Role of cartography in image processing

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Abstract

In this paper we will discuss about the cartography technique with image processing. Mainly cartography is used for image processing map and also used for different types of images. There are many methods for image processing.

Introduction

Cartography is used to measures the positions of places and represents the surfaces of a sphere on two dimensional maps. Map has played an important role in developing mathematics .A map is a graphic representation of concepts. It is a way for conveying geographic information. We can say that Map is a universal medium for communication and supported by many people, regardless of language. Map is a "snapshot" of an idea. Old map provides information about past and the philosophy which were different from modern cartography. Map means that by which scientists distribute their ideas to future generations.

Many can argue that man needs to make map during an early stage in the co-evolution of brain. It would be advantageous for man to structure information about spatial aspects of world and communicate it with others. Unlike temporally structured information's such as narratives, which we can transmitted as speech and music in sequential ways but Spatial information could not transmit by earliest man's communication system. After this graphic form is introduced this is way that is used to express information about all the world in spatially structured images.

In inner's mental world and outer's physical world map is fundamental tool that helping the human's mind to make sense of universe at various scale. It is the oldest form of human communication. Probably there has always mapping impulse in human's consciousness For many centuries map have been used as tools for analogical thinking.

We can say that mapping have both capabilities written language and visual. It means with mapping we can express any term. If we think any of them, then we express it with mapping, now these days mapping is used to show cities, countries and space etc. With mapping we can easily find anything like city, river, country.

Maps have used as memory bank for spatial data without printing. A group of American historians said that map "constitute a common language used by men of different races and tongues to express the relationship of their society".

CARTOGRAPHIC REPRESENTATION:-

Principal task of cartography is to communicate environment information. But the primary theme that ties the material together is map effectiveness in thought and communication. Mapping

effectiveness is best achieved by making and using of maps equally. The task of the map designer is to enhance the map user's ability to retrieve information.

The mapping process is a series of information transformations, each of which has the powers to alter the appearance of the final product shown in figure below, data collection environmental information is distorted through the filters of ground survey, census, remote sensing, or compilation procedures. Mapping modifies this information by the Abstraction processes of selection, classification, simplification, exaggeration, and symbolization.
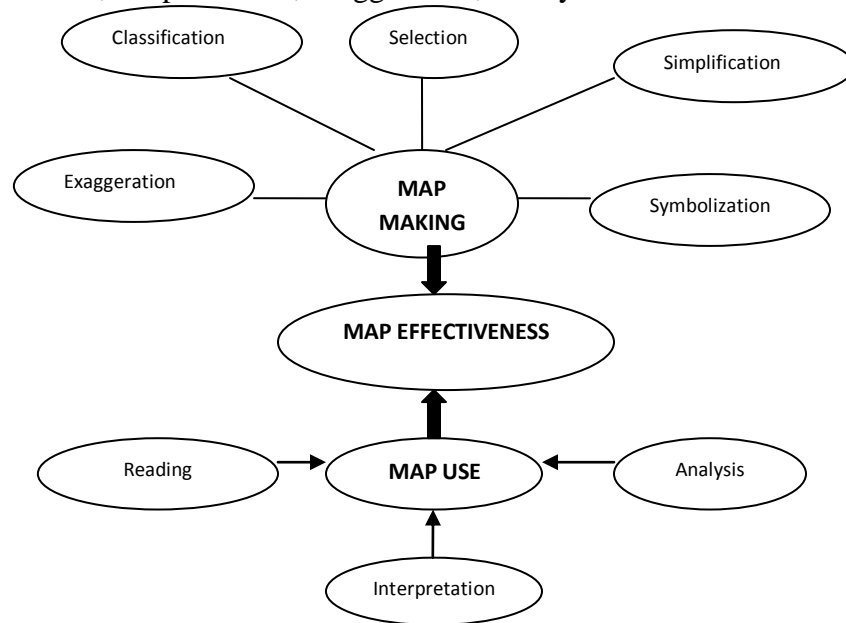
At the end of the map leads to the distorting effects of map reading, analysis, and interpretation. The effect of a map is in large part a function of the user's skill, experience, and perceived needs. Mapping process lies in its ability to provide fresh, insightful perspectives on our environment. There are many possible maps of the same information, each of which will possess certain communication advantages as well as limitations. The cartographer's task is to explore the ramifications of each mapping possibility and to select the most appropriate for the intended task.

SCOPE OF CARTOGRAPHY:-

In cartography, the map maker and map user played a very important role with two stage properties, the map and the data domain. The map maker selects the information from the data domain and puts it into map format. The user then observes and responds to this information. There are four processes in cartography:

1. Collecting and selecting the data for mapping

2. Manipulating and generalizing the data, designing and constructing the map

3. Reading or viewing the map

4. Responding to or interpreting the information
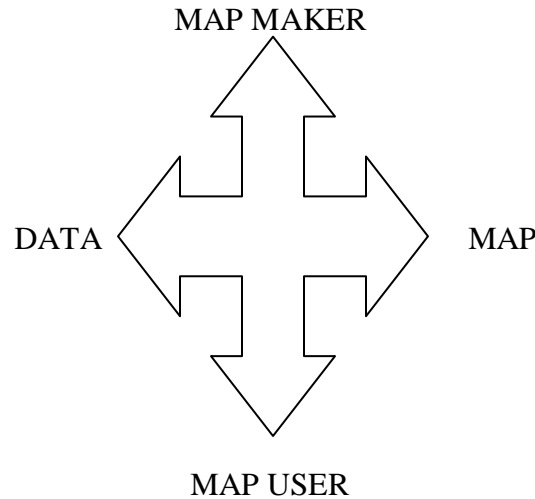
MAP MAKER

DATA   MAP

MAP USER

Image processing refers to manual and digital techniques used to improve image geometry, enhance image appearance, identify features in an image and extract selected information from an image.

When applied to images of the environment produced through remote sensing, image processing is a powerful cartographic tool.

MANUAL METHODS OF IMAGE INTERPRETATION

Manual image processing techniques have served the needs of cartographers for many years.

SINGLE IMAGE

An image poses two problems for the cartographer. We must first determine what we are seeing. We call this process of feature recognition or identification image interpretation. Our second problem is that we usually want to determine the location as well as the identity of features to find the location of a feature on the ground from an image we must relate the image geometry to the geometry of the ground scene.

Image interpretation

Image interpretation is used to interpret images. For black and white images, these elements include the size, tone, texture and relative position to identified entities. The additional elements of hue difference will often help you identify features on color images.

STEREOSCOPIC IMAGES

When we see on images with only one eye we must relate on the relative sizes of the objects, clarity of object detail and on whether one object appear in front of another. When we see an object with both eyes each eye sends a separate message to your brain creating stereophonic vision because your eyes are separated each sees an object from a slightly different angle. The subsequent slight variations in two messages to your brain cause a sensation of an object depth.

DIGITAL IMAGE PROCESSING

Cartographers use digital image processing systems to geometrically rectify images , prepare contrast enhanced multi color image maps create thematic maps by extracting information from image data and simplify such thematic maps. Before they can accomplish these tasks all images must be in raster format. In raster format each image is defined by matrix of pixels electronic scanner images typically are collected in raster format, but aerial photography and most SLAR (Side -looking airborne Radar)images must be converted to pixels using a scanning digitizer digital image processing then deals with mathematical procedures employed to rectify, enhance , classify and simplify digital images in raster form.

IMAGE ENHANCEMENT

Digital image enhancement is used to improve the appearance of image data displayed on color monitors or written to hardcopy devices such as printers and film recorders. Electronic images and film or paper copies of original image data often are low in contrast, with many features of interest very hard to identify. The problem is that the gray tone or color assignment system in the display device is not tuned well to the range of digital reflectance values in the image. For example, assigned printed gray tones ranging from black to white to a 0-255 digital reflectance value range. The reflectance values in the image only ranged from 10 to 107. The result is a low-contrast, dark gray print which is in need of contrast enhancement.

Image Processing

An Image may be defined as 2-dimensional light intensity function $f(x,y)$ where x & y denote spatial co-ordinate and amplitude or value of f at any point(x,y) is called Intensity, grayscale or brightness of the image.

The Image is the input for image processing which is the form of signal processing, such as video frame or photograph . The output of image processing can be either an image or, a set of characteristics related to the image. Many image-processing methods include use the image as a two dimensional signal provide signal processing techniques .

Geographical Information System

Geographical system study attempts to integrate geographical databases and data analysis tools, using an interactive information management system. The aim is to provide a proper structure for geographical data management and, in particular, faster image processing, in order to be used for training, educational, and research purposes. Based on this environment, the graphical user interface that has been developed provides interactive management of geographical information and the opportunity for advanced users to develop more specific applications. The whole system comprises a flexible structure that is continuously evolving and being improved in order to maintain up-to-date geographical information

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