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Role of knowledge management in Geoinformatics

V. K. Mishra[1], S. Prakash[2], S. K. Singh[2], N. Dwivedi[1], S. Dwivedi[1], V. S. Pundir[2], V. Singh[3] and P. A. Jain[4]

[1]*Department of Biotechnology, S. D. College of Engineering & Technology, Muzaffarnagar, U. P.*
[2]*Department of Civil Engineering, S. D. College of Engineering and Technology, Muzaffarnagar, U. P.*
[3]*Biotechnology Department, NIET, Greater Noida, U. P.*
[4]*CBBI, JSBB, SHIATS-Allahabad, U. P.*

ABSTRACT

Knowledge management technology is used to collaborative integration of multiple forms of spatial knowledge in support of collaborative community planning. The knowledge management system included a customized user interface for data entry. One of the most widely uses of photogrammetry are in preparation of topographic maps. In modern time photogrammetric operations are commonly used to produce a range of GIS data products. The satellite imagery information as satellite images (Landsat, SPOT, JERS, Corona etc) and products(DEM, GCP, land cover map etc) using satellite images and other primitive sources in remote sensing. Remote sensing is a technique to observe the earth surface or the atmosphere from out of space using satellites or from the air using aircrafts. The recent advantage of Geographic Information Systems and Global Positioning Systems has created an effective means by which the acquired data are analyzed for the effective development and mapping of temporal dynamics of glaciers. The main purpose of this paper is to discuss using areas and contribution potentials of knowledge management in geoinformatics.

Keywords: Remote sensing, satellite, global positioning system, geographic information system.

INTRODUCTION

Long time ago humankind faced many problem related to geographical hazards like earthquake, volcanism, tides and eclipses etc. Due to less knowledge of geoinfomatics and they do not understand these events at timely.so with the help of Pioneers of the earth sciences solve these problems, geologists Lyell (1797–1875) and Hutton (1726–1797), made multidisciplinary observations in stratigraphy, paleontology, and petrology, stored their observations in logbooks, and visualized them through interpretive products, such as maps and cross sections. We continue to conduct our science in similar ways (1). Knowledge management can be defined as an approach, strategically targeted, so that to motivate the members of an organization to develop and use their cognitive capacities, sources of information, experience and abilities by subordinating their own objectives to the overall objectives (2). In the organizational environment, knowledge is derived from the information that is processed by those who have the capacity to effective action (3).In present time using technologies such as satellite aerial photography, remote sensing, GIS and GPS find out the position and information about the places in micro seconds (4).

Satellite: The satellite meeting will consider how knowledge management may be the key to successful innovation and transform organizations to support the future of the library profession.it will particularly focus on the developments of knowledge management in libraries in low income countries. Satellite image has properties of high

resolution and multispectral; it is widely used in the defense and environmental field. But it is used more and more in the field of map production, agriculture, forestry, planning of national land, establishment of city plan, etc(5). Possibility of periodic data acquisition of satellite image and diverse satellite images between hyper spectral and high resolution satellite image makes the satellite images the important resource for the record of national land. So, it is necessary to preserve the satellite images which contain the change of geographic information, national land, and environment for the form of digital library or museum (6). Processing of satellite image is done using foreign software because of non-systematic management of the developed technology and these facts result in the mass budget waste for each year. For the solution of these problems, it is necessary to establish the service which gives and manages the information of satellite image systematically and distribute information to the institute which needs freely (7).The path followed by a satellite is referred to as its orbits, Satellite orbits are matched to the capability and objective of the sensors they carry. Orbit selection can vary in terms of altitude and their orientation and rotation relative to the Earth. Satellites at very high altitudes, which view the same portion of the Earth's surface at all times have geostationary orbits these geostationary satellites, at height of approximately 36,000 kilo meters, rotate at speeds which match the rotation of the Earth so they seen stationary, relative to the Earth's surface (8).

Data management system: Managing the satellite imagery information, we design the structure of data in hierarchical process. Since the size of satellite imagery information is large, we register the satellite image in online. If the amount of online is 70 ~ 80% full, we move the satellite imagery information to the near line. If the amount of near line is 80% full, we draw the tape offline. The satellite image which use frequently want to service is on the online. For the set of data, we backup the metadata, raw data, browser images and thumbnail images for periodic times (9).The development and management of information technology tools assists executives and the general workforce in performing any tasks related to the processing of information (figure).MIS and business system are especially useful in the business data and the production of reports to be used as tools for decision making (10).

Fig.1

Global Positioning System (GPS): GPS use satellite data to calculate an accurate position on the earth. These calculations can relate the user's position to almost any map projection within mille-seconds. All GPS work in a similar manner but they often look very different and have different software (11). The most significant difference between GPS receivers is the number of satellites they can simultaneously communicate. Most receivers are described as 12 channels meaning they can communicate with 12 satellites. Older models may be 8 or even 5 channels with more modern receivers capable of communicating with 14 – 20. Given the current (2005) makeup of the GPS satellite's constellation 12 channels is more than adequate (12).

GPS signals do not contain positional data. The position reported by the receiver on the ground is a calculated position based on range-finding triangulation (13). GPS positioning is achieved by measuring the time taken for a signal to reach a receiver. Almost one million times a second the satellite transmits a one or a zero in a complex string of digits that appears random. In actuality this code is not random and repeats every 266 days. The receiver knows that the portion of the signal received from the satellite matches exactly with a portion it generated a set number of seconds ago. When the receiver has determined this time, the distance to the satellite can be calculated using simple trigonometry where:

Distance to the satellite $=C*(T_r - T_o)$

Where C=speed of light in vacuum is 2997925000 m/s
T_r = time at the receiver
T_o = time at the origin. (14)

This simple operation allows the distance to a satellite to be calculated accurately. When the distance to three satellites is known then there is only one point at which the user can be standing. This principle is demonstrated in the diagrams on the following pages. From one measurement we know the receiver can be anywhere at a uniform

distance from the satellite with a radius equal to R = C*(T_r- T_o). This defines the outer surface of a sphere of radius r.

C= speed of light
R= radius
T_r = time at the receiver
T_o = time at the origin

From two measurements we know the receiver must be anywhere on the line of the outer edge of a circle of intersection between the two spheres shown as a shaded ellipse .GPS receivers can collect the information latitude and longitude coordinates, real time position and elevation (15). GPS is a system of satellites. Receivers identify point-specific and "real-time" locations, GIS software programs can merge data from GPS and numerous other sources, Maps and tables from GIS programs can facilitate responders' fast and accurate response to a plant bio security problem, GPS and GIS technologies can assist producers' mitigation and preparedness efforts by identifying potential impact areas and areas vulnerable to intentional and unintentional bio security problems. There are three segment global positioning system works that is 'space segment, control segment and user segment. They are interconnected to each other.

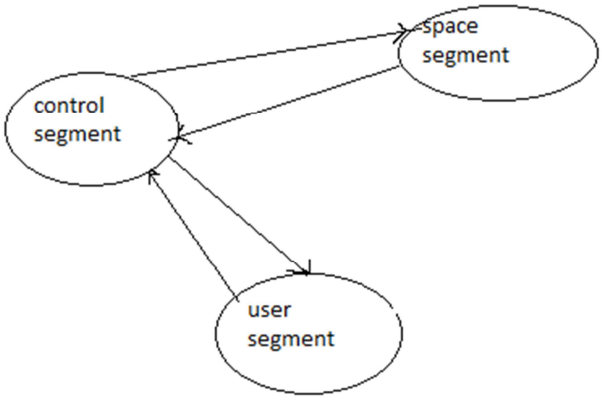

Fig.2

The space segment consist of 24 satellite circling the earth at 12000 miles in altitude, the high altitude cover large area. Each satellite transmits low radio signals with a unique code on different frequencies. The main purpose of these coded signals is to allow for calculating travel time from the satellite to the GPS receiver. The travel time multiplied by the speed of light equals the distance from the satellite to the GPS receiver. The control segment tracks the satellites and then provides them with corrected orbital and time information. The control segment consists of four unmanned control stations and one master control station. The four unmanned stations receive data from the satellites and then send that information to the master control station where it is corrected and sent back to the GPS satellites. The user segment consists of the users and their GPS receivers (16).

Remote sensing: Remote sensing is the science of acquiring information about the earth's surface without actually being in contact with it (17). Sensors can be used to obtain specific information about an object or the geographic extent of a phenomenon (18). Remote sensing is a tool or technique similar to mathematics, using sophisticated sensors to measure the amount of electromagnetic energy exiting a geographic area from a distance (19). The Remote Sensing is basically a multi-disciplinary science which includes a combination of various disciplines such as optics, spectroscopy, photography, computer, electronics and telecommunication, satellite launching etc. All these technologies are integrated to act as one complete system in itself, known as Remote Sensing System. There are a number of stages in a Remote Sensing process, and each of them is important for successful operation (20).

Passive sensor: The sun provides a very convenient source of energy for remote sensing. The sun's energy is either reflected, as it is for visible wavelengths, or absorbed and then remitted, as it is for thermal infrared wavelengths. Remote sensing systems which measure energy that is naturally available are called passive sensors. Passive sensors can only be used to detect energy when the naturally occurring energy is available. For all reflected energy, this can

only take place during the time when the sun is illuminating the Earth. There is no reflected energy available from the sun at night. Energy that is naturally emitted such as thermal infrared can be detected day or night, as long as the amount of energy is large enough to be recorded (21).

Active sensors: Active sensors provide their own energy source for illumination. The sensor emits radiation which is directed toward the target to be investigated. The radiation reflected from that target is detected and measured by the sensor. Advantages for active sensors include the ability to obtain measurements anytime, regardless of the time of day or season. Active sensors can be used for examining wavelengths that are not sufficiently provided by the sun, such as microwaves, or to better control the way a target is illuminated (22).

Geographic information system: GIS is a set of spatial-analytical tools, a kind of data base system (23). GIS is a system of hardware, software and procedure designed to support the capture, management, manipulation, modeling and display of spatially referenced data for solving complex planning and management problem (24). Geographic information system capable of assembling, sorting, manipulating, displaying geographically referenced information (25). Geographic data record the locations and characteristics of natural features that occur on are near Earth's surface (26).The whole geographic information about the surface goes under the follows statement.

- Cognition map: The basic application of GIS in knowledge management is to associate all sorts of information with spatial location, carry out visual management and help to form cognition map.
- Network map: Internet carries out the connection of web pages, which provides the communication of e-mail and web browsing.
- National condition map: Geographical national condition include territory area, region division, landform characteristic, road network, urban layout and expansion (27).

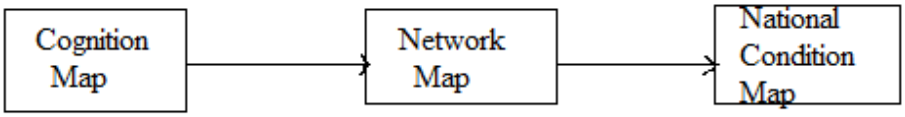

Fig.3

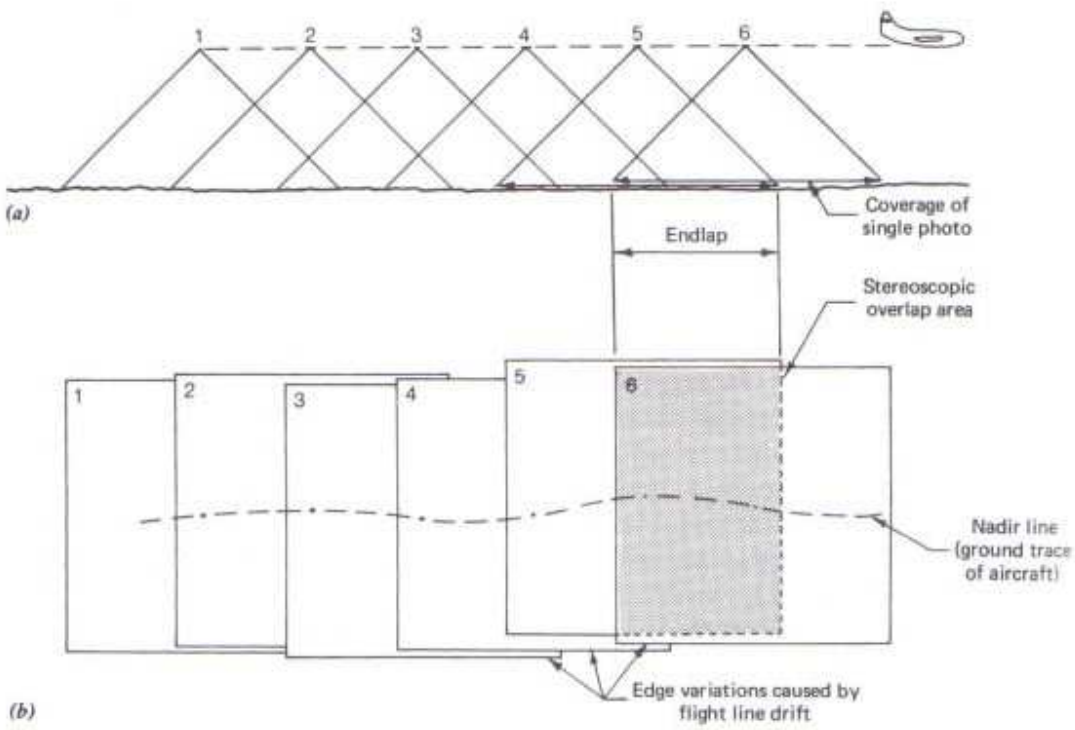

Fig.4: photographic coverage along a flight strip (34)

Arial photography: Mapping of large area using aerial photography is faster and economical than any other method. The development of photogrammetry clearly depends on the general development of science and technology (28). It is interesting to note that the four major phases of photogrammetry are directly related to the technological inventions of photography, airplanes, computers and electronics (29). Photogrammetry had its beginning with the invention of photography by Daguerre and Niepce in 1839 (30). Photogrammetry is the science and technology of obtaining spatial measurements and other geometrically derived products from aerial photographs (31).One of the most widespread uses of photogrammetry is in preparation of topographic maps. Today, photogrammetric operations are extensively used to produce a range of GIS data products such as the metric data in 2D and 3D, raster image backdrops and DEMs (32).

Flight planning: Flight planning mission consists of area to be surveyed, focal length of the camera, scale of the photograph, longitudinal and side overlap and the approximate ground speed of the aircraft in still air (33). Flight planning is used to compute the altitude of the aircraft above the datum, area covered by each photographs. Sufficient photographs with proper overlaps must be taken to cover the entire terrain to be surveyed (34).

CONCLUSION

Construction of big projects in field of civil engineering the full knowledge of geoinformatics is must for advanced surveys. Advanced surveys of large area done by aerial photography taken by cameras from the elevation point in the air with the help of kite, pigeons, helicopters etc. In modern time remote sensing provides clear photographs of that area with the help of satellite. Global positioning system give accurate knowledge of the earth's surface on the navigation map with in micro second with the help of satellite. Geographical information system is capable to manipulate the geological information of the earth's surface. GIS which address a broad spectrum of users such as public agencies, local communities, civil society organizations, the private sector, academic environment, and personal users have been aiming to solve problems which occurred in location-based areas. In the building block of knowledge goals, it is defined which capabilities are going to be built in which level. After the relevant objectives respectively the knowledge assets are determined, it is analyzed which of these assets are available in the organization. The building block of knowledge development, it is aimed at the development of new abilities, new products, better ideas and more efficient processes.

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