

Implementation of Route Suggestion System over Natural Language Processing

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Abstract - Along with traffic and road conditions, climate and weather forecast are also very important factors which need to be taken under consideration by tourists before planning their short travel or long trips and tours since no one likes to get caught in heavy rain while travelling. There are lot of cases of road mishaps caused due to bad weather conditions. Here in this project we want to propose an automated system which can help people suggest best possible routes after comparing all possible routes from the starting point to destination on the basis of the weather forecast along the routes, traffic and road condition. A new source or location can be added to the project and learning can be gained from travelers' experiences. This system will help travelers find the best route to their destination by collecting feedback from their visitors. It will then provide them with suggestions on the best routes and destinations. The system is very user friendly and will allow the users to make their own decisions regarding the travel experience so that there won't be any interruption while driving. The solely purpose of the proposed system is to provide the perfect information to the user for his/her journey and make user's journey safer. The system will be highly accurate so that system will have a good experience over using it

Key Words: Navigation System, Weather Forecast, Natural Language Processing (NLP), Traffic, Route Suggestion etc...

1. INTRODUCTION

Today, people are very conscious of their time and money when it comes to travelling. They want to avoid spending their precious time and money on a long route.

The planning process for a trip is complex and involves various factors such as the quality of the destination, the cost of the trip, and the number of people travelling. Due to the rise of Internet and ICT technologies, the tourism industry has started to rely on these tools to improve its operations. A decision support system known as a recommendation system (RS) helps tourists and tour operators make informed decisions regarding the various attractions and events they can visit. Prior to the implementation of this

technology, the most common method of providing recommendations was based on estimates. Unfortunately, there are many factors that prevent a decision support system from being able to provide effective and accurate recommendations. These include the lack of scalability, reliability, and personalization theories.

Numerous Studies have shown that severe weather conditions can significantly affect a person's driving speed. This is because worsening pavement conditions can lead to reduced visibility and vehicle movement. It is also possible that the weather conditions can cause drivers to change their routes. Unfortunately, as of today, this information is not included in the travel time predictions of private drivers. Climate and Weather has a significant influence on navigation processes. Nowadays Human Machine Interfaces (HMIs) are commonly used in navigation systems. These systems can be useful in calculating the optimal route for vehicles on the road. In addition, they can also take into account weather forecasts., It will be highly beneficial for the travelers to get the prior information of the weather forecast of the place they are heading towards. The motivation behind this idea is come from google map which is a web-based as well mobile app for navigation system developed by Google. This project comes under the segment of user safety from natural events and Tech, where the goal is to make the travel journeys of user safer and secure using the latest technologies with the higher accuracy, dependability and flexibility.

The rest of this paper follows the following format. In section 2, we discuss literature work on existing systems in the domain of route suggestion and navigation. Limitations and drawbacks of the existing systems are discussed in section 3. The implementation methodology and underlying components of the proposed system are described in Section 4. Finally, In Section 5 we conclude the paper.

2. LITERATURE REVIEW

[1] In Today's digital era Navigation apps are commonly used on smartphones to provide turn-by-turn directions. When we think of navigation apps, we usually think of Google Maps. There are a variety of apps that can help users navigate through various locations.

Google Maps is a popular navigation app that has been around for a couple of years. It has various features that are designed to help users navigate through various locations. It has live traffic updates, turn-by-turn directions, and information about public transportation schedules [1]. Users can also download maps offline and use Google Street View to have a closer look at their surroundings.

Backcountry Navigator is a great app for hikers [1] that provides offline topographical maps. It's also useful for those areas that don't have data services. There are a variety of fun features that allow users to add their own markers and favorite spots.

[3] The goal of this paper is to develop a decision tree-based method that will help solve the problem of identifying the ideal destination for visitors. It was done through a combination of data sets that were collected from various tourism sources. The method was then used to improve the system's accuracy and reduce the complexity. The decision guidelines were derived from the decision-making bodies that made the decisions regarding the destination. The results of the tests revealed that the proposed decision tree is feasible. It can be used to identify the ideal city for visitors based on their specific requirements. In addition, the author proposes that various kinds of classifiers can be used to improve the accuracy of the data sets. This paper also focuses on developing web applications that will be able to provide users with interactive and adaptive user experiences.

The increasing complexity of today's technological environment has led to the development of Voice-based Navigation Systems. These systems can bridge the gap between machine and human.[4] Author Pooja, Naditha, Eshan, Samantha proposes a user-centric navigation system called Direct Me, which will generate the user preferred route through the use of various audio streams. It will then process the route in the Map using the Google Map API. Through the use of NLP and AI, the author will be able to provide a personalized

navigation experience. This system aims to provide a machine-understandable translation of natural language directions into a machine-readable format. It will help develop a voice-based navigation system.

[4] The concept of Direct Me is that the four main components are interrelated. They have the ability to create a dynamic and interactive system. The automatic speech recognition module takes the user input and identifies the voice commands that are used in natural language. These inputs are then used to implement the Natural Language Processing component of the system. The extracted navigational information is then used to map the route through the interactive user interface.

[5] The author aims to analyze the various factors that influence the decisions that drivers make regarding their routes and how they are communicated to the users. According to the author, severe weather can have a negative effect on driving speed. Aside from reducing visibility, other factors such as weather conditions can also affect the driving speed. It is generally believed that information about severe weather conditions should be included in the calculations of the fastest route. However, as of today, this information is not being widely used by private drivers. The author aims to find out why this lack of acceptance is so.

The author also discussed the importance of communicating the weather forecasts in a way that is understandable to the users.

This qualitative study presented by the author shows that most drivers support the use of weather forecasts in navigation systems, but it should not be paternalistic towards their decisions. Despite the lack of scientific evidence supporting the accuracy of weather forecasts, most drivers still support the use of these in navigation systems. However, they should still be able to trust the data provided by the weather service. This is why it is important that the users can easily choose the most reliable weather data service.

The use of navigation systems is very essential for every person, as it allows them to keep track of their current location and find useful information about a place.[6] In this review, the author talks about the various web-based applications that are used by the users in Mumbai for travelling by various modes of transportation such as the Metro, Bus, Train, and taxi. There are various pros and cons of these applications

as each and every one of them tries to solve a specific problem. Therefore, a single application is required to make travelling easier.

[7] The increasing use of advanced driver-assistance systems (ADAS) has the potential to improve safety and comfort on the road.[7] author Patrick Planning reviews the existing empirical work on these innovations and presents the potential acceptance constructs. He conducted a survey instrument to collect data from a sample of 400 participants. The results of the survey revealed that the safety and comfort benefits of ADAS were the most decisive factors in the acceptance of this technology [7]. However, the desire to exert control over its use was also strong.[7] The Advanced Driver-Assistance Systems (ADAS) technology defines the various factors that influence the acceptance of new technologies in the transport sector. This paper aims to identify these factors and develop a framework for the development of driver-assistance systems.

3. LIMITATION OF EXISTING SYSTEM

Acceptance of the technology is a prerequisite to economic success of an information system, but not a guarantee. This study suggests that most drivers view navigation systems that include weather forecasts favorably. But these systems should not be paternalistic, and the user should have the final say in changing the route if they wish. In previous studies, it was discussed how information systems in vehicles should communicate with drivers. When it comes to technology acceptance, "technology paternalism" is an essential factor. Technology paternalism refers to the belief of software developers that their software knows what's best for its users. Due to this, they tend to design communication with users in a mandatory manner. However, this is not very well received by users, and is one reason why advanced driver assistant systems.

In the existing system There are many features available, including one of the features that lets the user navigate to the specified location. Currently, navigation systems require users to mention the source point and destination point of the journey as user inputs, and then the system provides all routes between those two locations. In either case, if the user cannot specify a precise destination, he will be unable to use the app to its full extent. In spite of the fact that the user cannot pinpoint the exact location, there is a

chance that he knows the route to that destination (e.g. The place where someone live). Therefore, if a navigation application could plan the route as the user describes where he would like to go, it would remove the previous limitation of existing apps. Presently, Navigation Systems don't provide dynamic route mapping on top of the user's very own customized route, which is given to the system by voice instructions. Additionally, current navigation systems do not provide real-time weather data along with navigation routes and the current condition of a route.

4. PROPOSED METHODOLOGY

The proposed system consists of the four main components. The four components of this system depend on each other. In brief first system will takes the user input in the form of source and destination and with the help of source and destination will fetch best route via API then we will use weather forecast component and traffic layer data component in order to fetch weather and traffic information of that particular route and if user doesn't provide the destination then in that case system will follow the location of the user device and with the help of all these data system will generate the response in the form of text and further system will convert that response to voice message by using natural language processing (NLP) component. Later the voice message will be conveyed to the user along with the text.

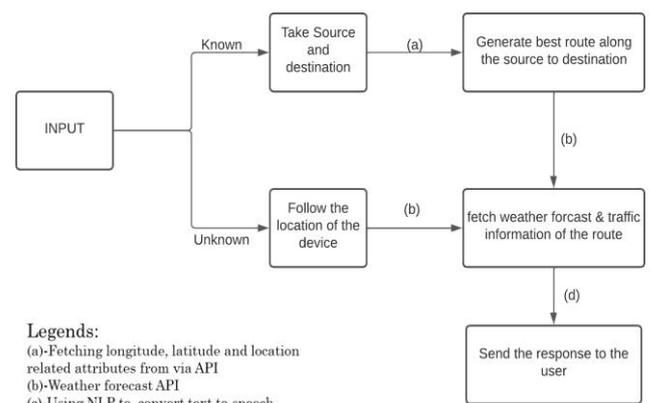


Fig -1: System Architecture

4.1 Application Programming Interface for Map and Routing

In order for map API prepared routing information as part of map API input from the route processing middleware used in the development of systems needs

to be able to provide accurate and precise navigation information. This process involves taking out the navigational commands from the JSON response and sending them to the appropriate API. The mapping API responds to the route processing commands by implementing various methods to provide the most accurate and relevant navigation information. These include calculating the distance between the user's location and the map's points. Here the system will use distance matrix API to get the route.

The Distance Matrix API provides a service that displays travel distance and time for a given pair of destinations and start and end points. It uses the Google Maps API to calculate the route between the start and end points.

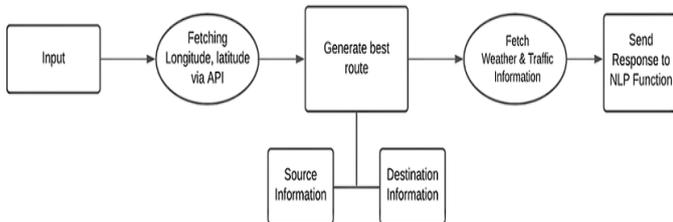


Fig -2: Brief overview of the data flow in the system

Fig.2 shows the system will accept the source and the destination as an input from the user then the system will extract the route between source and destination via Distance Matrix API. Distance Matrix Service uses the Distance Matrix Service object to fetch the distances between a set of locations. then as Fig.3 shows system will call the weather API and Traffic data layer in order to incorporate the weather and traffic data of the route.

If the given direction has not been mentioned, the system will not be able to find the exact path that the user wants to travel. Instead, it will use the user's location to determine the route that it should take.

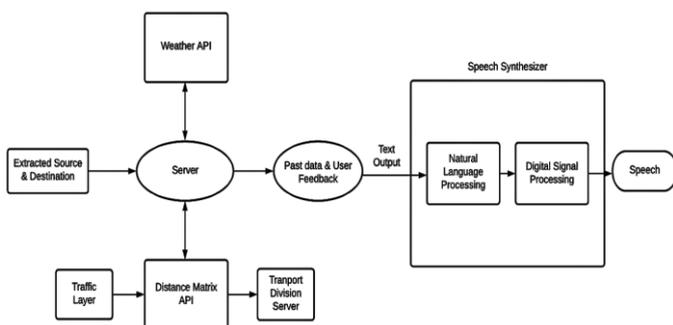


Fig -3: Proposed Methodology

Now the system has the best route among all the routes and the weather and traffic data associated with that route by using all these data systems will generate the response in the form of text, after that system has completed its task, it will call the text-to-speech service. This process is used to convert words into audio form. It utilizes natural language processing to understand the language used by the user. It then performs various calculations to convert the text into a speech format.

This system will also accept the feedback from the users so that the system can also be trained based on textual feedback comments on a route from travelers. If a difficult route is known, then its comments can be stored in a document which relates to the difficult journey.

5. CONCLUSION

The study revealed that most drivers are positive about the use of navigation systems that provide weather forecasts. They also believe that these systems can help them avoid certain types of accidents. In this project, we will be trying to create and implement the service like google maps with an additional integration of weather forecast along the routing with Natural Language Processing. The data collected by the system is being processed and transformed into an annotated text using the various functions in the NLP module. This system will also accept the feedback from the users so that the system can also be trained to recognize and interpret the comments made by other travelers on the route they are travelling. This feature can then be used to create a document that describes the route's difficult journey. The system will be helpful for the travelers and trip organizer's as well to plan their tourist will be a mobile app which will make it very handy and there will be no any kind of cost issues.

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REFERENCES

- [1] Joe Hindy, "10 best GPS app and navigation app options for Android", Android Authority. Updated February 27, 2022[Blog]. Available:<https://www.androidauthority.com/best-gps-app-and-navigation-app-for-android-357870/>

- [2] Danielle Abril, "Google Maps wants to help users avoid getting stuck in the rain", Fortune. Updated March 30,2021[Blog].
Available:<https://fortune.com/2021/03/30/google-maps-weather-ibm-conditions-forecast/>
- [3] Nikhitha Pulmamidi, Rajanikanth Aluvalu, Uma Maheswari V, "Intelligent Travel Route Suggestion System Based on Pattern of Travel And Difficulties", ICMLSC, February 2021.
- [4] Pooja Withanage Tharaka L, Naditha D, Eshan Dias, Samantha Thelijjagoda., "Road Navigation System Using Automatic Speech Recognition And Natural Language Processing (NLP)", IEEE, December 2018.
- [5] Michael Klafft, "Including weather forecasts in routing decisions of navigation systems for road vehicles: the users' view", IEEE, October 2017.
- [6] Prof. Suvarna Pansambal, Nikhil Iyer, Vira Meherkar Pankaj Sharma, "Literature Review: Navigation Systems for Fastest Route", IJARCCCE, March 2016.
- [7] P. Planning. Innovation acceptance: "the case of advanced driver assistance systems" Wiesbaden: Springer Gabler, 2014.