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UNIVERSITY OF MUMBAI

Academic Year 2019-2020

A Project Report on

Personalized itinerary recommendation system

Submitted in partial fulfillment of the degree of
Bachelor of Engineering(Sem-7)
in
Computer Engineering

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1.Project Conception and Initiation

1.1. Abstract

- The hassle of deciding on a travel destination is often overlooked by travel websites. Travellers, a lot of times, don’t have a clear idea of where they want to travel to.
- We aim on solving this problem by introducing a chat bot system that can recommend travel destinations based on minimal information from the traveller. Another interesting feature of the project is it’s itinerary generator.
- The system aims on providing a human-like user experience through the use of a chat bot interface. The interface interacts with the user to retrieve information about the user’s details like travel date, number of children and adults travelling and the budget of travelling.
- The user’s budget will be the main focus of this application as we want to give the end-user the best travel experience based on their particular budget. The recommender also takes other external factors such as the season, previous traveller experiences and weather into consideration. Incorporating these factors ensure that the most optimal destination is recommended to the user.
- As per the recommendation, the user can opt to get several itineraries to choose from. The itinerary generator also takes several external factors into consideration when generating an itinerary. The choice of itineraries vary in the choice of places and in activities according to budget and other external factors.

1.2. Objectives

1. To make the process of trip planning hassle free and cost-effective.
2. To make it convenient for the users to pick a travel destination and itinerary of their choice.
3. To curate a travel plan according to the user’s preferences, making the user’s budget the center of attention.
4. To ensure maximum accuracy through consideration of external factors.
5. To provide the best possible user experience.

1.3. Literature Review

- In the research paper *'Personalized Attraction Recommendation System' for Tourists Through Check-In Data*', the authors have focused on building a personalized recommendation system that outputs the most optimal travel destination as per the user's social network data. It is most helpful in resolving the 'cold-start' problem i.e. the RS does not have any information about a new user.
- The project paper on *'Crowd Prediction System for Tourists'* proposes a solution for dynamically obtaining the crowd density in a particular tourist hotspot. The paper provides solutions to obtain alternate routes and analyse the overall tourist behaviour using social media data which can help optimize the itinerary generator module.
- The project paper on *'Crowd Prediction System for Tourists'* proposes a solution for dynamically obtaining the crowd density in a particular tourist hotspot. This paper provides valuable insight into how we can incorporate the proposed solution into the recommendation system. The itinerary generator benefits the most from the solution proposed in this paper.

1.4. Problem Definition

To develop a user-friendly system that recommends a travel destination based on minimum user input and also generates a set of itinerary for the user to pick from.

1.5. Scope

- The system takes basic details from the user and utilizes the same along with stored external information to precisely recommend the most suitable destination in the country.
- The user interacts with the system through a chatbot
- The system also generates a set of itineraries for the user to choose from
- The system is confined to tourist hotspots in India

1.6. Technology stack

- Android Studio :
  - For development of chatbot system as an Android application.
- DialogFlow
  - For chatbot agent.
- Firebase
  - Backend for the android application
- TensorFlow
  - Development of recommendation model & itinerary generation model
- Jupyter Notebook
  - Mainly for portability of python code used in model generation

1.7. Benefits for environment & Society

- Instead of physically going to the travel agencies for the recommendation, the users can simply interact with the personalized itinerary recommendation system through a chat bot. Moreover, the travel agencies provide information to the users through brochures or pamphlets, resulting in a huge amount of paper wastage.

- Tourism is the fastest growing economic sector in terms of foreign exchange earnings and job creation. It has become one of the most important sources of employment. It also provides financial support for the conservation of the ecosystem and natural resources management making the destination more reliable and desirable to visitors.

- Easy interaction that the system provides to the user through a chat bot, it attracts more and more users to use this system thereby attracting them to different places. Certain users may even leave a full review of the places that they have visited which in turn benefits the other users. This helps to increase tourism and brings people into closer contact with nature and the environment.

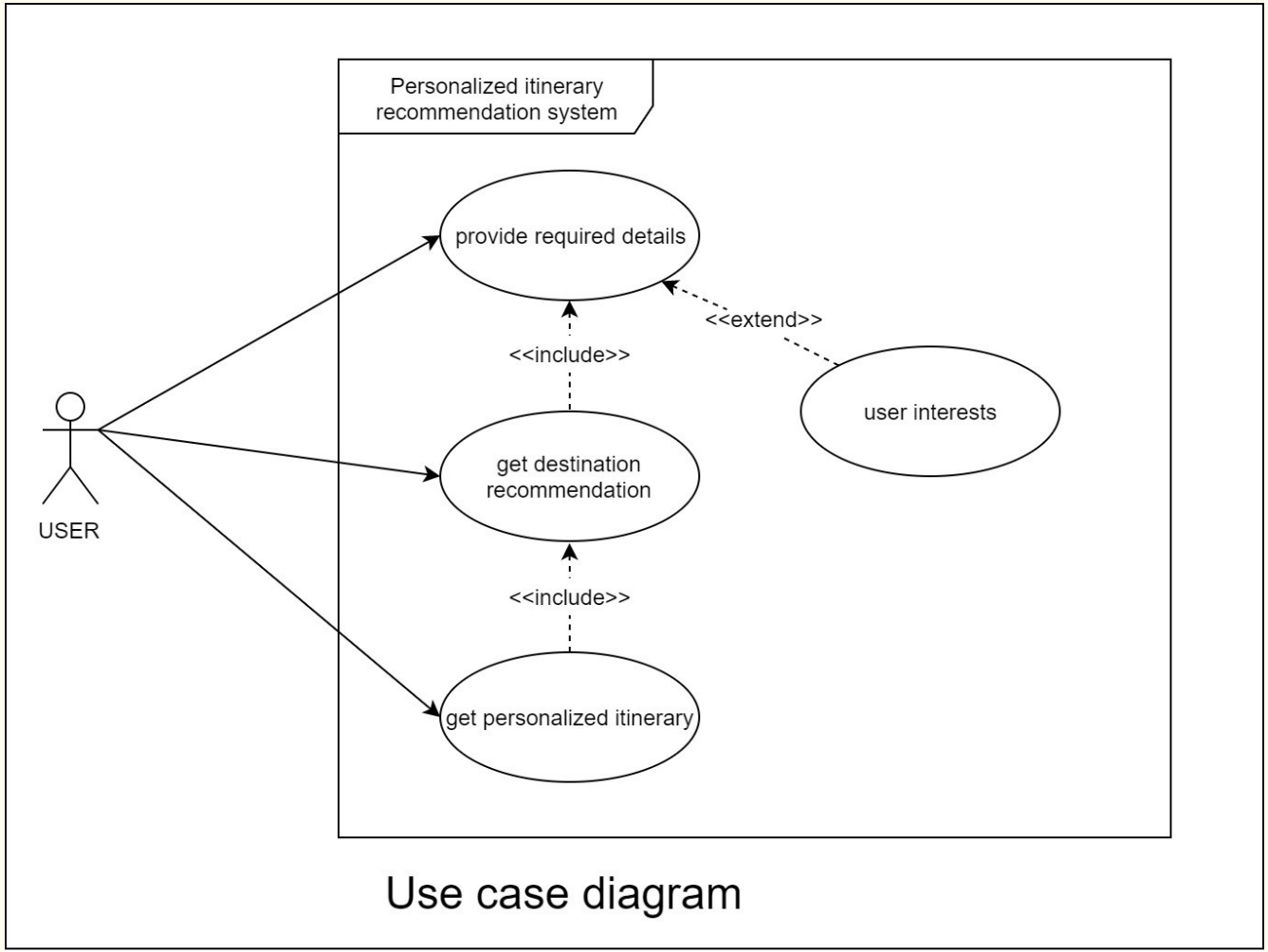
2. Project Design

2.1. Proposed System

- The main aim of our project is to make it extremely convenient for people to plan their vacations by integrating all aspects of choosing a travel destination and planning the itinerary inside one application. This means the hassle of searching multiple websites to choose a place of interest could be avoided.
- ‘Personalized Itinerary Recommendation System’ is the one-stop application that will recommend the user an array of travel destinations as well as personalized itineraries by considering various aspects such as season of travel, the budget of the user and so on.
- The unique thing that sets this recommendation system apart is its extremely user-friendly interface. The highlight of our application is the chatbot interface. Through the chatbot medium, the user can effectively interact with the chatbot, thereby gaining a human-like experience while communicating.
- With a little chatting, the user is presented with a cluster of suitable travel destinations as well as personalized itineraries right from adventure to relaxation.

2.2. Design(Flow Of Modules)

- The entire project can be broadly classified into four main modules: the dataset, chatbot interface, destination recommender, and itinerary generator.
- The flow of modules is such that the working of the current module depends on the successful completion of the previous module. For example, the chatbot interface cannot work if the dataset module is not under working conditions or if the data is not trained accurately.
- The first step in the basic flow of modules includes the collection of data from relevant sources. After the data has been retrieved, the data has to be trained to generate a recommendation model. Only when this phase is successfully completed, the chatbot interface module comes into the picture.
- The chatbot provides a human-like interface for the user to interact with. The chatbot will take certain inputs from the user in order to recommend a place. The application that we will use to train our chatbot will be 'DialogFlow'.
- After the chatbot is fully implemented, it can recommend a place and a personalized itinerary. While recommending a place, it will suggest a number of places of similar type. Not only that, the itinerary generator will generate a few itineraries of different types from which the user can choose according to his/her interest.

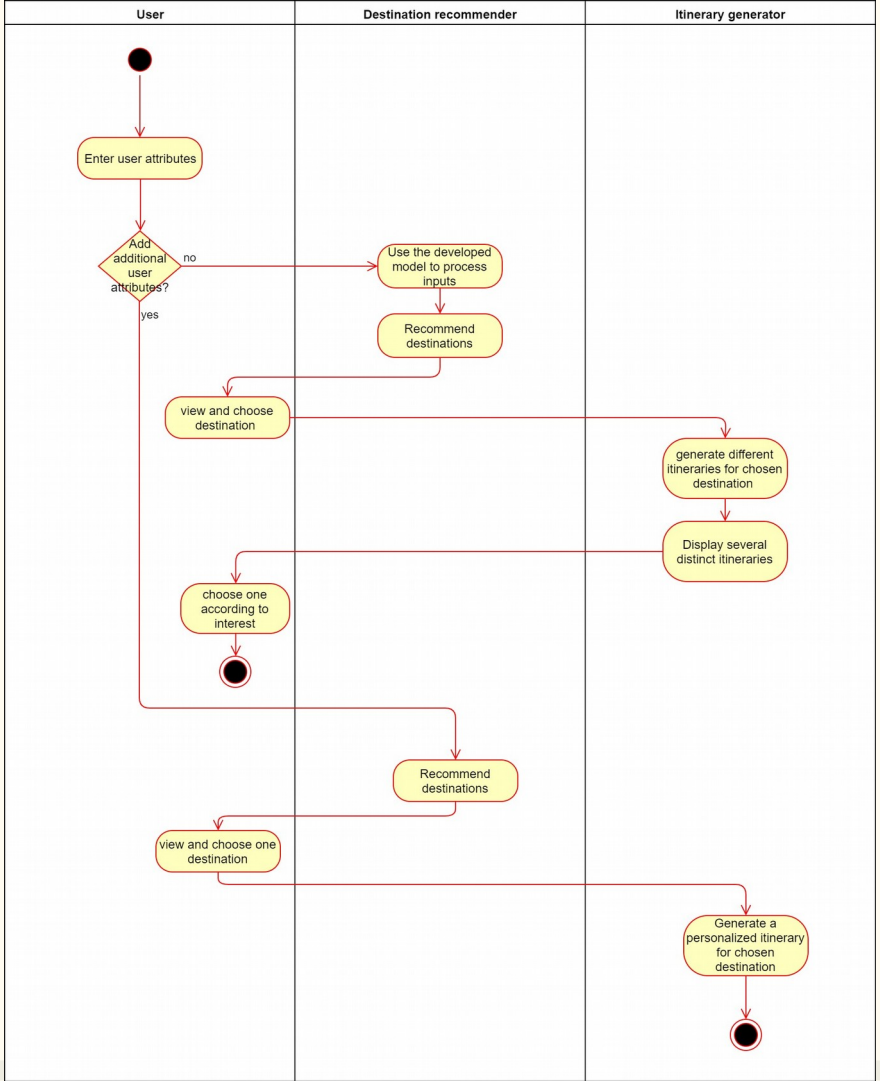


Use case diagram

2.3. Description Of Use Case

The above use case diagram shows the visual representation of the process that is required to get a travel recommendation. This use case diagram helps us to visualize the functional requirements of the system. In this diagram, the actor that is going to interact with the system is the tourist or the traveler looking for a place to travel to. Here, the user interacts with three use cases namely; get user attributes, get travel recommendation and get a personalised itinerary. The user has to enter the desired attributes like date of travel, number of adults and children, etc. in order to proceed. A number of travel destinations would be recommended on the basis of the input attributes. Hence, the include relationship is used for dependency. For each destination, three different itineraries would be provided according to different interests. Therefore, personalized itinerary is dependent on the destination. ‘Get user attributes’ has an extension of ‘user interests’ wherein the user can add its interests as well and only one personalized itinerary will be provided on the basis of that. This is completely optional. In this way, the core functionalities of the system are highlighted with the help of the use case diagram.

2.4. Activity diagram



2.5. Module-1 : The dataset

- The data is the most crucial aspect of the system since it acts as the fuel that powers the recommendation module and the itinerary generator module.
- The dataset has been prepared with data acquired manually from travel blogs, websites and other sources.
- The dataset for the recommendation system is in the form of .csv files.
- Attributes most relevant to recommendation of a destination are considered in the dataset.

Module-2 : Destination recommendation system

- This module deals with taking the user details and processing them against a trained model to generate a cluster of recommendations to the user.
- This module uses the trained dataset and recommends a cluster of places to the user according to the user’s interest.
- The input is taken from the user through the chatbot interface and the resulting recommendations are also provided through the same interface.
- Instead of recommending only one place, the recommendation system recommends a number of places of similar type from which the users can choose the place of their interest.

Module-3 : Itinerary generator

- The itinerary generator is the last phase of the application.
- After the user has been recommended a cluster of places, they could choose a destination of their choice from these places, after which a few personalized itineraries will be generated according to the choice of the user.
- By default, several itineraries, each focusing on a different genre of travel will be generated such as adventure, sightseeing, relaxation and so on.
- If the user wishes to enter the specific details, a fixed itinerary catering to that provided specific details will be generated, e.g. solo trip.

Module-4 : Chatbot UI

- The chatbot interface will act as an intermediate between the user and the system.
- The interface will be developed using DialogFlow platform.
- The user can interact with the chatbot in order to input the desired attributes.
- The interface is responsible for handling inputs to and outputs from the destination recommendation module as well as the itinerary generator module.

2.6. References

1. K. Kesorn, W. Juraphanthong and A. Salaiwarakul, "Personalized Attraction Recommendation System for Tourists Through Check-In Data," in IEEE Access, vol. 5, pp. 26703-26721, 2017.
2. X. Wu, Z. Huang, X. Peng, Y. Chen and Y. Liu, "Building a Spatially-Embedded Network of Tourism Hotspots From Geotagged Social Media Data," in IEEE Access, vol. 6, pp. 21945-21955, 2018.
3. Kartik Rajendra Kokane, Pratik Pradeep Jogdand and Rohit Dhuri, “Crowd Prediction System for Tourists”

3.Planning for next semester

Planning

- The next semester will be devoted to the development of itinerary generator module.
- This module will be integrate into the currently incomplete system to complete it.
- The development process will include:
  - Decoding the problem of itinerary generation
  - Data collection
  - Creation of a model to generate itinerary
  - Testing the module
  - Integration of this module into the system
  - Testing the system as a whole

Thank You