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Research paper

Intelligent Policy Framework for Georouting Using Spatial Database

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Abstract

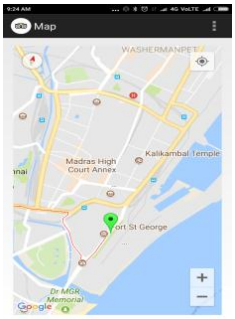
In today's world of time effectiveness and climate change it is a necessity to take the right decision at the right time and act responsibly! Our carbon footprint is increasing day by day and our injudicious use of non-renewable sources of energy are posing a threat to get these energy sources exhausted soon! It is our responsibility to take an initiative towards it from our end.
In this paper I am going to discuss about an Android Application which I have developed that will solve the problem of finding the shortest route from source to destination. This will lead to less wastage of car fuel and time to find the shortest path!
This application has a two fold benefit i.e. one of finding the shortest path from source and destination and second is acting as a world tour guide. It will not only show you the places of tourist attraction in that place but will also facilitate in providing suggestions for the cheapest means of transport that should be taken in order reach destination in minimum possible time and by spending minimum amount of money on travel!

1. Need for the Application in Today's Era

In basic google search we first need to search for the places of tourist interest. Then separately type in for each place to find out the time taken to reach there, route to be taken, amount to be spent on travel to each place , mode of travelling to be used and finally the route to taken .Generally for searching each place of tourist interest in an area and collecting all the above mentioned information it requires at least 5-6 searches. Even after that one cannot be so sure that the path taken by the person either by using google map navigation or by any other means of navigation is the shortest path and least amount of fuel would be used to travel to that place.
To solve all these problems I have developed an application that serves this purpose! For real time application we need to buy APIs from Google under an agreement. This wasn't feasible for me as a student so I have developed a prototype of the same real time application which is concentrated in a smaller region i.e. of Chennai.
The potential of this application of producing dynamic results in minimum amount of time with exact results is immense. The best part is that it will not be region specific. It could be used in and for any part of the world and will produce the best possible results each time with minimum number of clicks (always less than basic Google search) in short time duration and routing to the shortest path possible to reach the destination.
It will also serve as a perfect tourist guide in any part of the country. So , one does not need to belong on any person/ tourist guide even in a foreign land. Another striking difference between this application and prevalent google search is that one first needs to know the name of destination i.e. a hospital/ restaurant/ places of tourist interest etc. then only other distance, fare, time and route searches can be done between the source and destination.

This application does not even require the source and destination names specifically! One can easily zoom in the map to find one's current location and just point the source marker to any point in map from where one wishes to start the journey and place the destination marker to any point where one wishes to go e.g. a hospital / museum / beach etc. where ever one wishes to travel by pointing that on map. Then it will show the shortest path possible to reach the place. This is made possible through a polygraph line which shows the exact shortest path which needs to be taken to travel from source to destination

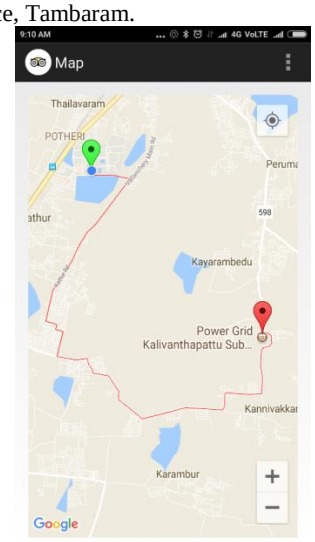
Screenshot 1: Showing the shortest possible



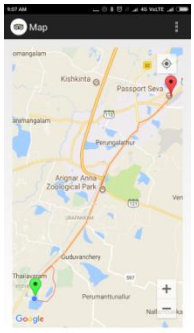
Screenshot 2: Source location

Screenshot 3: Destination location route between Chennai and CoimbatoreFort St. George, Chennai Womens Center, Coimbatore

In the above search we have given source location as Fort George in Chennai and have marked destination location as Women Center in Coimbatore. It can be further zoomed-in for the purpose of navigation to get the shortest land route possible. Here Green Marker shows the Source location and Red Marker shows the destination location. The polygraph line joining the source and destination constitutes the shortest path to reach the destination. Screenshot 4 and 5 are examples of shortest route between SRM IST, Potheri and Power Grid, Kalivanthapattu& SRM IST, Potheri to Passport Office, Tambaram.



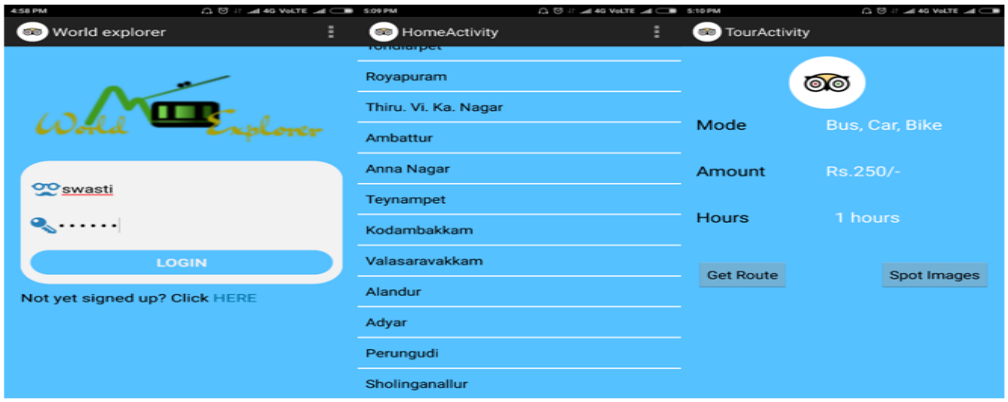
Screenshot 4: Shortest route between SRM IST, Potheri and Power Grid, Kalivanthapattu



Screenshot 5: Shortest route between SRM IST, Potheri and Passport Seva (office), Tambaram

2. Working of the Application

Initially we are required to register for the application. After registration we can login the application using username and password. When credentials are matched then a welcome toast is displayed. There are 15 zones in Chennai to choose from.
For example, if we choose Sholinganallur zone then we are further directed to a list of places of interest. From the list if we choose Shollinganalur Marsh Lands then we'll be directed to the next activity which displays the mode of transport which can be used, fare along with time required to reach the place. There are two buttons also. One is 'spot images' which will display images of Shollinganalur Marsh Lands and the second button is 'Get Route'. When we click on 'Get Route' then shortest route between the current location i.e. Potheri and Sholinganallur Marsh Lands is shown. We can further zoom in to navigate through the route.
Second application can be to find the shortest distance between two places which are not tourist places / eminent places but are places of utility. For example if we want to reach Annai Arul Hospital from The Shriram Gateway, Perungalathur then we can navigate through the shortest possible route to reach that place.



Screenshot 6: Login Page **Screenshot 7**: Home Activity for displaying 15 zones of Chennai city **Screenshot 8**:Tour Activity-Displaying mode of transport fare, time to reach Sholinganalur

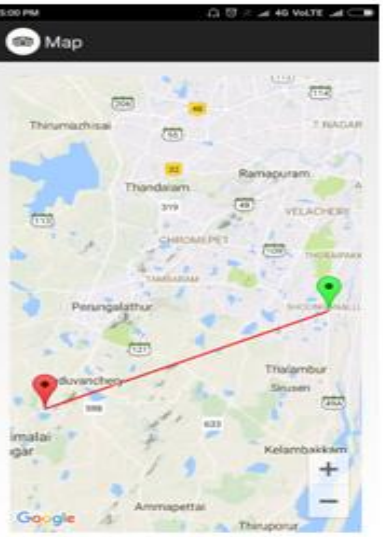
Technical details

I have used google play services using free google api for map. Gallery named slider is used to add introduction screen . Storage type used is 'Shared Prefrences'. It is used to store private and primitive data in key value pairs. I have implemented Runnable interface and have used 'Intent' keyword for moving across activities.

Activity can also be referred as Page. Toasts are used at appropriate places. Designing of layouts is done in xml.

Screenshot 9: List Activity: List of places Tourist interest

Screenshot 10: Route from Sriram Gateway To Annai Arul Hospital



Screenshot 11: Zoomed-out route view of Shillinganalur Marsh Lands

HOME ACTIVITY: All 15 zones of Chennai are displayed in the list view. An array list is used to store these zones. Bundle is used to pass data from one activity to another activity. As one chooses a zone e.g. Shollinganallur then the list position of Shollinganalluris sent to list activity.

LIST ACTIVITY: After receiving the position through bundle, corresponding list activity data is displayed. One can choose from the displayed list, any place of interest. Then through intent we are directed to Tour Activity

MAP ACTIVITY AND CALCULATION OF SHORTEST ROUTE FROM SOURCE TO DESTINATION: CameraUpdateFactory class is being used for zooming in to the current location. BitmapDescriptorFactory class is used for getting source and destination marker. Snippet is used for displaying the marker position's name. Polygraph line is drawn by using the below mentioned snippet:

PolylineOptionpop= new PolylineOptions(). add(srm) . add(tey) . width(5). color(Color. RED). geodesic (true);

Where source, destination, width of polygraph line, colour of polygraph line and enable/ disable option for polygraph line is provided.

DIRECT JASON PARSER: It is used for calculating the shortest path from source to destination. It has been implemented in this application by deploying Dijkstra's Algorithm and radius algorithm. These algorithms combined are used to define the radius of the area to be considered for finding the shortest path along with marking nodes and then discovering the shortest path out of them.

3. Scope of the project

One of the best parts about this project is that it has a wide scope for it's future real time application. While developing a real time large scale project we can cover the whole world under one application! No land will remain strange and foreign with it's application. We'll be able to tour the best places in any part of the world without the need of any guide and can take the most economic and time effective decisions while travelling to any place.

We can buy Google APIs for exact map tracking. Display of travel time, mode of transport and cost of transport with minimum fare possible will be shown in real time. Thus we will no longer have to compare flight prices or prices of other means of transport from different websites and waste our time and energy on this.

Instead ,comparing of fares from different websites we can use Jason url technique. To use this technique we will need to create a Jason online server , fetch details from all websites and integrate it in Jason url. This Jason url can be integrated in the code to show real time prices with the best deals!

4. Utility of the project

1) It can be used to save time and non- renewable sources of energy which are being wasted by reaching the same place by taking a long route.
2) It can serve as a perfect tour guide and can show places of tourist interest around that place along with the shortest route to reach that place.
3) It will compare and display the lowest fare from all the websites. This will save a lot of browsing time.
4) It produces accurate results with minimal to no mistake. Thus it is highly efficient!
5) It will be really helpful in foreign lands , especially in the countries where we don't understand their language and navigation becomes a real problem.
6) No need for hiring a separate tour guide who may not know the lowest prices to reach from one source to destination. One can be one's own most economic guide!
7) It is highly essential when we ourselves get lost and are not sure about our whereabouts. Our exact location is displayed on the map.
8) It will be highly essential for military purpose as well as by using the shortest path in a difficult terrain can save a lot of lives and resources.
9) This will also be really effective in carrying out relief activities or reporting on crime scene on time.

10) This may also be helpful in making the shortest land corridor in case of human organ transportation in which time is the most important factor.
11) In future , it can also be used by postal / courier service agencies for their timely delivery .
12) It will help us to reduce our carbon footprint over a period of time which is of real necessity!

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