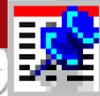


Tutorial



PIN
MAPPING

Pin Mapping



with

TNTmips®

TNTedit™

TNTview®

Before Getting Started

Visualization of point locations directly from database materials is a very powerful tool in TNTmips® and TNTview®, particularly when the information is frequently changed. Each location mapped can be represented as a simple point, a symbol, or as a pie chart or bar graph. Databases for pinmaps can be in TNTmips' internal format or in some external format supported by direct linking or by Object Linking and Embedding, Database (OLE DB) or the older Open Database Connectivity (ODBC). Any table that contains X and Y coordinate fields in each record can be used for pin mapping.

Prerequisite Skills This booklet assumes you have completed the exercises in the *Displaying Geospatial Data* and *TNT Product Concepts* tutorials. Those exercises introduce essential skills and basic techniques that are not covered again here. Please consult these booklets for any review you need.

Sample Data The exercises presented in this booklet use sample data distributed with the TNT products. If you do not have access to a TNT products DVD, you can download the data from MicroImages' web site. The exercises in this booklet use objects in the GSPINMAP and UNTDSTAT Project Files in the PINMAP directory of DATA. Objects in Project Files in the CB_DATA directory are also used. Make a read-write copy on your hard drive of the sample data so display parameters can be saved when you use these objects.

More Documentation This booklet is intended only as an introduction to pin mapping. Consult the Technical Guides and tutorial booklets on MicroImages' web site for more information.

TNTmips Pro, TNTmips Basic, and TNTmips Free TNTmips comes in three versions: TNTmips Pro, TNTmips Basic, and TNTmips Free. If you did not purchase the professional version (which requires a software license key), you are using TNTmips Free or TNTmips Basic, which limit the size of your project materials. Pin Mapping is available in TNTmips, TNTedit, and TNTview. Pinmaps can be used with TNTatlas, but they can't be created while running one. All exercises in this booklet can be completed in TNTmips Free using the sample geodata provided.

Merri P. Skrdla, Ph.D., 4 December 2013
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You can print or read this booklet in color from MicroImages' web site. The web site is also your source of the newest tutorial booklets on other topics. You can download an installation guide, sample data, and the latest version of TNTmips Free.

<http://www.microimages.com>

Welcome to Database Pin Mapping

The ability to visualize database information directly is a very powerful tool—it means the information can be updated as often as needed, even during the display process, and the updated locations and information can be viewed immediately. Because TNTmips supports OLE DB and ODBC, as well as direct linking to dBASE IV, FoxPro, ARC/INFO, Oracle, and Oracle Spatial database formats, you can manipulate databases in their native software and view the updated results in the TNT products without any additional steps. Any table that contains X and Y coordinate fields in each record can be used for pin mapping.

The point locations in the database table can be represented in a variety of ways: as symbols or as open or filled boxes or circles. The symbols can be from the standard set that comes with the TNT products, geotagged digital photo thumbnails, or symbols you design using the Symbol Editor, which is accessible in any process that lets you assign symbols for display. You can also create pie charts or bar graphs that represent the relative values for several attributes at the point location.

Even with elaborate symbols selected to mark point locations, you generally need a reference layer to provide a context for your pin map. The reference layer can be satellite imagery, vector polygons, or other layer types that reside locally or on the Internet.

There are two parts to a pinmap: the graphic depiction of the point locations and the other associated information in the database table. You can view the database records for the pinmap as single records or in tabular form. When using the tabular view, you can choose to see all records or only the records related to currently selected pins. You can also update the information for existing pins or add records that will place new pins on the map. These changes are immediately reflected in the display.



Vocabulary: A **database pinmap** is a visualization of a number of point locations represented by spatial coordinates in a database table. The pinmap derives its name from the wall-mounted counterpart where pins in a map represent points of interest.



STEPS

- launch TNTmips
- copy the sample data files for this booklet to your hard drive
- select Main / Display from TNT's menu and open an empty 2D display
- choose Options / View Options (Display Manager), and turn on the *Default to redraw primary views after any change* choice (View panel)

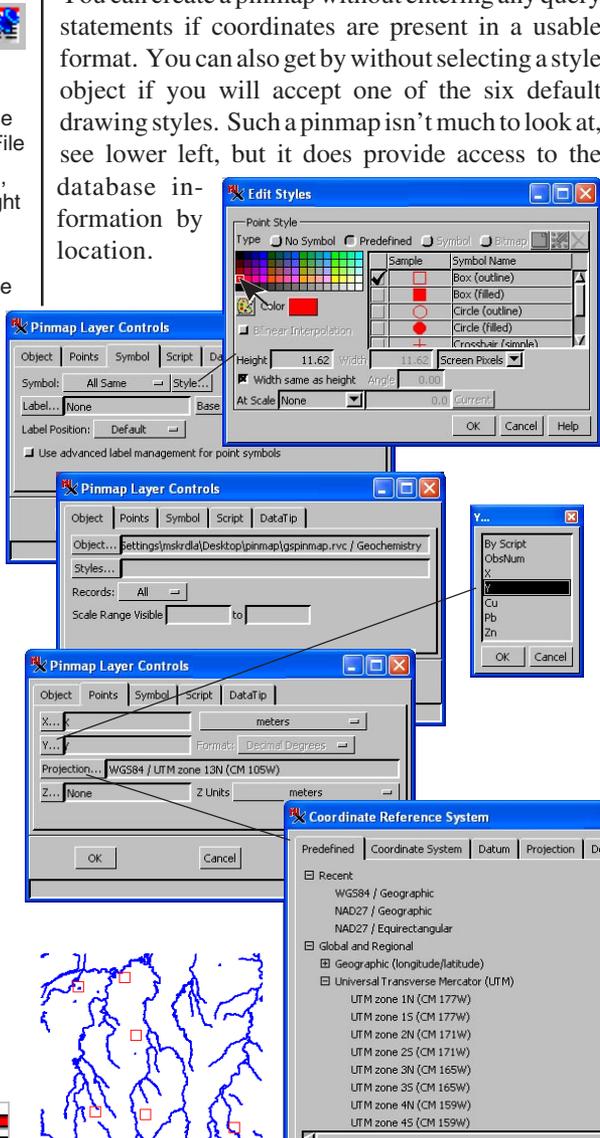
Pages 4–10 provide instruction for relatively simple pin maps. The remaining exercises take you through more complex pin mapping concepts, such as pie charts and bar graphs, label positioning, pin selection, and geotagging digital photos.

Simplest Possible Pinmap

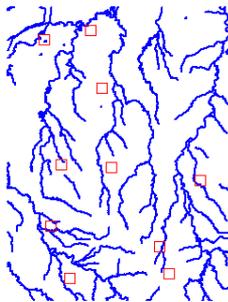
STEPS

- click on the Add Database Pinmap icon and select the GEOCHEMISTRY table from the GEOCHEM_CB database in the GSPINMAP Project File
- click on the Symbol tab, then on [Style] to the right of the Symbol option menu
- click on the red tile in the color palette then [OK]
- click on the Points tab, then on [X], then on X in the list, and [OK]
- click on [Y], then click on Y, and [OK]
- click on [Projection], then expand the Universal Transverse Mercator (UTM) list (under Global and Regional on the Predefined tab), select UTM zone 13N (CM105W), and click [OK] in the Coordinate Reference System window and [OK] in the Pinmap Layer Controls

You can create a pinmap without entering any query statements if coordinates are present in a usable format. You can also get by without selecting a style object if you will accept one of the six default drawing styles. Such a pinmap isn't much to look at, see lower left, but it does provide access to the database information by location.



- pinmap without reference layer
- click on the Add Objects icon (Display Manager), and select HYDROLOGY from the CB_DLG Project File in the CB_DATA data collection

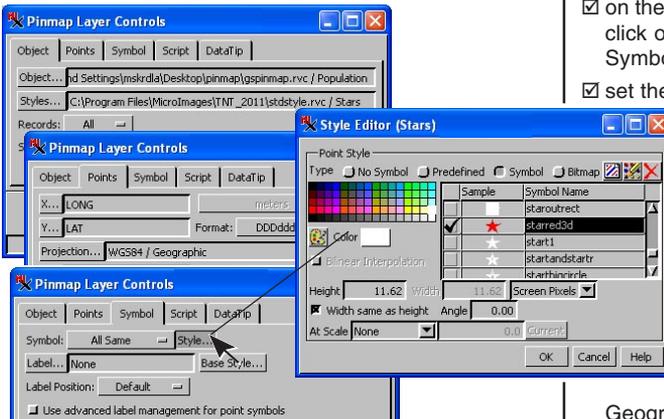


A reference layer is almost necessary with pinmap display to provide a context for what you are viewing.

Coordinate Formats and Symbols

The format in which Latitude / Longitude coordinates are expressed must be designated. TNTmips supports 25 different formats. Select the format used from the option menu on the Points panel (for the CAPITALS database, millionths of a degree). If degrees, minutes, and seconds are expressed in separate fields, you can convert the coordinates to a usable format with a script.

A style object is a collection of drawing specifications for vector, shape, CAD, TIN, and pinmap objects. These specifications include such factors as color, size, and assignment of symbolic representation. Symbols, line patterns, and fill patterns are also stored in style objects. You need to select a style object before symbols become an option for the All Same drawing style.



* For future reference
STDSTYLE.RVC is also in the directory on your drive where the TNTmips executables are found.

STEPS

- right-click on the pinmap layer in the Display Manager and choose Remove Layer
- click on the Add Objects icon, and select STATES from the UNTDSTAT Project File
- click on the Add Database Table Pinmap icon and select the POPULATION table from the CAPITALS database in the GSPINMAP Project File
- click on [Styles] and select STARS from the SYMBOLS folder in the STDSTYLE Project File*
- on the Symbol panel, click on [Style] for the Symbol
- set the Point Style to Symbol
- select STARRED3D, then click [OK]
- on the Points panel click on [Projection], then on the Coordinate System tab, and choose

Geographic 2D: longitude, latitude (degrees), and click [OK]

- set the X field to LONG, the Y field to LAT, and the format to DDDddddd
- click [OK] in the Pinmap Layer Controls
- click on the Save Display icon and create a STATECAP group object

Selection and Style By Script

STEPS

- ☑ choose Display/ Close, then choose Empty 2D from the New icon 
- ☑ click on the Add Database Table Pinmap icon and select the database table under the ARTIFACTS object* from the GSPINMAP Project File 
- ☑ click on the Symbol tab, click on [Style], and set the Point Type to Circle (filled)
- ☑ click on [OK] in the Point Style Editor window, then set the Symbol option menu to By Script
- ☑ click on the Points tab, click on [X...], and select EASTING
- ☑ click on [Y...], and select NORTHING
- ☑ click on [Projection...], expand the UTM list, and select UTM Zone 16N
- ☑ click on the Script tab and, in the query specification field, type the text exactly as below[§]

```
if (DATABASE.FREQUENCY > 39)
  DrawColor$ = "cornflower blue";
else
  DrawColor$ = "sea green";
return DATABASE.FREQUENCY > 19;
```

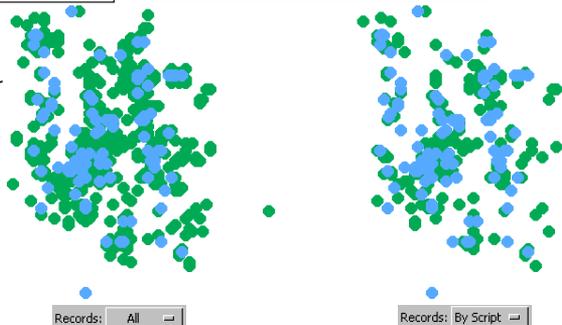
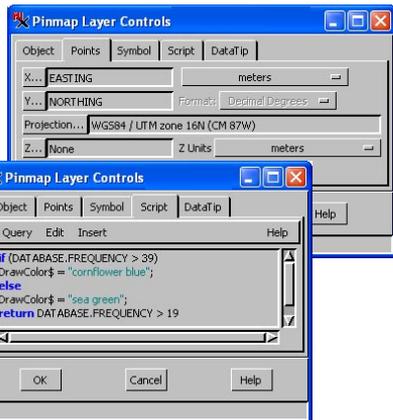
- ☑ click OK and note the number of points drawn
- ☑ return to the Pinmap Layer Controls window, click on the Object tab, and set the Records option to By Script
- ☑ click [OK]

[§] You may be able to copy this text and paste it into the query field.

Record selection, symbol assignment, labels, and coordinates can all be specified in a single script. The corresponding option also must be set to By Script for the relevant query statements to be used, as shown by the initial display in this exercise. The “return” statement at the end of the script means that only those records with a FREQUENCY greater than 19 will be displayed when the record selection method is set to By Script.

You can specify drawing color using any color name found in the RGB.TXT reference file or by supplying percent red, green, and blue (separated by spaces). In either case the color specification in the DrawColor\$ = statement must be in quotes. If shape and size are not specified in the query, the last settings for All Same are used.

* The points in the ARTIFACTS object represent a subset of the data collected for the Sayil Archeological Project (Michael P. Smyth and Christopher D. Dore, Principal Investigators).

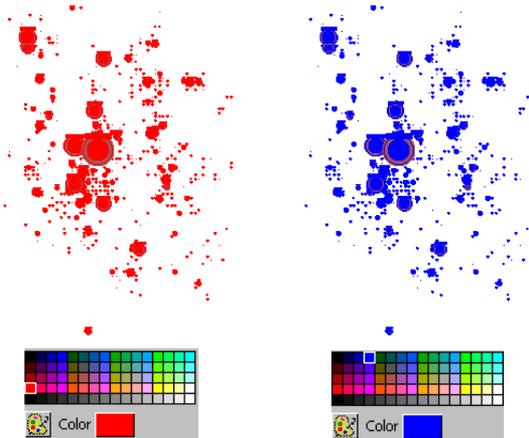


Symbols and Size By Script

You can specify a symbol from a selected style object either by the symbol name or the style name. If the symbol in question uses elements of variable color, the actual color is specified by the style if a style is selected or by the color last chosen for All Same symbol display if only a symbol name is specified.

You need to include scaling information in the query if you specify the symbol by its name. Scale information is included as part of the style definition and, therefore, need not be in the script if a style name is specified. The script in this exercise uses one of the field values to determine the scale so that locations where a greater number of artifacts were found are represented by larger symbols.

The symbol name must be entered exactly as it appears in the style object. In situations where you are not sure of a name or its capitalization, set the Symbol option menu to All Same and click on the Specify button*. Then set the Point Style Type to Symbol (this choice is not active if you don't have a style object selected), and check the list of symbols to the right of the color palette. Remember to set the Symbol option back to By Script.



STEPS

- return to the Pinmap Layer Controls window and click on [Styles] on the Object panel
 - select the STYLECERAMIC object from the GSPINMAP Project File
 - click on the Symbol tab and click on [Style] at the right of the Symbol option menu
 - click on the red tile in the color palette then on [OK]
- 
- choose Query / New on the Script panel and type (or paste) in the text exactly as below

```
Symbol$ = "ceramic";
XScale = (DATABASE.FREQUENCY / 50);
YScale = XScale;
DrawSymbol = 1;
return (DATABASE.FREQUENCY >= 25);
```

- click [OK], and observe the style, distribution, and size of symbols
 - return to the Pinmap Layer Controls window
 - click on [Style] in the Symbol panel
 - click on the blue tile in the color palette then on [OK]
- 
- click [OK] in the Pinmap Layer Controls window

* Assigning a style in a script requires you to be even more familiar with the style object because, at this point, you have direct access only to the list of symbol names.

Symbol Angle and Multiple Pins

STEPS

- ☑ choose Display / Close then click on the Open Display icon  and select the SCHOOLS group from the GSPINMAP Project File
- ☑ click on the Add Database Table Pinmap icon, and select the MAYORS_RUN table under the SCHOOLS database object in the GSPINMAP Project File 
- ☑ click on the Symbol tab and set the Symbol option menu to By Script
- ☑ type the text exactly as at the right on the Script panel in the Query Specification field
- ☑ click [OK]
- ☑ repeat steps 2 and 3, then change the query so DrawColor\$ = "Green" Angle = 0 and XScale = Mayors_Run._1996 / 10
- ☑ click [OK]
- ☑ repeat steps 2 and 3, then change the query so DrawColor\$ = "Blue" Angle = 310 and XScale = Mayors_Run._1997 / 10
- ☑ click [OK]

Each database record can produce only one pin in the pinmap, so to look at information for one location on several dates, it is simplest to have multiple pinmap layers, each with a different drawing style (or you could use a pie chart or bar graph, which are described later in this booklet, if that seems appropriate). To prevent pins in different layers from obscuring one another, assign a different angle to the symbols used in each layer.

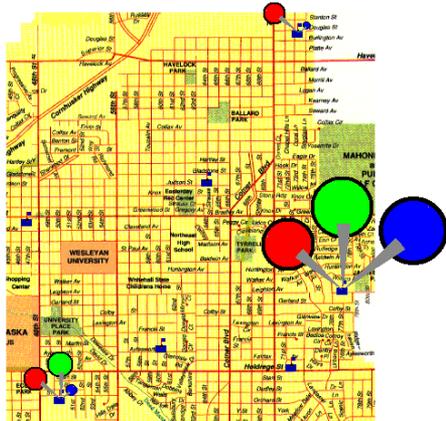
This exercise maps the number of participants from each of seven schools in a 1-mile foot race in three successive years. The years are distinguished both by pin angle and color (all red pins, which are also rotated 50° counter clockwise, represent the 1995 participants). The size of each pin is determined by

```
Symbol$ = "MapPinN2";
DrawColor$ = "Red";
Angle = 50;
DrawSymbol = 1;
XScale = Mayors_Run._1995 / 10;
YScale = XScale;
MapScale = 40000;
```

the number of runners from the school located at the point of the pin. When pinmap locations are represented by

symbols, the "hot spot" is placed at the coordinate location. For many symbols, such as those on the preceding pages, the hot spot is in the center of the symbol. For these map pin symbols, the pin point is a more logical choice.

The same database object appears four times in this group, once to identify school locations with a representative symbol, and once for each year in which race participation is being mapped.



Simple Labels

You can use the value of any field in the database to label the pins. You can also enter a query to generate the labels. The default position for labels is to the right of the pin. You can, however, position labels wherever you want around the pin using the option menu on the Symbol panel.

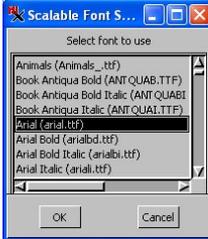
You need to add the labels to only one of the database pinmap layers in this example since the pins represent the same location in each layer. You can, however, have labels in different layers at different sizes if you choose. More advanced labeling features are described in later exercises (*Multiple Line Labels* and *More About Labeling*).

STEPS

- click on the Layer Controls icon for the **SCHOOLS** pinmap layer
- click on the Symbol tab, then on [Label], and select **School** in the Label window

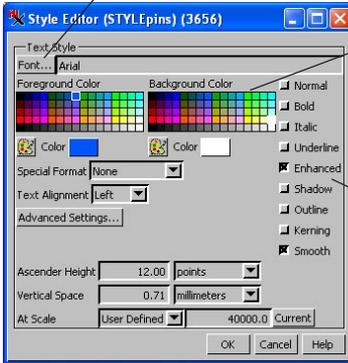


- click on [Base Style], then on [Font] in the Text Style Editor window, and select **Arial.ttf** (or a similar font)



- set the Ascender Height to 12 Points at a map scale of 40000 with At Scale set to User-Defined

Select the font from the scrolling list that opens.



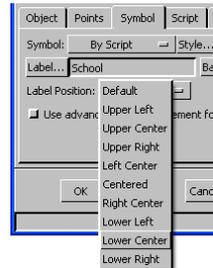
Click on tiles in the color palettes to set the text color.

Set the character style by clicking on one or more of these choices (some are mutually exclusive).

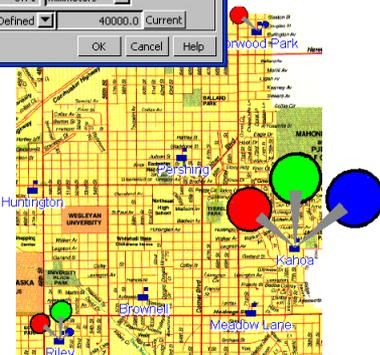
- click on a blue tile for the Foreground Color and a white tile for the Background Color

- click on the Enhanced check button to the right of the color palettes, then click [OK] in the Text Style Editor window

- set the Label Position to Lower Center, then click [OK] in the Pinmap Layer Controls window



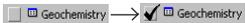
Use of enhanced text helps to ensure that labels will be visible whether the local background is dark or light.



Dynamic Update

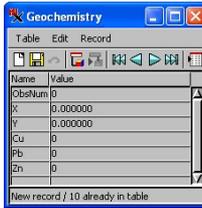
STEPS

- choose Display / Close
- click on the Add DatabaseTable Pinmap icon and select the GEOCHEMISTRY table under the GEOCHEM_CB object in GSPINMAP.RVC
- check that the settings are still the same as for the exercise on page 4
- click on the [Style] button on the Symbol panel and choose Circle (Filled) for the Point Style Type
- click on [OK] in the Point Style Editor and in the Pinmap Layer Controls
- expand the GEOCHEMISTRY layer to show the table and click in the Show or Hide Table checkbox to open the table
- in the new record, enter the information shown above the center pinmap
- choose Record / New and enter the information shown over the pinmap on the right, then choose Table / Close, and click Yes
- click on Refresh

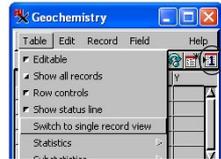


You can update your pinmap during display by adding new records or changing existing records. When coordinates are changed, the pins are moved. These changes can be made during the display process or, if the database is in an external format, using its native software. During display, changes are apparent after the database is updated and the View is refreshed.

When you open a table in single record view with no points selected, the table is automatically positioned at a new record. You then simply enter the information for the new record. You need to take some action that indicates you are done with the record, such as clicking on Save, closing the table, or selecting another pin, before the new pin is drawn.



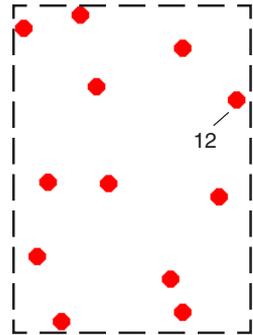
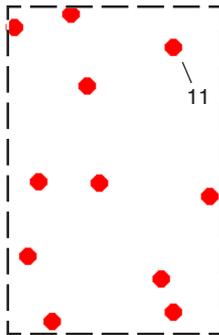
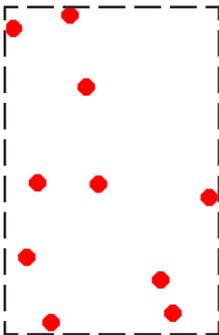
If your table opens showing rows and columns instead of appearing as



at the left, choose Switch to Single Record View from the Table menu or click on the icon of the same name (circled).

ObsNum: 11
 X: 640759.83
 Y: 4731825.48
 Cu: 87
 Pb: 627
 Zn: 429

ObsNum: 12
 X: 642763.89
 Y: 4729854.62
 Cu: 117
 Pb: 414
 Zn: 658



Pie Charts

Special query statements are available so you can create pie charts and bar graphs to represent each data point. These special symbols can incorporate values from as many different fields as desired. We will display over a raster object for this pie chart sample exercise. An outline around the pie and between the wedges is an optional component of a pie chart so the background is relevant when choosing its color. The color to use for this outline is indicated at the beginning of the pie chart specification (here, it is “white”). If a color name is omitted here, there will be no outline.

```
Symbol$ = PieChart$(“white”, Geochemistry.Cu,
                    Geochemistry.Pb, Geochemistry.Zn);
DrawSymbol = 1;
XScale = 5;
YScale = 5;
MapScale = 125000;
```

You can add as many fields as you want to a pie chart and the proportion of each to the whole for that location will be reflected in the relative size of the wedges. The default colors assigned counterclockwise in order from the origin (positive X axis) are red, green, blue, cyan, magenta, yellow, and then repeating if you have more than six fields. You can also specify the color for each wedge if desired (consult the symbol functions parameters for PieChart\$).

You are instructed to type all the queries in this booklet to match the example provided. You can, alternatively, use the Insert menu choices to add most of the components of a query. Using the Insert menu to build queries is described in another booklet in this series (*Getting Started: Building and Using Queries*).



Lead accounted for nearly half of the dissolved chemicals found at the location represented by this pie chart.

STEPS

- click on the Layer Controls icon for the pinmap layer 
- choose By Script from the Symbol option menu
- click on the Script tab and enter the query as below, then click [OK]

- click on the Add Objects icon, and select `_8_BIT` from the `CB_COMP` Project File in the `CB_DATA` collection 
- right-click on the raster layer in the Display Manager and choose Lower

Bar Graphs

STEPS

- click on the Add Objects icon, and select `HYDROLOGY` from the `CB_DLG` Project File
- right-click on the `_8_BIT` raster layer in the Display Manager and choose Remove Layer
- click on the Layer Controls icon for `GEOCHEMISTRY` and replace the pie chart script with the following



```
Symbol$ =
Rectangle$(0,0,1000,1000,0,"white",1) +
Rectangle$(0,0,1000,1000,0,"black",0) +
BarGraph$(
750,
"black",
Geochemistry.Pb, "blue",
Geochemistry.Zn, "green",
Geochemistry.Cu, "red"
) +
Line$(-100,0,1100,0,"black");
DrawSymbol = 1;
XScale = 5;
YScale = 7.5;
MapScale = 125000;
```

The query to specify a bar graph is more complex than that for a pie chart; a pie chart requires only the symbol type, the fields to be included, and a size at a specified map scale. For a bar graph you also need to specify information for the surrounding rectangle, which is really two rectangles (one white and filled, the other black and unfilled), the baseline (if you want one), and the field value equivalent to the rectangle height.

You can include as many fields as you like in the bar graph; each bar becomes narrower as more are included. You change the overall width of the bar graph using the `XScale` parameter in the query. As with pie charts, the color of the bars can be omitted from the query and then is automatically assigned in the order red, green, blue, cyan, magenta, yellow.

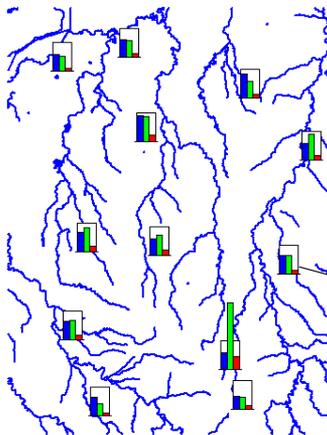
The first value in the `BarGraph$` portion of the script sets the rectangle height, here 750. The color name that follows the rectangle height is for the bar outline if desired. The baseline length is determined by the `Line$` part of the script and

- click on [OK]

is relative to the rectangle coordinates such that

`Line$(-100,0,1100,0,"black")` specifies a black line that extends 10% of the width beyond a 1000 x 1000 rectangle both to the right and left.

These bar graph symbols present values for the same fields but in a different order than in the pie chart exercise.



Approximately equal concentrations of lead and zinc were found at the location represented by this bar graph.

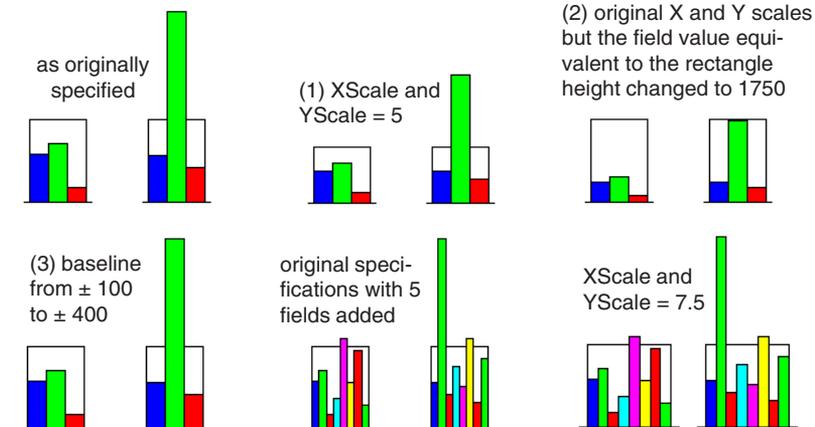
Better Understanding Bar Graphs

Let's change a number of bar graph parameters so you can see how each works. The one part of the bar graph script you should not change is the size specified for the bounding rectangles. The bar graph itself is scaled so the bars for all fields listed in the query fit in a width of 1000 and the maximum field value specified is represented by a height of 1000. The units are arbitrary and used only so that the bounding rectangles can fit the graph. The actual dimensions of the bar graph are controlled by the XScale and YScale assignments and the map scale specified. If you change the width of the rectangle, the width of the bar graph will exceed or fall short of the width of the rectangle. If you change the height of the rectangle, the maximum field value specified will not occur at the top of the rectangle.

The bar graphs that correspond to observation numbers (ObsNum) 3 and 10 are used for the illustrations on this page. All of your bar graph symbols will change in a similar fashion since the script applies to all pins. Your sample data is not set up for the last two examples, which include five additional fields without color specification in the bar graph script. As you can see below, adding more fields with the same XScale specified makes each bar narrower.

STEPS

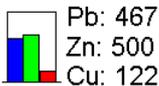
- click on the Layer Controls icon for GEOCHEMISTRY 
- change the YScale in the script from 7.5 to 5
- click [OK], see (1) below
- click on the Layer Controls icon for GEOCHEMISTRY 
- change the YScale back to 7.5, and change the field value that is equivalent to the rectangle height from 750 to 1750
- click [OK], see (2) below
- click on the Layer Controls icon for GEOCHEMISTRY 
- change the field value / height back to 750, and change the Line\$ statement from -100,0,1100,0 to -400,0,1400,0
- click [OK], see (3) below



Multiple Line Labels

STEPS

- click on the Layer Controls icon for GEOCHEMISTRY 
- change the Line\$ statement back to that specified on page 12
- add the three lines at the right to the end of the script exactly as shown (there is a space between the initial quote and the element identifier so that the label sits to the right of the baseline)
- on the Symbol panel, click on [Label] and select By Script
- click on [Base Style], then click on [Font] in the Edit Styles window and double click on Arial.ttf (or a similar font)
- set the Ascender Height to 10 Points at a map scale of 100000 with the At Scale option set to User-Defined
- click on the black tile (or white tile if you have a black background) in the Foreground palette
- click [OK] in the Edit Styles window
- click [OK] in the Pinmap Layer Display Controls window
- exit the Display process



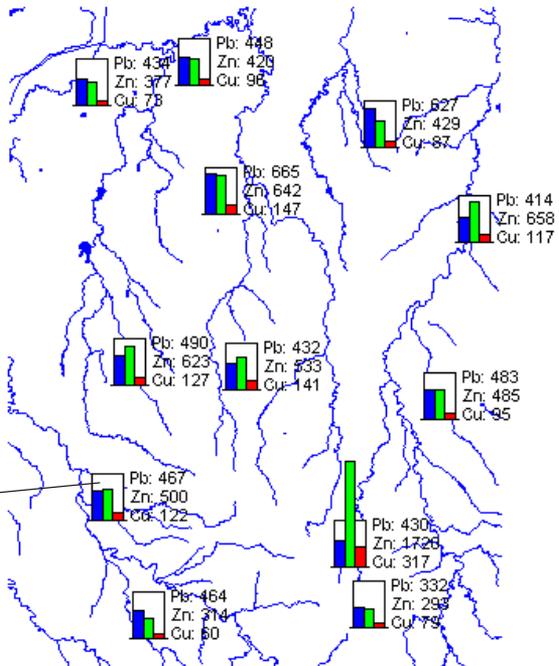
The labels report the concentrations in parts per million of the three elements in these bar graphs.

Adding simple one line labels is described in an earlier exercise. Some pin maps, such as pie charts and bar graphs, benefit from multiple line labels. The labels can include values for all of the fields used in these special symbols or values for a subset of these fields. Field values can be reported with or without identifying text. You can also include a line

```
print (" Pb:", Geochemistry.Pb);
print (" Zn:", Geochemistry.Zn);
print (" Cu:", Geochemistry.Cu);
```

of text without an accompanying field value if desired. An

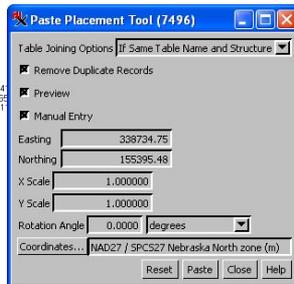
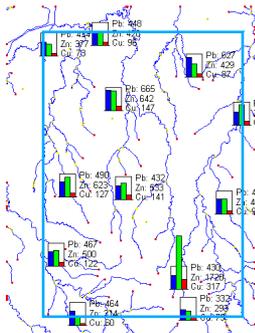
alternative method for entering multiline labels uses the Label\$ assignment statement listed for simple labels in combination with text, integer field identifiers, new line specifications, and field names. Consult the reference manual for details on this more complex method of label assignment.



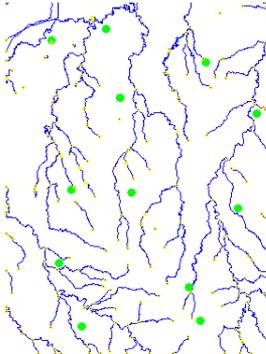
Pasting a Pinmap into a Vector Object

The Copy and Paste features of TNTmips' Spatial Data Editor let you create point elements in a vector object from a database pinmap using the specified coordinate fields to position the database pins you select. These point elements retain direct attachments to the corresponding records in the table, which becomes part of the vector's point database.

You can choose to copy elements from the entire object or from a designated region, which may have been saved previously or can be drawn before copying is initiated. You may copy either all elements or only selected elements from the designated region. The object you are pasting the points into must be an active editing layer while the pinmap can be a reference layer.



The Paste Placement tool appears as a box with the extents of the copied elements in the same position as the originals. Generally, this is the correct position for pasting because it was determined by georeference. You can, however, move, resize, or rotate the box. The original pinmap layer has been hidden and the point display style is set to filled circles that are larger than the default size.



STEPS

- select Main / Edit from the TNTmips menu
- click on the Open icon in the Editor Layer Manager and select HYDROLOGY from the CB_DLG Project File 
- choose Reference / Layer / Database Pinmap in the Editor Layer Manager, select the GEOCHEMISTRY table in the GEOCHEM_CB database in the GSPINMAP Project File, and click [OK]
- click on the Copy icon in the Editor View window, and set the Region Type to Entire Object 



- click on [Copy] in the Copy to Clipboard window
- click on the HYDROLOGY layer in the Editor Layer Manager
- click on the Paste icon 
- click on [Paste] in the Paste Placement Tool window
- click on the Save As icon and save the edited HYDROLOGY object to a new file, adding POINTS to the object name so you can't confuse it with the original HYDROLOGY object 

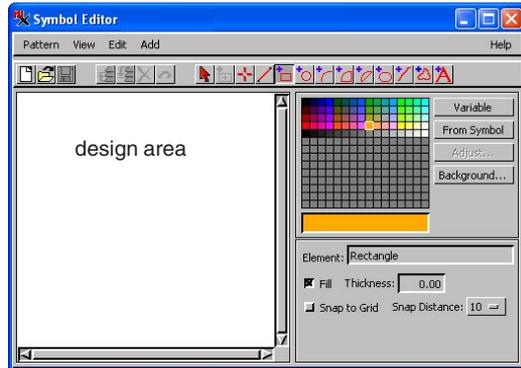
Designing Your Own Pinmap Symbols

STEPS

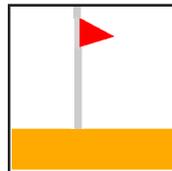
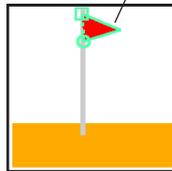
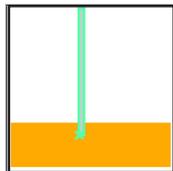
- ☑ launch Display, click on the Add Database Table Pinmap icon, and choose the table under the ARTIFACTS object 
- ☑ click on the Symbol tab, set the Symbol option menu to All Same, and click on [Style]
- ☑ set the Point Style Type to Symbol
- ☑ click on the Create or Edit Symbol icon then on the Rectangle icon in the Symbol Editor window  
- ☑ click on an orange tile in the color palette, then turn on the Fill toggle
- ☑ pull out a rectangle that fills the bottom quarter or third of the design area and right-click to add it
- ☑ click on a gray tile and change the shape of the rectangle tool to be thin, extend to the top of the design area, and overlap the first rectangle, then right-click
- ☑ click on the Polygon tool 
- ☑ click on [Variable] and draw a triangle as shown, then right-click
- ☑ click the Select icon then on the gray, thin rectangle and next on the Lower icon  
- ☑ save your work, close the Symbol Editor window, choose your new symbol from the list, click [OK] and display

You can create your own symbols in any TNTmips display process if a style object has been specified for the pinmap. Since you can choose to create a new style object in the selection process, you can design your own symbols to be added to an existing or new style object at any time by opening the control window, designating a style object on the Object panel, clicking on [Style...] on the Symbol panel, and clicking on the New Symbol icon. TNTmips also has a separate Style Editor process (Tools / Edit Styles) that lets you design point symbols, line patterns, and fill patterns for use with any object type without a specific object selected for display.

The tools used in this exercise for symbol design are interactive. A scripting language for precise, symmetric symbol design is also available.



The All Same drawing color, which is used as the variable color, is set to red in this example.



Creating Symbols from TrueType Glyphs

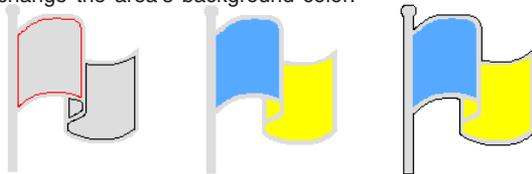
You do not have to rely on your own drawing abilities to create pinmap symbols; you can paste and colorize any glyph from a TrueType font. Some fonts contain only one element in a glyph, which means you cannot create a multicolored symbol without adding to the design.

Symbol elements can have one color assigned and be either filled or unfilled. Thus, to have an outline for a filled symbol, you need to add a copy of the outermost element and assign a contrasting color to it (without filling).

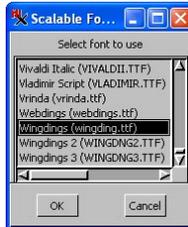
Symbol elements have an assigned drawing order that may need to be changed when the elements are filled. If you fill an element and can no longer see another element that should be on top, you need to lower the former element in the drawing order.



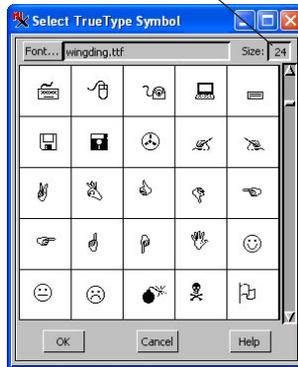
Selected glyphs appear in outline. If you don't see the selected glyph in the design area, change the area's background color.



The pole and the background of the flag are a single polygon in this glyph, so they can only be assigned a single color. Several steps in the sequence of coloring and outlining the flag symbol are shown above.



The font size set does not affect the symbol, only the size at which it is viewed for selection.



STEPS

- click on the Layer Controls icon for the pinmap layer 
- click on the Symbol tab, then on [Style]
- click on the Create or Edit Symbol icon 
- choose Open TrueType Symbol from the Pattern Menu in the Symbol Editor window
- select wingdings or some other TrueType font
- scroll until you find a glyph you'd like to use, click on it, then click [OK]
- select each element in turn, click on the color you want in the palette (or choose Variable), and click on Fill
- change the drawing order of any element layered so it hides another element
- select the outermost element again, choose Copy from the Edit menu, then choose Paste, and click on [Apply] in the Box Edit Controls window (without moving the box)
- click the Select icon, select the new outermost element, click on the black (or white) color tile, and turn off the Fill toggle if on 
- save your work



single element



multiple elements

Table Viewing

STEPS

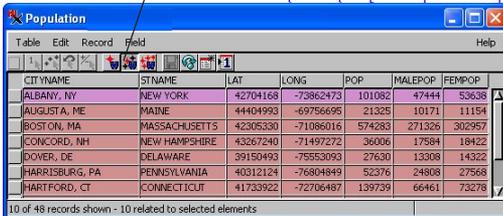
- click on the Open Display icon, and select the STATECAP group you saved on page 5
 
- choose Options / Colors in the View window, change the *Marked* color to green, then click [OK]
- fully expand the pinmap layer in the Display Manager
- open the POPULATION table
 
- click on the Geo-Toolbox icon, then on the Rectangle icon, and draw a rectangle that includes the capitals of the northeastern states
 

- right-click and choose Select Elements
- click on each of the View icons (in the toolbar below the Field menu), and note the differences in information shown
- click on the *Switch to single record view* icon and note the difference in data presentation
 
- return to tabular view before proceeding to the next exercise
 

Database tables can be displayed in either single record or tabular view. Each view type has its own associated features. There are two methods to switch between viewing modes: select the other viewing mode from the Table menu in the database table viewing window or click on the corresponding icon on the toolbar in the table window.

Single record view is often easiest for data entry because a smaller window is needed to view all fields. Also, for vector, shape, CAD, and TIN objects, a new record is created automatically when you click on an element without a related record in a table. Single record view, however, only presents information about the active element and does not have any of the element selection features available in tabular view.

You have the option in tabular view of viewing all records, records related to all marked elements, or only those records related to the active element. You can also select one or more records and click on the Exclusive icon at the left of the table's toolbar to select all the elements related to those records.



Selecting Pins

You changed the highlight color for marked elements in the last exercise because the symbol used for the pinmap is red, which means marked elements are indistinguishable from other elements unless the highlight color is changed from red.

You can click on pins and view the related database information, as you did in the last exercise, or select records and view the associated pins. When you are selecting pins to view related records you want to be in either the *Show active element records* or *Show marked element records* mode so all the records of interest will be in view in the table. You generally want to be in the *Show all records* mode to choose records for use in selecting pins.

You can choose to sort on any field for database viewing purposes. This table was initially sorted alphabetically by capital city. After sorting by population and selecting as described, all capital cities with population > 250000 should be highlighted.

STEPS

- ☑ click on the View All Records icon 
- ☑ widen the Population table so you can see the fifth field, or column (Pop), right-click on this field name, and choose Sort on this field from the menu that pops up
- ☑ scroll down until you see a population >250,000 and click in the Select Record box (should be St. Paul, MN)
- ☑ scroll to the bottom of the table (after sorting, should be Phoenix, AZ), hold the <shift> key and click on its Select Record box
- ☑ click on the Exclusive icon 

1) click here

BATON ROUGE, LA
ST PAUL, MN
SACRAMENTO, CA
ATLANTA, GA
OKLAHOMA CITY, OK
AUSTIN, TX
DENVER, CO
NASHVILLE, TN
BOSTON, MA
COLUMBUS, OH
INDIANAPOLIS, IN
PHOENIX, AZ

icons for element marking from selected records

Clear
Exclusive
Select Record

Population

Table Edit Record Field

CITYNAME	STNAME	LAT	LONG	POP	IMAGED	TEMPPOP
ALBANY, NY	NEW YORK	42704168	-73862473			53
ANNAPOLIS, MD	MARYLAND	38984891	-76538967			16
ATLANTA, GA	GEORGIA	33751846	-84440961			207
AUGUSTA, ME	MAINE	44404993	-69756695	21325	10171	11
AUSTIN, TX	TEXAS	30292230	-97801515	465622	232920	232
BATON ROUGE, LA	LOUISIANA	30452175	-91122442	219531	104477	115
BISMARCK, ND	NORTH DAKOTA	46714639	-100576249	49256	23737	25

Sort on this field
Field options...
Make field permanent

Show active element records

Show marked element records

Show all records

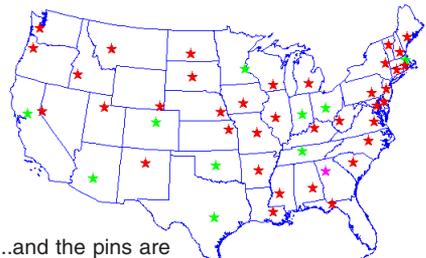
2) hold down the <shift> key, then click in the last record's Select Record box

3) click on the Exclusive icon



4) the records that were checked are highlighted*...

CITYNAME
BATON ROUGE, LA
ST PAUL, MN
SACRAMENTO, CA
ATLANTA, GA
OKLAHOMA CITY, OK
AUSTIN, TX
DENVER, CO
NASHVILLE, TN
BOSTON, MA
COLUMBUS, OH
INDIANAPOLIS, IN
PHOENIX, AZ

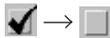
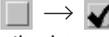


...and the pins are redrawn with marked elements in the designated colors.

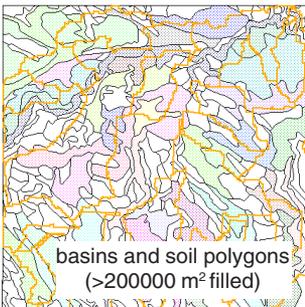
*Highlight colors correspond to marked and active colors.

Pinmap from Vector Database Tables

STEPS

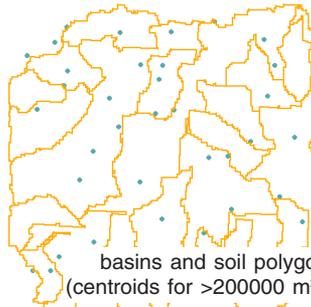
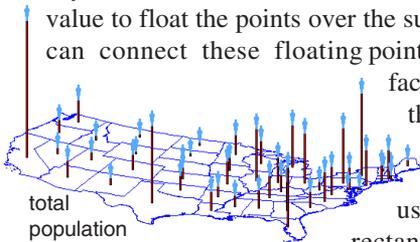
- click on the Open icon in the Display Manager, and select BASINSANDSOILS from the CENTROID Project File
 
- note how difficult it is to determine which basins (wide, orange outline) contain soil polygons with area >200000 m² (filled)
- uncheck the Show/Hide toggle for the CBSOILS_LITE vector layer to **hide** the layer
 
- check Show/Hide toggle for the POLYDATA pinmap layer to **show** the layer
 
- click on the Layer Controls icon for the pinmap layer and note the settings in the Pinmap Layer Controls
 

soil polygons less than 200000 m² are not filled



You can create a pinmap from any database table that can be viewed in TNTmips and contains X and Y coordinates in each record. The table need not be part of a main level database object; it can be part of the point, line, or polygon database of a vector object, for example. You might want to represent soil polygons by their centroids when displayed over other polygonal data, such as watershed basins, because multiple sets of polygon boundaries are visually confusing. You can, however, readily visualize the number of different soil type polygons within a watershed basin when soil polygon centroids are displayed with the watershed polygons. Usable centroid coordinates are available for any polygon-containing vector object that has a standard attributes table (polystats).

Pinmaps can also have a Z component provided by any field in the same table. You can use this value to float the points over the surface. You can connect these floating points to the surface by adding the pinmap a second time and using narrow rectangular symbols with a Y Scale tied to the same field. (Symbols are billboards and have no Z scale.) Although this effect can be created from a database pinmap, it is

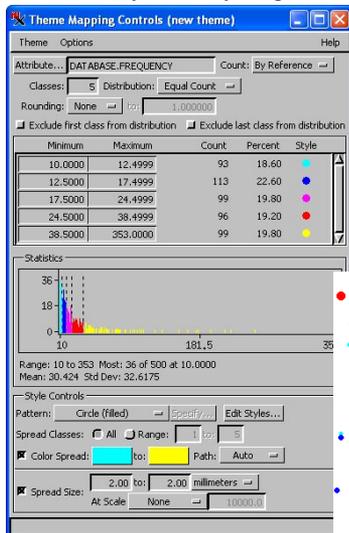


done more easily and versatily using vector points (connecting line can use a variety of line styles instead of a single symbol).

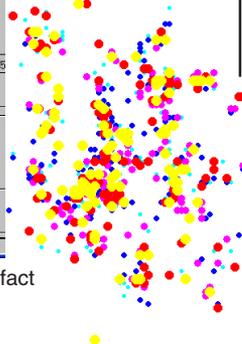
Pins to Vector Points for Theme Mapping

Pasting pins into an existing vector object as points has been discussed. This exercise describes converting a database to a vector object for theme mapping. Converting points from a database table to a vector object eliminates the fluid properties of a pinmap that allow pin movement by simply changing coordinate values in the table. A theme map equivalent to that created interactively for vector points can be generated for a pinmap by script, but writing such a script is rather tedious. Converting a database to a 500 point vector object takes about two seconds for the conversion and less than a minute to set up. Interactive theme map setup is also very quick.

You then need to consider the source and use of the data to decide whether script writing or import is the best choice for you. If the data is dynamic with pin positions frequently changing, you should probably write the appropriate script. If the data is static with pin positions based on past observations, conversion is likely the way to go.



Accept the defaults in the upper portion of the Theme Mapping Controls window.



Compare this depiction of the artifact data points with the versions presented on pages 6 and 7.

STEPS

- choose Database / Convert to Vector, and select ARTIFACTS from the GSPINMAP Project File
- choose the table named DATABASE
- click on [Reference System] and choose UTM Zone 16N (under Global and Regional or under Recent if there)
- choose EASTING for the X field and NORTHING for the Y field, then click [Run] and name the new object in the GSPINMAP Project File ARTIFACTPOINTS
- choose New / 2D Display in the Display process, and select ARTIFACTPOINTS
- click on its Layer Controls icon then on the Points tab, and set the Style to New - by Theme
- choose the DATABASE table and FREQUENCY field, then click [OK]
- check that Equal Count is selected on the Distribution option menu
- in the Style Controls panel, turn on the Spread Size toggle, and set the spread from 2 to 4 mm at Design Scale
- choose Theme / Save, enter a new object name or accept the default and click OK, then choose Theme / Close and click on [Apply] in the Vector Layer Controls

More About Labeling

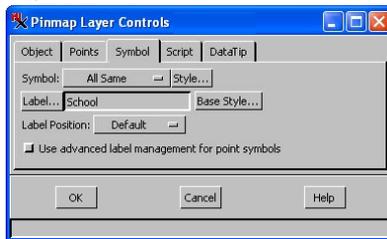
STEPS

- choose New / Empty 2D in the Display Manager
- click on the Add Database Table  Pinmap icon and select the Mayors_Run table under the SCHOOLS object in the GSPINMAP Project File
- click on [Styles] and select STYLEPINS from the same Project File
- check that the Symbol option menu is set to All Same and the Point Style is specified as Symbol with school_p as the selected symbol
- click on the Script tab and enter the text below in the Script panel
 - LabelPosn=2;
 - LabelOffset=5;
 - LabelAngle=20;
- click [OK] and observe the result
- return to the Pinmap Layer Controls and modify the script to match the second example below
- click [OK] and observe the result
- try the other examples

Designating label position from the option menu on the Symbol panel was described on page 9. You can also specify label position in the script, which lets you vary the position according to other pin attributes. The label position is specified by including “LabelPosn” in the script and assigning a value from 1–9. The values are in a 3 X 3 grid as shown, such that a value of 5 positions the label centered over the pin, 1 positions the label above and to the left of the pin, and so on.

1	2	3
4	5	6
7	8	9

Two additional terms can be added to a script to modify the position of pinmap labels: LabelOffset



and Label Angle. The direction for label offset is determined by the label position. Labels above the pin are moved up, labels to the right

of the pin are moved further right, labels positioned diagonally from the pin are moved the specified offset distance in the two appropriate directions, and so on. The offset you specify is from the pin location to the beginning of the label in the same units as the symbol size, which means the offset must be at least half the symbol width/height or the label will cover part of the symbol. Unrotated labels without specified offsets do not collide with their associated symbols. Add a LabelAngle assignment to the query to set label rotation. Rotation is specified in degrees anti-clockwise around the label position.

Riley  LabelPosn=2;
LabelOffset=5;
LabelAngle=20;

Riley  LabelPosn=1;
LabelOffset=7;
LabelAngle=90;

Riley  LabelPosn=7;
LabelOffset=5;
#LabelAngle=90;

When you want to remove a statement from a script, you can either delete the text (bottom right) or you can comment it out by placing a # at the beginning of the line (bottom left). (Other SML conventions also apply. See the tutorial booklet entitled *Writing*

Riley  LabelPosn=5;
LabelAngle=-45;
Scripts with SML.)

Geotagging Digital Photos

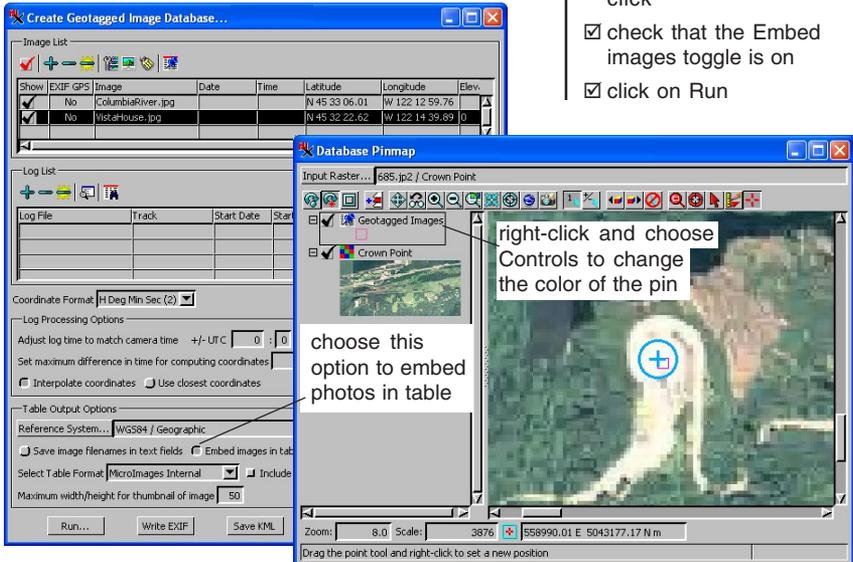
Digital photos can be tied to their geographic location and stored in a database for display as a pinmap in TNTmips. The geographic coordinates for each photo may be obtained from its EXIF header, from a GPS log, using a reference image, or by direct entry. The photos can be linked to or embedded in the table in a BLOB (**binary large object**) field. When embedded, a second BLOB field with an image thumbnail is automatically created for use as a DataTip and/or to represent the point.

Geographic coordinates are fairly easily obtained if you have access to the Internet. For example, Google Earth provides geographic coordinates for your cursor location. Additionally Internet layers displayed in TNTmips provide cursor coordinates.

Digital photos are generally much bigger than allowed in TNTmips Free. The Raster Extract process in TNTmips was used to prepare small pieces of the digital photos used in this exercise. Once digital photos are embedded in a database table, they can be viewed in TNTmips Free regardless of their size.

STEPS

- choose Database / Create Geotagged Image Database
- click on the Add Images icon and select ColumbiaRiver.jpg and VistaHouse.jpg
- enter 45.539522 for Latitude and -122.2443 for Longitude for VistaHouse.jpg
- enter 45.574878 for Latitude and -122.177611 for ColumbiaRiver.jpg
- click on the Database Pinmap icon,  then on Input Raster, and select 685.jp2
- zoom up near the lower left of the image
- click on the VistaHouse entry in the main window
- move the point to center on the feature and right-click
- check that the Embed images toggle is on
- click on Run



Create Geotagged Image Database...

Show	EXIF	GPS	Image	Date	Time	Latitude	Longitude	Elev.
<input checked="" type="checkbox"/>	No		ColumbiaRiver.jpg			N 45.53 06.01	W 122.12 59.76	
<input checked="" type="checkbox"/>	No		VistaHouse.jpg			N 45.53 22.62	W 122.14 39.89	0

Database Pinmap

Input Raster... 685.jp2 / Crown Point

- Geotagged Images
- Crown Point

right-click and choose
Controls to change
the color of the pin

choose this
option to embed
photos in table

Embed images in table

Run... Write EXIF Save KML

Zoom: 8.0 Scale: 3876 558990.01 E 5043177.17 N m

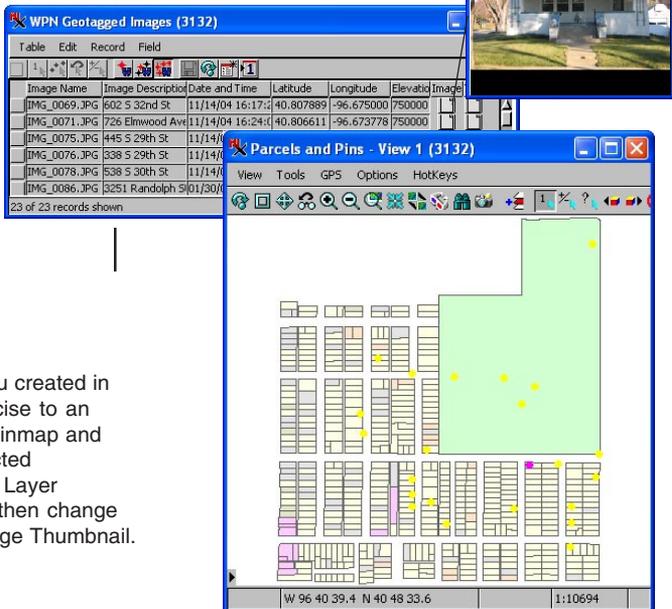
Using Geotagged Photos

STEPS

- open the PARCELS AND PINS display group in the GEOTAG Project File 
- pause the cursor over a number of the pinmap points and note the DataTips
- expand the pinmap layer in the Display Manager and open the table
- click on the Image field to open the digital photo viewer
- use the icons on the viewer toolbar to browse the photos in the database and to zoom in and out
- open the Layer Controls for the pinmap layer and switch to the Symbol tab 
- change the symbol to Image Thumbnail, and click OK
- zoom up on an image thumbnail and note its size relative to the vector parcels

In the previous exercise you learned how to make a database table with embedded, geotagged photos. That process also sets up the pin mapping parameters for the table*. Pinmaps from tables with embedded geotagged photos can use a symbol like any other pinmap or geometric point or they can use each image thumbnail to represent the point's location. The thumbnail of an embedded image can also be used as the DataTip.

You can open any of your geotagged images by clicking on the Image field in tabular view. The image is shown at the bottom of the record in single record view. The viewer that opens from the tabular view Image field has controls that let you step through each of the photos in the table, zoom in and out and view the photo's metadata. You can also drag the image to reposition the view when you are zoomed in in the viewer.



The screenshot displays two windows from a GIS application. The top window, titled "WPN Geotagged Images (3132)", shows a table with the following columns: Image Name, Image Description, Date and Time, Latitude, Longitude, and Elevation. The table contains several records, with the first one highlighted:

Image Name	Image Description	Date and Time	Latitude	Longitude	Elevation
IMG_0069.JPG	602 S 32nd St	11/14/04 16:17:40	40.807889	-96.675000	750000
IMG_0071.JPG	726 Elmwood Ave	11/14/04 16:24:40	40.806611	-96.673778	750000
IMG_0075.JPG	445 S 29th St	11/14/04			
IMG_0076.JPG	338 S 29th St	11/14/04			
IMG_0078.JPG	538 S 30th St	11/14/04			
IMG_0086.JPG	3251 Randolph St	01/30/05			

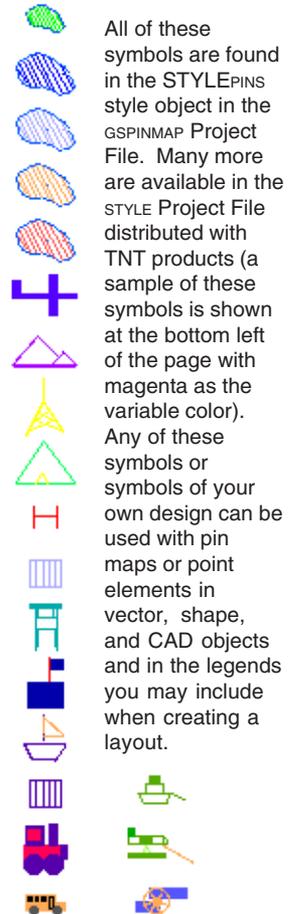
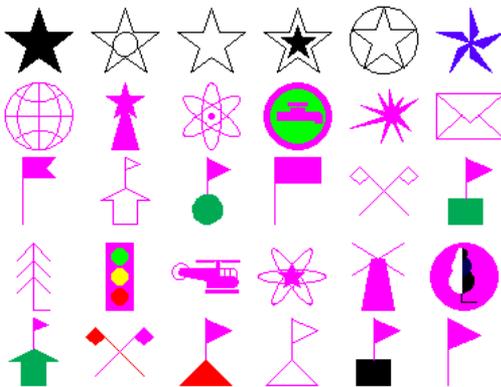
The bottom window, titled "Parcels and Pins - View 1 (3132)", shows a map view with a grid of parcels. A large green parcel is highlighted, and several yellow pins are visible on the map. The status bar at the bottom of the map window shows coordinates: W 96 40 39.4 N 40 48 33.6 and a scale of 1:10694.

* Add the table you created in the previous exercise to an empty view as a pinmap and note the pre-selected parameters in the Layer Controls window, then change the Symbol to Image Thumbnail.

Further Notes on Pin Mapping

The last used display parameters for a database pinmap are saved with the database object for use as defaults the next time the database is selected for pinmap display. These display parameters include the settings of all buttons and fields in the Pinmap Layer Controls window and any entered query statements. When multiple pinmap layers of the same database are used in a single layout, as in the Symbol Angle and Multiple Pins exercise on page 8, these multiple display parameters for a single database object can be saved as a group or layout. The display parameters for the last added pinmap layer will be the ones retained for the next time the database is selected as an individual pinmap layer, while all the different parameters will be used to recreate the initial display when the layout is opened.

You can save any entered pinmap script for later use with the same or other database objects by choosing Query / Save from the menu bar in the Script panel of the Pinmap Layer Controls. Obviously, any field names in the script would have to be the same across objects for an unmodified script to work with another object. You can always use one script as a model for the next, changing field names and map scales as necessary. You will get a syntax error in the query if you forget to modify all field names to match the currently selected database.



All of these symbols are found in the `STYLEPINS` style object in the `GSPINMAP` Project File. Many more are available in the `STYLE` Project File distributed with TNT products (a sample of these symbols is shown at the bottom left of the page with magenta as the variable color). Any of these symbols or symbols of your own design can be used with pin maps or point elements in vector, shape, and CAD objects and in the legends you may include when creating a layout.

Don't forget, if you find a symbol you want that is a character in a TrueType font, you can easily use it with your pin maps or vector objects.

STEPS

- choose Options / View Options (Display Manager), and turn off the two *Default to redraw after any change* choices on the View tabbed panel

Notes

Advanced Software for Geospatial Analysis

MicroImages, Inc. publishes a complete line of professional software for advanced geospatial data visualization, analysis, and publishing. Contact us or visit our web site for detailed product information.

TNTmips Pro TNTmips Pro is a professional system for fully integrated GIS, image analysis, CAD, TIN, desktop cartography, and geospatial database management.

TNTmips Basic TNTmips Basic is a low-cost version of TNTmips for small projects.

TNTmips Free TNTmips Free is a free version of TNTmips for students and professionals with small projects. You can download TNTmips Free from MicroImages' web site.

TNTedit TNTedit provides interactive tools to create, georeference, and edit vector, image, CAD, TIN, and relational database project materials in a wide variety of formats.

TNTview TNTview has the same powerful display features as TNTmips and is perfect for those who do not need the technical processing and preparation features of TNTmips.

TNTatlas TNTatlas lets you publish and distribute your spatial project materials on CD or DVD at low cost. TNTatlas CDs/DVDs can be used on any popular computing platform.

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