Learning ArcGIS Desktop

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Introduction

ArcGIS Desktop is a suite of integrated applications including ArcMap, ArcCatalog, ArcToolbox, ModelBuilder, and ArcGlobe. It is used to create, import, edit, query, map, analyze, and publish geographic information.

This tutorial is intended to introduce you to the basic use of ArcGIS 9.1. We will concentrate on ArcMAP and ArcCatalog that describe some of the common operations a user may need to know in order to manipulate and/or analyze their spatial datasets.
Topics

- Getting Started with ArcGIS
- Displaying Map
- Querying Data
- Analyzing Spatial Data
- Making and Printing Maps
Getting Started with ArcGIS

Applications of ArcGIS: ArcCatalog and ArcMap

ArcCatalog™ allows the user to easily access and manage geographic data that is stored in folders on local disks or relational databases that are available on the user's network. Data can be copied, moved, deleted, and quickly viewed before it is added to a map. In addition, metadata can be either read or created using this ArcGIS application.

ArcMap allows the user to display and query maps, create quality hardcopy maps and perform many spatial analysis tasks. ArcMap provides an easy transition from viewing a map to editing its spatial features.
Viewing Data in ArcCatalog –(1)

The ArcCatalog application window includes the catalog display that allows you to preview data, either spatially or tabularly, a catalog tree for browsing the data, and several toolbars.
- Viewing Data in ArcCatalog – (2)

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preview the attributes by switching to Table
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In addition to previewing the geography and the attribute table of a data layer, the user can view or create metadata. By clicking on the **Metadata** tab in the catalog display, technical information about the data set (such as its coordinate system, its spatial extent, description of its attributes, and descriptive information about when and how the data was created) can be obtained.
There are two ways to add data layers to the map display:

1. Go to File / Add Data... on the main menu toolbar OR click on the Add Data button on the standard toolbar.

Navigate to the data layer of interest. Select it, and click the Add button.
Viewing Data in ArcMap – Add map(2)

2. Simply click the name of the data layer from the ArcCatalog data tree, and drag it anywhere within the ArcMap display.
Viewing Data in ArcMap – ToolsBar

- Zoom In
- Zoom Out
- Fixed Zoom In
- Fixed Zoom Out
- Pan
- Full Extent
- Previous Extent
- Next Extent
- Select Features
- Select Elements
- Identify
- Find
- Measure
- Hyperlink
Viewing Data in ArcMap – View Attribute
Various statistics can be computed for a particular attribute field. To perform this operation the user should right click on the field of interest, and select **statistics**. A dialog box appears with the statistics for that selected field. The statistics box displays the number of records in the table and the minimum, maximum, sum, mean, and standard deviation values. The frequency distribution chart represents the distribution of values graphically.
Displaying Map

- Symbolizing Features (1)

To change the color or width of the outline, the user can click on the symbol for the desired data layer in the table of contents. The **Symbol Selector** dialog box opens. The left side of the dialog box contains predefined symbols. The options frame on the right allows the user to select a color and set an outline width.
The user can also have features within the map display to be labeled. The user can do this by right-clicking on the LAYER of interest in the table of contents (NOTE: click on the layer name and NOT the symbol) and selecting the **Label Features** option.
The user may also change the background of the map display. This can be done by right-clicking on the data frame and clicking Properties. The Data Frame Properties dialog box opens. The user should click on the Frame Tab, click on the Background drop down arrow, select the desired color, and click OK. The background color will then be applied to the map display.
The user can change a feature's symbology to make it more informative by assigning a different symbol to each unique value, or to distinct ranges of values, in the layer's attribute table.

If the user wishes to assign a unique color to a particular class or name within the attribute table, the user can right-click on the desired layer and click Properties. The Layer Properties dialog will open, and the user should choose the symbology tab.

By default, the features are symbolized with a single symbol (meaning all of the prefectures in a Japan map will have the same color). If the user wishes to change the representation to a categorical one (where each prefectures has a unique symbol), the user should click Categories in the Show box of the Layer Properties Dialog.
A Value Field from the attribute table should be selected. In this case PREF was selected in order to show a different symbol for each state. The color scheme of choice may also be selected. Once these parameters are set, the user should press the **Add All Values** button to get a listing of all the categories and their associated unique symbol. Once the user is satisfied with the symbology, the user can press OK.
Classifying Features

ArcGIS™ has four ways to apply scaled symbology:

- **Graduated Color**
  These symbols are more commonly used. It displays features as shades in a range of colors that change gradually (also called a color ramp). This symbology is best used with polygon layers.

- **Graduated Symbol**
  These symbols are used to represent features using different marker sizes. Normally used with point layers.

- **Proportional Symbol**
  These symbols vary in size proportionally to the value symbolized.

- **Dot Density**
  These symbols should only be used with polygon layers. They represent quantities by a random pattern of dots. The greater the value, the more dots.
Creating Graduated Color Map (1)

To create a graduated color, the user must double click on the data layer name in the table of contents. The Layer Properties dialog will open. The symbology tab should be activated. In the show box, the user should click Quantities and select the Graduated Colors option. Within the value field, the drop down arrow should be clicked, and the attribute field of interest should be selected. In this case the Population field was selected for the Japan data layer.
Creating Graduated Color Map (2)
Creating Graduated Symbol Map (1)

To create a graduated symbol, the user must double click on the data layer of interest in the table of contents. The *Layer Properties* dialog box will open, and the *symbology* tab should be selected. In the *show* box, the user should click *Quantities*, and then select *Graduated Symbols*. Within the value field, the drop down arrow should be clicked, and the attribute field of interest should be selected. The normalization method and the number of classes can then be selected.
Creating Graduated Symbol Map (2)
To create a proportional symbol, the user must double click on the data layer of interest in the table of contents. The *Layer Properties* dialog box will open, and the *symbology* tab should be selected. In the *show* box, the user should click *Quantities*, and then select *Proportional Symbols*. 
Creating Proportional Symbol Map (2)
Creating Dot Density Map (1)

To create a dot density, the user must double click on the data layer of interest in the table of contents. The Layer Properties dialog box will open, and the symbology tab should be selected. In the show box, the user should click Quantities, and then select Dot Density.
Creating Dot Density Map (2)
Querying Data

- Identifying Features

To use the **Identify** tool, the user must select it from the **Tools** Toolbar. Within the map, the user must click on the feature of interest in order to view the attribute information for that particular feature.
Selecting Features (1)

1. Click on Select Features Tool
2. Hold Shift Key and select features of interest
3. Open Attribute Table
Selecting Features (2)
Finding Features

The user can find a feature, by selecting the Find tool on the Tools toolbar. When the Find dialog Box appears, the Features tab should be selected. The known attribute information should be typed in the Find box. In the In Layers drop down box, the layer that the user wishes to find features in should be selected. In the Search options, the user should choose to either search all fields in the attribute table or a specific field. Once all parameters are set, the Find button should be clicked.
Selecting Features by Attributes

To create an attribute query, the user must click the Selection menu on the Standard Toolbar. The Select by Attributes option should be clicked. In the Select by Attributes dialog box, the Layer drop down arrow should be clicked and the data layer of interest should be selected.
Selecting Features by Location

To begin selecting features by location, the user must click the Selection menu and click the Select by Location option. The Select by Location dialog box opens.
Analyzing Spatial Data

- Buffering Features (1)

To use the ArcToolbox Buffer tool, the user must go to Analysis Tools and select Proximity. Buffer then appears in the list of tools.
A double click on Buffer results in the appearance of the Buffer dialog box. The drop down arrow should be clicked, or the browse button used, to select the layer the user wishes to buffer. Then, the Linear unit radio button should be clicked and units and distance specified. If the user wishes to dissolve the barriers between any overlapping buffers he or she may do so by selecting LIST from the drop-down menu within Dissolve Type. Once the list of attribute fields appears with a white background the box next to Shape should be checked.
• Buffering Features (3)
Overlay Features

An overlay operation is also one of the most common spatial analysis tools. Overlays allow the user to identify areas where features in two layers overlap. A new data set is often created from these overlaps. In a **Union Overlay**, all features are included in the new data set but the features that overlap represent a new feature. In an **intersect overlay**, only the areas that overlap are contained in the new data set.
The union overlay option may be very useful if the user wishes to combine data layers into one layer. To perform a union overlay, the user must go to ArcToolbox's Analysis Tools, select Overlay, and then click **Union**. The user then specifies the input layers to union and a name for the output data set.
Overlay Features – Union (2)
Overlay Features – Intersect (1)
Overlay Features – Intersect (2)
Making and Printing Maps(1)

If the data is already present within the data view, the user simply needs to switch to **Layout View** and select the **Map Template** button on the **Template Toolbar**.
Making and Printing Maps(2)

The map background color may be changed by selecting the data frame and clicking the down arrow next to the **Fill Color** button on the **Draw Toolbar**. When the user selects a desired color, the map background color will be updated.
Making and Printing Maps (3)

A map title may be added to the layout by clicking the **Insert menu** and selecting the **Title option**. A text box will be added to the page. Within this text box, a default title will be present. The user can type in a preferred title within the text box and press Enter. After the Enter key has been pressed, the user can go back and edit the title by double-clicking the on the title and editing its text properties.

The **font, size, style, or color** of the title may be changed using the **Draw Toolbar**.
A North Arrow may be added by clicking the Insert menu and selecting the North Arrow option. In the North Arrow Selector dialog box that appears, the user may select from a variety of north arrows and change the properties of any selected arrow.
A Scale Bar may be added by clicking the Insert menu and selecting the Scale Bar option. The desired scale bar style may be chosen and its properties may be edited within the Scale Bar Selector dialog box.
A Legend may be added by clicking the *Insert* menu and selecting the *Legend* option.
Making and Printing Maps(7)

The user needs to make sure that the map size is the same as the printer page size. Once all parameters have been chosen, the OK button should be clicked. Before printing the map, the user should always preview their map. This can be done by clicking the File menu and selecting Print Preview. This allows the user to see if anything needs to be changed before the map is printed. If changes need to be made, the Print Preview should be closed (by clicking the Close button), and the appropriate changes should be made. If everything appears the way that it should, the user may click the Print button. Appropriate print parameters must be set, and the OK button should be clicked when the user is ready to print the map.
Reference

1. Getting to Know ArcGIS Desktop: The Basics of ArcView, ArcEditor, and ArcInfo Updated for ArcGIS 9

2. GIS Tutorial: Workbook for ArcView 9.0 (GIS Tutorial series)