DETECTION OF ROAD WITH LESS AIR QUALITY INDEX AND ALERT THE BEST ROUTE

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***Abstract* — With the growth of urban transportation and the raise in the number of cars commuting in megacities, the need for a solution to travel healthy for daily activities becomes a place of importance. The growth of urban transportation and the raise in the number of cars commuting in megacities, the need for a solution to travel healthy for daily activities becomes a place of importance.**

The results are obtained by processing the location return the accurate and live AQI from the global API.AQI is an index for reporting air quality and its impact on different group of people. The final paths are provided based on the combination of several parameters such as distance and air quality index.Current navigation systems include options for the quickest paths which is based on distance and traffic and least expensive paths based on fuel costs and tolls. The existing system does not solve the concern of travelling in paths that is less polluted and hence might take a toll on people's health, especially people with lung diseases and senior citizens.

Keywords—Air quality index, navigation systems, API.

I. INTRODUCTION

This project overcomes the drawbacks of the existing system by providing the best route based on the Air Quality Index though there are certain limitations. Various methods are used to reach this objective starting with calculating the Air quality Index of the required route. AQI is an index for reporting air quality and its impact on different group of people. The next requirement is to identify the shortest route possible to reach the destination. The final paths are provided based on the combination of several parameters such as distance and air quality index.This project brings in an idea of on-road air quality monitoring and control approach by proposing an application for modelling the urban road network infrastructure, establishing the real time air pollution indices in different road segments &generating recommendations and regulation proposals for road users.

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For individual pollutants at a monitoring location are calculated using its 24-hourly average concentration value and health breakpoint concentration range. The worst sub-index is the AQI for that location. Overall AQI is calculated only if data are available for minimum three pollutants out of which one should necessarily be either PM25 or PM10. Else, data are considered necessary for calculating AQI.

II. RELATED WORK

Green Paths is a prototype of route planning software for finding exposure-optimised routes for active travel. It incorporates external data on environmental exposures, including traffic noise levels, air quality, and street-level greenery into the street and paths network produced by the Open Street Map project. Written in the Python programming language, the software applies a novel environmental impedance function in the least cost path routing to find exposure-optimized routes. Routes for externally defined origin-destination pairs can be queried via a RESTful API. The API returns alternative routes equipped with rich exposure data. The published version of the software has been applied in population level environmental exposure assessment and in an end-user-oriented web-based route planner application designed for use in the Helsinki Metropolitan Area. The Green Paths software is a prototype for exposure-optimised routing engines and applications. It is an open-source software written in the Python programming language. Python provided a suitable technical base for fast prototyping of different routing features and utilising several third-party libraries. The Green Paths software has been built as prototype for demonstrating path finding equipped with rich exposure metrics between selected origin-destination pairs. Thus, it has not been optimised to provide a routing service for extensive production use. The Green Paths software has three main features: (i) scripts and utilities for combining environmental data on noise, air quality, and greenery with OpenStreetMap-based street network graph; (ii) the main routing application for finding fastest and exposure-optimised routes for both walking and cycling; and (iii) RESTful API for publishing the environmentally sensitive routing functionalities as a web service. The Green Paths software uses external open-access data of street network, traffic noise, air quality as Air Quality Index (AQI), and street-level greenery as Green View Index (GVI) The Green Paths software has been built as prototype for demonstrating path finding equipped with rich exposure metrics between selected origin-destination pairs.

III. INCORPORATED PACKAGES

A. Geolocator

A Flutter geo location plugin which provides easy access to platform specific location services is used. This package is in corporate with the following features some of which were used in this application:

- Get the last known location
- Get the current location of the device
- Get continuous location updates
- Check if location services are enabled on the device
- Calculate the distance (inmeters) between two geo coordinates
- Calculate the bearing between two geo coordinates

B. Geocoding

A Flutter Geo coding plugin which provides easy geo coding and reverse-geo coding features is used. This plugin uses the free Geo coding services provided by the iOS and Android platforms. This means that there are restrictions to their use. Geo coding in Flutter is a plugin that basically helps us to retrieve the complete address with the help of Latitude and Longitude and vice-versa.

C. Location

This plugin for Flutter handles getting a location on Android and iOS. It also provides callbacks when the location is changed. The user has to accept the location permission to always allow to use the background location. The Android 11 option to always allow is not presented on the location permission dialog prompt. The user has to enable it manually from the app settings. This should be explained to the user on a separate UI that redirects the user to the app's location settings managed by the operating system.

D. Air quality index

The air quality index is an indicator that allows you to assess the air quality as a whole with a single value. The purpose of an AQI is to show pollution levels in a way that allows us to quickly understand the impact exposure will have on our health. An AQI brings together the concentration values (expressed in µg / m3) of all these different pollutants in relation to the impact they have on health. Thus, the higher the value of the AQI, the more polluted the air and the greater the health risk. On the other hand, a low AQI means fresh air and a low health impact.

E. Google Maps

A flutter plugin that provides a Google Maps widget. The map view can be controlled with the Google Map Controller that is passed to the Google Map's on Map Created call back. To get started we first need to fetch the API key which is specific for every user. It allows the users to search for different places around the world. It also provides some information about the different places which the user wants. The user can get directions for another location concerning his location.

F. Firebase

Firebase is a platform developed by Google for creating mobile and web applications. Firebase is a toolset to "build, improve and grow an application and use the tools it gives to cover a large portion of the services that developers would normally have to build because of their more focus on the app. This includes things like analytics, authentication, databases, configuration, file storage, push messaging and other major applications. The services are hosted in the cloud and scale with a little no effort on the part of the developer.

IV. THE PROPOSED METHOD

The proposed method consists of an application that makes use of navigation features which is the method for determining the position, best route for a good scale air quality index and direction of the rider.

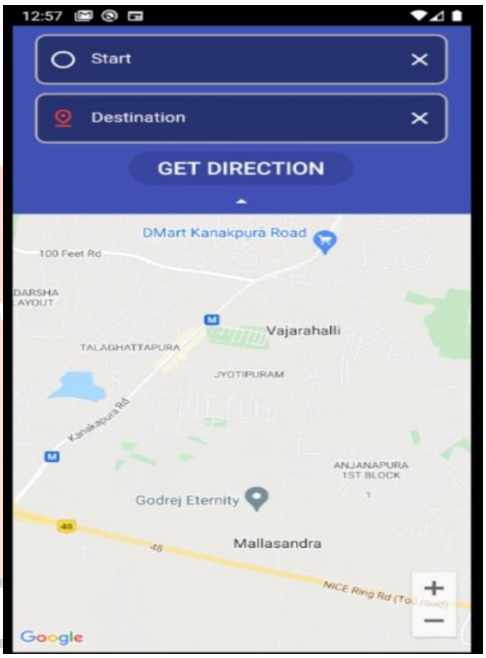

Fig. 1.Landing Page of Application

Using direction API with different arguments, transit and driving two routes are chosen. Driving will be a path with minimal AQI with shortest distance and transit will be average AQI path again with shortest distance. In this stage along with Google maps API the AQI API is also fetched to calculate the two routes. The AQI is the real-time data fetched from aqicn.org which is live and more accurate. The AQIs at each latitude and longitude point is known from the API. The overall AQI is calculated by taking the average of AQIs at equal intervals of latitude and longitude points. In whole paths with minimum distance and safest AQIs will be recommended to the user.

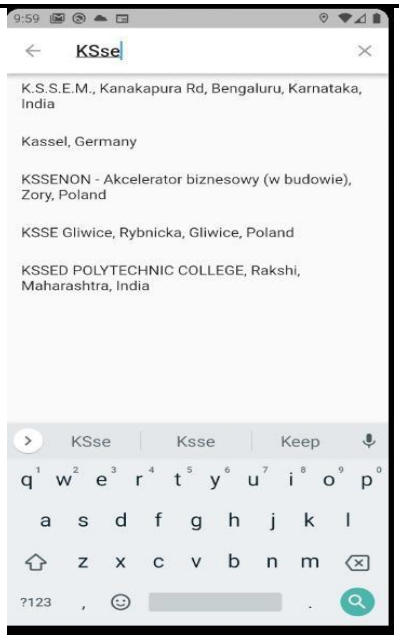

Fig.2.Part of Initial Interface

The overall AQI is calculated by taking the average of AQIs at equal intervals of latitude and longitude points. In whole paths with minimum distance and safest AQIs will be recommended to the user based on their input locations. Alerting the routes is done by creating notification channels. Notifications are getting triggered and displayed with the aid of flutter local notifications. The notifications include information about AQI values of the recommended routes and necessary messages displaying precautionary measures and the safety in travelling with those routes.

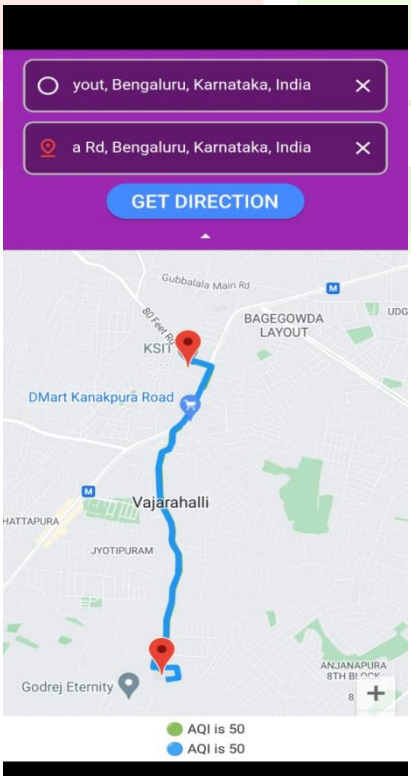

Fig.3(a).Average AQI of the path

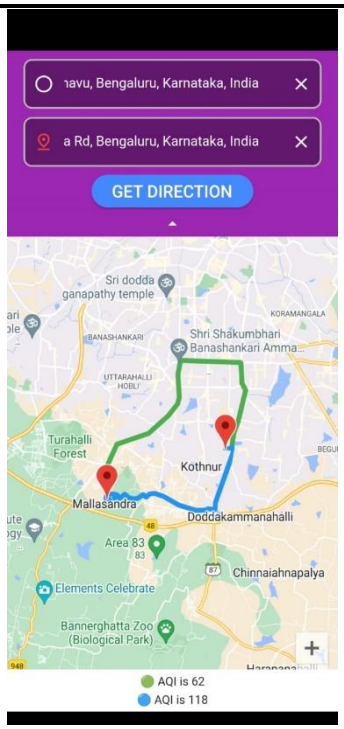

Fig. 3(b).Suggestion of two routes

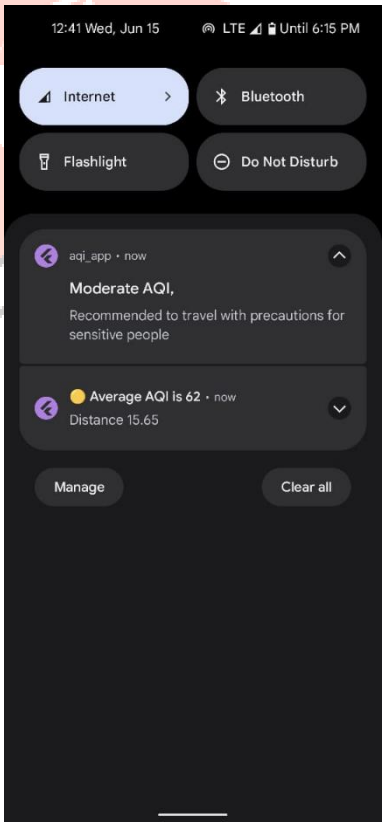

Fig.4.Notification Generate

V. RESULT AND ANALYSIS

Air pollutant is measured by using a scale called as Air Quality Index. Various approaches have been done to analyze the Air Quality Index value. The fate of the Air auto regressive model is fitted to know the future values. By knowing which pollutant contributes more that specific pollutant can be reduced from usage. By knowing the highest polluted city that city can take measures to avoid the air pollution in future. Air pollution is the severe problem faced in our country. This air pollution is measured by using a scale called as Air Quality Index. The fate of the Air Quality is also analyzed by suitable statistical techniques. An auto regressive model is fitted to know the future values.

After analysis of the system, future enhancements that can be made were found:

1) Completed placing markers and poly lines on Google maps widget.
2) Calculated distance and average AQI of the path.
3) Enabled alert through notification.

By knowing which pollutant contributes more that specific pollutant can be reduced from usage. By knowing the highest polluted city can take measures to avoid the air pollution in future. Be a part of the solution and not in the pollution. This can also be enhanced in the future by improving the UI of the application. It rather suggests multiple routes than two.

VI. CONCLUSIONS

In this paper, we briefly explained the motivation of the work at first. Then Air pollutant is measured by using a scale called as Air Quality Index. Various approaches have been done to analyze the Air Quality Index value. The fate of the Air auto regressive model is fitted to know the future values. By knowing which pollutant contributes more that specific pollutant can be reduced from usage. By knowing the highest polluted city that city can take measures to avoid the air pollution in future. Air pollution is the severe problem faced in our country. This air pollution is measured by using a scale called as Air Quality Index. The fate of the Air Quality is also analyzed by suitable statistical techniques. An auto regressive model is fitted to know the future values. By knowing which pollutant contributes more that specific pollutant can be reduced from usage. By knowing the highest polluted city can take measures to avoid the air pollution in future. Be a part of the solution and not in the pollution.

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