

An Introduction to Geographical Information Systems (GIS)

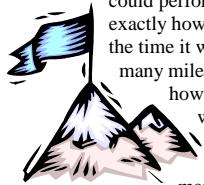
(Student)

Principles of a GIS

Have you ever used a map before? Perhaps you have used one when trying to drive to a distant town following a series of highways and freeways. Or maybe you have used one while hiking in the backcountry to find your way to the top of a remote mountain. Or it could even have been as simple as trying to find the McDonalds nearest your hotel. Whatever your experience with maps you would probably agree that they are useful.



Now, how often did you wish there was more information on the map or that the map could perform calculations for you? For example, did the road map specify exactly how many miles from the rest stop to the next exit and then calculate the time it would take to drive to it? Or did the topographic map tell you how many miles it would take to reach the top of the mountain and then calculate how far you would be able to see from the top of the mountain and what kind of obstructions would block your line of sight. And did the map in the phone book tell you how many fast food restaurants were within the city limits and then calculate how many were less than one mile to your hotel? By using a GIS all of this information and more is available with a click of your mouse.



A Geographic Information System is, in its most basic form, a map with a database connected to it. Standard information is seen on the digital map and yet by clicking a button you can pull up a table of additional information about any specific item on the map. Things like the population of a city, or the number of hotels in a city, or the facilities available at the county park are all useful facts that usually cannot fit on a paper map. In a GIS, all this additional information is stored in a database that is linked to the map. By using the database and certain functions within

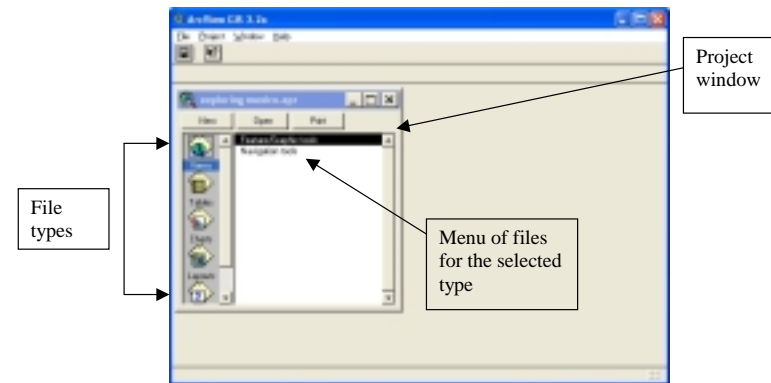


ArcView it is then possible to perform complex calculations like those mentioned in the paragraph above.

Introduction to ArcView

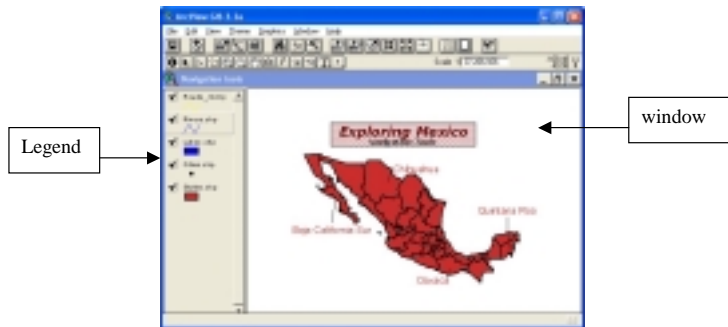
ArcView is a basic GIS program. It was created to be a desktop viewer for maps generated in more advanced GIS programs. Although the current trend is making ArcView more and more capable of performing complicated analyses similar to those done in other sophisticated programs. The manufacturers of ArcView (Environmental Systems Research Institute, ESRI) designed the program to be very user-friendly. Following is a series of terms and pictures to illustrate the ArcView interface.

The opening screen of ArcView is shown below. All work in ArcView is done through **projects**. A project is similar to a large folder. Only one project can be open at a time. The project window acts as the main menu and organizes all the work done in ArcView.



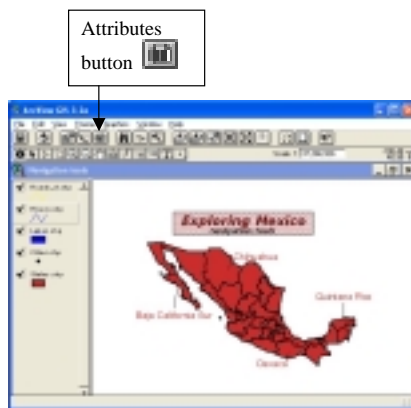
Within the project multiple files can be stored. There are five different types of files that can be created in ArcView: views, tables, charts, layouts, and scripts. Only one file type can be selected at a time. When a file type is selected (single click) a list of created files appears to the right. If no list appears there are no files created of that type.

For this project we will only be working with Views and Tables. A **view** is similar to a piece of paper on which the map can be drawn. A **table** is what holds the information about things drawn in the view. A view is made of two parts, the **window** and the **legend**. The view window is where the map information is displayed. The legend explains what is displayed in the view window.



One set of data (i.e. roads, rivers, highways, etc...) is called a **theme**. Multiple themes can be loaded in a view. Themes can be either points (ex.: dots for cities), lines (ex.: roads), or polygons (ex.: states of a country). To use or edit data in a theme it must be **active**. To make a theme active you single click on the desired theme, a shadow box will appear around theme name.

The table of information linked to a theme is called the **attributes**. From within a view you can open the attributes table by selecting the attributes (theme table) button.



A table is pulled up showing all the information linked to that theme. It is possible to add or delete data in the attributes.

The image shows a table window titled 'Attributes of Mexico.shp'. It contains a list of data rows with columns for 'OBJECTID', 'NAME', 'POPULATION', 'AREA', 'PERCENT', and 'COUNTRY'. The first few rows are:

OBJECTID	NAME	POPULATION	AREA	PERCENT	COUNTRY
1	Chihuahua	1,200,000	100,000	10.0	MEXICO
2	Baja California Sur	500,000	50,000	5.0	MEXICO
3	Quintana Roo	1,000,000	10,000	1.0	MEXICO

This concludes the introduction to ArcView. This short lesson is only intended to familiarize the user with the general layout of ArcView. To learn how to use some of the tools of ArcView please complete the enclosed activities.