A Review: GIS Based Home Tax Revenue System

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Abstract— This paper describes the outlook on the analytics of geographical information system. The paper includes an argument of the importance of this system and how it's generated. One of the software tools successfully and wide spread used for system designed to capture, store, manipulate, analyze, manage, and present spatial or geographic data. GIS stands for geographic information system, a method of managing, analyzing, and displaying geographic information on easily understood, computer-generated maps. The strength of GIS is its ability to create distinct ma players for different types of information, and then to combine them in any way desired or needed. Each layer consists of geographic, or spatial, data linked to descriptive, or tabular, information.

Key words: GIS Based Home Tax Revenue System, GIS, GIS Plug-in

I. INTRODUCTION

GIS is a broad term that can refer to a number of different technologies, processes, and methods. It is attached to many operations and has many applications related to engineering, planning, management, transport/logistics, insurance, telecommunications, and business.

A. GIS History

Modern GIS technologies use digital information, for which various digitized data creation methods are used. The most common method of data creation is digitization, where a hard copy map or survey plan is transferred into a digital medium through the use of a CAD program, and geo-referencing capabilities. [2]

The layers in GIS:

1) Imagery

In terms of the specific GIS data type, imagery is considered raster data. As such, all GIS images are made up of a grid of numbers that are arranged into rows and columns. Each grid is called a pixel and the pixels are assigned different numeric values.

The different values assigned to the pixels typically represent quantities that identify things like elevation, slope gradient, or spectral brightness of an area .When all of the pixels are combined an image is formed.

2) Elevation

The *elevation* map incorporates multiple resolutions representing the best available elevation data.

3) Transportation

Base map of all roads in the Roadway Characteristics Inventory. We use GIS for recognizing the various transportation roads network.

4) Addresses

The addresses of the particular locations and details.

5) Boundaries

The outline of buildings, places, sections.

6) Water features

River, lakes, any river banks.

7) Survey control

Zoom to your location of interest and search for geodetic control

8) Your data

user created layer of personal data inputs and overall added elements to be included in map.

B. Why is GIS important?

Viewing and analyzing data geographically impacts our understanding of data. A geographic information system (GIS) lets us visualize, question, analyze, and interpret data to understand relationships, patterns, and trends.

Cost reductions, Time reductions, and new product development and optimized offerings. When you combine New GIS digitized data with the old one you can accomplish tasks such as:

Determining the area of the particular habitant.

1) Generating customer details.
2) Calculating tax based on the area acquired.
3) Detecting tax and evaluating the overall cost with digital area generation

II. GIS PLUG-IN

GIS is a graphical plug-in developed by Google with the purpose of processing of large area. We use this plug-in for calculating dimensions, graphical representation and implementing simple programming mod.

A. Why GIS is important?

Geographic information is the key to better decision-making; just about everything a community, business, or public agency does, whether in day-to-day operations or long-term planning, is related to its geography.

Imagine how maps would present the information described above in an easy to understand format [4].

In fact, many routine operations of business and government are tied to a location and rely on the use of geographic information to accomplish their goals.

Some examples are:

- Land-use planning (Where is growth happening?)
- Marketing (Where are our customers?)
- Subdivision review (Where is the wetland?)
- Permit tracking (Whose property is the permit attached to?)
- Parcel/tax mapping (Who are Jane Doe's abutters?)
- Engineering design (What is the topography of the building site?)
- Road and utility maintenance (Where is the downed power line blocking the road?)
- Event (crime, fires, accidents) reporting (Where do the most accidents takes place?)

- Emergency dispatching (Where is the E-9-1-1 call originating from?)

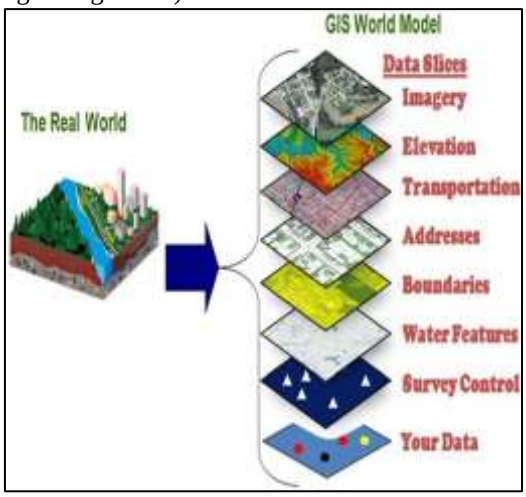

Fig. 1: Layers of GIS

For many years, personnel involved in these routine operations have had to rely on reams of printed material, hand-drawn maps and their own imaginations to consider alternatives and make choices.

GIS stands for geographic information system, a method of managing, analyzing, and displaying geographic information on easily understood, computer-generated maps. The strength of GIS is its ability to create distinct ma players for different types of information, and then to combine them in any way desired or needed. Each layer consists of geographic, or spatial, data linked to descriptive, or tabular, information.

In combining layers, GIS uses known earth coordinates (like latitude and longitude) to make sure each layer lines up correctly with the others. To compare that information with data showing where development is already occurring, GIS could generate another map or series of maps showing where permits have been issued, when, and for what kinds of development. GIS can also help businesses research retail markets. By entering customer survey data into a GIS database, marketing research staff can see where customers are coming from and decide where their marketing efforts will have the most impact. [3]

1) The Sandwich Analogy

Using GIS is a little like making a multi-decker-sandwich? The person desiring the "sandwich" can use any type of layer or number of layers required. The tooth pick holding the sandwich together is the coordinate system that guarantees the layers line up properly.

2) How is GIS Different from Using Traditional, Hand-Drawn Maps?

Traditional paper maps exist in many different map scales and projections, making it next to impossible to superimpose or overlay them the way GIS can. GIS can mathematically transform map features from one scale or projection to another to allow map layers from different sources to be used together.

Traditional maps are also less efficient because changes require starting from scratch with a brand-new map. Once information is entered into a GIS system, it is a simple matter to change the data on the computer and produce an updated product. GIS can produce maps at any size, depicting an entire community or only a selected area using information from different scales.

B. What are the challenges of using GIS?

- Tax evaluation: The appropriate tax calculation on the basis of longitude and latitude must be accurate.
- Data security: Another challenge centers on the fragmented data security issues which includes authorization, handling, updating and maintenance.
- Full-fledged data management and governance: Data management, data cleansing, governance and metadata.

C. GIS Overview

Viewing and analyzing data geographically impacts our understanding of data. A geographic information system (GIS) lets us visualize, question, analyze, and interpret data to understand relationships, patterns, and trends

GIS is a broad term that can refer to a number of different technologies, processes, and methods. It is attached to many operations and has many applications related to engineering, planning, management, transport/logistics, insurance, telecommunications and business.

D. Working overview

1) Android application

The android application focuses on the digital format of the map where the details of the area regarding users input are taken where then the calculation of the outline of that area is established using longitude and latitude.

2) System Establishment

The system uses GPS for inputting the values/co-ordinates of the area that has to be calculated. The fetched data is stored in the database where the details of the owner, personal details, tax to be paid and rest are included.

3) Property management

The property management includes of locating the co-ordinates and evaluating the tax as per the rate of the area is given. The area is calculated by using Haverisine formula where the longitude and latitude are converted into meters and then used to calculate rate.

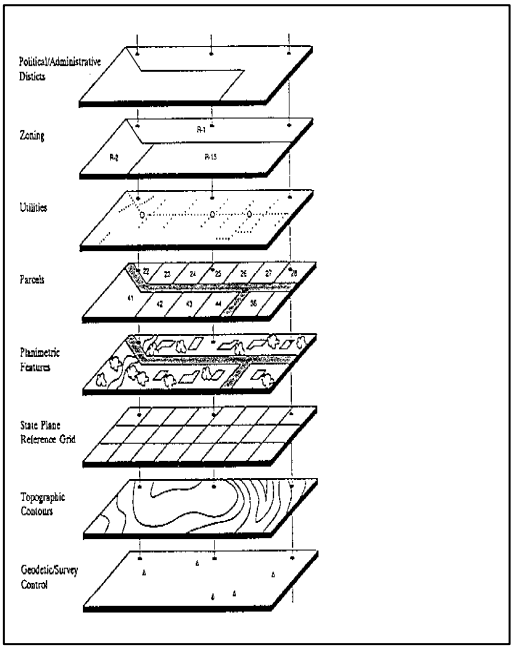

Fig. 2: Layers of GIS

The details of the holder including personal details, amount (Tax) paid/unpaid, contact, address, contact is taken. The system overall maintains the record and necessary updation can be done easily.

4) Inspection

The process is at first the applicant or service provider examines the area and calculates coordinates using app then updates record into database, further this data is used to calculate the tax.

The inspection includes of verification of the details and authorization of the service provider and lastly the evaluation.

III. Advantages and Challenges of Real time GIS

A. The Advantages of Real-Time GIS [5]

The advantages of using a geographic information system include:

1) Communication

GIS-based maps and visualizations greatly assist in understanding situations and storytelling. They are a new language that improves communication between different teams, departments, disciplines.

Professional fields, organizations, and the public.

2) Better geographic information recordkeeping

Many organizations have a primary responsibility of maintaining authoritative records about the status and change of geography (geographic accounting). Cultural geography examples are zoning, population census, land ownership, and administrative boundaries. Physical geography examples include forest inventories, biological inventories, environmental measurements, water flows, and a whole host of geographic accountings.

GIS provides a strong framework for managing these types of systems with full transaction support and reporting tools. These systems are conceptually similar to other information systems in that they deal with data management and transactions, as well as standardized reporting (e.g., maps) of changing information. However, they are fundamentally different because of the unique data models and hundreds of specialized tools used in supporting GIS applications and workflows.

3) Improved decision making

Decisions are made easier because specific and detailed information is presented about one or more locations. This typically has to do with making better decisions about location. Common examples include real estate site selection, route/corridor selection, zoning, planning, conservation, natural resource extraction, etc. People are beginning to realize that making the correct decision about a location is strategic to the success of an organization.

4) Reduce costs and increase efficiency

Especially regarding maintenance schedules, fleet movements or scheduling timetables. Improved communication between any involved organizations or departments as the visual format is easily understood by all. These are associated either with carrying out the mission (i.e., labor savings from automating or improving a workflow) or improvements in the mission itself.

A good case for both of these is Sears, which implemented GIS in its logistics operations and has seen dramatic improvements. Sears considerably reduced the time it takes for dispatchers to create routes for their home delivery trucks (by about 75%). It also benefited enormously in reducing the costs of carrying out the mission (i.e., 12%-15% less drive time by optimizing routes). Sears also improved customer service, reduced the number of return visits to the same site, and scheduled appointments more efficiently.

5) Easy recordkeeping

Geographical changes are easily recorded by GIS for those responsible of recording the changes.

6) Managing geographically

Knowing what is and will be occurring in a geographic space in order to plan a course of action.In government and many large corporations, GIS is becoming essential to understand what is going on. Senior administrators and executives at the highest levels of government use GIS information products to communicate.

These products provide a visual framework for conceptualizing, understanding, and prescribing action. Examples include briefings about various geographic patterns and relationships including land use, crime, the environment, and defense/security situations.

GIS is increasingly being implemented a enterprise information systems. This goes far beyond simply spatially enabling business tables in a DBMS. Geography is emerging as a new way to organize and manage organizations. Just like enterprise-wide financial systems transformed the way organizations were managed in the ‘60s, ‘70s, and ‘80s, GIS is transforming the way that organizations manage their assets, serve their customers/citizens, make decisions, and communicate.

Examples in the private sector include most utilities, forestry and oil companies, and most commercial/retail businesses. Their assets and resources are now being maintained as an enterprise information system to support day-to-day work management tasks and provide a broader context for assets and resource management. It has the ability of improving the organizational integration. GIS would then integrate software, hardware and also data in order to capture, analyze, manage and so display all forms of information being geographically referenced.

1) GIS would also allow viewing, questioning, understanding, visualizing and interpreting the data into numbers of ways which will reveal relationships, trends and patterns in the form of globes, maps, charts and reports.
2) Geographic Information System is to provide a help in answering questions as well as solve problems through looking at the data in a way which is easily and quickly shared.
3) GIS technology could also be integrated into framework of any enterprise information system.
4) And there would be numbers of employment opportunities. Considering the use of the said technology might be considered as of great decision to make.

B. The Challenges of Real-Time GIS

Real-Time Big GIS is not only positive as it also offers some challenges.

Surely the activity of collecting GIS data has never been easier. With this idea in mind, permit me to interpret the question of challenges of GIS data collection in a restricted sense.

Plenty of high quality datasets are freely available from the web servers of large organizations. However, these products and organizations (many of which are governmental) are sometimes restructured. One challenge might be to collect all relevant data while the opportunity still exists. Will these datasets continue to be supplied as discrete units that we know how to handle? Another challenge: to patch a working collection with subsequent updates (in different formats). Our own computing platforms are also changing.

1) Real-Time Big Data Analytics Tools

1) The Buffer Tool- the Buffer Tool is a proximity function. When you use this geo processing tool, it creates a polygon at a set distance surrounding the feature(s). A buffer is a polygon or collection of cells that are within a specified proximity of a set of features

How is the Buffer Tool Used in GIS?

Add a point, line or polygon feature,Set a buffer distance.

2) The Clip Tool: Bring out the cookie cutter. It's time to carve out vectors and raster's using the clip tool. A clip is an overlay tool that cuts out an input layer with the extent of a defined feature boundary. The result of this tool is a new clipped output layer. How is the Clip Tool Used in GIS?

Add the feature to be clipped, Set the extent to be clipped to using a polygon feature. The preserved data is defined by the boundary determined in the clip layer.

3) The Merge Tool: What do you do when you have hundreds of data sets, and you want them in a single data set?

You run the Merge tool; the merge geo processing tool combines data sets that are the same data type (points, lines or polygons). When you run the merge tool, the resulting data will be merged into one.

4) The Dissolve Tool: The Dissolve Tool unifies boundaries based on common attribute values.

How does the Dissolve Tool work in GIS?

The Dissolve Tool merges neighboring boundaries based on common attribute values. An example of using the Dissolve Tool is when you dissolve countries to continents. In order to do this, you would need an attribute in each country record. For each country, there must be a continent field indicating the continent it's in.

5) The Intersect Tool-The intersect tool is very similar to the clip tool because the output is defined by the extents of input features. The only exception is that attributes from all the data sets that overlap each other are preserved in the final data set.

How does the Intersect Tool work in GIS?

Add multiple inputs. Different data types (points, lines and polygons) are accepted. When features overlap each other, they will be in the output. The Intersect Tool preserves the attribute values in both input layers

6) The union and Erase tool: The union tool is used for overlapping portions and erase to erase the portions.

IV. CONCLUSION

The geographical information system will provide the application based tax detail and area detail with the particular owner details in ease.

The overall process time is reduced as by far the tax calculation is manual. The geographical provides an interface with the permission to log in and use the application for navigating through Google map and our provided layer will show the detail regarding the owners.

The system is digitized and all the data is recorded in database which can be further updated as per requirements.

V. FUTURE SCOPE

Smart City Planning, Electricity management. Water management and other governmental management system. Android app for home user to ease navigation. Payment method to home users. The smart city planning includes of overall city development plans and graph and electricity management of all city data water supply.

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