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Navigation Based on Distance and Width of Road

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***Abstract*—** Nowadays people uses Google Maps (digital Navigator) during travelling to get exact road map with proper direction including distance in km and total time remaining to reach out destination. For this purpose people need to have facility like, inbuilt GPS system in vehicle or cell phone with internet connectivity but there are certain limitations. GPS (Global Positioning System) basically works with satellite. It is used to determine location of user. Navigator (Google Map) always gives shortest path during travelling that is the biggest limitation. Many times travellers face problems with width of road and create traffic problems as well on smaller roads. So, it is suggested that navigator should consider road width and based on findings it should provide alternate shortest route. For that in this paper an algorithm is provided for solving this problem.

***Keywords*—** Navigator, Search Engine, GPS

I. INTRODUCTION

Smart phone users normally uses navigator to get directed map to reach out destination. Instead of probing for an address of a street name, the application can also search by name, for example guide the user to a nearby bank by being given the name of the bank. The application can also take phrases such as "a place for banking and suggest nearby destinations that match expression. The application can also receive a voice input text instead of typing the destination location on the device. There are multiple views of using navigator in smart phone.

Traffic View: The application's traffic jamming map shows the route paths with different colours based on the current traffic along the route. The traffic is measured by data from local road services such as highway cameras, as well as speed and location information from other Android devices that are accessing Google Maps for Mobile. [1]

Satellite View: The application displays a route from a bird's eye view using Google's satellite imagery. [1]
Street: The Google Street View feature displays a route from first-person view as which automatically changes as the user travels along the route. [1]
Following are different approaches of using navigator:

Car Port Mode
Users can port their Android device in a car using a special car port for the device (which may or may not come with the device). Once ported, the device will come into this approach, enabling for easier access to the navigation features.

Walking and Transit
The application provides facility of voice navigation for walking and in the past for transit directions. In its current approach navigation is not available for transit, only a list of directions provided. The transit directions are available in few cities around the world.

Offline Direction
Once the user has searched for a destination location, the map will cache along the intended route. Note that the application requires an Internet connection to search for the route, but once a route has been found, the user no longer requires an Internet connection as the route is temporarily saved onto the device. [1]

II. RELATED WORK

A. GPS Navigation

A **GPS navigation** system is a **GPS** receiver and audio/video (AV) components designed for a specific purpose such as a car-based or hand-held device or a smart phone **app**. The global positioning system (**GPS**) is a 24-satellite **navigation** system that uses multiple satellite signals to find a receiver's position on earth. [2]

GPS was developed by the U.S. Department of Defense (DoD). The technology was originally used for military purposes. Since 1980, when GPS technology was made available to the consumer market, it has become common in cars, cell phones, mobile devices. [2]

GPS receivers find their location by coordinating information from three or four satellite signals. That information includes the position of the satellite and the precise time of transmission. With three signals, any 2D position can be found on earth; additional satellite signals make it possible to find altitude. [2]

GPS technology works in almost any condition and is accurate to within 3-15 meters, depending on the number of signals received, the spread of satellites in the sky and the technologies used in the receiver. [2]

B. GOOGLE MAPS

To get easy, turn-by-turn navigation to locations, use the Google Maps app. Maps will show directions and use real-time traffic information to find the best route to destination. With voice navigation, once can hear traffic alerts, where to turn, which lane to use, and if there's a better route. It is noted that navigation and related information about which lane to use are not available in all regions and languages.

A. Start or stop navigation [3]:

1. On Android phone or tablet, open the Google Maps app .
2. Search for a place or tap it on the map.
3. In the bottom right, tap **Directions**. If user touch and hold the button instead, you'll start navigation and can skip steps 4-6.
4. **Optional:** To add additional destinations, go to the top right and tap More **Add stop.** User can add up to 9 stops. When all are finished, tap **Done**.
5. Choose one of the following:
   - Driving:
   - Transit:
   - Walking:
   - Rides:
   - Cycling:
6. If other routes are available, they will be shown in gray on the map. To follow an alternate route, tap the gray line.
7. To start navigation, tap Start . If it shows "Searching for GPS," user cell phone is trying to get a GPS signal. For example, user might be in or near a tunnel, parking garage, or other location where there is no GPS signals.
8. To stop or cancel navigation, go to the bottom left and tap Close .

B. Facilities in navigation [3]

To see more actions while user is navigating to a place, go to the bottom right and tap the up arrow . To hide the menu, tap the down arrow .

- **Search along route**: Look for a place along travelling route, like a bank or petrol pump.
- **Show satellite map:** See the map in more detail using satellite images.
- **Directions**: Get a list of step-by-step directions.

Settings: Change settings, like switching between miles and kilometres.

C. ROAD API

The Roads API allows user to map GPS coordinates to the geometry of the road, and to determine the speed limit along those road segments. The API is available via a simple HTTPS interface, and exposes the following services:

- **Snap to roads** This service returns the best-fit road geometry for a given set of GPS coordinates. This service takes up to 100 GPS points collected along a route, and returns a similar set of data with the points snapped to the most likely roads the vehicle was travelling along. Optionally, user can request that the points be interpolated, resulting in a path that smoothly follows the geometry of the road.
- **Nearest roads:** This service returns individual road segments for a given set of GPS coordinates. This services takes up to 100 GPS points and returns the closest road segment for each point. The points passed do not need to be part of a continuous path.
- **Speed limits:** This service returns the posted speed limit for a road segment. The Speed Limit service is available to Google Maps APIs.

D. LIMITATIONS OF GOOGLE NAVIGATIONS

Google Map is the navigation app, developed by the Google. Through Google Map, user can search the destination and can navigate the same in an easy way. It made the life easier, now travellers do not have to ask about the route from the public.

Even with so many advantages, Google Map has multiple disadvantages. There are issues related to Google Map which are as follows [4]:

1. Irrelevant Content: Sometimes the images of searched results show the inappropriate contents, such as street sign is not clear, and if looking for any location, it will show the blur images of the building due to privacy concern

and hence users encounter the problem to find the correct location.

2. Infinite Accuracy: Google Map is not accurate, it does not show the exact situation of the particular situation. Suppose user searched particular destination and the road is blocked, User will not be able to come about this in Google Map.

3. Too slow to Load: The Google Map shows the larger image and due to this, it takes a lot of time to upload the searched location with an image. If operating from the computer and if browser is not updated, then Google Map will appear poorly or even user can expect no image.

Major problems travellers are facing with navigator that is, directing towards shortest path. It not feasible solution always for traveller. Sometimes shortest path creates problems to travellers like, Road width is smaller than width of car, sometimes road reserved as one-way, sometimes it is 'kachha road'. So, traveller faces lot in this. And many times this kind of situations increases traffic problem in smaller road

III. METHODOLOGY

For solving problem of car driver or traveller related to road width measurement following model is developed:

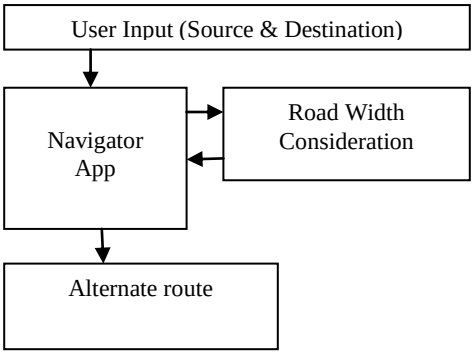

Figure 1: New model of navigator

Figure 1 shows now model of navigator works on following newly developed algorithm.

1. Open navigator map
2. Enter Source and destination locations
3. Click on Done
4. Then start journey from current point
5. App should work with Forward pointer minimum 5 kilometers.
6. App should measure width of road 5 kilometers ahead from current location and need to check road width is appropriate for car passing or not.
7. If not then route map should adjust with another nearest path

IV. CONCLUSION AND FUTURE SCOPE

People use navigators during their travelling to get exact road map with proper direction but there are certain limitations. Navigator (Google Map) always gives shortest path during travelling that is the biggest limitation. Many times travellers face problems with width of road and create traffic problems as well on smaller roads. This paper demonstrates an algorithm for suggesting a navigator considering road width and based on findings it provide alternate shortest route. This paper considers a navigator app which takes into consideration road width so that navigator uses don't have to face the blockage due to small roads.

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