



SCALING PROCESS OF CONTINUAL K-NEAREST NEIGHBOUR QUERIES TO LOCATE FROM DATABASES

P. V. Vijaya Krishna, L. Lakshmanan and K. V. Rajesh Kumar
Department of Computer Science Engineering, Sathyabama University, Chennai, India
E-Mail: Krishna.vijay32@gmail.com

ABSTRACT

Location Based Services and Geographical Information System together have enabled a new era in the development of mobile based applications in all the industrial and commercial applications. Recently these services are widely used in military, naval and air force defence services to find the enemy location. Unlike the current information services such as those on the web and as mobile apps, the GIS has benefited greatly from developments in various fields of computing. Better database software allows the management of vast amounts of information that is referenced to digital maps. Computer graphics techniques provide the data models for storage, retrieval and display of geographic objects. Geographic Information Science, the field of science behind GIS, offers specialized knowledge about spatial data collection and processing, data modeling as well as modeling of spatial processes for analysis purposes. We propose a method for finding the locations of various places. According to user location using GPS, the user can access the important unique data without unwanted data Information related to the searched location.

Keywords: GIS, data modelling, computer graphics techniques, spatial data collection.

1. INTRODUCTION

Advancements in Health Information System, Location Based Services and Geographical Information System together have enabled a new era of the development of a mobile based applications for various commercial and military applications. Unlike the current information services such as those on the web and as mobile apps, the GIS has benefited greatly from developments in various fields of computing. Better database software allows the management of vast amounts of information that is referenced to digital maps. Computer graphics techniques provide the data models for storage, retrieval and display of geographic objects. Geographic Information Science, the field of science behind GIS, offers specialized knowledge about spatial data collection and processing, data modeling as well as modeling of spatial processes for analysis purposes.

A. Graphical Information System (GIS)

A GIS can be defined generally to be an information system that processes geographic data. Geographical Information System provides a powerful software tools for the manipulation and analysis of spatial data, making maps into dynamic objects. Because of services like Google maps and Google earth, all the people are able to search, study and do research and able to show the exact and accurate locations and display them where ever needed. GIS are used for many different tasks and in many different fields of application. As such, a GIS often forms an interface between a variety of disciplines such as geography, information sciences, mathematics, surveying, or environmental sciences.

A GIS is collection of large sources of data and information collected and connected to all the specific locations which can be analyzed spatially through various spatial enhancement techniques. The majority of data in public health has a spatial (location) component, to which

GIS adds a powerful graphical and analytic dimension by bringing the fundamental epidemiological triad of person, time, and the often-neglected place to one thing. GIS Technology includes various database operations, queries, data retrieving, unique techniques for visualization and benefits including geographic analysis offered by Google maps. All these abilities of GIS makes it unique from all the other information systems and made it more valuable to predicting outcomes, environmental care organizations for expressing and explaining events and planning various strategies. From this we can say, GIS is much more than an internet mapping where it provides and gives accurate location and information of any place through statistical analyses of spatial data from database.

GIS is one of the best known tool for examining population and its levels of effects and exposures as reflected in the geographic and spatial distribution of populations. Though we have old methods for map making GIS Performs faster and better than Old manual methods. Once upon a time when there was no GIS, people used to look for various options to find the exact and accurate locations using various methods which may take much and even if we can bring out the location it might not be accurate.

A) GIS services

The major services offered by GIS are Geoprocessing and Geo-data services.

a) Geo-data - is the information about geographical locations that is stored in the database in a format that can be retrieved and used with the help of geographic information system (GIS). There are many storage modes like databases, Microsoft Excel spreadsheets, raster images, and shapefiles including Dbf tables.

b) Geoprocessing- The major purpose of Geoprocessing is to provide tools and a framework for



performing analysis and managing the geographical data. ArcGIS is one of the modelling and analysis tool used in Geographic information system.

B) Types of GIS

There are three major classification of GIS namely Desktop GIS, the Web GIS and the Mobile GIS.

a) Desktop GIS

Desktop GIS Shows the real world on a computer like that of a world map drawn on a paper. GIS and Paper maps give the same information of places and their location. Whereas, paper maps are not that flexible to that of desktop GIS. In desktop GIS, one can edit and move the latitude and longitudes of desired locations and also can add necessary data to it for a particular location. We call them objects because on maps everything appears in the form of objects.

With the help of desktop GIS, one can get all the information regarding a particular location regardless of limited restrictions to access any information to specific location. GIS has lots of Functionalities which include View data on a map, to analyze the data and to create quality professional maps. ArcGIS Desktop (ESRI) is one of the software available on the internet one can get to use it with conditions apply.

b) Web GIS

It is one of the globally used GIS services. Anyone can get data from web GIS without any restrictions. One can add and edit the Geo-spatial data stored in the server with the help spatial analysis tools.

The GIS is entirely a Client - Server based Architecture consisting of both the Geoprocessing Server side and Client side tasks. It is a three tier architecture having three stages i.e., user interface, application tier and the third one is storage tier. Not only Web GIS all the types of GIS include these three tier stages for a basic Geographical information system. Again there are two types of architecture for GIS namely: The Thin client architecture and the Thick client architecture.

c) Distributed architecture

Here both data and processing components are distributed while the client and server do not refer to a specific machine. The "Geo-data anywhere" model, "Geoprocessing anywhere model" and Distributed object architectures are three different distributed architecture models which include Java Remote Method Invocation, Microsoft's Distributed Component Object Model and Common Object Request Broker Architecture.

d) Mobile GIS

Mobile GIS is the best technology designed using user interface framework with the help of API and Gps for the access of geospatial data and services through mobile devices via wireless or wired internet communication.

Mobile GIS is a sub new research of Web GIS. There are certain Issues with Mobile GIS as the client will not be stable in his location and in Mobile GIS we use Gps

device to find the exact location using our current location regardless of particular location. It is similar to the traditional client/server architecture in Web GIS. It uses "Thin Client" structure. The two major application areas are the Location Based Services (LBS) and the Field based GIS.

Mobile GIS includes One Gps system and one Mapping application connected to web GIS. It has become one of the highly used GIS service as everyone has a smart mobile device.

C) Types of Geodatabases

Geodatabases are classified into three types as follows: the File GDB, personal GDB and the ArcSDE.

a) File Geodatabase

Each Geodatabase is held in a file or a folder and each dataset is stored as a separate file on the disk. The FileGeodatabase provides fast performance and can scale the very large file sizes. Example: each dataset can be upto one terabyte in size.

b) Personal Geodatabase

The personal Geodatabase are stored and managed using the Microsoft access. They are designed for a single user working with smaller datasets and are limited in size to 2GB for the entire Geodatabase. They are only supported on Microsoft windows.

c) ArcSDE

It is spatial data engine software designed to store data in its own database regardless of wireless data access.

2. LITERATURE SURVEY

In one of the researches we have seen and detected that the need of expertise doctors or surgeons for users or patients is not available in the system. Hence a GIS based information analysis system was invented to find the nearest health care facilities and hospitals and their availabilities from the patient's location [1].

Finding of that facilities is done through various networking and GIS tools and techniques. So that we can find the nearest and shortest path from our location or patients location. In this project we have designed a methodology which explains the implementation of this project and it covers the process of project planning, data collection, data processing and data analysis. The software and tools that we have used are: ArcGIS 9.3, along with mapping and network analysis tools (shortest path and closest facility). The results obtained from them show the shortest route from a patient's location to the nearest hospital with the help of the Road network and the Hospital network [1].

In another research paper we have found the transportation and route has been a lot complicated for e-tourism people like tourists in a place like Kumasi metropolis. We have obtained and showed the shortest route starting from certain point, so as to relieve the traffic and the GIS network tool calculates the optimal route by means of Dijkstra's Algorithm. In particular we have used



ArcGIS Network Analyst's route solver to find a way through the set of stops with less cost [2].

In another research we have found out lots of static and dynamic location finding a big problem. Hence we have defined a new Data-pre-processing, improving the way of search which has improved the evaluation function as well as improved the structure of internal data. All these are the four aspects about the new shortest path algorithm. The methodologies involved in this paper are: A* algorithm, Bidirectional ST Algorithm and shortest path. The time complexity of the improved bidirectional ST algorithm is linear. The simulation results show the higher efficiency of bidirectional ST algorithm in large-scale networks [3].

3. SYSTEM ANALYSIS

A. Existing system

In the existing system, we have seen a user can get the information of required location through various websites and portals through internet.

In this system, if a user searches for a location then it will take more time to display high level data to the user.

User has to specify the name of the particular location if he wants to search a place.

A user can access the required information regarding the location from the server.

Disadvantages

- As the buffering time is high, the user can't get the required information or location in emergency.
- The user has to update the location manually so as to store in the server.
- In the server only high level data is available and any data regarding a location has to be added it cannot be done manually.
- The accuracy of the location is less, as the existing system takes only one shot of a location.

B. Proposed system

In our proposed system, when the user makes a query to the main data base through GIS application using GIS technique, user gets the required data.

When the user makes search of any location then our application will first get the current location of the user using GPS.

As the user makes the query regarding his search for a location using GPS values, the exact location of the user will be sent to the main database and processes the query.

As we use various network analyst tool in which the shortest path and closest path facility analysis are conducted to find the shortest path from the source to the destination and it also provides the possible best routes from source to destination for all the modes of transportation.

This will give the enhanced and accurate route to the user to reach his required destination even in emergency situations.

Advantages

- Existing system contains only low level data but it consists of all the data required for the user to know as it will be collected and updated globally for every second.
- Satellite information can be easily incorporated using this system.
- This system provides the accurate positional information which is best to store all the discrete thematic features.
- With the help of this system the communication between the user and the application increases with the increase in collaboration and productivity.

4. SYSTEM DESCRIPTIONS

A. Problem descriptions

facilities and various benefits of the current technology that has been provided in all the hospitals and Emergency services due to lack of exposure and lack of accurate mapping of the route to nearest hospitals or emergency services. Along with this we have a huge and massive transport system with traffics and complicated routes which makes the user to find the nearest possible emergency service a crucial thing. Even though we have multiple hospitals located nearby the customer, he finds difficulty in reaching there with inaccurate location data and outdated location info in databases.

B. Overview of the Project

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C. Modules description

Modules

- a. Location Quality of Service
- b. Context Search
- c. Context Details
- d. Displaying a Location Address
- e. Google Map with Distance, Duration

a) Location quality of service

In GIS we use objects (modules). We require a module where the quality of the location provider should be good and accurate. So we have a Location Request object which is used to request for the quality of service (QoS) for all the location updates from the various Location Clients. We have lot more useful methods to retrieve data from the data base accurately.

Location based services (LBS) is a software application for IP based and compatible mobile devices which require to get the location of the mobile device by using GPS and mobile carrier service provider info. Location-based services are query-based which provide useful information to the end user such as "Where is the nearest restaurant?" or "Where the nearest ATM?" or "Where is the nearest hospital?" from a specific geographical area.

An LBS software requires five basic components. They are: the mobile service provider's software application along with a mobile network to transmit data which requests for service and a content provider to provide the end user with geo-specific information along with a positioning component (GPS) provided by user's mobile device.

According to communication laws, all the location-based services must be permission-based. Which means that, the end user must opt-in to the service in order to use it or else the services might go misused. Hence we install the LBS application in our device and accept a request to allow the service to know the device's location. All our latest mobile gadgets have these functionalities.

b) Context search

ArcGIS uses this module to provide the user end with all the tags and short names of places we are looking for. For example we can search for location by using

location ids provided by the GIS software. Context search provides user interface integrated with API associated with context menu. So if user want to search for any place then he can access database regardless of authentication problems using API.

c) Context details

As we have seen locations are provided with tags and place IDs which are replaced with the user constraint once he completes his search. User will get the details of particular place only when he requests for particular place id. Using API user can have the location object from which he can get the details displayed further.

d) Displaying a location address

We use Geocoder. get From Location() once we get the location object. This method is used to get an address for a given latitude and longitude from the server. This method is synchronous, hence it may take some time, so you should call the method from the doInBackground() method of an AsyncTask class. So that the process will be done in background.

The AsyncTask should be subclassed so that it can be used and that subclass will override doInBackground(Params...) method to perform a task in the background and onPostExecute (Result) method is invoked on the UI thread, so that the background process gets finished. There is one more important method available in AsyncTask which is execute (Params... params), this method executes the task with the specified parameters.

e) Google map with distance, duration

We have to develop one android application to display driving distance along with the travel time in between two locations using google map android API version 2. It also provides latitudes and longitudes by the help of polylines with mixed colors along with driving route from source location (start) to destination location (end).

We use GPS and network providers to get Android device location along with the latitude and longitude values. Synchronization of both GPS and mobile carrier network provider is important for an accurate location finding. There are some places like indoor where we find GPS accuracy of finding location decreases and mobile carrier provides full signal strength. So in this situation network provider will use the cell site network tower help to find the mobile device location to get the current location of the user.

And we have designed the android and various mobile operating systems os in such a way that their application protocol interface (API) which will take care of GPS and network provider to be in synch.

Duration of the query to be solved and processed plays a major role in GIS because there are many Emergency situations where one will look for fast, reliable and accurate location of Emergency services. Hence, the Google maps android API is designed in such a way to provide user the most accurate results in less time.



5. SYSTEM DESIGN

A. User interface design

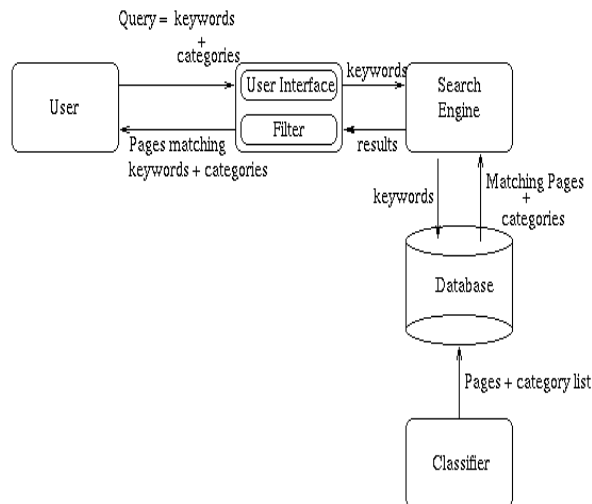


Figure-1. Block diagram of user interface design.

The system is designed with the help of user interface design and various approaches. Now the user searches the query from the search menu based on the search keywords and then categorizes to the user interface (UI). Then the user interface filters the query and sends the exact user requirement to the search engine. Then the search engine sends the keywords to the database. Once the keywords sent into the database, the classifier will make a layout of pages and category list to the data base. From the database it sends the information of matching pages and categories to the search engine. It shows the result to the filter of categories and provide to the user.

B. Uml diagrams

Unified Modelling Language gives all the specifications of software systems and their design. There are three important type of UML modeling. They are Structural model, Behavioral model, and Architecture model. To model a system the most important aspect is to capture the dynamic behavior which has some internal or external factors for making the interaction.

6. CONCLUSION AND FUTURE ENHANCEMENT

For first phase, the working of the ArcGIS software used for this project implementation is learnt in detail. The first stage of this study is the project planning where the study area and the hardware, software are keenly selected and studied. In addition to this the study area is selected using the OpenStreetMap(OSM) services and the data are exported with the geographical coordinates with which the OSM file is got and the OSM2KML conversion is done as the ArcGIS software does not accept raw data, hence the KML files are again converted to LAYER using the KML2LAYER conversion tool and thus the selected map's projection is got with which the Hospitals are categorized as points, the road

network as polylines and the study area as the polygon. In order to calculate the shortest path and closest facility offered we are proposing a new shortest path algorithm called the Bidirectional ST algorithm.

In this paper, we presented the implementation and evaluation of map, which provides an autonomous construction of a personalized map for the development of advanced mobile services. The core component of this map is a location management scheme that provides offline and online location information in everyday lives. Each user search his/her own location in map incrementally with a help of centralized server and a local server. We minimized the energy consumption of a device by using a minimum set of sensors based on user activity. User privacy was also considered by designing a decentralized system. Our belief is that the proposed approach complements current localization technology, taking an important step to expand the domain of mobile services to indoor environments in daily lives. Although focuses on the major source of user context (i.e., location), we believe that our approach is a building block toward a sophisticated system that provides various user context, including both location and situation.

This project proposes a new field of secure transactions. Enhancements can be made by implementing newer techniques like image authentication, biometrics to authenticate users.

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