An Interactive Method for Tracking & Geocoding

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***Abstract*—** Tracking has been used for many years commercially. Some important applications are RFID tracking on animals and marine beings, military applications etc. tracking and navigation is done by using a wireless sensor having some transmission power. In Geocoding, the local names of the location are matched to their respective longitudes and latitudes so here after tracking we have to place its location on the map so for that the process of geocoding will be used. In this paper we are performing a survey on the various methods being used for geocoding and tracking.

Keywords- *Geocoding, Geological Information System, Global Positioning System, Location Based Service, Point of interest*

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I. INTRODUCTION

Geocoding is a process of finding longitudes and latitudes with an address as an input or vice-versa. According to current research data available, main requirement of geocoding is actually having the latitudes and longitudes of the POI or the nearest neighbor. As mentioned by Omar Charif[1] this is required to find the address of nearest neighbor of the POI under consideration. Furthermore, a similar kind of technique is used in "A Geocoding Algorithm for Natural Language Address with Neighborhood Properties" by Feiquan Wu[2] which is used to process the natural language into spatial address. Also there is the technique of finding precise location of the POI by Jung, Jung S.[3] in which the GSHHS data for the reference. The previous system uses spatial co-ordinates of the nearest neighbor of POI. Then by using that data we find the spatial co-ordinates using linear interpolation which is called "geo-coding by nearest-neighbor" of the POI [1]. Although there are natural language algorithms [2], but they still use the nearest neighbor spatial co-ordinates to find the spatial co-ordinates of the POI. We are taking help from an enterprise named AND. Their maps have a database of roads connecting more than 200 countries in the world, including fully attributed navigation maps of Western Europe. AND proprietary digital maps: They are having an experience of 30 years of creating digital maps. The total length of their roads in maps which are digitized is over 34 million kilometer having a wide range of attributes, they have almost 1 million polygons and uncountable POI's. The database on which they are currently working of AND, and which they are providing to us to work on contains a worldwide database of Digital Maps on various levels, from a scale of 1:250.000 to 1:2.000.000. Most of the countries in Western Europe are available on turn-by-turn navigation level. That data is stored on different levels throughout the database. The most of the things which are included in the worldwide maps of the Country, province, urban area boundaries and major lakes and rivers. With the database of provided by AND, we have longitudes and latitudes stored at RDBMS server and address at another server, we will be just retrieving information from both the databases and plotting it on a map. By the need of calculating POI is eliminated and the process becomes much faster from the existing system.

II. LITERATURE SURVEY

The main requirement of geocoding is actually having the latitudes and longitudes of the POI or the nearest neighbor. As mentioned by Omar Charif [1] this is required to find the address of nearest neighbor of the POI under consideration.

Furthermore, the similar kind of technique is used in "A Geocoding Algorithm for Natural Language Address with Neighborhood Properties" by Feiquan Wu [2] which is used process the natural language into spatial address.

The existing system involves the use of the spatial co-ordinates nearest neighbor of POI. Then by using that data we find the spatial co-ordinates using linear interpolation which is called "geo-coding by nearest-neighbor" of the POI [1]. But this system [1] requires postal address as an input. The postal address is hard to remember, thus making it difficult to common people. Also there might be a chance that a common person might make a mistake in postal address itself. Although there are natural language algorithms [2], but they still use the nearest neighbor spatial co-ordinates to find the spatial co-ordinates of the POI.

There are two main steps in geocoding first is address correction i.e. address matching and the second is geocoding of the identified address. These 2 steps of geocoding can be used in a lot of fields like crime detection [8], health monitoring [6] and many fields of computer science. The method of localization [1] produces some errors, the errors were around 3 kilometers which were large if we consider them in the real world. Goldberg [5] defines geocoding as finding the geographically referenced code representing an input address, determined by a processing algorithm. The processing algorithm consist of the following steps

1. Normalization and standardization of the address and coordinates

In this step, the input address is transformed into a standard form, for example by removing punctuation and

Recognizing abbreviations. The words in the input string (or, substrings of the input string) are also tokenized (i.e., classified as belonging to a specific input type).

2. Weighting of the attributes in the address.

The attributes obtained from tokenizing are weighted, to be able to measure the degree of similarity of the input address with addresses in the reference data set.

3. Search the reference set for a match and output the geographical coordinates.

Geocoding is also done by using record linkage. Record linkage (RL) [1] means searching of records in a dataset that belongs to the same entity across various data sources. It is concerned with how to find entities referring to the same real world entity, in the same or different databases. In [4] many methods for geocoding have been explained like one given by Goldberg, Churches, Winkler and Elmagarid and similarity measure as a weighted distance of distances. Its application is written by Koudas [9] in a paper about how to deal with problems in record linkages encountered in practice. All the methods of geocoding mainly deal with single line input i.e. the whole address is provided in a single line. Address matching is a big problem in geocoding. Here in this we will be using record linkage method to demonstrate the method of geocoding by taking an example of tracking, in that example we will be tracking a vehicle and displaying its location on the map and will provide the real time location to the user who will be at place which is unknown to the driver so by the help of geocoding we will provide the location of the user to the bus driver and the location of the bus to the user. In the next section we will be giving the methodology which we will be using to do this task.

III. METHODOLOGY

The most common method used for displaying a tracking device's location on a map (GIS) is by using push pins and reverse geocoding. This process is carried out in the following way:

Step 1: GPS technology makes the use of satellites to show the proper place of the device being tracked on a map (GIS) with the help of latitudes and longitudes of the earth

- Adding the namespace.

For using all the function related to geocoding we need to add the geolocation namespace which defines all the functions and system calls related to location. The class named Geolocator is present in the namespace which aids in providing access to current geographical location. Utilizing the Geolocator class. The users current location on the map is given by event handler named getCurrentLocation_Click. The method that is responsible for getting the latitudes and longitudes of the user's device is GetGeopositionAsync( ). After this method a variable of the type Geoposition class is returned. Thus the returned value is stored in the Geoposition class variable.

Figure 1. Location of GPS device on map[11].

There are two main properties in Geoposition class. First is the Coordinate property which is of the type Geocoordinate class. This Geocoordinate has a property named Point that is of type Geopoint class. Basic Geoposition structure contains every information that is needed, like Altitude, Latitude and Longitude fields in it. Therefore, the flow to derive the access results is given below:

Geoposition > Coordinate > Point > Position

Figure 2. Flow to derive access results.

Step 2: Push pins To display the precise location of the device we are using the push pin feature. The Pushpins are shown on the map by a class called pushpin class. A class called MapLayer has elements positioned on the map itself. Therefore, this is the appropriate place where the pushpin on the map is placed. Where the Pushpin must be placed within the map, in other words “current location” and the “Pushpin object”, must be given as inputs to the SetPosition( ) method of class MapLayer. This helps in setting the position of the Pushpin to the current location (in other words current latitude and longitude) within the map view. This helps in showing the Pushpin on the exact location within the map.

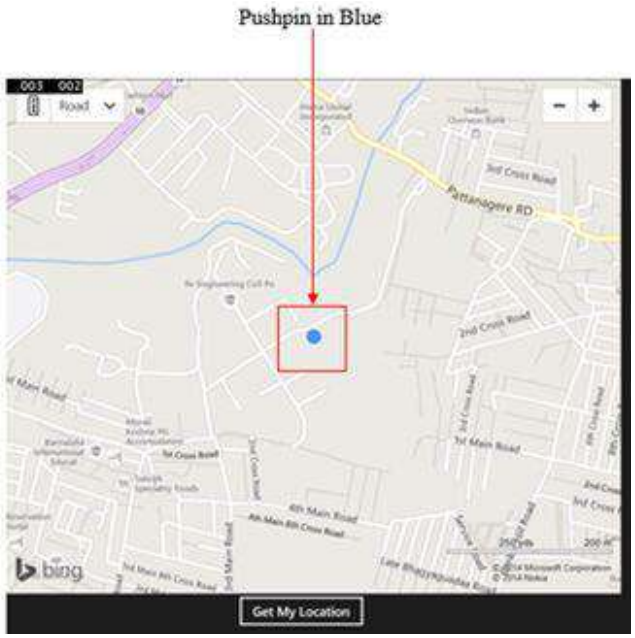

Figure 3. Has the pin point in blue color[11].

Step 3: Reverse geocoding to get the address. Reverse geocoding is the process of getting the address or place details in readable format using the latitude and longitude of the location. The SearchManager class is used for matching the latitudes and longitudes to an address. This class contains the necessary methods to manage geocode and reverse geocode requests. The location is the variable of type Location class. This location variable stores the current location of the device. For the sake of defining reverse geocoding request options we use the ReverseGeocodeRequestOptions class. The variable of type Location class must be passed as a parameter to the ReverseGeocodeRequestOptions class's constructor during object creation. Getting the search manager of the current map and storing it in a separate object of type.

The GeocodeAddress class contains three properties. All are of data type "string". The postal address of the geolocation is got by the address variable. Neighborhood fetches the neighborhood associated with an address.

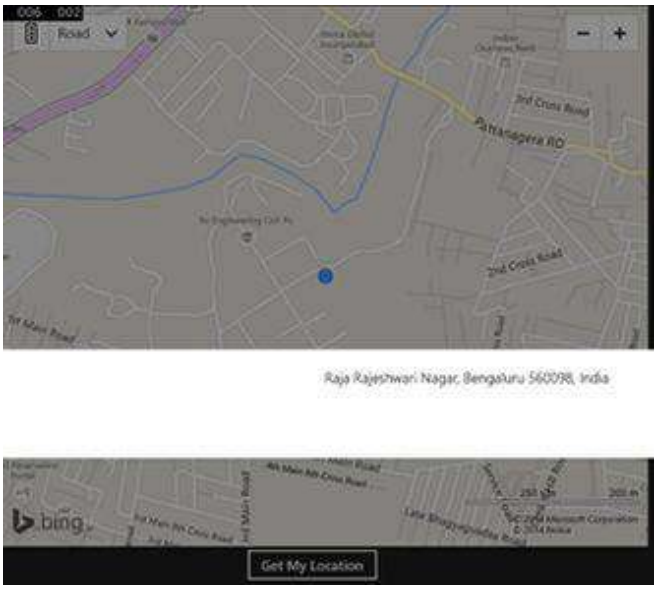

Figure 5. Output screen [11].

IV. APPLICATION

This API will serve requests regarding the location based queries of the passengers who wish to know the exact location of the bus (Transport vehicle) which they want to travel in. It can also be useful in keeping track of the buses so that a proper schedule can be maintained centrally.

V. CONCLUSION

Thus we have proposed a method for geocoding where we are using a pushpin to mark a point of interest which we want to get the location of by the help of geocoding process.

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