Design of Geospatial Information System for Resource Management of land Cover.

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Abstract: -The efficient and even distribution of resources on land cover is the key issue of these days. Information system plays vital role in planning and development land cover. The most advanced computer based information technology tool for spatial planning is the Geographic Information System, which become indispensable in planning and management of database. GIS is one of the fastest growing technologies and has became as powerful and modish way to manage vast amounts of geospatial data. It provides an skillful system by which information on location, spatial interaction and geographic relationship of various facilities can be assessed and viewed in moments. It facilitates effective and efficient means to view and access geospatial data and thus to improve decision making process. The volume, quality, and resolution of geospatial data are increasing exponentially. The development of knowledge based geospatial information system is an appropriate approach to solve the problem of efficient distribution of resources on land cover. In this paper the architecture of such system is presented.

Key-Words: -GIS, Spatial Database, knowledge discovery, resource management

1 Introduction

Rapid development geographic tools and techniques of lands vary without conservation concerns has caused the inefficient and improper use of land resources. Further ineffective management of resources caused deterioration and depletion in available natural resources. The main requirement for resources management involves the establishment and maintenance of a good database of informations in digital format. The storage of reliable and up-to-date information reduces the inefficiency and uncertainty in planning and management or resources. The main strategies to overcome these issues is to design an efficient and reliable information system that can assist the decision making for management and distribution of resources. The value of the information and the effectiveness of the decision-making and planning processes are closely related to the quality and completeness of the information. In this respect data access, management, integration, analysis, standards, and communication are key components. Solutions for land development specially resource distribution, frequently require not only spatial analysis but proper distribution of resources. The solution for these problems is need of an information system for proper management and distribution of resources available in that land, and embedding or integrating this system with geospatial information system. The integration of the information with information processing tools like GIS and knowledge discovery techniques can result an efficient information system. In this paper we present the modular structure of geospatial information system for resource distribution by mean of using GIS and spatial data mining techniques. The main objectives for development of this system are to apply this integrated system to the land development in the perspective of resource distributions. The main goals of this system are

- It can provide information of resources available spatially in particular area
- It can distribute the available resources efficiently
- It has skill of decision making for the optimal path to that resource location.

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good database of information in digital format. The storage of reliable and up-to-date information reduces the inefficiency and uncertainty in planning and management or resources.

1-1 GIS

A Geographic Information System (GIS) is a powerful tool for acquiring, manipulating and analyzing geographic data. GIS is one of the fastest growing technologies of present time. It has emerged as powerful and sophisticated means to manage vast amounts of geographic data [1]. It provides a mechanism by which information on locations, spatial interaction and geographic relationship of various facilities can be assessed and viewed in moments. Conceptually, a GIS can be envisioned as a stacked set of map layers, where each layer is aligned or registered to all other layers. Typically, each layer will contain a unique geographic theme or data type. These themes might include, for example, topography, soils, land-use, cadastral (land ownership) information, or infrastructure such as roads, pipelines, power lines, or sewer networks so shown fig.1. It provides an opportunity to effectively view and access geographic data and thus to improve decision making process [2].

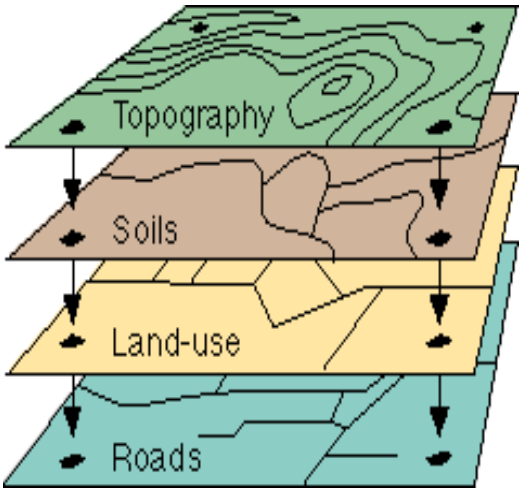

Fig 1. Conceptual model of a GIS

1-2 Spatial data mining:

Spatial data mining, i.e., mining knowledge from large amounts of spatial data, is a highly demanding field because huge amounts of spatial data have been collected in various applications, ranging from remote sensing, to geographical information systems (GIS), computer cartography, environmental assessment and planning, etc. The collected data far exceeded human's ability to analyze. Advances in database technologies and data collection techniques including barcode reading, remote sensing, satellite telemetry, etc., have collected huge amounts of data in large databases [3]. Data mining represents the integration of several fields, including machine learning, database systems, data visualization, statistics, and information theory. Various architectures (models) have been proposed for data mining [4]. One of those architectures is presented in Fig. 2. In this architecture, the user may control every step of the mining process. Background knowledge, like spatial and non-spatial concept hierarchies, or information about database, is stored in a knowledge base.

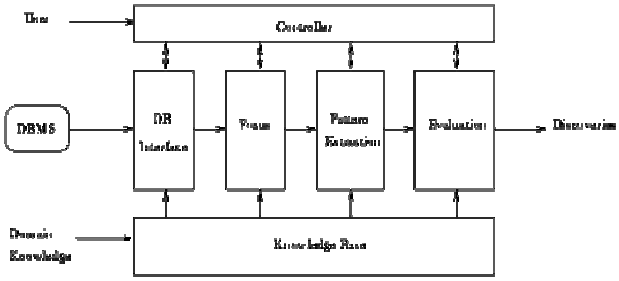

Fig.2 An architecture for a KDD system

1-3 Spatial Database

Spatial database is the database that is used for storing, retrieving, manipulating, querying, and analyzing geometric data, the data related to space [5]. Research has shown that special data types are necessary to model geometry and to suitably represent geometric data in database systems. These data types are usually called spatial data types, such as point, line, and region but also include more complex types like graphs (networks) and partitions. Spatial data types provide a fundamental abstraction for modeling the geometric structure of objects in space, their relationships, properties and operations as shown in fig.3.

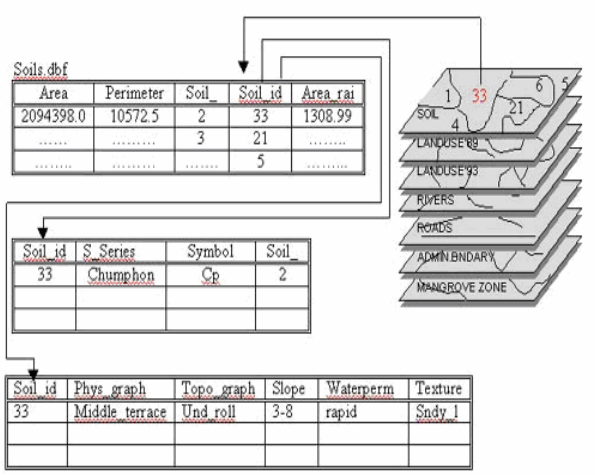

Fig.3 Spatial data

2 The system Architecture

The system consist of six module

2-1 Input module:

In put module is used to facilitate the transformation of all kinds of input data related to different resources including thematic maps, raster images transformations.

2-2 Editing module

Maps data are organized, classified and depicted in a manner chosen by the map maker. When we read maps, we are looking for patterns, linkages or relationships in the map data. Editing module including the correcting the maps, projection transforming and topology relationship.

2-3 Image processing module:

The function of this module is to process the images that are most of times in the form remotely sensed data like aerial data pictures.

2-4 Database management module

Used to implement the query of data

2-5 Spatial analysis module:

This module is related with spatial analyses of data like points, lines and polygons and combining them with thematic maps.

2-6 Output module

That provide the resulting output that may be in the form of tables, version, maps, and image data

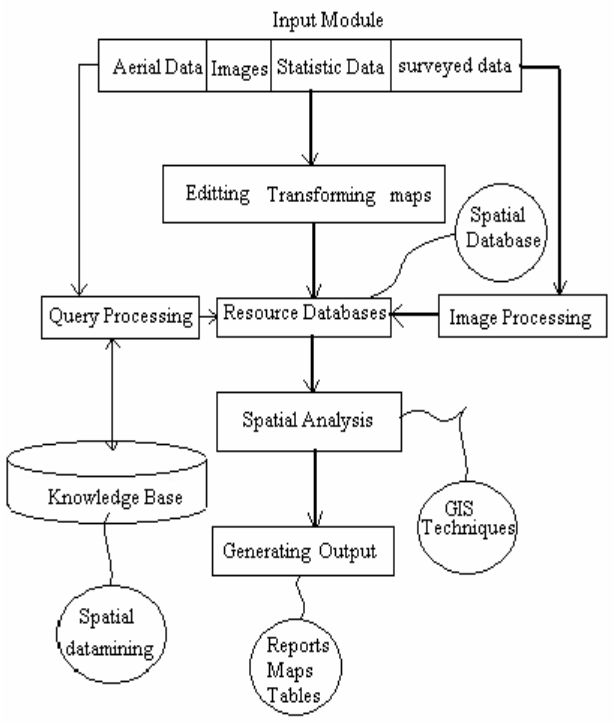

Fig.4 Geospatial Information System

3 Conclusion

In this paper we presented the modular structure of geospatial information system for resource management on land cover. There is enormous number of algorithms developed for knowledge discovery, use of those algorithms with constraint based functions can help the user to manage resources in accordance with the application requirements. Specially in case of E-government for example in case of dense populous cities if there shortage of petrol, the system can provide good guidance to vehicles for even distribution of all available gas stations with their stocks. Same can also be considered in case of shortage of other major resources most oftenly used like water, gas, power.

In this system the role of SDB has key importance, this can also be used for other kind of applications like path planning, hazard mitigations and crisis management. Online or up-to-date information is also plays important role in this function, for example online satellite imageries can inform user (traveler) about traffic

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