Tourist Guide for Mumbai City Using K-Nearest Neighbor (KNN) Algorithm

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ABSTRACT

Mumbai City presents a unique experience that is unmatched to any other destination. Mumbai is the city of aspirations, power, wealth, glamour and nightlife along with stretches of shimmering beaches, caves, magnificent architecture, religious sites and a mouth-watering cuisine. With all this exciting and varied recreational opportunities Mumbai tourism offers a wholesome holiday experience. Various information about tourism developments, supporting facilities, tourism objects, visitor information about the locals is important information to know. However, many unknown places are worth a visit but people do not know about their existence, because of the lack of public information. The purpose of this paper is to design an application on an Android Smartphone for Tourist Guide for Mumbai. In this research K-Nearest Neighbor (KNN) is used to provide the nearby locations. A model is trained using the publicly available dataset (latitudes and longitudes) to query the traveler's spot using GPS and acquire its location.

Keyword : - *Tourism, GPS, KNN, Tourist-spot, Recommendation system.*

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1. INTRODUCTION

In recent years, the tourism industry has grown tremendously and Information Technology has also been developed for travel and tourism sectors[1]. Tourism offers a variety of benefits, including economic benefits, provides a large number of job opportunities, and much more. Tourism of Mumbai attracts almost 6 million tourists per year, making it the 30th-most visited location worldwide[2].According to United Nations, as of 2018, Mumbai was the second most populous city in India after Delhi and the seventh most populous city in the world with a population of 19.98 million[3]. Worldwide, travel and tourism directly contributed approximately 2.9 trillion U.S. dollars to GDP in 2019. India was placed 22nd in the world in terms of international tourist arrivals into the country. 79% of the foreign tourists / visitors to the state of Maharashtra visited Mumbai[4]. This paper focuses on the Android Application which maintains a centralized repository of all related information. The system allows one to easily access the relevant information such as Accommodations, restaurants, nearby attractions and make necessary travel arrangements. Users can decide about places they want to visit in Mumbai and plan accordingly for travel and accommodation. In this system, K-Nearest Neighbor (KNN) is used to provide the nearby locations. The working principle of KNN is finding the closest distance between the data to be evaluated with its closest neighbors in the training data.

2. PROBLEM STATEMENT

In the past, people obtained suggestions for their personal tourism from their friends or travel agencies. Such traditional sources are user-friendly; however, they have serious limitations. First, the suggestions from friends are

limited to those place they have visited before. It is difficult for the user to gain information from less traveled members of the community. Second, the information from travel agencies is sometime biased since agents tend to recommend businesses they are associated with. Even worse, when users plan their travel by themselves, they often find. Their knowledge is too limited to produce a satisfying travel experience. The prevalence of the Internet provides the possibility for users to learn to plan their tourism by themselves. There has been an increasing amount of visual and text information which the user can explore from various websites. However, Internet information is too overwhelming and the users have to spend a long time finding those that they are interested in. Users desire more efficient ways to find tourism recommendations such KNN Algorithm which can save time and efforts.

3. LITERATURE SURVEY

In 2014, Konstantine Abuladze, Sergo Tsiramua, Giorgi Tsiramua has published a "Georgia In International Trade Tourism Services" that describes that the application is the current pioneering information-communicative system to publicize the country's touristic resources and potentials in the world. The paper gives a virtual touring effect through the application[5].

In 2016, Logesh Ravi et-al has published "A Collaborative Location Based Travel Recommendation System Through Enhanced Rating Prediction for the Group of Users". In this, He proposed an ideology to suggest a location-based travel Recommendation system using various recommendation algorithms, system functionalities, various interfaces, filtering, and AI techniques. They proposed a location recommendation based on a social pertinent trust walker (SPTW) and compared it with the existing random walk model [6].

In 2017, K. B. Kang, J. W. Jwa, and D. E. Park has published "Smart audio tour guide system using TTS" that describes the Global Positioning System (GPS) mobile phone provides a locationbased travel guide application for indoor or Outdoor environments [7].

In 2018, P. K. Jithin, M. Vishnuram, P. Prasath, and J. T. Thirukrishna has published "Tourism Guide for Tamilnadu (Android Application)". In this, He mentioned that the Tourism Tamil Nadu E-Guide proposes a Mobile tour guide system architecture capable of providing tourism information to mobile users easily developed using Java as the Front end and SQL as the back end [8].

4. CHALLENGES

4.1 Network Connection Issue :

In remote areas, Network Connectivity is a big problem for any android application. But, In Future this issue can overcome where Wi-Fi enabled smart streets will meet.

4.2 Crashing Avoidance :

This application doesn't crash while multiple simultaneous users and multiple downloads[9].

5. ALGORITHM

5.1 KNN Algorithm :

K-Nearest Neighbors Algorithm (KNN) is a non-parametric method used for classification and regression[10]. In both cases, the input consists of the k closest training examples in the feature space. In k-NN classification, the output is a class membership. An object is classified by a majority vote of its neighbors, with the object being assigned to the class most common among its k nearest neighbors (k is a positive integer, typically small). If k = 1, then the object is simply assigned to the class of that single nearest neighbour[11].

KNN algorithm is used to find the nearest attraction and location in this project. In this project dataset is very important; we are storing many locations in that dataset along with distance. Then we will find nearest locations by calculating distance between current place and all locations stored in dataset.

5.2 Distance Calculation Formula :

It is used to find distance between two places.

We can compute the distance between two scenarios using some distance function, where are scenarios composed of features.

Euclidean Distance Measuring :

$$Distance = \sqrt{\sum_{i=1}^{n}(q_j - p_i)^2}$$

6. WORKING STEPS

Step 1   : Load the Data
Step 2   : Obtain the Current Location

Step 3   : Obtain latitude longitude of all tourist spots
Step 4   : Consider latitude and longitude of all tourist spots as the training set (i.e. input parameter of KNN
                Algorithm)
Step 5   : Apply the KNN Algorithm
Step 6   : Compute distances and sort in ascending order
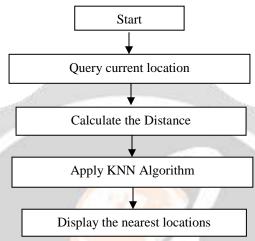Step 7   : Find K-nearest location
Step 8   : Stop

Fig -1: Architecture Diagram

7. FUTURE WORKS
7.1 Language Translator :
Language Translator feature is help tourists be independent on their trip to a new location. This feature prevents Misguidance, overcharges by tour guide.
7.2 Help Features :
Implement Help Features such as dials to an emergency numbers will be useful in uncertain circumstances. It will helpful for aged pilgrims, novice travellers, etc.
7.3 Booking Features :
Currently, our systems only recommends nearby places, hotels, tourist attraction, transportaiion, etc. But, In Future, It can be further extended to provide Hotel Booking and Bus/Rail/Plane Booking System.

8. ADVANTAGES
- Recommends places as per tourists need.
- Getting up-to-date information around the tourist independently on the tourist location.
- It is not needed to keep a big database with information about attractions in the tourist mobile device.
- Easy efficient technology with user friendly access.

9. DISADVANTAGES
- It required a device(smartphone) which should have installed android operating system.
- Internet, Global Positioning System(GPS) and cellular data required continuously.
- It cannot be run on personal computers without any virtual device.

10. CONCLUSIONS
The application of the tour guide as a result of this research works to facilitate tourists in Mumbai. In this application, The recommendation will be to use the K-Nearest Neighbor (KNN) algorithm to determine the closest place. Many times, we miss a place because of the misguidance of maps or unaware of the details about the place (such as timings and holidays). Meeting these basic requirements, the app combines various features using Maps API and KNN. Thus, it will prove to be efficient and be a turning point in the future and will have an impact on the tourism industry. It has major benefits such as including GPS feature, offers all kinds of services a tourist can avail on a trip. The app provides real-time information to the users to make a better decision and also it requires less

human intervention. In future, It is used as a smart emergency help application due to algorithm used. The algorithm used has capacity to notify the emergency to user's nearby contact, instead of notifying to every or specifically selected contacts.

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