CrimeMapTutorial
Workbook

MapInfo 5.5 Version

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How to Get Crime Mapping
Started in Your Agency...100

Acknowledgments

Introduction

What Is the Goal?

There are many advanced and sophisticated things that can be done with GIS and crime mapping. This tutorial, however, intends to provide the basics - the "bread and butter" of daily police work. Here is what is really important: 1) uniformed officers and detectives need daily access to real-time crime data on maps; 2) as important as displaying crime patterns is displaying recent changes in crime patterns; 3) the data behind the points on pin maps need to include investigative information like suspect MO and physical description, location type, vehicle, and victim data; and 4) crime analysts and detectives need to be able to frequently perform ad hoc queries and produce custom maps as special needs arise. You can do all of this with MapInfo, pretty much as it comes out of the box.

What Are the Prerequisites?

CrimeMapTutorial assumes that you are PC computer literate, meaning that you can 1) find folders and files on your computer, and 2) know how to use common packages like spreadsheet and word processing packages.

Which Parts Are for You?

CrimeMapTutorial has material for both crime map GIS users and specialists. In the material below, we recognize that all three roles identified may be filled by the same person or persons. Nevertheless there will be specialization in some agencies, and hopefully many users who are not computer or GIS specialists.

o *Users of GIS* - If you want to learn how to use a crime mapping GIS built by someone else, work through the first 19 pages of CrimeMapTutorial 1. If you want to learn how to make ad hoc map queries using MO, suspect, and other data, work from page 20 to the end of CrimeMapTutorial 1. Tutorial 1 has you use the map layers and crime maps created in tutorials 2 and 3. GIS specialists should also work through tutorial 1, to get an introduction to the end product, crime mapping system.

o *Data Preparers* - If you need to learn how to process police data for use in a GIS, work through all of CrimeMapTutorial 2. This work includes address matching police incidents to place them on pin maps, and aggregating crime counts by areas (like car beats) to produce area or choropleth maps.

o *Map Makers* - If you want to learn how to construct useful crime maps, given police data that have already been mapped and preprocessed by data preparers, work through CrimeMapTutorial 3. You can jump into this tutorial without having done CrimeMapTutorial 2, because I provide a folder called FinishedProducts, which has results from tutorial 2 needed for tutorial 3.

Crime map GIS users will learn most of what they need from this tutorial. Crime map GIS specialists (data preparers and map makers) will get a good, quick start and be able to do maybe 85% of what they will eventually need. The last section of this tutorial, "How .to Get Crime Mapping Started in Your Agency," tells you what else there is to learn, alternatives on where you can learn it, and what to do next.

Should You Do the Practice Exercises?

Yes, you need to do the exercises. Many of the exercises are essential as input to further tutorial steps. The exercises do not take long to complete, and help make material "stick" by immediately having you review steps with a little independent thinking required. You should keep CrimeMapTutorial Workbook open flat so that you can see steps to take on your computer (left pages) and corresponding screen prints of what you should be seeing on your computer (right pages).

What are Software and Hardware Requirements?

You will need to purchase and install MapInfo Version 5.5, if it is not already on your PC. The PC version of MapInfo 5.5 requires that you run Microsoft Windows 95, 98, or Windows NT 4.0 as your operating system and have at least 32 MB RAM, 58 MB disk space for software installation, and up to 31 MB for free sample data compact installation. (I installed only about 10Mb of the data.)

How do you install the CrimeMapTutorial Data?

Download the *CrimeMapTutorialData* folder (MapInfo version) from the CMRC Web site (http://www.ojp.usdoj.gov/cmrc/), which is in a single zipped file. Once the down-loaded file is on your computer, double-click on the zipped file to activate the decom-pression software on your machine, such as WinZip® or PKZip®. Then choose the option to **Extract** the files onto your hard drive. Within the Extract dialog box, check the options to extract *all files* and to *retain the original file structure and folder names*. When choosing the directory to which you will extract the files, it is **very important** to select the **C:** drive. This extraction process will then create a folder called **C:\CrimeMapTutorial**. It requires 18 MB of disk space.

Objectives

Examine GIS Files

GIS 101: The Basics of GIS

Use Crime Maps

Make Ad Hoc Map Queries

Make Spatial Queries

CrimeMapTutorial 1: Using a Crime Mapping GIS

Introduction

Welcome to CrimeMapTutorial. You will learn a lot about using MapInfo GIS for crime mapping, plus a lot about GIS in general through concrete examples. First you will examine the structure of a GIS's files. Next you will learn the basics on using and getting around in MapInfo - we do this in the context of the maps and files you will use for crime mapping. Next you will use two crime maps: 1) an early warning system area map with drill down to a pin map and 2) a daily pin map for uniformed officers. Lastly is a section on making ad hoc map queries. For those of you who want to be crime map GIS builders, CrimeMapTutorials 2 and 3 have all of the steps to build the early warning system and daily pin map. CrimeMapTutorial 2 handles all data processing steps and CrimeMapTutorial 3 has all map-making steps.

Examine GIS Files

1. Double click the **My Computer** icon on your computer's desktop.

    The My Computer window opens. Your window may appear differently depending on whether you have Windows 95, 98, NT, or 2000 on your computer. If you do not have the Up button, click View, Toolbar to get an equivalent - a yellow folder icon button.

2. Double click the (**C:**) icon.

    The C:\ window opens, showing folders on that drive.

3. Double click the **CrimeMapTutorial** folder.

4. Click **View, Arrange Icons, By Name** in the C:\CrimeMapTutorial window.

    CrimeMapTutorial has the folders for this tutorial and is also a good example of how to organize your GIS files in practice.

5. Double click each folder, starting from the top. Read my comments below on the folder's contents, click the **Up** button, double click the next folder, etc.

    DataIncident - has offense data from the Rochester, NY Police Department.

    DataIntermediateTables - (now empty) is just that, a place to put tables needed to accomplish something, but not end products. You will place all files that you create in this folder

    DataSeries - (now empty) would have one dBase file for each crime type, areal unit, and time unit of interest, such as created in Tutorial 2. The data series are useful for trend analysis and mapping changes in crime patterns. They form the basis of the early warning mapping system that you will build.

    Documentation - includes background material on map data sources, code tables, a data dictionary, etc.

    Finished Products - has files that you will build in this tutorial. These files allow you to skip sections and jump to advanced material. They also allow you to proceed if you were unsuccessful in some step. We will use these files in this first tutorial, because you will learn how to use what you will later build from scratch.

    MapsBase - has all maps for this tutorial, except ones made from police incident data. These are all commercially available maps, or easily constructed, and include car beats, census tracts, 2,000 foot square grid cells, retail stores points from an electronic yellow pages, and street centerlines for plotting police incidents.

    MapsIncident - (now empty) would have police incident maps such as created in tutorial 2.
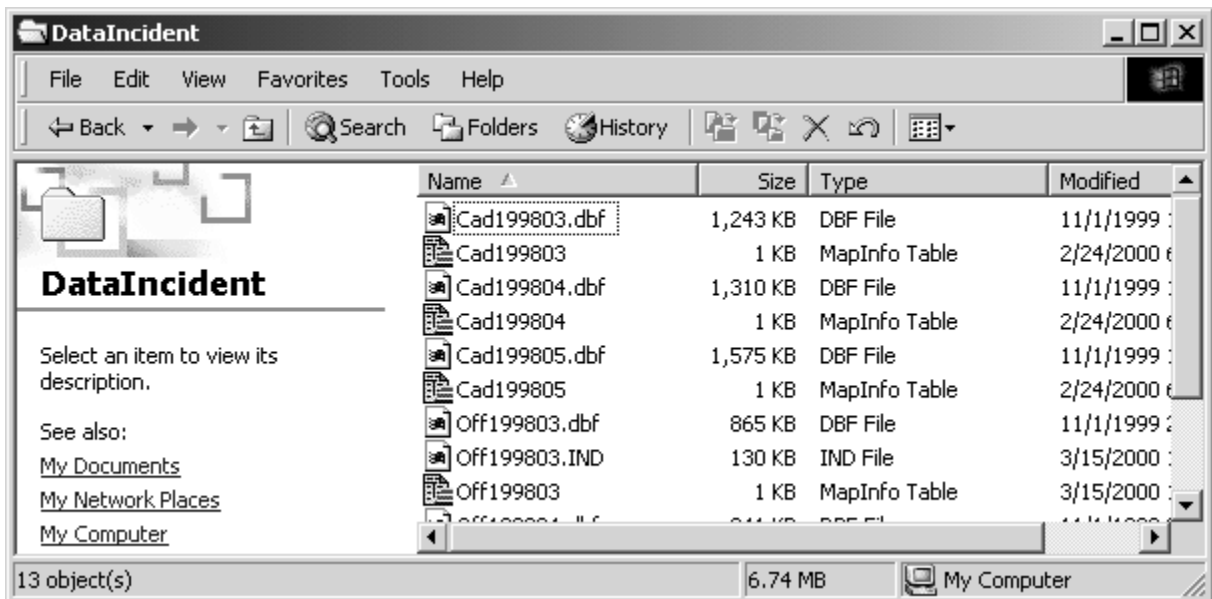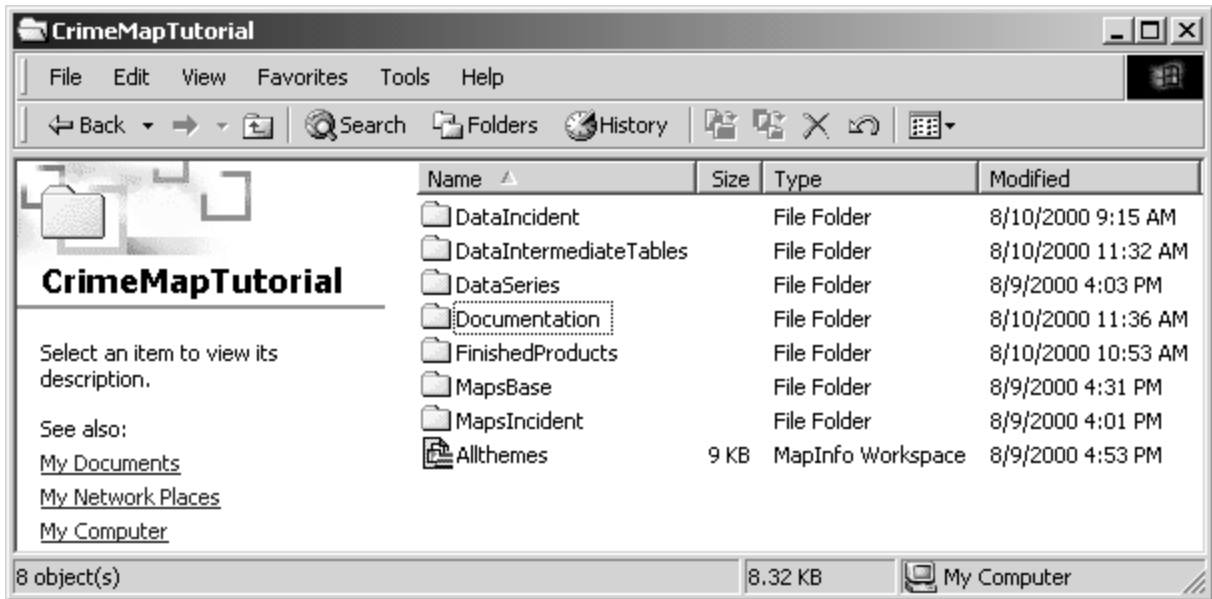
GIS 101: The Basics of GIS

Open a MapInfo Workspace

Allthemes is part of the documentation for CrimeMapTutorial's GIS. It simply has all base map layers (or themes) included in the GIS. You can get a quick look at the maps and data behind them, which is what you will do next.

1. In My Computer, navigate to **C:\CrimeMapTutorial and** double-click the **Allthemes file.**

    MapInfo opens the Allthemes workspace. A workspace is a predefined and preformatted set of maps and tables. Allthemes includes seven data files. Right now only one is visible, a map of police section boundaries.

2. Click **Map, Layer Control...** on the menu bar and in the **Carbeats** line click the first **check box** immediately to the right and click **OK**.

    This turns on the Carbeats layer. The Sections layer was already on. MapInfo draws from the bottom up, so the thick black line of Sections (these are precincts) cover corresponding thin red lines of the carbeats. Layer Control is one of the most important controls in MapInfo. This dialog controls which layers are visible, editable, selectable, and labelled, what order they are drawn in, and the display characteristics of the map features and labels. (NOTE:You can open Layer Control more quickly by clicking on the right mouse button and then clicking on Layer Control.)

3. Click **Map, Layer Control...** and click in the **check box** to turn Carbeats back off.

Practice (You must do this exercise!)

Turn on the **Grid2000cells** layer on, look at the map, and then turn that layer back off. Turn the **Streets** layer on, look at the map, and leave Streets on.

Grid cells are very good for displaying information through color shading, in area or "choropleth" maps, as you will see a bit later. These grid cells are 2,000 feet on a side - a pretty coarse grid but one that lets you spot patterns when zoomed out. Sections and Carbeats are polygon themes, made up of connect-the-dots lines that form closed areas. Streets is a line layer, made of connect-the-dots lines. Streets has street centerlines in the US Census format called TIGER, and were obtained from *MapInfoData StreetPro, Enhanced Address Layer Edition*.

Map with Sections
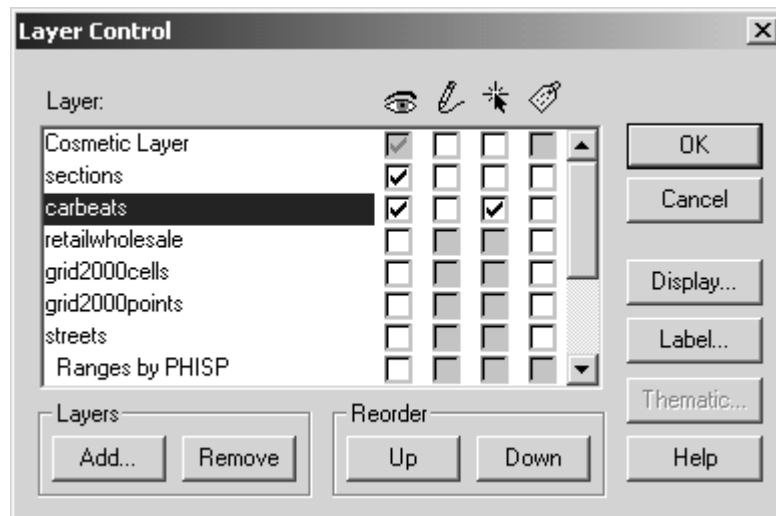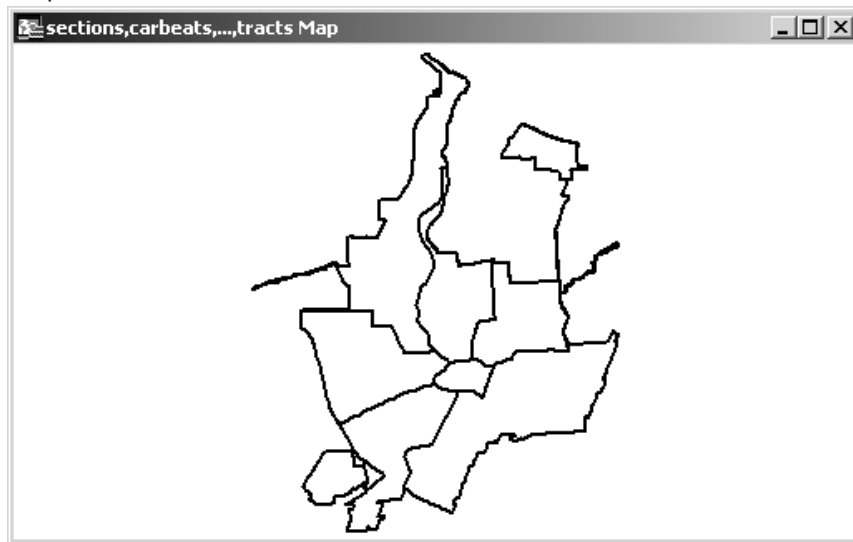
Map with Sections and Carbeats
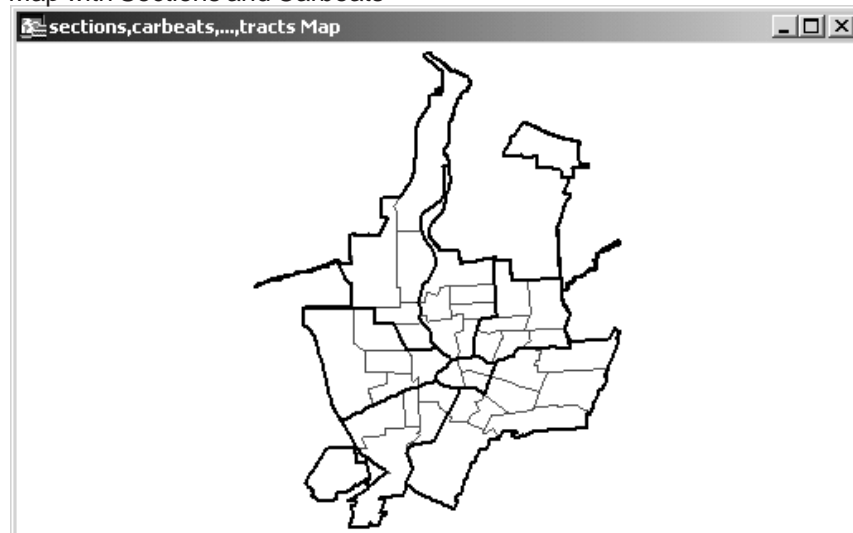
Navigate Around the Map

1. Click the **Zoom In button** ⊕ on the main toolbar and then click in the center of the map three times.

   This button enlarges the zoom width by a factor of two, and recenters the screen on the point where you held the cursor.

2. Click the **Grabber button** ✋ , click and hold anywhere on the map, drag a short distance, and release.

3. Click the **Layer Control button** ≥ on the main toolbar, click the rightmost check box opposite **Streets** (the box under the Label icon), and click **OK**.

   MapInfo labels as many streets as it can fit with street names.

4. Click the **Zoom Out button** ⊖ on the main toolbar and then click in the center of the map.

5. On the top menu, click **Map, View Entire Layer...**, accept the default choice ("sections"), and **click OK.**

   The map zooms out to show the entire map. Notice that many street names are suppressed. MapInfo is set not to let them overwrite each other.

Streets Zoomed in and with Labels
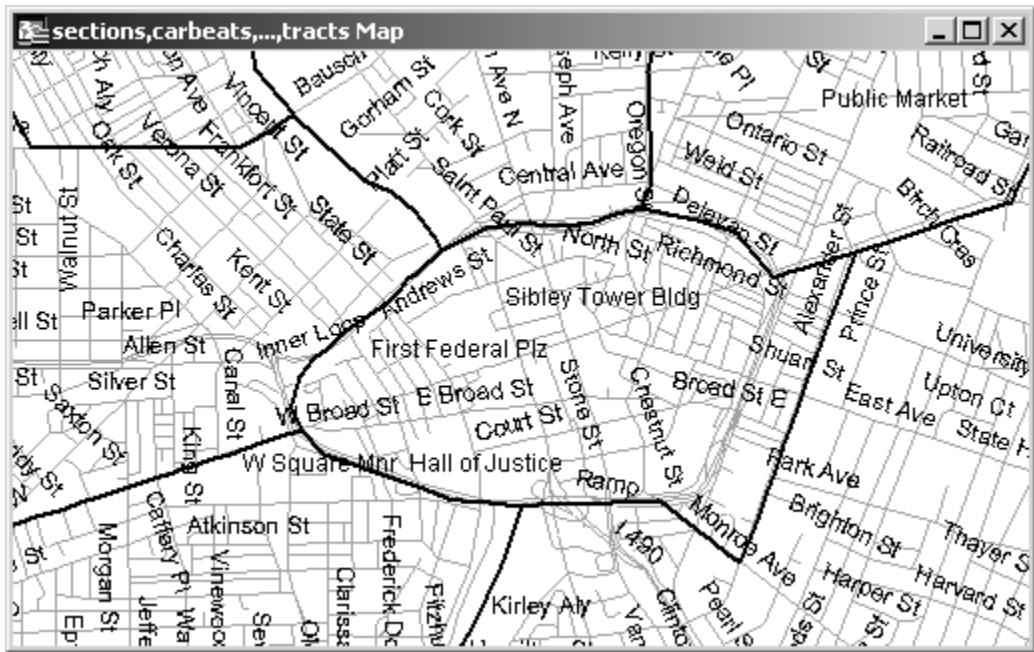
Navigate Between the Map and Its Data Table

1. Click **Window, New Browser Window...** on the top menu, click **Streets,** then **OK**.

   The Streets table opens. There is one record in this table for each street segment (which is generally one block long). Each street segment has several attributes. Starting in column 11 you can see street numbers, starting and ending, for the left and right sides of the street. This is part of the TIGER format. All in-between street number locations must be interpolated.

2. Scroll to the right in this table to see other attributes.

   When you address match police offense records to place them on the map in CrimeMapTutorial 2, MapInfo will use a sophisticated matching process (geocoding), searching attributes like Prefix, Name, and Type to find the offense street address and place a point on the street map.

3. Find the record for Weidner Rd. (9th row down). Click on the **small square** at the far left of the row.

   The row is "selected."

4. Click on the **x** in the upper right corner of the **table window** (not the MapInfo window) to close the table and restore the map.

   The table window is closed, but the record is still selected.

5. On the top menu bar, click **Map, Change View...** and in the zoom dialog box, change **Zoom** to **2** (mile) and click **OK**.

   The map zooms in. Change View gives you precise control of the map display scale, zoom width, and center coordinates of the screen.

6. On the top menu, click **Query, Find Selection**.

   The map centers on the street whose record you selected in step 3. MapInfo shows the selected feature on the map, Weidner Rd.

7. Click **Map, View Entire Layer, Sections**, and **OK**.

Practice:

Repeat the steps of this page and locate another street on the map, starting by selecting a street in the table.

streets Browser

	Street	FromLeft	ToLeft	FromRight	ToRight	ZIP_LEFT
☐	Old Beahan Rd	0	0	0	0	14624
☐	Beahan Rd	672	716	673	717	14624
☐	Beahan Rd	642	670	643	671	14624
☐	Airport Rd	0	0	0	0	14624
☐	Salem Park	0	0	0	0	14624
☐	Cherokee Cir	1	39	2	38	14624
☐	E River Rd	1,001	1,115	1,000	1,114	14623
☐	E River Rd	967	999	966	998	14623
■	Weidner Rd	1	63	2	62	14624
☐	Airport Rd	0	0	0	0	14624
☐	Salem Park	0	0	0	0	14624
☐	Cherokee Cir	41	51	40	50	14624
☐	Airport Rd	0	0	0	0	14624
☐	Salem Park	0	0	0	0	14624
☐	Cherokee Cir	0	0	0	0	14624

Selected row

sections,carbeats,...,tracts Map

Selected feature
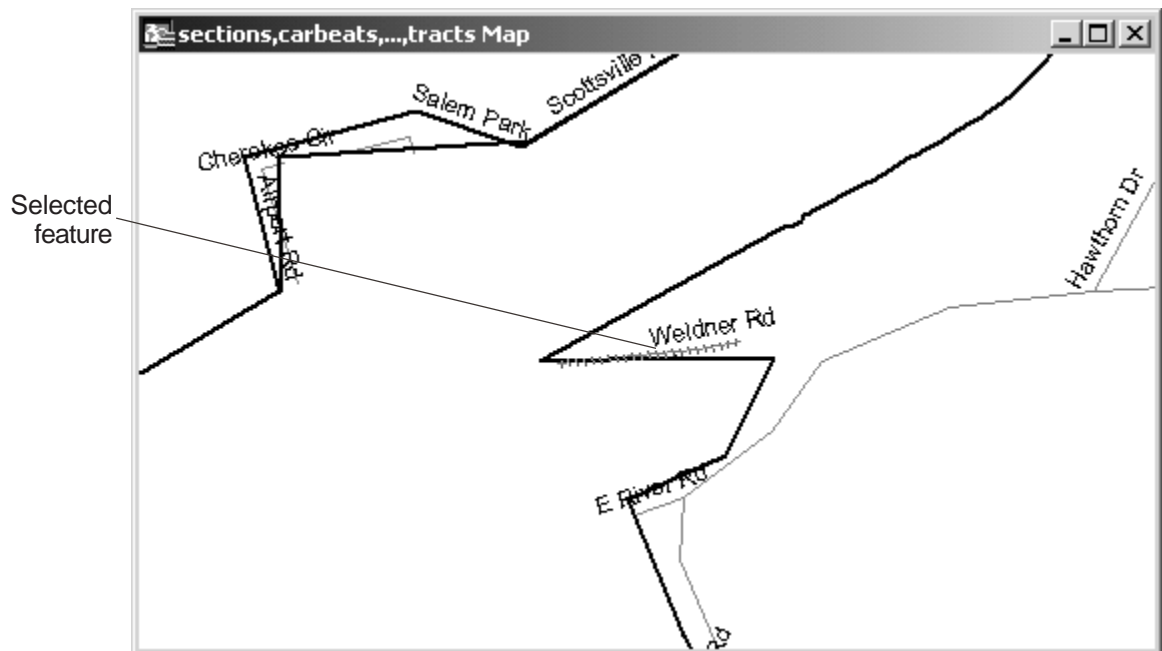
Set Label Display Characteristics For A Layer

1. Click **Map**, **View Entire Layer...**, and **OK**.

2. Click **Map, Layer Control...**, and click off checkboxes for **Streets**.

3. Click **Sections** and then click the **Label...** button in the layer Control window.

    The Label Options Dialogue opens. Here is where you decide which attribute you will use to label the map features, and where you set the style, color, positioning, visibility, and background of the labels.

4. At the top of Sections Label Options box that appears, look at the text box opposite "Label with". It should read "sectionnname." This verifies that **Sections** will be labeled with **SectionName**.

5. Leave the visibility and positioning unchanged, and click on the **Styles** font button. [Aa]

6. Change the font to **Arial Narrow** and the font size to **10**.

7. In the Effects option panel, click the box labelled **Bold.** Then click **OK** and **OK** again to return to the Layer Control window.

8. Click the **Labels** checkbox (the rightmost checkbox) in the **Sections** row and click **OK**.

    The section names are displayed as you set them. If you want to reposition a label, click the Select Tool in the Main toolbar, and click on the label with the pointer tool to create four grab handles. Then click, hold, drag the label to a new position, and release.

Practice:

Turn on the Carbeats theme and label the carbeats. When done, remove labels and click Carbeats off.

sections Label Options ☒

Label with: [SectionName ▼]

Visibility
- ⦿ On   ○ Off
- ○ Display within Range:
  - Min. Zoom: [0.000] mi
  - Max. Zoom: [100,000] mi

☑ Allow Duplicate Text
☐ Allow Overlapping Text
☐ Label Partial Segments
Maximum Labels: [   ]

Styles

Aa

Position
Anchor Point

Text Style ☒

Font: [Arial Narrow ▼] [10 ▼]

Text Color: [██████ ▼]

Sample
The quick brown fox jumps over the l azy dog.

Background
- ⦿ None   ○ Halo   ○ Box
- Color: [▼]

Effects
- ☑ Bold   ☐ Underline   ☐ Shadow
- ☐ Italic   ☐ All Caps   ☐ Expanded

sections,carbeats,...,tracts Map _ ☐ ☒

LAKE
GOODMAN
CLINTON
MAPLE
HIGHLAND
GENESEE
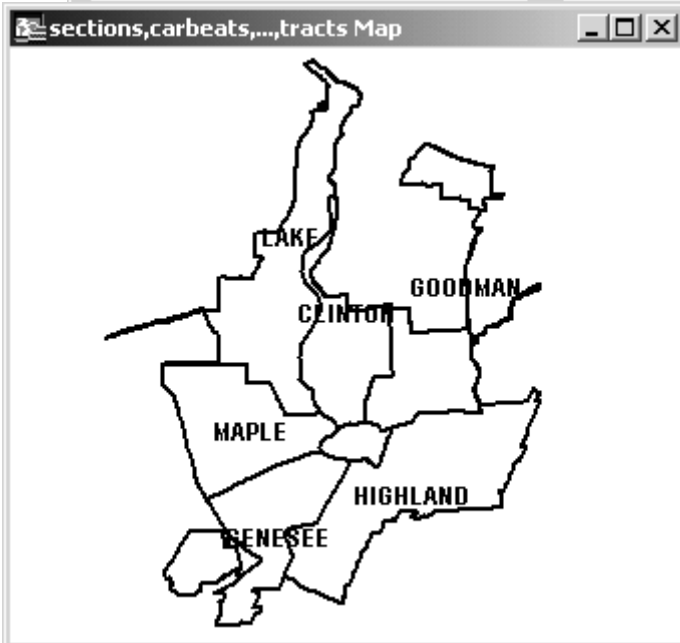
Identify Features in Layers

1. Click **Map**, **Layer Control...,** click off the labels for **Sections** and **Streets**, click **Streets** on, click the **RetailWholesale theme** on, and click **OK**.

    This is the third and last kind of layer that we will use, a point layer. We got the RetailWholesale data from an electronic yellow pages published on CD by PhoneDisc. The CD comes with latitude and longitude coordinates and standard industrial classification (SIC) codes. See the documentation folder for a listing of these codes. Here we have all retail and wholesale businesses (SIC Codes 5000 to 5999). A lot of these points are crime-prone land uses.

2. In the Main toolbar, click the **Zoom-in button**.

3. Click and hold down the cursor in the upper left corner of the **Clinton Section** (top center section), drag diagonally down and to the right to place a rectangle around Clinton Section, and release.

    MapInfo zooms into Clinton Section. If you made a mistake, click Map, View Entire Layer and try step 4 again. If you can't find Clinton, turn on the Section labels.

4. Click **Map, Layer Control...** and click the right-middle box (under the small black arrow icon) in the "retailwholesale" row to make RetailWholesale selectable.

5. Click the same boxes off for **Sections** and **Streets** and click **OK**.

6. In the toolbar, click the **Info button**.

    The mouse cursor becomes a small cross.

7. Click carefully on the **upper, right-most dot** of the RetailWholesale theme in Clinton Section.

    The Info Tool window opens. There are three establishments at that location.

8. Click on the first row, **Sammy's Appliance Service**, of the Info Tool window to view data for that establishment.

    Use the buttons at the bottom left to switch the three records for viewing.

9. Close the **Info Tool** window by clicking the X in its upper right corner. Click **Map, View Entire Layer..., Sections,** and click **OK**.

Practice:

Repeat the steps of this page for the Streets theme. Identify streets of your choice. When finished, be sure to do step 9 to clean up your view.

sections,carbeats,...,tracts Map

Rectangle to drag

sections,carbeats,...,tracts Map

Dot to click

Layer Control

Layer:	👁	✎	✳	🏷
Cosmetic Layer	☑	☐	☐	☐
sections	☑	☐	☐	☐
carbeats	☐		☐	☐
retailwholesale	☑	☐	☑	☐
grid2000cells	☐		☐	☐
grid2000points	☐		☐	☐
streets	☑	☐	☐	☐
Ranges by PHISP	☐	☐	☐	☐

OK

Layers
Add...   Remove

Reorder
Up   Down

Info Tool

NAME:	SAMMYS APPLIANCE SERVICE
ADDRESS:	1463 HUDSON AVE
ZIPCODE:	14621-1716
PHONE:	716-621-6070
LATITUDE:	43.1937
LONGITUDE:	-77.6005
SIC4:	5,064
SIC2:	50

<<   >>   List   **retailwholesale**

Display a Thematic Map

In this lesson you will look at thematic maps--maps that show variation along one theme or variable. In Tutorial 3 you will learn how to build thematic maps.

1. Click **Map**, **Layer Control...** , turn off the **retailwholesale** and **Street** layers, turn on the **Tracts** layer (scroll to the bottom of the list to find it), click **No** in the message box that appears, and click **OK**.

   A map of census tract boundaries appears for Rochester, NY.

2. Click **Map**, **Layer Control...** , turn on **Ranges by PHISP**, and click **OK**.

   The tracts are shaded from white to red.

3. If a legend has not appeared, click on the **Show/Hide Legend button** ▦ on the Main tool bar.

   A map legend appears, explaining what the colors signify. "PHISP" stands for Percentage Hispanic Population. The colors scheme used here is called monochromatic, with increasingly darker shades of the same color. This is a good color scheme for many variables, and photocopies nicely in black and white (to shades of increasing gray). You can purchase current-year estimates and five-year forecasts of several useful census variables at the tract and smaller block group levels from Claritas, Inc. (www.Claritas.com). Note that you can drag the legend window to a place where it does not hide the map.

Practice:

Turn off Ranges by PHISP and turn on another Ranges by…" additional layers. Look at each one (PBLACK is percentage balck population, MEDIANVAL is median income, PCRIME is crime-prone age group, and PELDERLY is percentage elderly).

The colors change, and the legend changes accordingly. Notice that if you turn on more than one, the topmost one hides the others. Notice that two of these legends use a dichromatic scale (two colors) to show standard deviations above and below the mean of the variable.

When you are through, turn off all the thematic layers. Close the legend window by clicking the legend button or clicking on the x in the upper right corner of the legend.

Percentage Hispanic Population (PHISP)
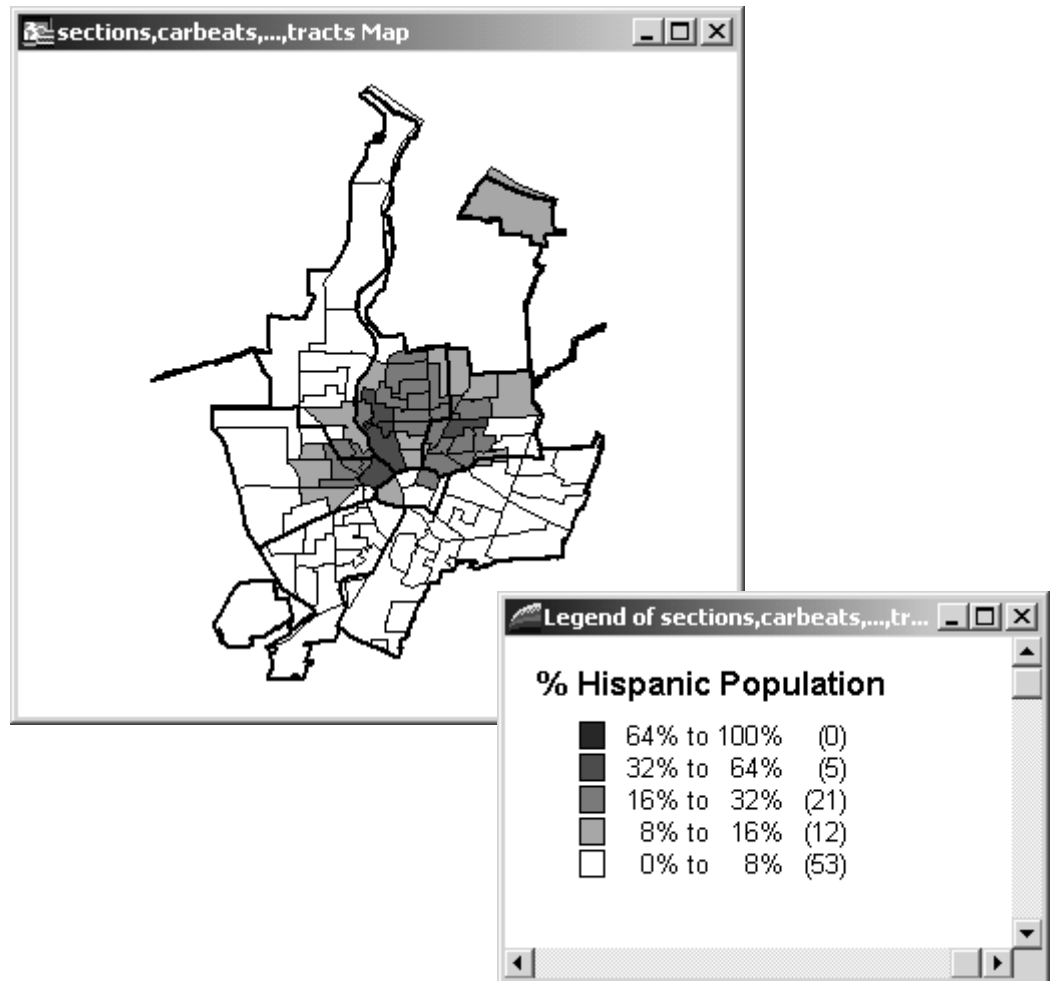
Use Crime Maps

Use an Early Warning Map View

1. Click **File, Close All,** and click **Discard** if a message box appears.

2. Click **File, Open Workspace...,** navigate to the **C:\CrimeMapTutorial\FinishedProducts** folder**,** and double click **CrimeMap19980430.**

   This is a MapInfo workspace that you will build in CrimeMapTutorials 2 and 3. It opens to an early warning system that helps identify crime pattern changes over the whole city. It shows the number of burglary offenses by 2,000-foot grid cell for the month of April 1998.

3. Click **Map, Layer Control...,** click off the **Ranges by BurglaryChange199804** theme, click on the **Ranges by Burglary199804 theme** on and off to see changes from 199803 to 199804.

   Focus on a section at a time, and you can see some interesting patterns of change. Better yet, the next map shows the changes directly. Note that MapInfo draws in order of the Layer Control list, from the bottom up, so when you click Burglaries 199804, it covers up Burglaries 199803.

4. Click **Map, Layer Control...,** click off the **Ranges by Burglary199804** and **Ranges by Burglary199803** layers, click on the **Ranges by ChBurgl199803to04** layer, and click **OK**.

   This theme has a bichromatic scale showing the difference between 199804 and 199803. Shades of red show heating up and shades of blue show cooling off. Click the Show/Hide button on the Main tool bar if the legend is not shpwing.

5. Click the **Zoom-in button** 🔍**,** drag a rectangle around the center of Clinton section, and release.

   MapInfo zooms into the desired area. The section squares close and a pin map of burglary incidents appears. Notice in the lower left of the view the zoom width has gone from 21.07 miles to a little under two miles. Zoom width is the distance between two points at opposite sides of the screen. We have set the section grids to turn off when the zoom width goes below five miles, and the streets and pin maps to turn off when the zoom width goes above five miles.

6. Click the **Info tool** button ℹ️.

7. Click on a red dot to get information on the corresponding criminal offense.

   The incident record appears. You can scroll through the other records by clicking on the >> button at the bottom if there is more than one record for the location.

Rectangle to drag

Burglary1998O4,sections,...,Streets Map

Legend

Burglary Changes 199804

- 17 and greater
- 9 to 16
- 5 to 8
- 2 to 4
- -1 to 1
- -4 to -2
- -8 to -5
- -16 to -9
- -17 or less

Burglary1998O4,sections,...,Streets Map

Point to click

Info Tool

CRNUMBER:	1998-116828
BEGDATED:	19,980,414
BEGTIME:	05:35
SHIFT:	1
CONTEXT:	BURGLARY
LOCTYPE:	COM-BUY/SELL/TRADE
ENT_POINT:	FRONT DOOR
ENT_TYPE:	OTHER
MODHOW:	
FORCELEVEL:	
GROUP:	BURGLARY
INCI_ADDR:	1062 CLINTON AV N
INCI_APT:	
OFF_DESC:	BURGLARY 3RD
S_ETH:	

<<   >>   List   **Burglary199804**

Use a Pin Map

1. Close the **Info Tool** window by clicking the **x** in its upper right corner.

2. Click **File, CloseAll.**

3. Click **File**, **Open Workspace...**, navigate to **C:\CrimemapTutorial\FinishedProducts**, click **PinMap19980430**, and click **Open**.

    The Four Weeks Ending 19980430 map opens, zoomed in to Clinton Section. This map is intended for use by uniformed officers. It has a selection of different crime types for the last four weeks (28 days) and can be further broken down to data by shift. Crimes that occurred within the last three days have larger symbols of the same shape as the earlier crimes. These maps can be printed just before roll call with the latest data (in Pittsburgh the police use 11"x17" color maps for a given precinct) and posted in the map room along with a printed report of the corresponding crimes sorted by street name.

4. Click the **Zoom-in tool** and drag a rectangle around **Carbeat 277**.

5. Click the **Info tool** button and click the **homicide point** (on the chest of the person icon).

6. Close the **Info Tool** window.

7. Close this workspace by clicking **File, Close All**, discarding any changes.
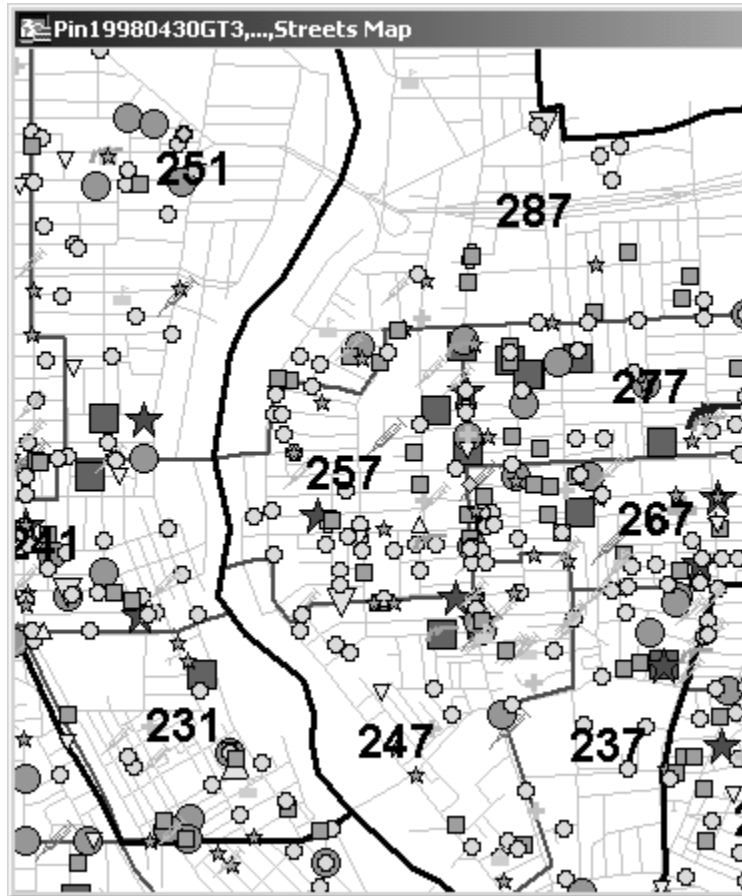
Homicide point

Offenses - Last 3 Days

★	ASSAULT	(35)
■	BURGLARY	(34)
●	DISTURBANCE	(153)
✎	DRUGS	(13)
△	FIREARMS	(1)
▽	GL-FIREARMS	(23)
🚶	HOMICIDE/MANS	(2)
✚	ROBBERY	(9)
◆	SEX/RAPE	(2)
▮	TRESPASS	(8)
⌐	WEAPON	(5)

Info Tool

CRNUMBER:	1998-134841
BEGDATED:	19,980,428
BEGTIME:	19:35
SHIFT:	2
CONTEXT:	MURDER
LOCTYPE:	RES-SINGLE FAM DWELL
ENT_POINT:	N/A
ENT_TYPE:	N/A
MODHOW:	
FORCELEVEL:	
GROUP:	HOMICIDE/MANS
INCI_ADDR:	30 WEAVER ST
INCI_APT:	
OFF_DESC:	MURDER 2ND
S_ETH:	N/A
S_HAIR:	
S_HEIGHT:	0
S_SEX:	M
S_RACE:	BLACK
S_DOB:	00000000
V_SEX:	M
V_RACE:	BLACK
V_ETH:	N/A
V_DOB:	00000000
LAWCODE:	125.25

<< >> List   **Pin19980430LT3**
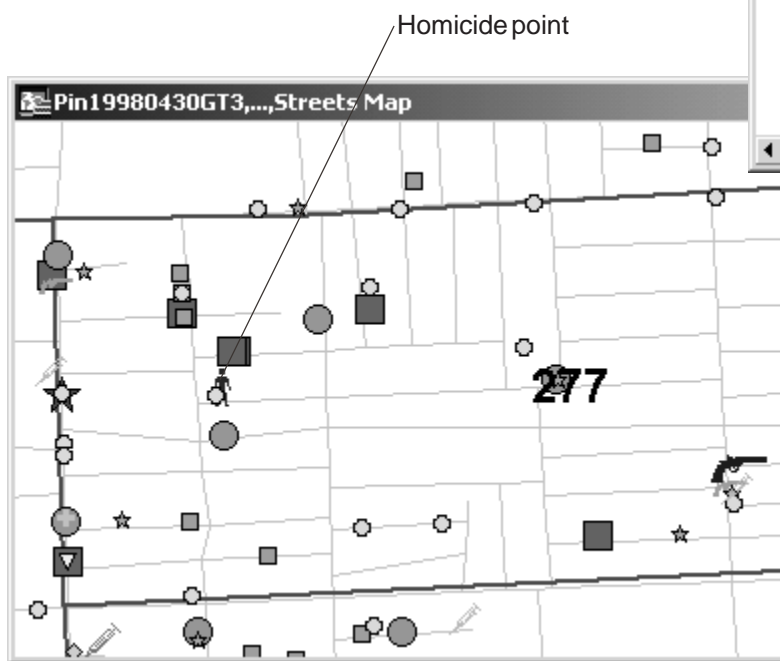
Print a Pin Map Layout

1. Click **File**, **Open Workspace...**, navigate to
    C:\CrimemapTutorial\FinishedProducts, click
    ClintonPinMap19980430, and click **Open**.

    This is a layout, for printing, of the 19980430 pin map zoomed to the Clinton Section.

2. Click **File**, **Page Setup**, **Landscape radio button**, and **OK**.

3. Click, **Print**..., change any printer settings as needed, and click
    OK.

4. Click **File**, **Close All**.

Clinton Section - 19980430

Offenses - Last 3 Days

★	ASSAULT	(35)
■	BURGLARY	(34)
●	DISTURBANCE	(153)
✎	DRUGS	(13)
△	FIREARMS	(1)
▽	GL-FIREARMS	(23)
🔫	HOMICIDE/MANS	(2)
✚	ROBBERY	(9)
◆	SEX/RAPE	(2)
■	TRESPASS	(8)
⌐	WEAPON	(5)

Offenses - 4 to 28 Days Old

★	ASSAULT	(191)
□	BURGLARY	(226)
○	DISTURBANCE	(780)
✎	DRUGS	(87)
△	FIREARMS	(2)
▽	GL-FIREARMS	(119)
🔫	HOMICIDE/MANS	(1)
✚	ROBBERY	(58)
◇	SEX/RAPE	(14)
■	TRESPASS	(52)
⌐	WEAPON	(19)
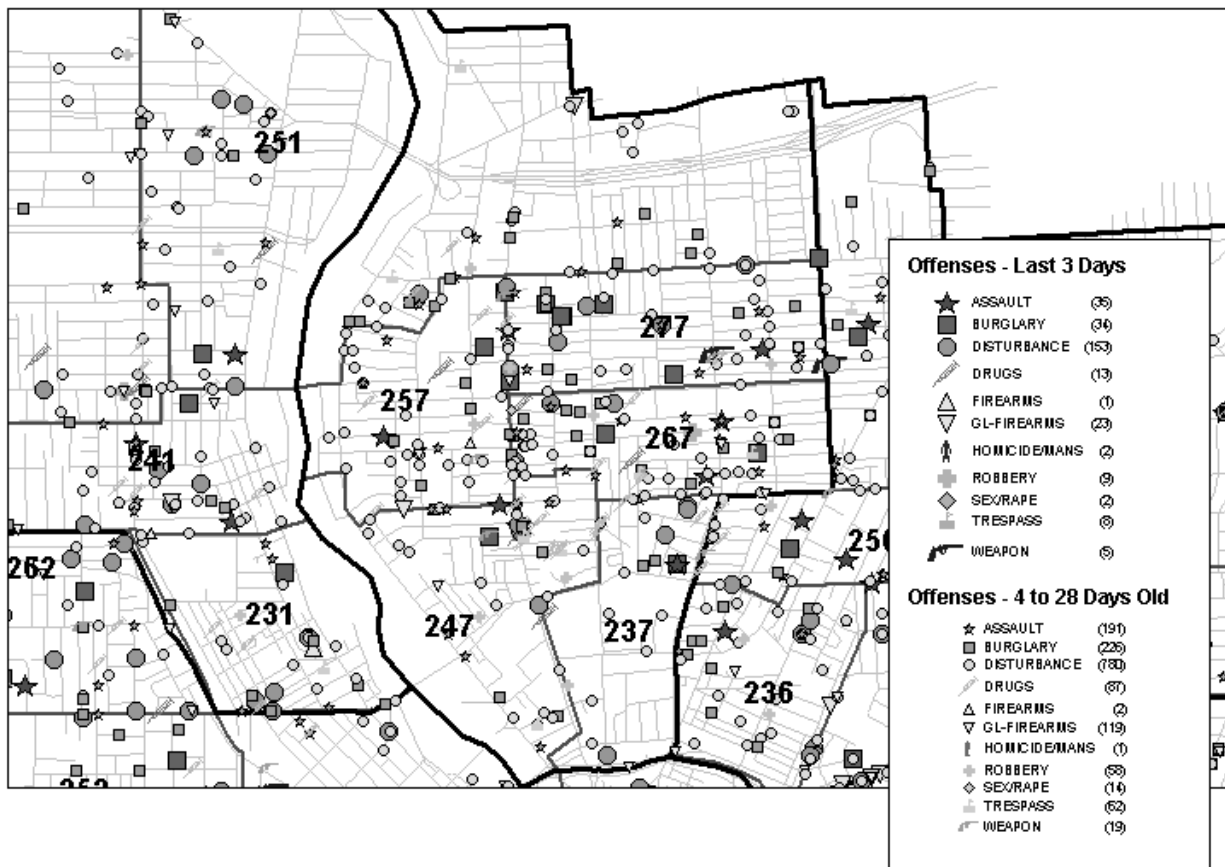
Make Ad Hoc Map Queries

Crime analysts often want to make maps or extract data for special purposes. They need to use a master file of all crimes over a long period of time. You will use such a file here, and make one in Tutorial 2. Here you will display all robberies reported in March 1998.

1.   Click **File, Open Workspace...,** navigate to **C:\CrimeMapTutorial\FinishedProducts**, click **AdHocQueries**, and click **Open**.

     The MapInfo workspace opens. Available are a map and corresponding table of all offenses for March and April 1998. Typically such a master file would have two to five years' of data. You should be able to get any information that you need from it.

2.   Click **Window, New Browser Window..., Master19980430, OK**, look at a few rows of the table and verify the contents, and close the browser window.

3.   Click **Query, SQL Select...**

     We want to find robberies that occurred between March 1 and March 31, 1998. In SQL terms, we want all records where group="robbery", and the date is >=19980301 and <=19980331. Notice the double quotes around "robbery". The quotes indicate a text string. This tells the software to look for that exact sequence of letters. The dates are numbers, so they are not in quote marks.

4.   In the **SQL Select window**, click in the **from Table** field, click the drop-list arrow in the **Tables field**, and click **Master19980430** in the dropped list.

5.   Click in the **where Condition** box, then key in the following: **group="robbery" and begdated >=19980301 and begdated <=19980331**

     You can type this in by hand, or you can use the Columns field to find the column names and the Operators field to find the logical operators. Notice the word AND between each condition. ANDs require that a record meets all three conditions to be selected.

6.   Click the **Verify** button,**OK**, and **OK** again to run the query.

     A table with 94 records appears (see lower left of screen) -all the records that meet the three conditions. Close the table, and the map appears, with the 94 locations highlighted.

7.   Close the browser window and click **Query, Unselect All.**
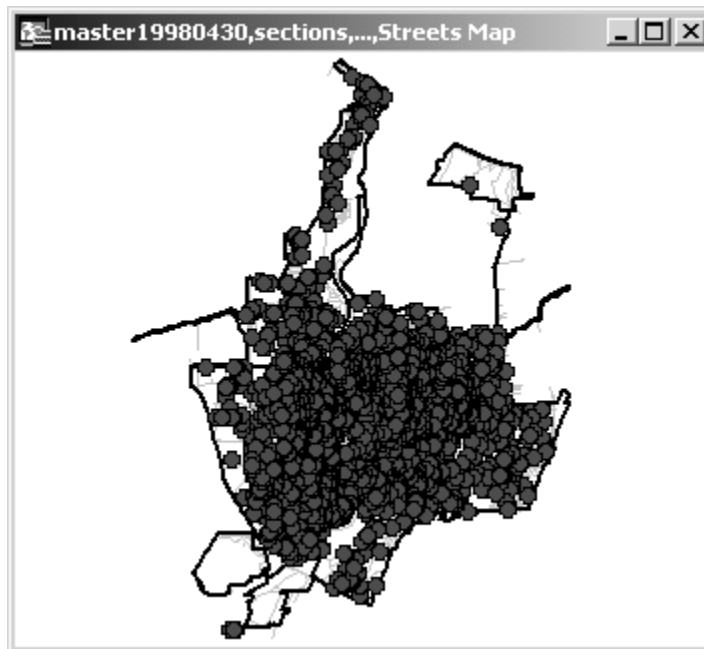
Make More Complicated Queries

Let's focus on the robberies from the same month that occurred in convenience stores. Location is given in the data element called "Loctype".

1. Click **Query, SQL Select...**

   The dialog box opens, and the previous query reappears.

2. Click in the **where Condition** box at the end of the old condition and without erasing anything add:

   and loctype="com-convenience stor"

   Notice that the final "e" is dropped, and don't forget the double quotes.

3. Click **Verify**, then click **OK**, and **OK** again to run the query.

   You will see that there were five robberies of convenience stores in March 1998.

4. To convert the selection to a new map layer, click **File**, **Save Copy As...**, **Query2** (or the query with the largest number), **Save As...**, navigate to the DataIntermediateTables folder, key in **RobberiesConvenienceStores199803** in the **File name** field, and click **Save**.

5. Click **File**, **Open Table...**, click **RobberiesConvenienceStores199803** and **Open**.

6. Click **Map**, **Layer Control...**, click off **Master19980430**, and click on **RobberiesConvenienceStores19980430**, and **OK**.

7. Click Map, Layer Control..., click on **Master19980430**, and click off **RobberiesConvenienceStores19980430**, and **OK**.

8. Click **Query, Unselect All** and close any open data browsers.

Practice:

(1) Try making a query for Assaults in or around bars (Com-Bars) in March 1998. All criteria are connected with ands. There are nine offenses meeting these criteria.

(2) Also try a query for Assaults in March 1998 with suspects who are male and of Hispanic origin between 18:00 and 22:00 hours. Use all "ands" to connect criteria, and put the times in double quotes. This is a tough one! There are four assaults that meet the criteria.

(3) Finally, try a query for [Group] = GL-FIREARMS (grand larceny firearms), March 1998, and commercial location types. There are many commercial location types, like COM-AMUSEMENT CTR, COM-ATM, etc. To include them all in your query, use: Loctype like "COM%". The % is a wildcard character that selects any values starting with COM, with zero or more additional characters afterwards. There are 27 offenses satisfying the query.

SQL Select

Select Columns: `*`

Tables ▼
Columns ▼
Operators ▼

from Tables: `master19980430`

Aggregates ▼

where Condition: `group="robbery" and begdated>=19980301 and begdated<=19980331 and loctype = "com-convenience stor"`

Functions ▼

Group by Columns:

Order by Columns:

Save Template

into Table Named: `Selection`

Load Template

☑ Browse Results

OK   Cancel   Clear   Verify   Help

Query3 Browser

CRNUMBER	BEGDATED	BEGTIME	SHIFT	CONTEXT	LOCTYPE
1998-069510	19,980,305	17:54	2	ROBBERY	COM-CONVENIENCE STOR
1998-075372	19,980,310	22:28	3	ROBBERY	COM-CONVENIENCE STOR
1998-077731	19,980,312	22:21	3	ROBBERY	COM-CONVENIENCE STOR
1998-083322	19,980,317	22:29	3	ROBBERY	COM-CONVENIENCE STOR
1998-087371	19,980,321	07:00	1	ROBBERY	COM-CONVENIENCE STOR

RobberiesConvenienceStores,...,Streets Map
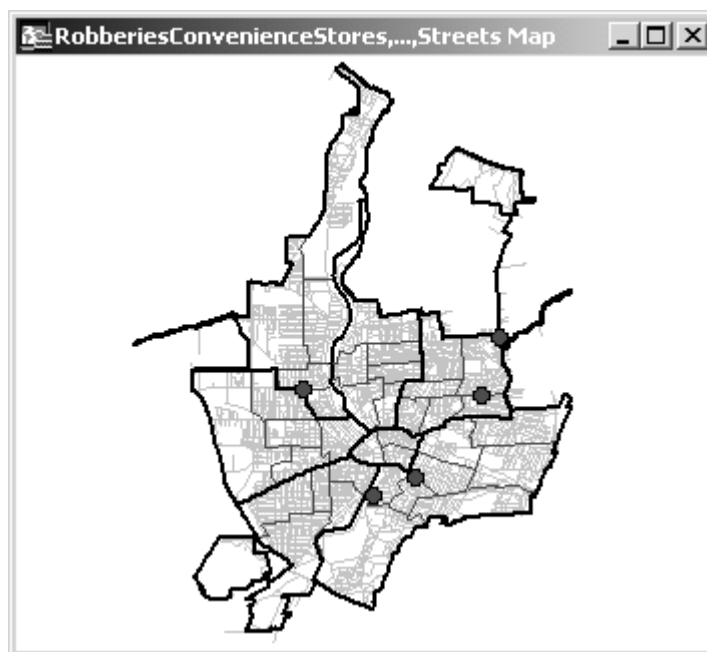
Make Queries Using Multiple Tables

Next, you'll learn new concepts for making selections based on multiple tables: "table.attribute" notation (sometimes called "dot notation"); the ".obj" attribute, which is part of every table that can be mapped; and spatial query operators: Contains, Contains Entire, Within, Entirely Within, and Intersects. Your assignment is to find all the assaults in the Downtown Section.

1.   Click **Query**, **SQL Selec**t...**,** and the **Clear button**.

2.   Click the **drop-list arrow** in the **Tables field**, then click **Master19980430**.

3.   Click the **drop-list arrow** in the **Tables field** again, then click **Sections**.

 Look at the text that appears automatically in the "where Condition" field: master19980430.obj within sections.obj. **.Obj** refers to a graphic object--that is, what you see on the map. "Master19980430.obj" refers to the red dots that locate crime incidents. "Sections.obj" refers to the boundaries that define the police sections. Notice also the spatial operator "within". SQL Select is being told to find all incidents that are located within sections. By itself, this is not very useful, but it is a critical piece of our assignment.

4.   Click in the **where Condition field**, move the cursor to the end of the text, key in a space, the word "and", key in a space, click the drop-list arrow in the **Columns field**, scroll down the resultant list and click **sections.SectionName**.

5.   In the where **Conditions field**, after "sections.SectionName" key in the following: **="Downtown" and**

 The where Condition should now read:

Master1998.obj within sections.obj and sections.SectionName="Downtown" and

6.   Key in a space, click the drop-list arrow in the **Columns field**, scroll up the resultant list and click **master19980430.GROUP**, and key in **="Assault"**.

The complete Where Condition should read:

master1998.obj within sections.obj and sections.SectionName="Downtown" and master19980430.GROUP="Assault"

We are asking for all incidents which are assaults and which occurred in the Downtown Section. Everything else will be excluded.

7.   Click **Verify**, **OK**, and **OK** again to run the query.

21 records should appear in the table.

8.   Close the browser window and click **Query, Unselect All** and close the table.

SQL Select ✕

Select Columns: `*`

from Tables: `master19980430, sections`

where Condition: `master19980430.Obj Within sections.Obj and sections.SectionName = "Downtown" and master19980430.GROUP = "Assault"`

Group by Columns:

Order by Columns:

into Table Named: `Selection`

☑ Browse Results

Tables ⬇
Columns ⬇
Operators ⬇
Aggregates ⬇
Functions ⬇

Save Template
Load Template

OK   Cancel   Clear   Verify   Help

Query4 Browser _ □ ✕

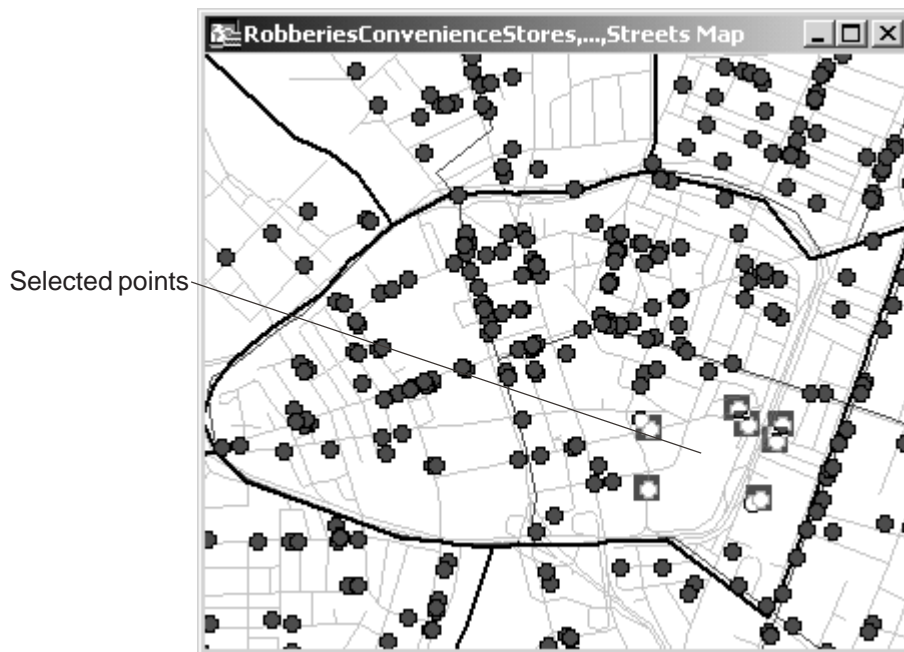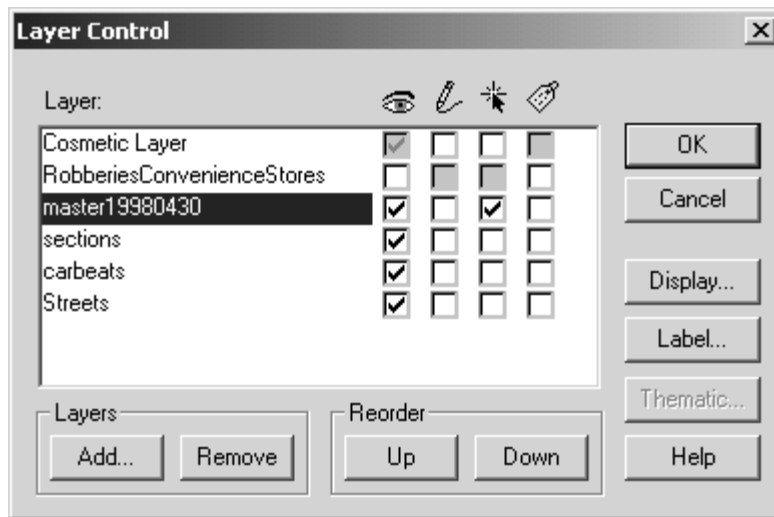|	CRNUMBER	BEGDATED	BEGTIME	SHIFT	CONTEXT	LOCTYPE
■	1998-104469	19,980,403	20:50	3	ASSAULT	OUT-STREET/SIDEWALK
■	1998-106067	19,980,405	01:57	3	ASSAULT	COM-RESTURANT
■	1998-106808	19,980,405	22:00	3	ASSAULT	RES-MULTI FAM DWELL
■	1998-108682	19,980,407	14:46	2	ASSAULT	OUT-STREET/SIDEWALK
■	1998-110312	19,980,408	15:30	2	ASSAULT	OUT-STREET/SIDEWALK
■	1998-111230	19,980,409	13:50	2	ASSAULT	OUT-STREET/SIDEWALK
■	1998-113193	19,980,410	02:00	3	ASSAULT	OUT-STREET/SIDEWALK
■	1998-115766	19,980,413	10:45	1	ASSAULT	RES-MULTI FAM DWELL
■	1998-115959	19,980,413	10:45			
■	1998-121777	19,980,417	23:50			
■	1998-125651	19,980,421	13:50			
■	1998-128153	19,980,408	16:10			
■	1998-129809	19,980,424	14:19			
■	1998-066094	19,980,302	02:00			
■	1998-075929	19,980,311	11:39			

RobberiesConvenienceStores,...,Streets Map _ □ ✕

Make Spatial Queries

SQL Select is one way to query the data base select records of interest. MapInfo also gives you other ways to query the map directly (a spatial query, as opposed to an attribute query).

The Select Arrow-Selecting Things One at a Time

1. Click **Map**, **Layer Control...**, and observe that only master19980430 has its third checkbox on (left to right), and thus is selectable.

2. Click **Cancel**.

3. Click the **Zoom-in button** 🔍 and zoom into the Downtown section..

4. Click the **Select Arrow** ↖, then place the tip of the arrow on a red dot, and click again.

    The dot is highlighted by a red square, indicating that it is selected.

5. Hold down the **shift key** and click on a few more.

    Now several are selected.

6. In the top menu bar, click **Window, New Browser Window..., Selection, OK.**

    Now you see the data records for the points you have selected from the map.

Selected points

CRNUMBER	BEGDATED	BEGTIME	SHIFT	CONTEXT	LOCTYPE
1998-121279	19,980,417	08:30	1	LARCENY	COM-BUSINESS OFFICE
1998-132612	19,980,426	21:45	3	ROBBERY	OUT-PARKING LOT
1998-066581	19,980,302	23:25	3	BURGLARY	PAC-GOVERNMENT OFF
1998-079115	19,980,314	00:05	3	DOMESTIC OFF.	RES-MULTI FAM DWELL
1998-098947	19,980,330	18:27	2	N/A	
1998-099598	19,980,331	07:30	1	ASSAULT	RES-MULTI FAM DWELL
1998-119552	19,980,329	12:30	2	OTHER	COM-BAR

Query5 Browser

Selecting Features within a Rectangle

1. Close the browser window and click the **Unselect All button** ⊗ on the Main tool bar.

2. Click on the **Marquee Select button** ▣ on the Main tool bar.

3.   Move the cursor onto the screen.

    The cursor changes to a pointing finger.

4. Hold the mouse button down and drag the cursor diagonally across the screen.

    Notice the rectangular dashed line that forms.

5. When the rectangle encloses several dots, release the mouse button.

    All the crime incidents in the rectangle are highlighted and selected.

6. Click the **Unselect All button** ⊗ on the Main tool bar.

7. Click **File, Close All**, then **File, Exit**.

End of CrimeMapTutorial 1

Selection rectangle