13 Data Analysis And Map Making Using Computer

Friends, earlier, we learnt about the methods to understand geographic information, to analyse it, to process it and to present it. In 21st century, the human tendency to go beyond national boundaries to expand upto a global platform has increased. Today, when a man's identity has developed as a global man, he is facing many geographical challenges. The basic aim of every technology was always to conquer all situations coming across the human development. So the study of new technology in geography has become very important.

The information received through satellites or other sources has become important for proper management at the time of natural hazards and various natural factors which affect the routine life of people. By using computers, such information can be easily used and analysed.

Computer is an important electronic device for analysis, processing and presentation of data. In this chapter, we shall learn about the computer and its integrated system for data processing and map making processes.

Hardware and Software

"Physical components of computer which can be touched and can be seen are known as Computer Hardware". Generally, key board, mouse, monitor, printer, processing unit, pen drive etc. are known as hardware.

"Software is a collection of programs to perform some operation for specified task." e.g. Microsoft Office, Open Office, Windows Operating System, Linux Operating System, Mozilla FireFox etc.

Special hardware like digitizer, scanner, plotter etc. are used to utilise geographical software and to analyse data.

Digitizer : This device is used to add a specific point and coordinates of latitudes and longitudes of any area.

Scanner : This device is used to add printed matter of the map in the computer.

Plottar : With the help of this device, the maps prepared in the computer are printed on a large scale; e.g. wall maps, topographic sheet etc. are printed through plotter.

Various software are available to prepare and analyse geographical maps. Let us know about the software for image processing and map production. Erdas Image and Envi software are used to get geographical information by applying different processes over satellite imageries. For the

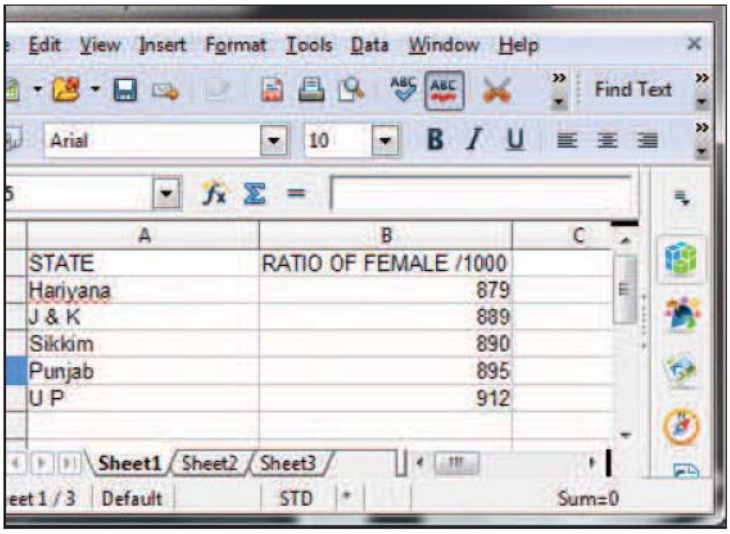
preparation of maps and graphs, software like GRASS-GIS, Arcview, GeoMedia, Gram++, I-GIS, SPSS (Statistical Program for Social Sciences), SAS (Statistical Analysis System), Open Office Calc, M.S.Office Excel etc. are used.

Use of Calc in graph creation

Calc is a spreadsheet program through which various types of graphs can be prepared. A graph is specialised technique to present large data in an attractive way. It is also known as a method to show statistical information in a pictorial form. A graph is used for various purposes such as to show the history of any geographical condition, for evaluation of various options, to know any specific trend or to find out extraordinary instances.

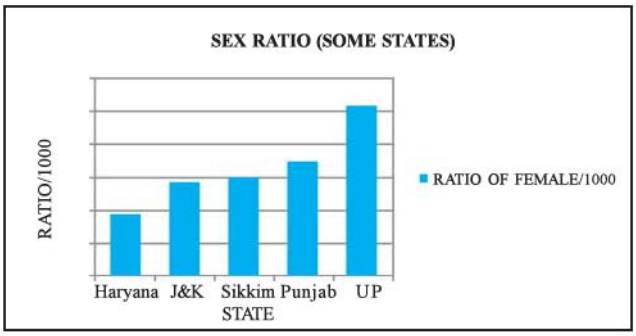
So, let us now understand the steps to represent geographical information in a graphical form with illustration.

Steps for Graph Creation

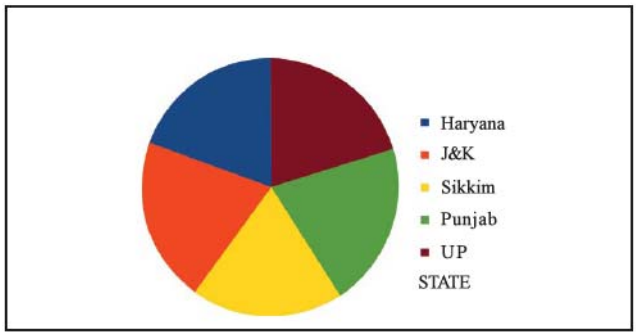


13.1 Calc data (Data to prepare a graph)

- Start the Calc program.
- Enter the data in the worksheet as shown in above figure and select it.
- Click the Chart button on the Standard tool bar. This will open the Chart Wizard.
- In the first step of Chart Wizard, select the type of the chart (column, pie, line)
- The second step in the Chart Wizard will show the **data range** of the selected data.
- In the third step of Chart Wizard, **data series** is shown.
- In the fourth step of Chart Wizard, add the **title**, **sub-title** and names of **X and Y axis**. Also select the location for **Legend** and click on Finish button.
- By doing this, the graph for the selected data will be shown on the computer screen.



13.2(A) Bar Chart



13.2 (B) Divided Pie Chart

(**Note :** Both the above charts are based on the data given in the fig. 13.1.) Similarly, a line chart can be prepared from any other related data.

Use File

Map Making Softwares and their applications

Maps are prepared to understand any geographical area thoroughly and to be acquainted with it. Various softwares are used in computers to prepare maps. Natural hazards, weather forecast, research about resources and its procurement, agricultural production, locating the fishing zones, rate of soil erosion, depth of ground water etc. are presented in a way which is understood easily even by a common man with the help of satellite imageries and processing software.

Among the softwares mentioned earlier for preparing different types of maps in geography, we shall know about the GRASS-GIS software.

GRASS-GIS

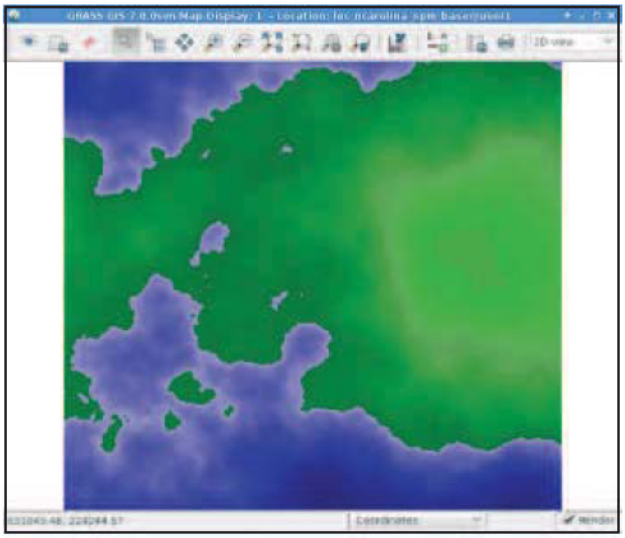
GRASS (Geographical Resources Analysis Support System) is a competent software for management and analysis of Geo-Spatial data and to prepare the geographical maps. GRAS software is used in educational field commercial sector and by the Government, GRASS-GIS is free-to-use and Open Source (a permission to publish modified software versions) Software program. GRASS provides views of the maps prepared by worldwide users and also the facilities to prepare new maps. Tools to prepare Two-dimensional (2D), Three dimensional (3D), Raster and Vector maps, image processing and to analyse the pictorial information etc. are given in GRASS. The GRASS software can be installed in Microsoft Windows, Linux, MAC and OSX operating systems. While starting the GRASS-GIS software, the opening screen appears which is shown in the figure 13.3.

13.3 GRASS-GIS

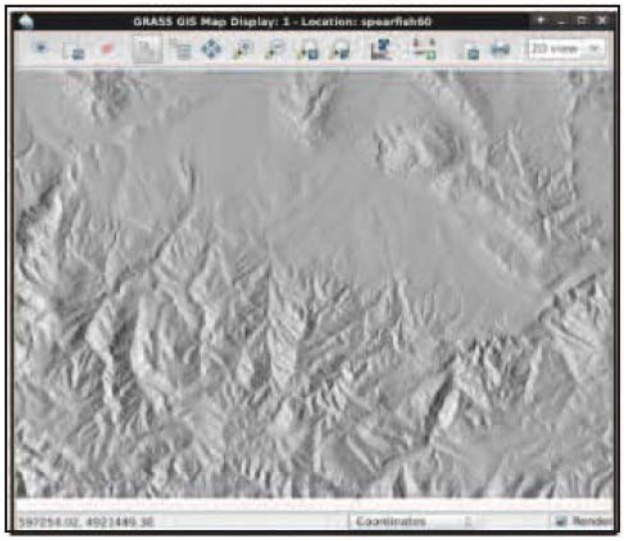
Raster Data : Generally those pictures which use pixels are called Raster. For example, the satellite imageries, scanned maps, aerial photographs etc. show 'pixels' when enlarged.

Vector Data : Vector data means the data which holds information about the direction and dimension. It is a dimension which shows relative location of one place or aspect to another. Street, river, railway, pond, urban area etc. are examples of vector data.

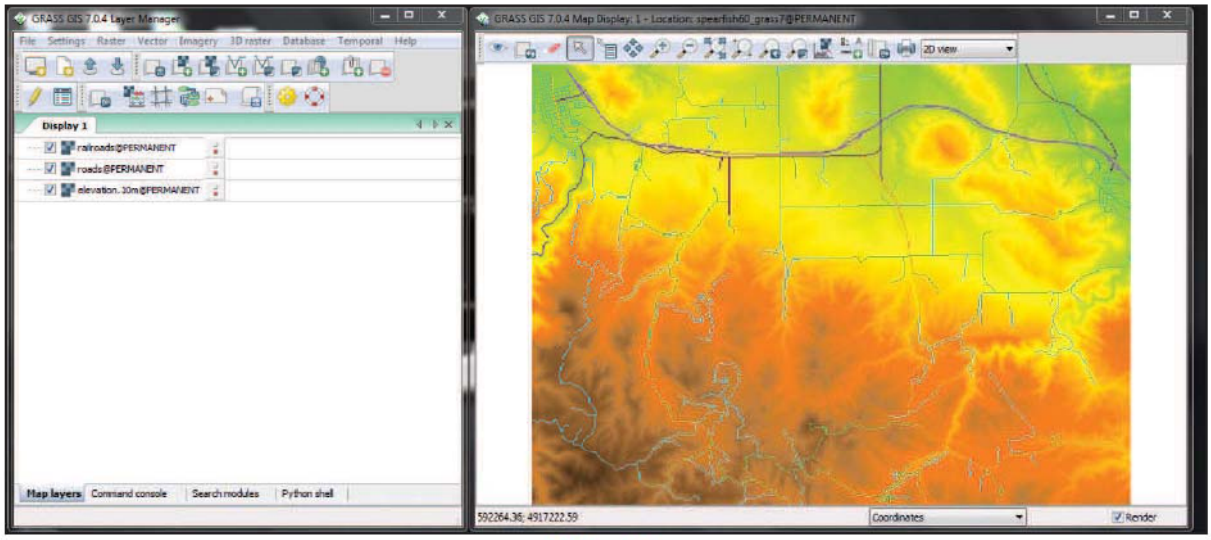
Raster and vector maps can be prepared using raster and vector data with the help of GRASS-GIS software. Some illustrative maps prepared by GRASS-GIS software are shown in figures 13.4 (a), 13.4 (b), and 13.4 (c).



13.4 (a)



13.4 (b)



13.4 (c)

Advantage of map making using computer software

- With the help of these softwares, maps can be prepared in short time, at lower cost and according to the need of the users.
- By using this new technique, maps are prepared easily, coloured, attractive and in a specific dimension.

- It is possible to make changes according to the requirements. These maps are more acceptable due to exact information.
- Statistical data are saved in the software, so these data can be retrieved after easy modifications.

Geographic Information System (GIS)

"Geographic Information System is such a computer system through which the geographical information collected through various sources is stored and can be presented after processing." GIS presents such information on maps and acquaints the common man about the geographical patterns and relations.

GIS was first used by Roger Tomlinson in 1968. He is known as the Father of GIS. This is a computer-based system wherein the observations of spatial information of various strata are stored.

In this system, the locations on the surface of the earth can be shown in the maps with reference to their latitudes and longitudes. This system is associated with construction, public health, criminal mentality, national security, sustainable development, natural resources, landscapes, transportation, location of public facilities, comprehension and management of natural hazards, regional and economic planning etc.

GIS is used with reference to the following :

- Searching of natural resources
- Community services
- Health
- Energy
- Mapping of natural phenomena
- Occupation
- Indication of water resources
- Bathymetric survey
- Education

Global Positioning System (GPS)

This is a global locational system through which global navigation is carried out. GPS system works on the same lines as that of Global Navigation Satellite System (GNSS) which is a Radio Navigation System working during all seasons. GPS was developed by U.S. Army. In this system, a total of 24 satellites are stationed around the

13.5 Global Positioning System (GPS)

earth and are working constantly. The revolution time of each satellite is 24 hours and is based on the Satellite Tracking System spread over the entire world, where the intersecting points of GPS signals are used by the group of satellites. It decides the location of any object within a circumference of 500 metres. This system is known as Triangulation.

Radio signals from satellites are sent on earth. These are received by the Ground Control Centres, and retrieved thereafter. These retrieved signals can be used by the user in his device. Here the person can know his location at that specific time on the earth. He can also see the aerial view of his location on the computer and hence he can plan his work very conveniently.

Would like to know

Trackers

Some nature lovers wander around the nature with least facilities. They remain in the groups and enjoy the vicinity of the nature under the leadership of a guide and by walking along the narrow marked footpaths. Some adventurers satisfy their hobby by marking new tracks in uninhabited vast deserts or dense forests. Earlier such adventurers lost their lives wandering through unknown regions, but with the invention of GPS they can find out their own way conveniently.

Sometimes the rescue team could easily reach at the place of unexpected phenomena or accidents at the right time because of the information about their location was available easily. This system has proved to be blessing to the adventurers and researchers.

Tracking : The relative locations of more than one vehicles or their location and the distance with reference to one another can be measured very precisely through GPS and their direction along a specific route can be shown. This process is known as 'Tracking'.

Uses of GPS

Location and Time related information : It is very helpful in deciding the location of any stellar body from any place on the earth. It is useful to sky gazers, navigators, trackers etc. It indicates the time zone of particular location.

Auto - Vehicles : It provides necessary guidance to driverless vehicles and to know the accurate locations of the vehicles like trucks, buses etc.

Maps : This technique is used for general maps and for military use.

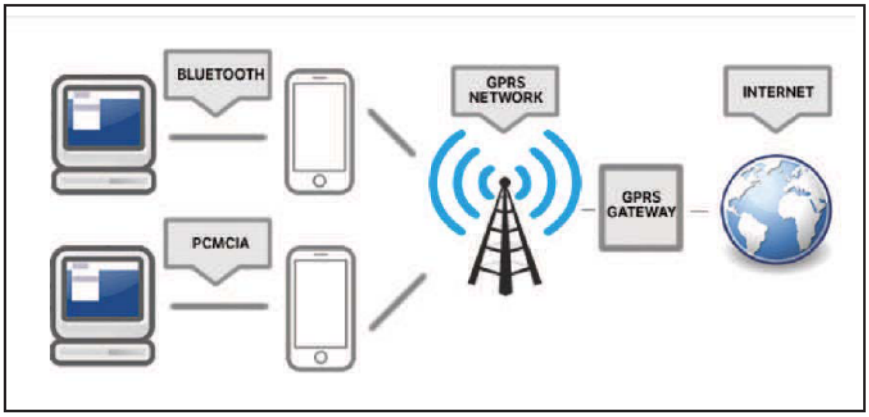
Cellular phones : Here the watch of the traveller entering one time zone to another time zone is automatically adjusted according to the time of the location concerned.

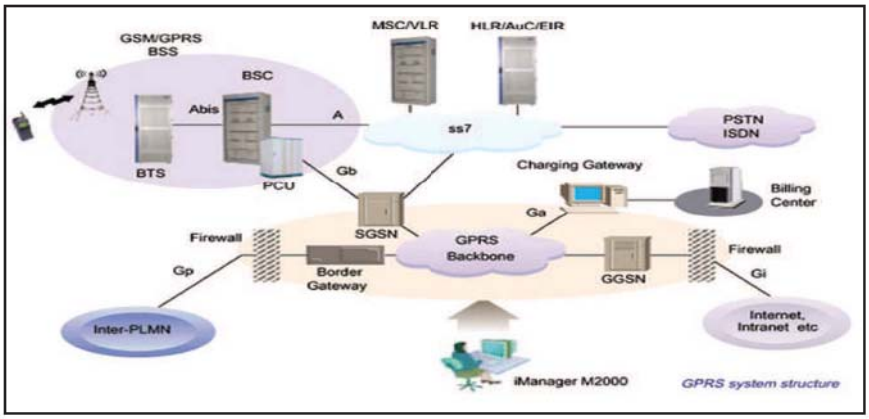
Emergency : It is useful to trace the caller, to know the location of the affected area or the phenomena, to know the exact location of a cell phone user etc. Mobile tracking system is used by the Police Department to nab the culprits.

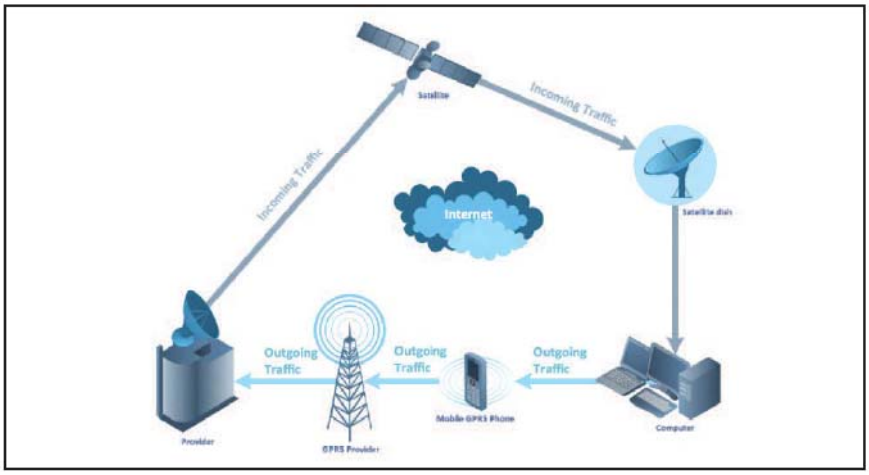
Disaster relief : This technique is also used to reach the spot and provide the relief. It is helpful to trace a group, movement of military forces, location of fleet of holders of VVIP security, speed and location of transport carriers from time to time etc.

General Packet Radio Services (GPRS)

General Packet Radio Service is a global technique based on 2G and 3G cellular communication System with reference to mobile data. It is known as GPRS.







13.6 GPRS

GPRS is a wireless communication service based on Eco-Packet which connects the users of mobiles and computers with Internet continuously at the speed of 56 to 114 kbps (Kilo bits per second).

This techniques is very widely used in the fields of various economic activities, routine transactions, exchange of information, disaster prevention, security etc. It can be said without any hesitation that the global transactions would become more convenient through these improved techniques and equipments.

Exercise

1. Answer the following questions in details :

(1) State the advantages of map making using computer.

(2) Write about hardware and software.

2. Answer the following questions :

(1) Explain GPS in brief.

(2) Explain how a bar graph is prepared with the help of a computer.

3. Answer the following questions in brief :

(1) Which components are included in the computer hardware ?

(2) Give brief information about GPRS system.

(3) Write about the functions of a map making software.

(4) Write about GIS.

4. Answer the following questions in one-two sentences :

(1) What is used to know the location on the earth ?

(2) What is meant by Vector data and Raster data ?

(3) State the utility of GIS technique.

5. Select the correct option for each question and write the answer :

(1) Which country has developed GPS technique ?

(a) U.S.S.R. (b) U.S.A. (c) Africa (d) Germany

(2) In GPS technique, how many satellites are stationed around the earth ?

(a) 20 (b) 100 (c) 58 (d) 24

(3) Which is the best technique to map the statistical data ?

(a) GIS (b) IAS (c) IPS (d) SMS

Activity

- By using the table of geographical information given in your textbook, prepare graphs with the help of your teacher in computer laboratory.
- Obtain satellite imageries with the help of your teacher and try to interpret them.
- Collect information about other softwar[illegible] making and graphical presentation.
- visit https ://grass.osgeo.org website[illegible]
- Use Google and collect more infor[illegible]ASS-GIS.