

I Introduction

ArcGIS Software

ArcGIS software is developed by ESRI (Environmental Systems Research Institute), USA who are the global market leaders in GIS. The software contributes approximately 43% share with estimated annual revenues of roughly \$1.1 Billion, from around Three lakh customers (<https://digital.hbs.edu/platform-digit/submission/esri-and-arcgis/>). In the last few decades, ArcGIS software has been widely utilized by numerous educational institutions across the world to carry out research projects and teach undergraduate and postgraduate students about GIS. Several GIS companies use ArcGIS software to create GIS tools, convert real-world maps into GIS, publish maps, and create customized work for clients' interests and needs.

The ESRI developed various products of software's for different applications and usages of mapping community. The products are

- ArcGIS Server
- ArcGIS Web Mapping APIs
- ArcGIS Engine
- ArcGIS Mobile
- ArcGIS Desktop

About ArcGIS Desktop

The **ArcGIS Desktop** is extensively using by many educational institutions, research organizations, NGOs, and individuals etc. ArcGIS Desktop is primarily used to create, assess, manage (storage and analysis), and communicate precise spatial locational information of physical objects on the globe, such as rivers, forests, and artificial structures. The software useful to Data building, Analysis, Modeling, Develop web mapping applications, Link to external data bases, Spatial statics, Network analysis etc.,

ArcGIS software has contained various modules. Each Module has its own advantages. The available various modules in ArcGIS showed in figure.1 and listed below.

- i) Arc Map
- ii) Arc Catalogue
- iii) Arc Scene
- iv) Arc Globe

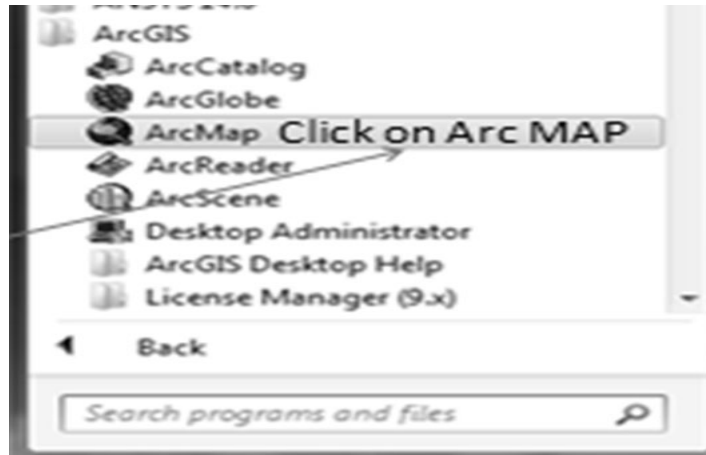


Figure 1 Screen shot of available modules in the ArcGIS software.

The section below covers each ArcGIS module's usage and purpose, along with the modules that are currently available.

i) ArcMap Module:

- a) Working on maps - Cartography maps, Satellite Images, Reproduce the maps, Geo spatial data base digitization, editing, spatial analysis, Raster and vector analysis.
- b) Presenting maps – Convey the finished maps with Legend, Scale, North Arrow, Grid etc.
- c) Charts – Prepare charts using the Geo spatial database
- d) Graphs – Prepare graphs from your data base

ii) ArcCatalogue:

- a) Organize or Managing the Geospatial database, (Creation, editing and etc.)
- b) Creation of Network analysis

iii) Arcscene:

- a) Two-dimensional Arcmap maps will be shown as three-dimensional maps, incorporating height information for geographic features.

iv) ArcGlobe:

- a) The Arcglobe works similarly to Google Earth. The module allows users to view a geo reference map of their precise geographical location on the globe.

The ArcGIS software is installed in your GIS lab.

ArcGIS 9.3, ArcGIS 10.0, ArcGIS 10.3, ArcGIS 10.4, Arc GIS 10.5, and so on are examples of GIS software that you might use in your GIS lab. Each edition of software incorporates both old and new tools, depending on the demands of researchers and engineers. Any of the software that I listed in the first line of this paragraph can be used by researchers, engineers etc.,

II Open ArcMap

ArcGIS software has been successfully installed within our GIS lab, Whether you're a practitioner, student, researcher, or an eager enthusiast in GIS, accessing the ArcGIS software we must know how to open the software, where it is located as a learner we must to know. Below, I provide a step-by-step guide on opening the ArcMap software, exploring its different components, toolbars, and navigating with the mouse to facilitate comprehensive learning.

II-I Open Arc Map on the Desktop or your Laptop

The opening Arcmap software in your desktop or Laptop the procedure is discussed below.

Go to start menu or press Windows button on the desktop computer as showed in the **figure. 1**

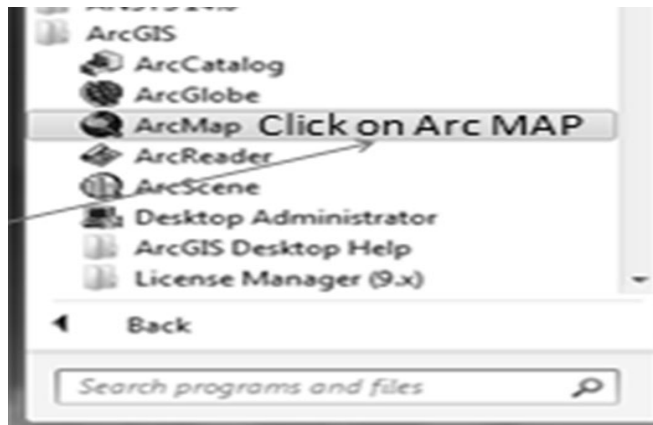
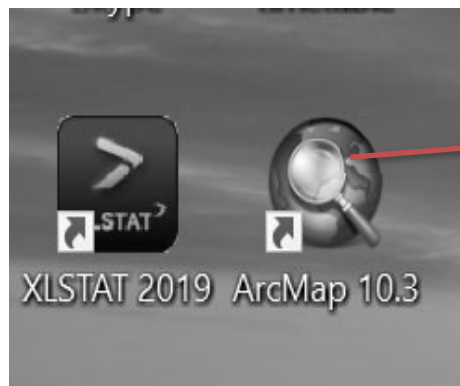


Figure 1 Screen shot of **ArcMap** icon on the desktop screen.



Arcmap.exe icon created as a shortcut menu after installed the software.

Figure 2 Arcmap.Exe icon which is appears on your desktop screen (double click on icon it open Arcmap on the screen as showed below).

Double-click on Figure 1 or Figure 2 to open them in ArcMap. This action will prompt a display, as illustrated in Figure 3. Subsequently, click on the 'OK' button to present a clear and enhanced view.

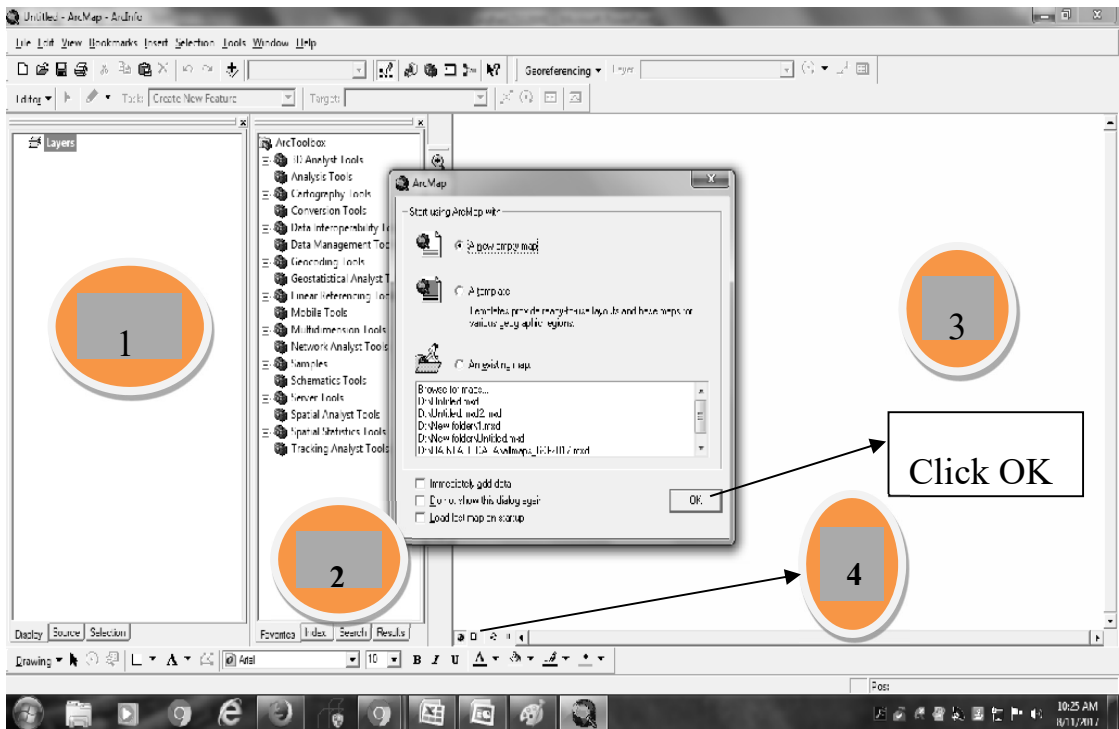


Figure 3 Parts of ArcMap Environments.

The various parts of ArcMap environment showed in figure. 3 are 1) Table of contents (Layers) 2) ArcToolbox 3) Data Frame 4) Layout view

- 1 **Table of contents (Layers)** – Display the added list of layers in to Arc map environment (like Point, polygon, line features, Raster's, text files etc.)
- 2 **ArcTool Box** – It contains several tools for raster and vector analysis, 3D analyst, spatial analyst, Image classification, and spatial statistics etc. The Arc tool box is heart of ArcGIS software. Without usage of these tools any user cannot perform raster and vector analysis in ArcMap environment.
- 3 **Data Frame** – Work to create map features, editing, modifying, copying etc.
- 4 **Layout view** – The layout is useful to prepare the final output maps and also add to show Legend, Scale bar, North arrow, Grid (Longitude and Latitude).

The menus visible in Figure 3 within ArcMap, including the File menu, Edit menu, etc., are depicted in Figure 4.

Subsequent chapters will provide detailed explanations regarding the functionalities and usages of these listed menus

Main Menu

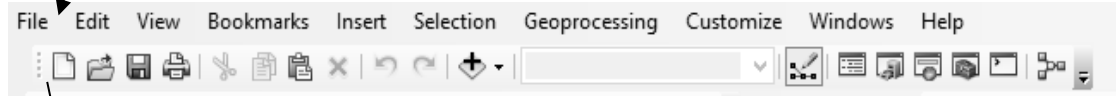


Figure 4 Main menu.

Main Menu – The main menu contains File, Edit, View, Book marks, Insert, Selection, Geoprocessing, Customize, Windows and Help menus are showed in figure. 4.

Standard Tool bar - New, Open, Save, Print, Cut, Undo, Redo, Add data etc.

Each menu bar has several tools for executing the GIS functions in ArcMap

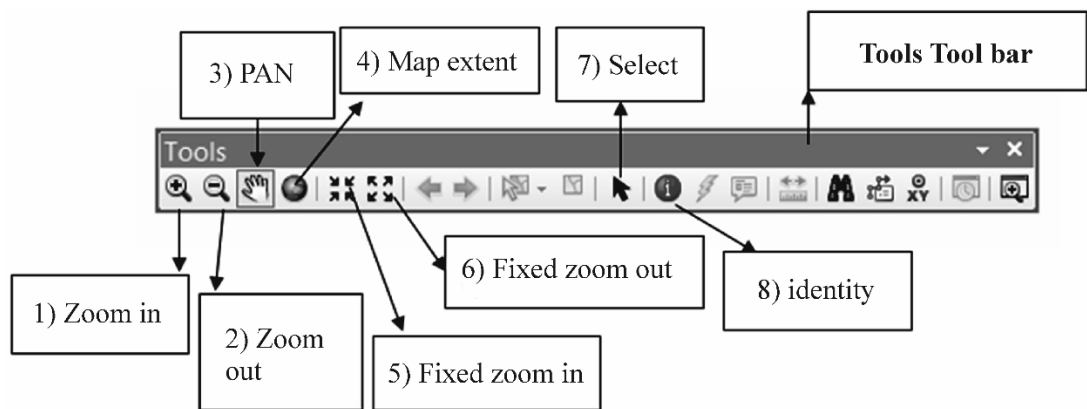


Figure 5 Tools toolbar.

Tools tool bar each tool wise explanation is discussed below.

- 1) **Zoom in** – To view larger portion of area in a map
- 2) **Zoom out** - To view small portion area in the map
- 3) **Pan** – User moves from one location to another location in a map. Click on pan button Hand cursor appears on the screen, using this tool user can move one location to desired location without moving any map elements.
- 4) **Map Extent** – If user click on this button, the command display the Map extent of the map, which user are working.
- 5) **Fixed zoom in** – Directs to a more detailed view on the map (enlarged to a specific scale)
- 6) **Fixed zoom out** – Navigates to a broader view of the map
- 7) **Select** – The tool allows to select any vector elements in the map.
- 8) **Identity** – The user click on this button or command, it displays the selected objection Information and display in the separate GUI on the screen.

Mouse and Keyboard

The utilization of keyboard and mouse input for software interaction is essential on every computer. Below, how these input devices are used in Arcmap software:

In ArcGIS, mouse and keyboard usage is essential for navigation, data manipulation, and executing various functions within the software.

How to operate Mouse and working with Keyboard discussed below.

Mouse has two buttons first one is Left Button, second one is Right Button and middle scroll wheel on a mouse is commonly used in ArcGIS for zooming in and out of the map.

Left button use for clicking of tools, double click etc. purpose, Right button is use for Enter button. Two enter button available in Keyboard, However, learner can easy to understand while operating the Arcmap software and tools usage once they know to operate.

Right button for Enter button



Enter buttons in the keyboard

Now we can go to ArcMap environment and how to do the exercises one by one

Topics and Background about the Exercises

I've provided an introduction, and listed the various modules available within ArcGIS. Furthermore, I've detailed the process of opening the software on a lab computer or desktop, discussed the various components encompassing ArcGIS, provided descriptions for a selection of tools, and outlined the usage of mouse and keyboard interactions.

However, moving forward from **Exercise 1 to Exercise 17**, I've meticulously explained step-by-step experiments utilizing ArcGIS. These exercises are comprehensively explained, aiming to ensure ease of understanding for users of all levels. From Exercise 1 to 17, the learning outcomes and important notes are presented in *italic format* for understanding.