme Properties window yet, you need it open for the next step.
7. With Definition icon clicked on, click the **query builder icon** in the Theme Properties window.

   The Query Builder Window opens.
8. Scroll down the **Fields panel** in the query builder and double click `[Group]`.
9. Click the **equal sign** button. 
10. Double click “**BURGLARY**” in the Values panel.

    The query design is now completed. The theme will only have burglaries in it. If you get an invalid expression in the next step, try to edit the expression to fix it, or delete the expression in the Query Builder and start again.
11. Click **OK** in the Query Builder window and click **OK** in the Theme Properties window.
12. Click the **Open Theme Table** button, scroll to the right in the table that opens, and verify that only Burglaries remain in the theme.
13. Close the theme table and click **File, Save Project**.

**Practice (you must do this for following steps):**

Do these steps again, starting with off199804.shp. Call the new theme Burglaries 199804.
Completed query expression

([Group] = "BURGLARY")

Attributes of Burglaries 199803

<table>
<thead>
<tr>
<th>Time</th>
<th>Shift</th>
<th>Context</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>01:30</td>
<td>3.0000</td>
<td>BURGLARY</td>
<td>OUT-S</td>
</tr>
<tr>
<td>20:00</td>
<td>3.0000</td>
<td>BURGLARY</td>
<td>RES-S</td>
</tr>
<tr>
<td>02:00</td>
<td>3.0000</td>
<td>BURGLARY</td>
<td>PAC-S</td>
</tr>
<tr>
<td>00:10</td>
<td>3.0000</td>
<td>BURGLARY</td>
<td>RES-S</td>
</tr>
<tr>
<td>01:50</td>
<td>3.0000</td>
<td>BURGLARY</td>
<td>PAC-H</td>
</tr>
<tr>
<td>08:15</td>
<td>1.0000</td>
<td>BURGLARY</td>
<td>RES-S</td>
</tr>
<tr>
<td>05:00</td>
<td>1.0000</td>
<td>BURGLARY</td>
<td>RES-M</td>
</tr>
<tr>
<td>10:10</td>
<td>1.0000</td>
<td>BURGLARY</td>
<td>RES-M</td>
</tr>
<tr>
<td>12:30</td>
<td>2.0000</td>
<td>BURGLARY</td>
<td>PAC-C</td>
</tr>
<tr>
<td>06:45</td>
<td>1.0000</td>
<td>BURGLARY</td>
<td>RES-M</td>
</tr>
<tr>
<td>12:25</td>
<td>2.0000</td>
<td>BURGLARY</td>
<td>RES-M</td>
</tr>
<tr>
<td>00:30</td>
<td>1.0000</td>
<td>BURGLARY</td>
<td>RES-M</td>
</tr>
</tbody>
</table>
Count up Offenses by Grid Cell

1. Click on the legend of the Burglaries 199803 theme to make it the active theme.
2. Click the Open Theme Table button to open the Attributes of Burglaries 199803 table.
3. Scroll to the right in the Attributes of Burglaries 199803 table and click on the gray column heading for Grid2000_i to highlight it (reverse its video).
4. Click the Summarize button. The Summary Table Definition window opens. You are about to create a new table with counts of burglaries by grid cell. You could count up burglaries by any boundary layer available; for example, we also have car beats and census tracts.
5. Click the Save As... button in the Summary Definition window.

Practice (you must do this for following steps):

Count up burglaries by grid cell for 199804. Create a new table, Burglary 199804.dbf and store it in the DataIntermediateTables folder. Click File, Save Project when finished.
Counts of burglaries by grid cell
Build a Crime Space/Time Series

The next task needs to be done only once for each boundary file of interest, like the 2,000 foot grid cells and car beats. It produces a table with the boundary file key identifier to which you will join each month’s crime counts.

1. Click on the Grid theme legend in the table of contents of the Address Matching view to make it the active theme.

2. Click the Open Theme Table button.

   The Attributes of Grid table opens. Each row has the unique ID of a grid cell from the map. You will create a new table with just this identifier, to start your crime space/time series table.

3. Click File, Export...

   The Export Table window opens with the dBase output format selected, the format that ArcView likes best.

4. Click OK, navigate to the c:\CrimeMapTutorial\DataSeries folder, key in BurglarySeries.dbf in the File Name field, and click OK.

   While no change is evident, ArcView just created a new table.

5. Close the Attributes of Grid table.

6. Click on the Tables icon in the geocode.apr project window, click the Add button in the same window, click the BurglarySeries.dbf line in the left panel of the Add Table Window, and click OK.

   The BurglarySeries.dbf table opens. We had to import this table back into the project.

7. Click Table, Start Editing.

8. Click the column heading label for Area to highlight it.

9. Click Edit, Delete Field, and Yes.

   The Area field is deleted from the table. If you make a mistake, click Table, Stop editing, and do not save the edits. Then start over.

10. Click Edit, Delete Field, Yes (step 9) twice more to delete Perimeter and Grid2000_ fields.

    Only Grid2000_i remains, and that is the key you will use to build your crime space/time series.

11. Click Table, Stop Editing, and Yes.

    Leave the BurglarySeries.dbf table open. You will join the 199803 burglary counts by grid cell to it next.
Add Crime Counts to the Crime Series Table

1. Click on the geocode.apr project window to make it active.
2. Click the Tables icon on the left side of the project window.
3. Double click the Burglary199803.dbf row in the project window to open that table.
4. Click the Grid2000_i column label in the Burglary199803.dbf table to highlight it.
5. Click the BurglarySeries.dbf table to give it the focus (make it active), click the Grid2000_i column heading to highlight it, and click the Join button. When you click the join button, the active table gets new columns from the other table. If you get the step wrong with the join in the wrong direction, click Tables, Remove All Joins and start again. The resulting table is not permanent, but just joined “on-the-fly” here. Next you will make the addition permanent and give a descriptive name to the count column.
6. Click Table, Start Editing.
7. Click Edit, Add Field.
   The Field Definition window opens.
8. Key in Brg199803 in the Name Field.
9. Key in 4 as the width.
10. Click OK in the Field Definition window.
    The next step is tedious, but is needed to substitute zeros for null values in grid cells that had no burglaries in 199803. When you calculate differences of Burglary199804 - Burglary199803 to get a change variable, the nulls will have to be zeros for the differences to calculate correctly.
BurglarySeries.dbf must be active for the join.

Joined table:

Field Definition:

Name: Bro199803
Type: Number
Width: 4
Decimal Places: 0
Calculate a Permanent Count Column

1. With the **Brg199803** column heading highlighted in the BurglarySeries.dbf window, click **Field, Calculate...**
   
   The Field Calculator opens.

2. Double click **[Count]** in the Fields panel of the Field Calculator window.
   
   [Count] is added to the Brg199803 = panel. This is the start of a calculation to replace null values with zeros.

3. Scroll down the **Requests** panel and double click **AsString**.
   
   This will make Brg199803 be a string value, for the moment.

4. Click the **String** radio button under Type in the Field Calculator.
   
   This gives us access to functions that work on string data types.

5. Scroll down the **Requests** panel and double click **Substitute**.

6. Key in "**Number Null**" and "0" (including the double quote characters) to yield Substitute("**Number Null**", "0") in the [Brg199803] = panel.
   
   This is the function that substitutes zeros for nulls. One more step is to turn the results back into a number.

7. Click to the right of the right parenthesis, "()", in Substitute("**Number Null**", "0"), scroll up in the **Requests** panel, double click **AsNumber**, and click **OK**.
   
   This steps replaced nulls (blanks) with zeros in the Brg199803 column.

8. Click **Table, Stop Editing**, and **Yes**.

   If your calculation fails, start with step 1 on this page and repeat the calculation. **This step and the next are critical!**

9. Click **Table, Remove All Joins**.

   That does it. You now have a permanent column in BurglarySeries.dbf with 199803 burglary counts by grid cell.

**Practice (you must do this for following steps):**

Repeat the steps on the previous page and this page to calculate the Brg199804 column. Start with step 1 on the previous page, using the Burglary199804.dbf table, and join it to the BurglarySeries.dbf table. Then calculate Brg199804 as instructed on this page.
Completed expression:

\[\text{[DisturbCount199803]} = \text{[Count]} \cdot \text{AsString} \cdot \text{Substitute} \left( \text{"Number Null", \"0\"} \right) \cdot \text{AsNumber} \]

Nulls replaced with zeros:

Table with join removed:

Finished table:
**Calculate a Burglary Change Variable**

1. Click on the **BurglarySeries.dbf** table to make it active.
2. Click **Table, Start Editing...**
3. Click **Edit, Add Field...**
4. Key in **CBrg199804** in the Name field.
5. Key in **4** in the Width field and click **OK**.
6. Click **Field Calculate...**
   The Field Calculator window opens.
7. Double click **[Brg199804]** in the Fields panel.
8. Double click the **minus sign** (-) in the Requests panel.
10. Click **OK**.
    Well done! You now have a start on a Burglary space/time series with three good variables for mapping. You will map them in the next tutorial.
11. Click **Table, Stop Editing**, and **Yes** to save edits.
12. Close the **BurglarySeries.dbf** window.
Field Definition

Name: CBrg199804
Type: Number
Width: 4
Decimal Places: 0

burglaryseries.dbf

<table>
<thead>
<tr>
<th>Grid2000</th>
<th>Brg199803</th>
<th>Brg199804</th>
<th>CBrg199804</th>
</tr>
</thead>
<tbody>
<tr>
<td>708</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>709</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>685</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>686</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>660</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>661</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>662</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>635</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>636</td>
<td>3</td>
<td>2</td>
<td>-1</td>
</tr>
<tr>
<td>637</td>
<td>1</td>
<td>0</td>
<td>-1</td>
</tr>
</tbody>
</table>
Build a Master Crime Point File

Crime Analysts often must supply information and maps on an ad hoc, one-time basis. For this purpose, they need a general and encompassing data source. For crime mapping, it is a crime point file with all crime types and all historical data. The Rochester Police Department went one step further and joined several record types to their crime points file to include investigative data, including suspect and victim data. The main task in building the master file is to append new data to the master file after they are address-matched. The steps are similar to the following.

1. Click the **Address Matching** view to make it the active window.
2. Click **View**, **GeoProcessing Wizard**...
3. Click the **Merge themes together** radio button and click the **Next** button.
4. Hold your **shift key** down and click on the **off199803.shp - Point** and **off199804.shp - Point** rows in the Select at least two themes to merge panel.
5. Click the **file browser** button for the Output File field and browse to the c:\CrimeMapTutorial\MapsIncident folder. The Output Theme window opens.
6. Key in **Master19980430.shp** as the File Name and click **OK**.
7. Click the **Finish** button in the GeoProcessing window.

ArcView adds the master point file to your view. The next time you address match new data, follow the steps here to append the new point file to the most recent master file, and create a new master file with the ending date for data included in the file name (e.g., Master19980501.shp). Keep at least one old copy of the master file for back up, and delete older copies.
About Merge
This operation appends the features of two or more themes into a single theme. Attributes will be retained if they have the same name.

Theme1 + Theme2 = Output Theme

1) Select at least two themes to merge:
- Burglaries 199803 - Point
- Off199804.shp - Point
- Off199803.shp - Point
- Street - PolyLine

Use fields from: Off199804.shp - Point

2) Specify the output file:
Output File: opsincident\master19900430.shp

NOTE: The fields in the output will be the same fields as the first theme.
Extract Data from the Master File

Uniformed officers need “pin maps” showing locations of individual offenses and CAD calls. A good approach is to provide a daily map at roll call with the most recent four weeks’ data, by shift and with the most recent few days’ events highlighted. The earlier data provides a crime context and the highlighted recent events show persistence, emerging hot spots, and cooling hot spots. You will build the point file for such a pin map, for use in CrimeMapTutorial 3.

1. Click the small embossed square in the legend of the Master19980430.shp theme to turn it on.
2. Click the legend of the Master19980430.shp theme in the table of contents to make it the active theme.
3. Click the query button on the ArcView main toolbar.
   A query interface opens.
4. Double click the [BegDated] field in the Fields panel.
   This is the beginning date of the offense, the date that the Rochester Police have decided to use to represent offenses.
5. Click the >= button.
6. Double click 19980403 in the Values panel.
   19980403 is the starting date of the four-week period that you will map.
7. Click the And button.
8. Double click the [BegDated] field in the Fields panel.
9. Click the <= button.
10. Double click 19980430 in the Values panel.
    This query will yield four weeks’ data.
11. Click the New Set button and close the query interface window.
    There are a lot of yellow dots. These are the ones satisfying your query. Next you will convert this selection to a new theme. If you made a mistake, click the Clear Selected Features button and start the query again.
12. Click Theme, Convert to Shapefile...
13. Navigate to c:\CrimeMapTutorial\MapsIncident, key in Pin19980430.shp, click OK, and Click Yes.
Calculate a Variable to Identify Recent Data

This step is tedious, but provides data to trigger highlighting of recent offenses, using larger point markers for them than the older data.

1. Click the legend of the Pin19980430.shp theme in the table of contents to make it the active theme.
2. Click the Open Theme Table icon. The Attributes of Pin19980430.shp theme opens.
3. Click Table, Start Editing...
4. Click Edit, Add Field.
   The Field Definition window opens.
5. Key in DataAge as the Field Name, change the width to 2, and click OK.
6. Click Field, Calculate...
   The Field Calculator window opens.
7. Key in (19980430.asdate in the [DataAge]= panel.
8. Double click the minus sign (-) in the Requests panel.
10. Scroll down the Requests panel and double click AsDate.
11. Key in a right parenthesis, “)”. 
12. Scroll down the Requests panel and double click AsSeconds
13. Scroll up the Requests panel and double click the forward slash (/).
14. Key in 86400.
   There are 86,400 second per day. ArcView works in time units of seconds, so the result here will be in days.
15. Click OK.
   Try again, starting with step 6, if you get a syntax or other error. Try out a few manual calculations to check your work.
16. Click the Sort Ascending button and scroll through the table to see that DataAge ranges from 0 to 27 days old.
17. Click Table, Stop Editing, and Yes.
18. Close the Attributes of Pin19980430.shp window.
Field Definition

Name: DataAge
Type: Number
Width: 4
Decimal Places: 0

Field Calculator

Fields

[Shape]
[Number]
[Begdted]
[Btnum]
[Shift]
[Context]
[Loctype]

Type

Number
String
Date

Requests

= 19980430.asdate - [Begdted].AsDate.AsSeconds / 86400

OK
Cancel

Attributes of Pin19980430.shp

<table>
<thead>
<tr>
<th>Perimeter</th>
<th>Grid2000</th>
<th>Grid2000</th>
<th>DataAge</th>
</tr>
</thead>
<tbody>
<tr>
<td>8000.0000</td>
<td>349</td>
<td>372</td>
<td>26</td>
</tr>
<tr>
<td>8000.0000</td>
<td>541</td>
<td>180</td>
<td>26</td>
</tr>
<tr>
<td>8000.0000</td>
<td>610</td>
<td>105</td>
<td>26</td>
</tr>
<tr>
<td>8000.0000</td>
<td>378</td>
<td>353</td>
<td>26</td>
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</tr>
<tr>
<td>8000.0000</td>
<td>450</td>
<td>261</td>
<td>27</td>
</tr>
</tbody>
</table>
Clean up the Geocode.apr Project for Future Use

1. Hold down your shift key and click on every point theme in the Address Matching view, except the master point file, to make them all active.

2. Click Edit, Delete Themes, and Yes to All.
   
   The themes are merely removed from the view and project. They are not deleted from your hard disk. When you geocode new data, you will not need the deleted themes - they just make ArcView take longer to open because of the on-the-fly queries to make the burglary themes.

3. Click the Tables icon in the Geocode.apr project window.

4. Hold down your shift key and click on all tables to highlight them.

5. Press your delete key and click Yes to all.
   
   Again, your tables are not deleted from your hard drive, but just removed as references from the project. This is a valuable point! An ArcView project just points to files in folders and does not make new copies of them.

6. Click the legend of the Master19980430.shp theme to make it active.

7. Click the Clear Selected Features button.

8. Click File, Exit, Yes to save your changes and exit ArcView.
   
   The next time you have to address match data, you can reuse this ArcView project.

End of Tutorial 2