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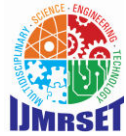
Priority Based Amenities Mapping Using Google Maps

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ABSTRACT: According to data and information on migration and migrants from World Migration Report 2020, India continues to have the largest number of international migrants and the top destination country being United States. Accommodation is unquestionably the very first point that comes to the mind while migrating. Apart from this there are also a number of checkpoints and considerations which likewise will undoubtedly be to some extent in view of individual inclination that should be taken care of before taking the final decision. Finding accommodations in foreign countries becomes a tedious task for people residing in India. Each city is different, and some might have accommodation deficiencies, making a rooftop over your head somewhat seriously testing. The main objective of this research work is to prepare a method of finding accommodation areas according to the amenities preferred by the user and suggest the best possible location available for residence. The Authors chose and taken the advantage of Google Maps to provide high efficiency, clear directions, good user familiarity, and high speed. Different Google maps APIs have also been utilized for different views and usage and unified with the aid of ionic framework. Ionic-native/google-maps plugin used as a wrapper plugin for Cordova-plugin-google maps for Ionic Framework. Ionic Cordova-plugin-geo location has been used to retrieve the present location with the aid of coordinates.

KEYWORDS: Accommodation Deficiencies, API, Plugin, Ionic-native.

I. INTRODUCTION

Accommodation is unquestionably the very first point that comes to the mind while migrating. Apart from this there are also a number of checkpoints and considerations which likewise will undoubtedly be to some extent in view of individual inclination that should be taken care of before taking the final decision. The common guideline to remember is that the migrant issolely in charge for finding your own housing. Even after finding an accommodation that fits the budget, finding an accommodation that fulfils the amenities required, has healthy environment and access to food becomes very difficult.According to data and information on migration and migrants from World Migration Report 2020, India continues to have the largest number of international migrants and the primary destination country being United States.

In this research topic, the authors chose and utilized Google Maps which will provide numerous features to all the users. There could be millions of reasons for why to use Google Maps for map-based project but boiling it down to the three most principle and key reasons are Data, Familiarity and Speed. Google is known to be the King of Data. According to a survey, it is observed that primary reason people prefer a navigation application is clear directions and for that, data is needed Familiarity plays an important aspect as most of the UI a user uses regularly are so familiar that they use it without thinking thereby giving better user experience. So, building a system on Google technology gives a better familiarity index. Since first impressions don't get another opportunity, and a slow responding system definitely impacts a bad impression. Hence the solution should run fast and this is another important feature offered by Google services. The Authors chose and have utilized Ionic as platform since it has made this possible. It has excellent plugins and features to integrate the map into the system and also give it a beautiful interface. Different Google maps APIs have also been utilized into it for different views and usage and unified with the aid of ionic framework. Ionic-native/google-maps plugin used as a wrapper plugin for Cordova-plugin-google maps for Ionic Framework. Ionic Cordova-plugin-geolocation has been used to retrieve the present location with the aid of coordinates. This project uses Visual Studio Code as IDE.

II. RELATED WORK

Google Maps is a research work discussing the factors, merits, advantages and its development [1]. It contains history of google maps and Algorithms used for its development such as Dijkstra's algorithm, its pseudo code, A*(A-star) algorithm and its pseudo code. It discusses that Dijkstra's algorithm is proved to be obsolete in this implementation as

it might increase time complexity drastically and this issue is resolved by more efficient, accurate and faster algorithm that is, A-star algorithm. Aside from the algorithms for development the research work also talks about the outstanding features such as Street view, locating the position of an object, person or place using GPS and Geocoding.

Authors [2-5], have proposed a research work on Google Map for implementation of Geographic Information System Development Search Location SMEs where they have developed an application which can help the website users to find the tourism location in the span of 20 km. They believe any information shared with completeness, makes it far more useful, efficient and a point of interest for retrieving any kind of information. Authors calculated the position of longitude and latitude in order to find out the nearest tourism object location [6-8].

III. METHODOLOGY

According to research it was discovered that the primary and key problem that comes into mind while migrating into another foreign country is accommodation. Finding an accommodation depends on various factors and finding an accommodation according to the preference of rent amount, locality area, amenities available and distances between work area and home is very difficult unless you're already residing in the same place. Carrying out this task being in a different country is not possible. Hence authors decided to develop an application with the Google map features providing the ability to the users to match the amenities based on their priority find an accommodation accordingly.

Google maps provide several features that can be added into the application for the better implementation and experience. It provides thirteen different APIs thereby giving multiple experiences. The APIs are- Maps SDK for Android, Directions API, Distance Matrix, Maps Elevation, Maps Embed, Geocoding, Geolocation, Roads, Maps SDK for iOS, Time Zone, Places, Maps Static, and Street View Static. These APIs are used by the developers to integrate the respective features into their projects by simply using the API keys. There are numerous technologies already available into the industry for the development. Now there are number of frameworks available today to work with and get established with a completely new idea and an application, but choosing which one to use or which one will prove to be more suitable for your work is a challenging task today. Amongst all Ionic is the framework which has extraordinary features which not only helps in making surprisingly excellent UI Designs but also helps the developer by reducing their work by containing numerous libraries, and several benefits among which code reusability is the most important one. Ionic is worked with Cordova, it implies, it contains the Cordova record design to bundle HTML/CSS/JavaScript into applications that can run on both versatile and work area gadgets. This is utilized alternatively by designers to characterize a worth once and use it in various spots inside a template record. Thusly, it empowers quicker production of various Interfaces for rich portable intuitive apps. Main advantage of this ionic framework is that a developer can write the single code base that is the code that you are writing cross-platform independent which means this single code can work in Android device as well as on iOS device.

IV. IMPLEMENTATION

Authors chose have made use of Google cloud platform for using Google maps into the project. First step includes creating credentials for API access. Go to the Google Maps Platform enable the Maps JavaScript API and Geolocation API and create the API key. API restriction is an optional but recommended task that should be done for security purposes of the API [9]. API keys help the developers to use the features of some already available functions of Google maps without actually construction it from scratch.

Create a new Ionic project employing the Visual Studio Code text editor. Creating a new ionic project installs all the inbuilt packages, dependencies and plugins needed to run a default ionic application and it can be run on browser. For creating ionic project, us command- "ionic start".". It will create a default ionic project running on browser at localhost:8100 by default. Changes made in the project template, styling, and logic are visible in the browser as soon as the changes made are saved. The project folder consists of package.json that containing all the dependencies required in the project, Package-lock.json for locking the dependencies with the installed version, tsconfig file to indicate the root files and also shows the compiler options required for compiling the project, node_modules folder to contain all the installed dependency for project, src folder containing the app,assets and environment folder and index.html and main.ts file. Index.html is the first file that executes when the project is compiled. And all the alternatives that a user need to perform for development are done inside the app folder.As shown in Figure 1, use the Google maps API key saved in earlier steps in the index.html file in the scripts tag.

```
<script src="https://maps.googleapis.com/maps/api/js?key=YOUR API KEY HERE" async defer></script>
```

```
<head>
  <meta charset="utf-8" />
  <title>Ionic App</title>

  <base href="/" />

  <meta name="color-scheme" content="light dark" />
  <meta name="viewport" content="viewport-fit=cover,
  width=device-width, initial-scale=1.0, minimum-scale=1.0,
  maximum-scale=1.0, user-scalable=no" />
  <meta name="format-detection" content="telephone=no" />
  <meta name="msapplication-tap-highlight" content="no" />

  <link rel="icon" type="image/png" href="assets/icon/favicon.png" />
  <script
  src="https://maps.googleapis.com/maps/api/js?key=YOUR_API_KEY_HERE"
  async defer
></script>

  <!-- add to homescreen for ios -->
  <meta name="apple-mobile-web-app-capable" content="yes" />
  <meta name="apple-mobile-web-app-status-bar-style" content="black" />
</head>
```

Figure 1. API Integration

The next step is to display the map in the browser. In the home.page.html file the use the #map id= map to make the map visible as a content to the template. A class variable is created to store the map and display in the template which basically addresses the map element. Above the component decorator a let google is declared for avoiding all sorts of warning by typescript related to the google object which is provided in the project by Maps SDK from Google. The Function ionViewDidEnter() is used so that the event inside this function is fired as soon as the page we are entering after it turns into the active page and the function here is calling the loadMap() method so that the map appears on the screen as soon as we are entering the map page. As shown in the figure 2 the loadMap() function is administering the loading of a new map and storing it into the map div. Firstly it displays the location given in terms of latitude and longitude. But when Geolocation API is added it automatically stores the current location of user and displays the same. Prior to the map creation the other map display settings are done in the mapOptions such as centre coordinates, map type and the initial zoom level.

```
loadMap(){
  this.geolocation.getCurrentPosition().then((position) => {
    const latLng = new google.maps.LatLng(position.coords.latitude, position.coords.longitude);
    console.log(position.coords.latitude, position.coords.longitude);
    const mapOptions = {
      center: latLng,
      zoom: 15,
      mapTypeId: google.maps.MapTypeId.ROADMAP
    };
    this.map = new google.maps.Map(this.mapRef.nativeElement, mapOptions);
  }, (err) => {
    console.log(err);
  });
}
```

Figure 2. LoadMap

As this code is run a plain black screen will appear. In order to see the map properly adjusted in the ionic application, it first needs to be styled in the home.page.css file as shown in the figure 3.

```
#map {
  width: 80%;
  height: 100%;
}
```

Figure 3. Map styling

Markers are a generally involved highlight in map applications, so we certainly need to investigate how to add those. Add the button in the home.page.html that call an addMarker function that will be created in home.page.ts file. Create a simple function with name addMarker() as shown in the figure 4, and it will be using the marker function provided by the Google maps API. The marker will be automatically be added to the window as soon as the addMarker function is triggered.

```
addMarker(){
  const marker = new google.maps.Marker({
    map: this.map,
    animation: google.maps.Animation.DROP,
    position: this.map.getCenter()
  });
  const content = `<h4>Information!</h4>`;
  this.addInfoWindow(marker, content);
}
```

Figure 4. addMarker function

From that point forward, we're likewise making some satisfied and adding an info window that will be displayed when the client clicks on the marker. On the little chance that user might not need information windows, it can simply be eliminated by removing the last two lines, yet assuming they are really needed, the function named addInfoWindow() also needs to be added as shown in figure 5. In this function,functionality provided by Google maps API is implemented and a click listener is setup for listening to the taps on marker and display the information that is being retrieved from API.

```
addInfoWindow(marker, content){
  const infoWindow = new google.maps.InfoWindow({
    content
  });
  google.maps.event.addListener(marker, 'click', () => {
    infoWindow.open(this.map, marker);
  });
}
```

Figure 5. addInfoWindow function

V. EXPERIMENTAL RESULTS

Google maps is widely used for directional and route planner purpose and also allows the consumers to navigate to different places, measure distances, measure time, find methods of travelling, know your location, and also know the traffic availability on the way. It is the most established and traditional application for navigational purposes. The recognition of Google maps can be credited to the numerous and salutary services offered by it. Using Google maps into the application gives users a known interface thereby providing them comfortable accessibility as it is very popular and almost everyone these days uses it for day-to-day purposes. Hence, the authors have Google maps for implementing map for displaying location feature with completeness of information in the project. The users looking for accommodation are pleased to look for a location where their daily needs can be fulfilled properly without travelling much and sort their priorities according to their requirements and displaying the properties on the Google maps give users a better experience and detailed description and helps them plan their accommodation accordingly and easily. Specialists say that Ionic and Angular is the solitary most impressive and amazing matches in the field of web application advancement. Most of the applications on play stores are assembled utilizing this blend. Features like component creation, code reusability, and excellent mobile user interface are easily achieved by the use of combination of Ionic and Angular. The authors have therefore used Combination of Ionic and Angular frameworks for interface development and finer user experience and also reduce labour. Figure 5 below displays the result obtained and the figure 6 displays the functionality.
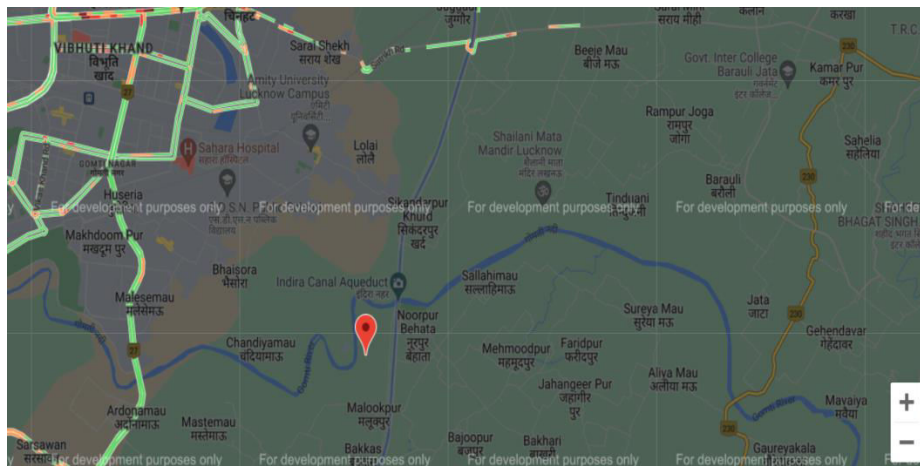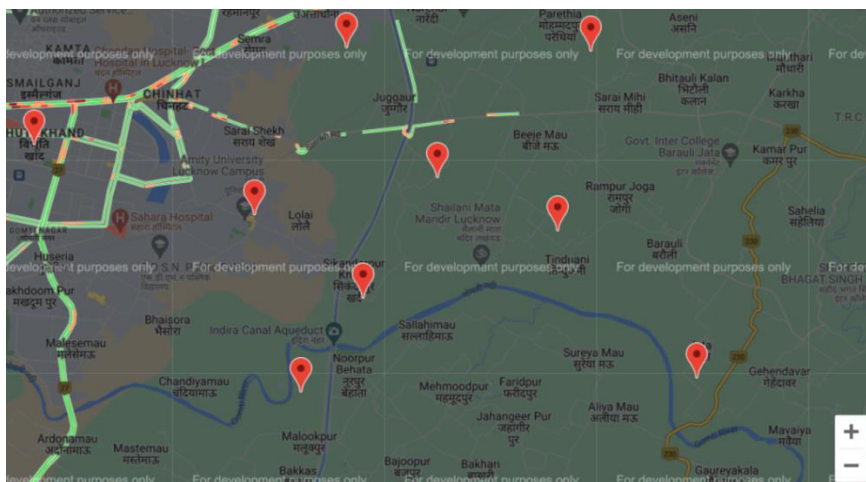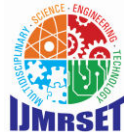

Figure 6. Result

Figure 7. Locations Saved

VI. CONCLUSION

The Accommodation is unquestionably the very first point that comes to the mind while migrating. Besides this there are also a number of checkpoints and considerations which likewise will undoubtedly be to some extent in view of individual inclination that should be taken care of before taking the final decision. Finding accommodations in foreign countries becomes a tedious task for people residing in India. The paper is constructed in order to help develop an application with the Google map features providing the ability to the users to match the amenities based on their priority find an accommodation accordingly. Usage of Google maps is an important step for various merits associated with the same and technologies combination is a trend these days and using ionic and angular as a development framework helps a lot for interface development and finer user experience and also reduce labour.

Advancements like booking and accommodation areas and including payment features online are some other features that can be implemented. Also using some other maps APIs to include more Google maps features to make the application look more realistic and interactive can be done to make the application more effective.

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