

# Tourist Attractions Locating System in Colombo

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## Abstract:

The tourism business is one of the most important contributors to the global economy. It is also one of the best sources of revenue in Sri Lanka. It earns a lot of money both directly and indirectly through contributing to the government budget, the job market, and foreign exchange revenues. Domestic passengers, like foreign visitors, contribute significantly to the Sri Lankan economy. As a result, the tourism business is popular in Sri Lanka, and this research attempts to improve visitors' trip experiences. Because of the absence of capabilities in current apps, travellers tend to get solutions to unanswered queries manually from forums and social media in today's travel communities. This paper addresses the creation of the "Colombo.lk" to bridge the gap between present apps and user needs. The mobile application primarily focuses on the following features: recommending the finest destinations to travellers from the location they are currently in. Showing ratings placed by travellers about travel destinations to determine the likelihood that they will visit that location, smart travel plan within the desired travel period, shortest and scenic path options, automatic review categorizing and rating system, place tagging and place feature extraction system As a result of the study project, this user-friendly smartphone application will provide a better user experience when traveling and will aid in the development of Sri Lanka's tourism culture.

*Keywords* —tourism, mobile application, economy, location.

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## I. INTRODUCTION

The tourist industry now plays an important part in the global economy. The 'tourism industry' is a collection of activities associated to short-term travels away from permanent residency. Transportation, travel firms, attractions, hotels, and other enterprises are among those involved in these activities. As a result, many emerging countries are driven by this source of money. In 2021, the entire contribution of travel and tourism to global GDP will be around 5.81 trillion US dollars [1]. In comparison, the travel industry's GDP is greater than the GDP of oil exports in 2021 [2]. That demonstrates the significance of the travel industry to the global economy. Sri Lanka is a developing country, and tourism is one of the best sources of income in the country. It generates significant revenue both directly and indirectly by contributing to the government budget, job market, and foreign exchange earnings [3]. Domestic passengers, like foreign visitors, contribute significantly to the Sri Lankan economy. As a result, the tourism business is popular in Sri Lanka, and this research attempts to improve visitors' trip experiences. Travel period, travel distance, transportation, ability to travel with family/babies or elderly, and travel expense are all factors to consider during the tour planning process. Many programs, such as Google Maps [4], Trip Advisor[5], and Booking.com[6] are available to fulfill some of the features stated above. However, there are a number of well-known

unresolved user issues among tourists. Current programs employ the quickest paths to connect places throughout the trip planning process, but the objective of 'traveling' is to see new things and have new experiences. What we strive to do in our app is provide the traveller with the ability to observe some areas that most people visit after visiting a specific place. This is quite useful for travellers because, like using reviews, they cannot decide whether they should go to a certain place next. This is because, for example, two locations with the same ratings may be located within the same distance. So, how could a traveller determine which one to visit in such a situation? In our solution, we rate the traveller's likelihood of visiting that location. As a result, he or she may quickly determine the best area to visit next from where they are. Another thing to keep in mind is that the shortest path is not always the best option. From the standpoint of the passenger, another approach that contains more scenic spots than the shortest path is a waste. Most apps feature a linear planning procedure when it comes to trip planning. The program then calculates the shortest pathways from the start place to the final location, which is a common procedure. However, present applications are unable to partition the entire journey into the necessary travel period (Total trip into three days). Travelers nowadays are more aware of what they are doing than in the past. Previous tourists' user reviews are prominent sources of information about a location. As a result, travellers base their judgments on user reviews and ratings of the

location. Current applications collect this data as user input. There is also diversity in the travel community. Everyone's needs are not the same. Some tourists go alone, while others travel in pairs. Similarly, there are many diverse types of travellers, such as family travellers, those traveling with a baby, and those traveling with impairments. There are also many personalities, such as introverts and extroverts. All of these groupings are not the same, and their options differ. An introvert prefers to visit less busy and relaxing locations, whereas an extrovert prefers to visit popular and packed locations. There is no feature in accessible services to identify and filter places using the above place attributes. This "Colombo.lk" research project is focused on discovering answers to the aforementioned travel difficulties. A complete travel planning and guide application will be accessible at the end of the project.

## II. RELATED WORKS

There has been presented a lot of research about recommending destinations for tourists. Those research were conducted as surveys, data mining approaches, etc. They used social media information to identify user needs in a variety of ways, including GPS trajectories, check-in data, and photos. The following shows some of the research work and products built by former researchers on the same idea but with different perspectives.

The main objective of this project is to design and implement a web/mobile application for helping tourists plan their journeys effectively. GuideMe has been designed to incorporate almost all the tourist attractions and services within a single application. The web application has been developed using technologies such as ASP.NET MVC4(C# Language) along with html5, css3, JQuery, Knockout and bootstrap libraries. One of the databases is a locally implemented one and the other is the Ideamart database. The local database is build using MSSQL that stores most of the user data. The remote database stores the updated list of available taxi drivers and tourist guides. The system is supposed to suggest the best service(s) located within the region. Categories include things to do or see, taste food, taxi or tour guide, health, meditation and shopping. A tourist is required register with a valid email address and log-in before registering his or her comments on a service provider. Taxi drivers and tourist guides can update their availability in the system. The taxi drivers and guides can access the ideamart application through the mobile telco application provided to them. The service providers may also be able to see the number of views, ratings, and comments through their own profiles. Telco applications are very useful, and they are very accessible to anyone with a mobile phone. Taxi drivers and tourist guides may currently be in rural areas where there is no 3G or 4G data access. Use of telco application increases the accuracy and accessibility of GuideMe. [7]

"Voyager" smart app generates a map route for the user for their available time limit. When the user inputs the place and

the time they can spend on the trip, the app shows nearby places taken from the firebase database. Users can choose between the shortest path or a scenic path while generating the route between places. Text mining is a technology used to determine people's opinions and sentiments using Natural Language Processing (N.L.P.). In this research, Sentiment Analysis uses to determine the positive, neutral, and negative manner of a review and calculate accurate star rating (numerical representation) for each text review. Lexicon based approach uses a set of words in a lexicon, and Each word corresponds to an intensity and polarity score of an emotion. The machine learning method needs model training to determine sentiment of a text. The raw dataset includes nearly 40000 text reviews and the respective rating score in the 1 – 5 range (one means lower and five means higher) from 150 places in Sri Lanka. The data is sent through the pre-processing procedure before being split into training and testing sets. After comparing results and identifying the best classifier, it is used to predict the accurate rating score for newly added texts. In this research, the text classification is used to identify place features such as Elder-Friendly, Family and Friends, Crowded, Calm, and Fun. Review texts are vectorized using TF-IDF vectorizer. After defining the respective measurement functions, vectorized text review set, and respective encoded tags set to train classifiers. Both sentiment analysis and text classification models were created to use in the mobile application. The selected classifiers are Logistic Regression, Linear Support Vector Classifier (LinearSVC), and S.G.D. D. If the user is in danger of running out of fuel while driving, the app alerts the user and directs him to fill up at the nearest station. In the event of an emergency, the proposed app will allow manage to quickly guide users to the necessary available emergency service with minimum clicks. The app continuously computes the distance travelled by the user. Users will be alerted to fill up at the nearest fuel station and update their fuel details.[9]

'JESSY': Intelligent Travel Assistance consists of four major components. These are a human-centered AI integrated conversational model, an information assistance of the travel places (a virtual tour guide), a feedback and social media data analysis for reliable tourist guide recommendation, and a leisure time planner with a recommendation suggestion system. The system uses thousands of images of the places that have been taken from various mobile phone cameras and numerous angles. TensorFlow has been used as the machine learning library and the Keras was being used as an interface to the Tensorflow. 'JESSY' mobile application system analyses and anticipates the information gathered in the collection area. Based on the components produced by the researchers, the system can register new users based on the actual data provided by the users. The list of nearby places to travel will be suggested to the user according to the previous user reviews and the results from the predictive model. The API makes the necessary computations using NLP – Machine Learning and provides a hospitable environment for the

application. The database stores and contains the information that the user provided to the system, and the data that has been collected will be processed and will give results when necessary. The final product contains an android mobile application to increase usability and user-friendliness. The application has been designed with the intension of facilitating a chatbot which is a human centered companion for travellers who visit Sri Lanka. Simultaneously, the chatbot is designed to act upon any inquiry or command make by the traveller as a voice or a text command. The necessary data was gathered by using a questionnaire and as well as by interviewing relevant parties. The present application has been designed as an android mobile application by considering elements such as usability and user-friendliness. React library has been used since it is a free and open-source platform which is convenient to market. The database of the system is handled by the My SQL servers that are supported for the windows operating system. 'JESSY' mobile application system conducts and apprehends the data set from the gathered region. The system will analyse the previous feedbacks, linked social media account data, and will store in the database. In accordance, the system suggests nearby guides to the traveller according to their preferences and ratings order. Each activity that the users perform in the application will be counted as the details and information for the next level upgrades of the machine learning software of the application. Social media data will be handled using the Multiple Linear Regression Algorithm instead of others because it is the most suitable for predicting and forecasting against multiple factors. [10]

**III.METHODOLOGY**

The main objective of this project is to design and implement a web/mobile application for helping tourists to plan their journeys effectively. In this research we have mainly focused on the likelihood of tourist visiting a certain place from the place where he/she currently. Also, "Colombo.lk" has been designed to incorporate almost all the tourist attractions and services within a single application.

The following paragraphs will describe the exact methodologies used and get the desired output of the application.

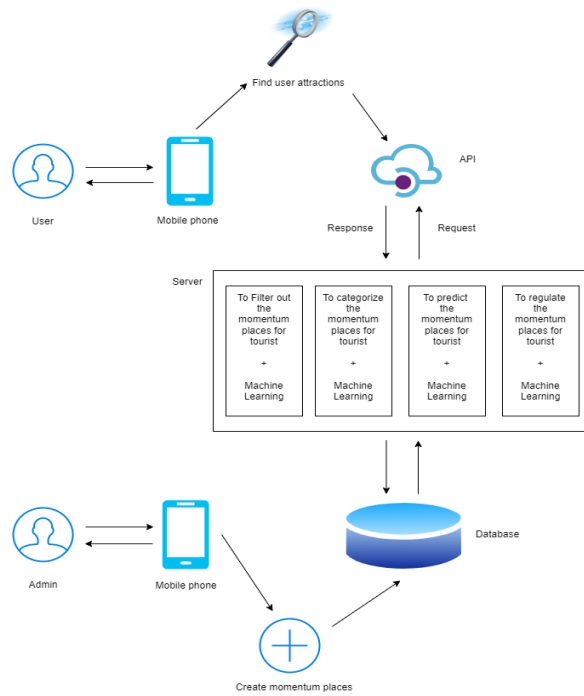


Fig. 1 Overall system diagram

**A. Data Collection**

As the first step of this research, it is needed to prepare a dataset. In order to prepare this, we have prepared a questioner in the form of a google form and then distributed across travel groups in Facebook. One thing to point out as we are doing this for the first time the initial location is taken as Colombo. So, we asked through the questioner from Colombo where would you chose to travel. The reason to choose Colombo as the starting point is almost everyone knows about it and even a foreign tourist when they first visited Sri Lanka it is where they come first. When giving the destinations we made sure to give them after categorizing them according to the types such as historical places, beaches, parks etc. We were able to receive about 230responces which is sufficient enough to build a working Machine learning model.

**B. Preparing Dataset**

One all the data is collected we added the longitude and latitude of the current location tourist is in and place he/she planned to visit. After adding that longitude and latitude parameters to each and every record we decided to do the further preparation. For this we used an API available freely called Foursquare. So Foursquare City Guide, commonly known as Foursquare, is a local search-and-discovery mobile app developed by Foursquare Labs Inc. The app provides

personalized recommendations of places to go near a user's current location based on users' previous browsing history and check-in history. Using Foursquare we were able to rate the places as per the likelihood that a tourist visits that place.

the top results app also provides that, so user can see less rated results also.

Place Name	Latitude	Longitude	Rating
Sri Lanka	6.881111	79.852222	4.5
Colombo	6.927222	79.858333	4.2
Deer Park	6.927222	79.858333	4.0
...	...	...	...

Fig. 1 Pre-processed dataset of model

**C. Preparing The model**

Once the dataset is fully prepared and ready to go, we prepped a python-based model using K-mean algorithm. So basically, what this model does is when a tourist asks from the app to recommend the best place to go next from the current place, they are in. What K mean algorithm does is it distributes the ratings and venues apart from the user. After that distribution a particular user only gets recommendations based on the cluster's recommendations. The ratings are sorted and showed based on the user.

```

Python 3.9.6 Shell
In [10]: import numpy as np
import pandas as pd
from sklearn.cluster import KMeans

# Load the dataset
df = pd.read_csv('colombo.lk_data.csv')

# Preprocess the data
df['lat'] = df['latitude']
df['lon'] = df['longitude']

# Apply K-Means clustering
kmeans = KMeans(n_clusters=5, random_state=0)
clusters = kmeans.fit_predict(df[['lat', 'lon']])

# Group by cluster and calculate mean rating
cluster_ratings = df.groupby('clusters')['rating'].mean()

```

Fig. 3 Python based model build of colombo.lk

**D. Mobile App**

Well, if we were able to build up all the models and all, that effort will be a waste if we couldn't give a proper UX (user experience). We have built a mobile app which can give that. The users (tourists) have to turn the GPS on their device. Once they turn on the GPS on their devices, the location they currently in will be taken as a city name. For example, if you are in somewhere in Colombo city, your current city is taken as Colombo and the app will provide it the model as an input. Once the model receives that request model shows the best results to the user based on the likelihood of visiting that place. In addition to this near each and every place recommendation there will be a rating displayed as a form of a number. If the user wants to see more destinations than the once suggested as

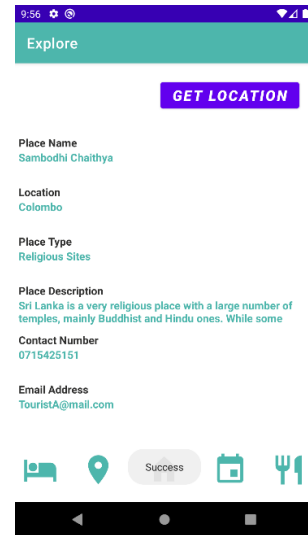


Fig.4 Colombo.lk mobile application

**IV. RESULTS AND DESCUTION**

The research was primarily focused on a collection of unsolved questions in the tourism domain that are missing in popular travel programs such as Google Maps and Trip Advisor. Answers to such questions are given as a collection of features of the developed application in the research introduction.

**A. Accuracy**

So as a conclusion our model was able to deliver the results with an accuracy of 75%. Things we need to keep mind is we mostly focused on the area Colombo. This is because as previously discussed Colombo is the city where most of the tourists, especially foreign tourist starts their travel and everyone who participated in our survey where and what Colombo is like.

The following graph shows the suggestion given by model about various cities about the minor tourist towns in Colombo.

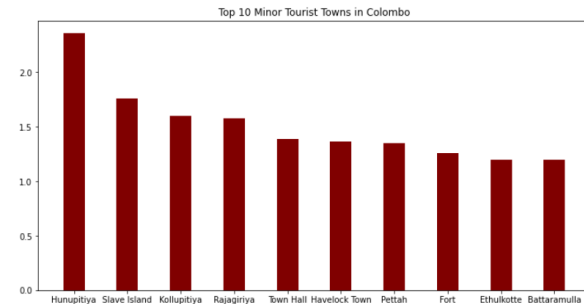


Fig. 5 Result from python base model

### **B. Future Work**

The existing system only capable of suggesting places without based on any place categories. As a future we have planned to improve the model as follows. When a user searcher the algorithm will suggest not only categories but also the category of the places where tourists will be most likely to go next.

### **V. CONCLUSIONS**

Tourist guide apps are growing increasingly popular as the number of tourists and options available to them grows. People today, especially tourists, lead very hectic lives and are expected to squeeze the most out of the limited time they have. As a result, people must efficiently arrange their daily activities in order to maximize both the money and time spent on activities.

As a result, prior planning before engaging in an activity such as going on vacation becomes critical. As a result, using ICT apps to arrange trips offers them with the greatest results they can get with little resources.

### **REFERENCES**

- [1] Published by Statista Research Department and 11, M. (2022) Travel and tourism: Share of global GDP 2021, Statista. Available at: <https://www.statista.com/statistics/1099933/travel-and-tourism-share-gdp/#:~:text=Overall%2C%20the%20total%20contribution%20of,trillion%20U.S.%20dollars%20in%202021>. (Accessed: October 25, 2022).
- [2] Team, T.I. (2022) What percentage of the global economy is the oil and gas drilling sector?, Investopedia. Investopedia. Available at: <https://www.investopedia.com/ask/answers/030915/what-percentage-global-economy-comprised-oil-gas-drilling-sector.asp> (Accessed: October 24, 2022).
- [3] International Trade Administration | Trade.gov. 2021. Sri Lanka - Travel and Tourism. [online] Available at: [Accessed 23 October 2022].
- [4] "Google Maps", Google.com, 2021. [Online]. Available: <https://www.google.com/maps>. [Accessed 21 October 2022].
- [5] "Trip Advisor", 2021. [Online]. Available: <https://www.tripadvisor.com>. [Accessed 22 October 2022].
- [6] "Booking.com: The largest selection of hotels, homes, and vacation rentals", Booking.com, 2021. [Online]. Available: <https://www.booking.com>. [Accessed 21 October 2022].
- [7] R. K. O. Kaushalya, J. M. G. R. Jayabahu, W. M. P. M. Weerasinghe, A. M. C. P. Herath, K. A. D. T. Kulawansa and M. F. M. Firdhous, "GuideMe: An innovative mobile application for guiding tourists," 2017 2nd International Conference on Computing and Communications Technologies (ICCCT), 2017, pp. 15-20, doi: 10.1109/ICCCT2.2017.7972245.
- [8] K. R. R. S. Thilakarathne, B. T. G. S. Kumara and B. Kuhaneswaran, "Analyzing Tourists' Perceptions of Tourism Destinations using YouTube Comments," 2021 International Conference on Data Analytics for Business and Industry (ICDABI), 2021, pp. 301-305, doi: 10.1109/ICDABI53623.2021.9655833.
- [9] W. A. K. D. Wijesinghe, A. G. L. D. P. Amarasinghe, T. M. U. A. Bandara, A. Ishara Gamage and D. Ganegoda, "VOYAGER – Smart Travel Guidance Cross Platform Mobile Application," 2021 3rd International Conference on Advancements in Computing (ICAC), 2021, pp. 163-168, doi: 10.1109/ICAC54203.2021.9671136.
- [10] K. K. D. N. Dilshan, U. M. D. M. Parussella, H. M. C. J. Herath, C. A. J. P. Chandranath, S. Thelijagoda and T. Jayalath, "JESSY: An Intelligence Travel Assistant," 2021 3rd International Conference on Advancements in Computing (ICAC), 2021, pp. 413-418, doi: 10.1109/ICAC54203.2021.9671229.