Sri Lanka Institute of Information Technology

“GOexp”

Landmark Recognition and Retrieval System

Project ID - 18-107

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Software Requirements Specification - CDAP-I

B.Sc. Special (Honors) Degree in Information Technology

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Declaration

I declare this Software Requirement Specification report entitled "Landmark Recognition and Retrieval System" submitted to the Sri Lanka Institute of Information Technology is not a copy of a document done by any organization, university or any other institute or a previous student project group at Sri Lanka Institute of Information Technology and it is a record of original work done by me under the guidance of Mr. Yashas Mallawarachchi (Supervisor). The diagrams, research results and all other documented components were developed by me and I have put the references that I have used.

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Herath P.H.R.S

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1. Introduction

1.1 purpose

The purpose of this SRS document is to outline the requirements and present a detailed description of the process needed for user profiling**.** The document contains the necessary requirements of the component. It will explain the functional and non-functional requirements, purpose and features of the component, design constraints, project approach, what the component will do, the constraints under which it must operate and how the component will interact with other external applications. The information is organized in such a way that the developers will not only understand the boundaries within which they need to work, but also what functionality needs to be developed and in what order. This document is intended to be proposed to a customer for approval and also this document is targeting the, designers, developers and other stakeholders as its audience.

1.2 Scope

The component to be produced is called "Predict user preferences by profiling". User profiling is used to profile the users. Here, we use Twitter as the social media platform to obtain user data. It will identify the preferences of the users by analyzing hash-tags and tweets. The thematic content will reflect users' interests and is then prominent in analyzing user preferences. We are considering two preference factors of the user. That is Food and Accommodation. We use Python library called "Twython" [1] to connect to the Twitter's Stream API and collect these required data of the users. The system will identify those preferences of the user and will give suggestions to the user about nearest restaurants, hotels or cafes which serve his/her preferred cuisine and also it will provide details about nearby preferred accommodations. Those preferred things will come first in the results. We use a "kaggle" dataset [2] about world restaurants to get details about restaurants. Furthermore, we use Naïve Bayes algorithm and the Logistic Regression algorithm for the classification of data.

1.3 Definitions, Acronyms, and Abbreviations

Term	Definition
SRS	Software Requirement Specification.
API	Application Programming Interface
UI	User Interface
BaaS	Back-end as a Service
RESTful	Representational State Transfer
SDK	Natural Language Tool Kit
	.

Table 1: Definitions and Abbreviations

1.4 overview

The remainder of this SRS document includes three sections and appendixes. The second section provides an overall view of the component functionality and interaction with other components. This section also discusses the specific requirements such as functional and nonfunctional requirements, design constraints and various approaches. Furthermore, this section also mentions the user interfaces system interfaces and Hardware Interfaces, system constraints, User characteristics and assumptions about the product.

The third section provides the requirements specification in detail. Different specification techniques are used in order to specify the requirements more clearly for different audiences.

The rest of the sections that organized this document are Project perspective and descriptions, Requirements of the system, Summary of major functionality, Users and characteristics of the system and the background of the general factors affect the system

2. Overall Descriptions

Predict user preferences by profiling

Predict user preferences by profiling is a part of the mobile application and it provides the facility to find preferred dinning and accommodation options for the User based on their interests. We get this information from Hash-tags and Tweets which the particular user is Tweeting in their Twitter profile. When a user wants to find the available dinning and accommodation options simply they have to tap on the buttons "Find nearby Dinning" or "Find nearby Accommodation". Then the user will be getting all the suggestions about dinning and accommodation based on their preferences.

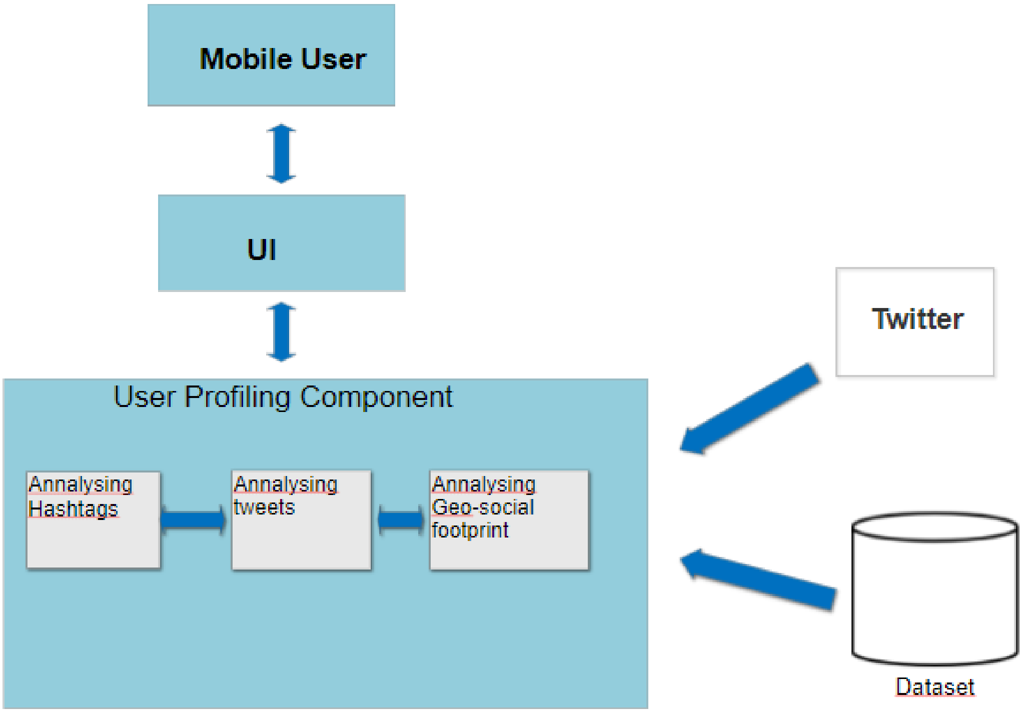

Figure 1: Predict user preferences by User Profiling

2.1.1 System interfaces

The “GOexp” is a mobile application focused on travelers which is built on the android platform. Mobile application interacts with travelers when they want to know about a landmark and even when they need accommodation and dining facilities around that area.

The mobile application will use android studio and connected via restful interface to connect with web services this will provide services for the application.

Using the user profiling techniques, it will gather data from a user’s Twitter profile and identify the Dinning and Accommodation preferences of the particular user. With that data it will interacts with the Google Maps to show the nearby dinning and accommodation providing places for the user.

As a client application android application will develop where firebase acts as the web service and the database server. As in usual Client-Server architecture, user requests through the client, in this case, the android application. The corresponding functionalities would be invoked in the server, the web service, where the request is processed and a respond would be generated back to the client. The web service is the core of the whole system since it holds all the logic and connects the application with a remote database. Firebase can act as both the web server and the database server. Because, Firebase is a “Backend as a Service” (BaaS) [3].

System overview

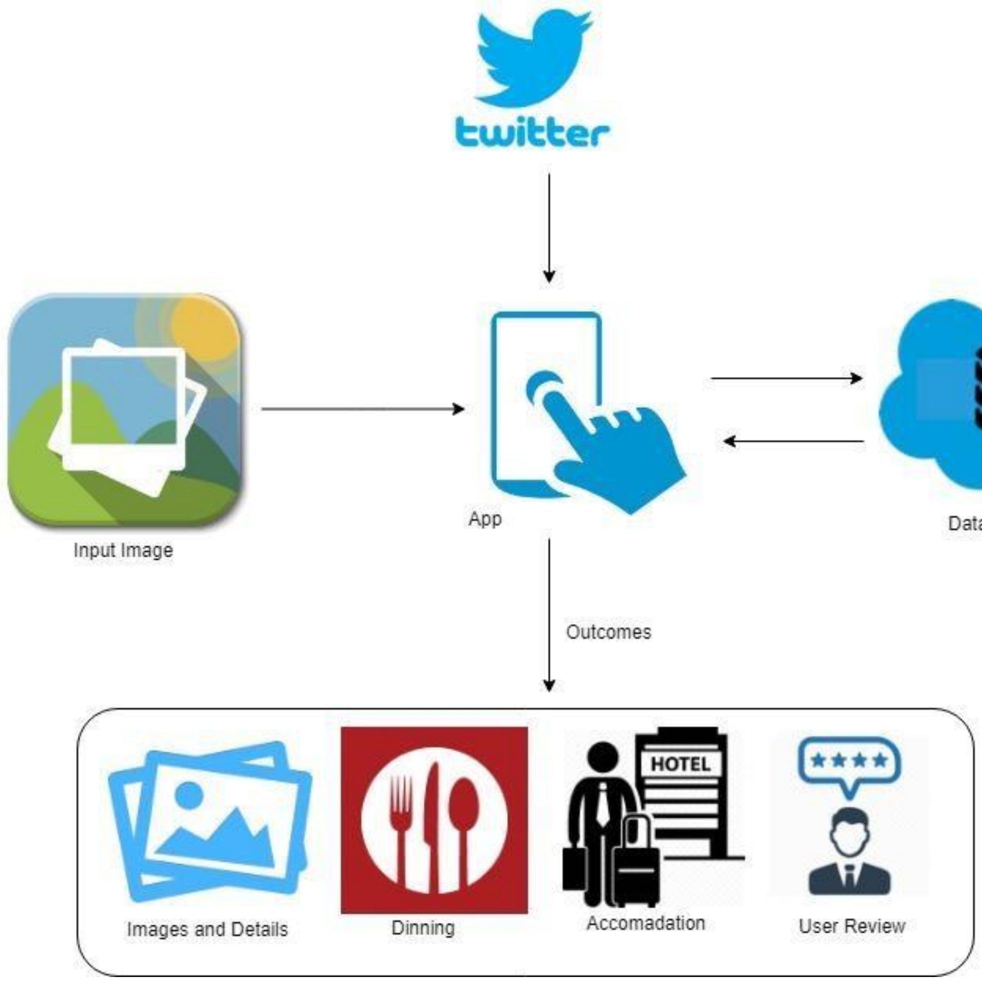

Figure 2: System Overview

2.1.2 User interfaces

The user interface (UI) comprises the logical face between software product and its users. This includes layouts, buttons, images, icons that provide the interface to the users.

There can be only one kind of users in order to use the feature. That is “Registered users”. Because to gather required data from Twitter, the user has to be a registered member in our system and should accept the terms and conditions in order to proceed. We shall do this due to the privacy concerns.

“Find nearby dinning” Interface

This interface shows the nearby dinning places filtered according to the user interests that we gathered from user’s twitter profile

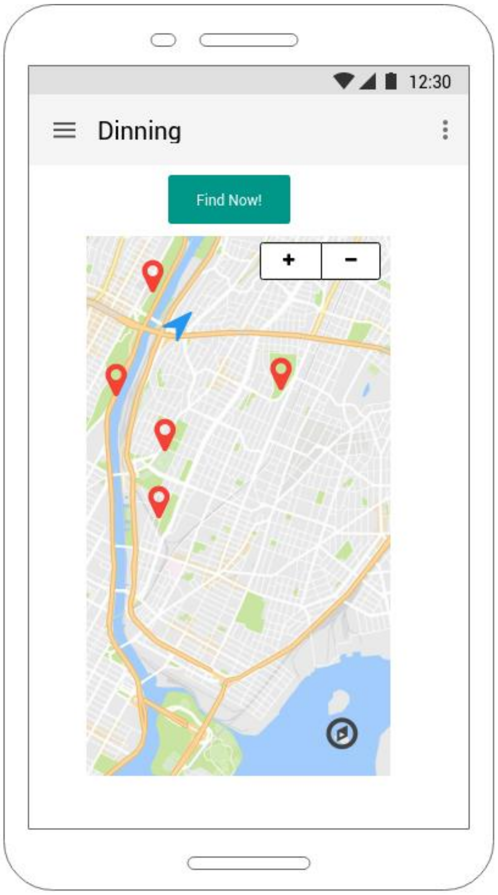

Figure 3: Find nearby Dinning interface

“Find nearby Accommodation” Interface

This interface shows the nearby accommodation places filtered according to the user interests that we gathered from user’s twitter profile.

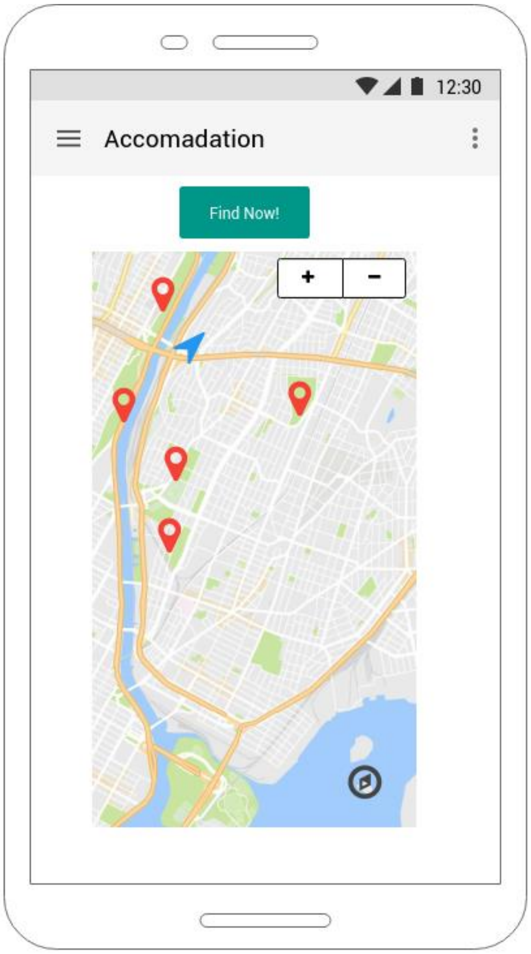

Figure 4: Find nearby Accommodation interface

2.1.3 Hardware interfaces

Mobile application doesn’t have any specified hardware; it does not have any direct hardware interfaces. The hardware connection to the database server is managed by the underlying operating system on the mobile phone and the web server. Basically there are few requirements like,

- The system will require an android based mobile device or tablet with minimum Processor speed of 1 GHz, with a RAM of at least 512MB.
- Temporary files might be saved in the local storage of minimum 128 MB on the device
- Mobile device screen size should be minimum of 3-4 inches
- And the mobile device should be equipped with at least a 5MP camera

2.1.4 Software Interfaces

In order to use mobile application, users must install it on the mobile device. The mobile devices must support to the android platform and the phone should have ability to run the android applications.

Android	The operating System where the app runs on
Firebase	Firebase is a “Backend as a service” (Baas). Acts as the data store in our app
Twython	Twython is a python library developed to connect with the twitter REST APIs to retrieve tweets and related information
Geolocation API[4]	To get the current location on the map
Geocoding API[5]	To convert between addresses and geographic coordinates

Table 2: Software Interfaces

2.1.5 Communication interfaces

The communication between the different parts of the component is important since they share functionalities on each other. The communication among the mobile application will be established over the internet. To load the map this required internet connection and it will load the user data gathered from Twitter via web services to filter the results according to user preferences. However, the communication is handled by the underlying operating systems for the mobile application.

2.1.6 Memory constraints

- 100 simultaneous connections to the database (Currently on Firebase free plan. Can be extended with the requirement in future)
- Android device should have minimum of 256 MB of RAM and 32 MB of storage to smoothly run the application

2.1.7 Operations

Prior to use, the android application will be installed in selected android mobile devices that are used by the observer. Once successfully install the application on mobile and when the user switch on the application the user will be directed to the Login page. With the successful login user will be landing on the Home page and from there, by tapping the button “Find nearby Dinning” user can search for the nearby dinning places according to his/her preferences. Also user can tap on the “Find nearby Accommodation” button to search for accommodation. When the user clicks on a button the process will connect to the firebase [6] and fetch the user’s data (Dinning, accommodation info) which was obtained through profiling and will be compared with the Kaggle dataset to provide a suitable result to that particular user by classifying the data using Naïve Bayes [7] and logistic regression algorithms [8]. And the results will be loaded in a map and the user can get more info by tapping on the places in the map.

2.1.8 Site adaptation requirements

In order to run the mobile application users must install the application on their mobile devices. The System will display the information only in English Language. Basically this is an android based application and the development team is planning to provide a IOS mobile application in later stages.

2.2 product functions

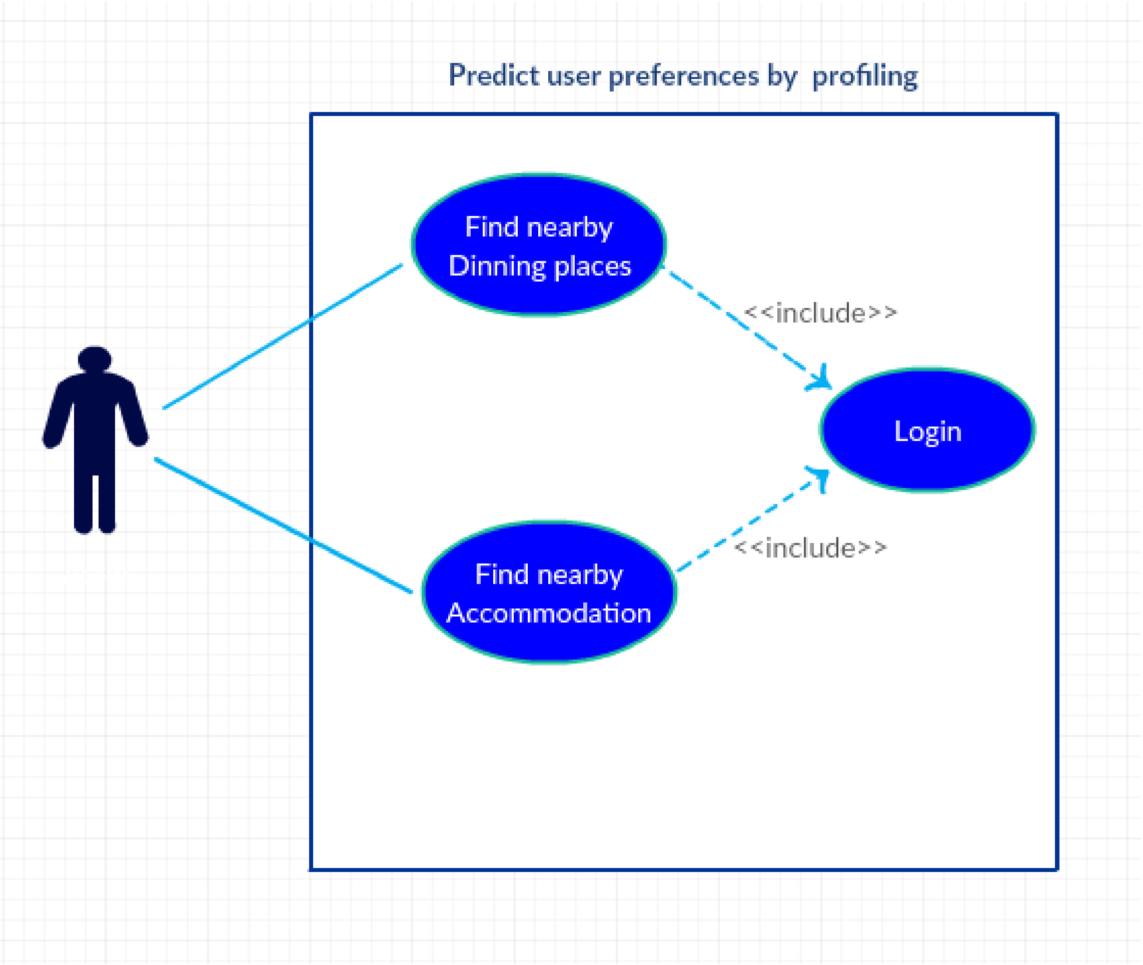
Predict user preferences by profiling
Find nearby Dinning places
<<include>>
Login
<<include>>
Find nearby Accommodation

Figure 5: Predict User Preferences Use Case diagram

login

Use Case No	01
Use Case	Login
Actors	User (traveler)
Pre-Condition	User should be a registered user
Flow of Event	1. Enter the username and password. 2. Click login
Post Conditions	Allow the user to use the mobile application
Alternatives	Display an error message to inform that invalid username or password are provided

Table 3: Login Use case scenario

Select nearby dining

Use Case No	02
Use Case	Select nearby dining places
Actors	Mobile app user
Pre-Condition	User must be a logged in user.
Flow of Event	1. Provide a button as “Find nearby dinning” to find nearby dinning places. 2. Tap on the button 3. Back end mobile application processes the inputs by accessing the dataset and sends the response back to the front-end view of the application
Post Conditions	Show the nearby dinning places arranged according to the user preferences

Table 4: select nearby dinning places

Select nearby
Accommodation

Use Case No	03
Use Case	Select nearby accommodation
Actors	Mobile app user
Pre-Condition	User must be a logged in user.
Flow of Event	1. Provide a button to click and find the nearby Lodges or restaurants which provides accommodation 2. Click on the button 3. Back end mobile application processes the inputs and sends the response to front end Application .
Post Conditions	Show the nearest places which matches to the user preferences
Alternatives	Show both preferred and other options available around the area

Table 5: select nearby accommodation

2.3 User characteristics

There are one main types of users for this component. The mobile application users. The mobile application users are the travel enthusiasts.

Mobile Application users

These users are the most significant users of the component. These users need to install the mobile application and interact with the mobile device to start the process. Basically these users need to have some knowledge about the mobile phones and some basic English knowledge in order to interact with the application.

2.4 Constraints

- Users should have the internet to deal with the applications to load the results of the nearby places.
- User login and the user authentication is must
- Server should be able to handle multiple requests at a time
- The response should be generated within minimum time constraint
- The server should be able to perform its normal operations without exceeding 2GB of RAM
- Battery life is also a constraint for the mobile application users
- Having basic English knowledge also will be a constraint for the users

3. Specific requirements

3.1 External interface requirements

3.1.1 User interfaces

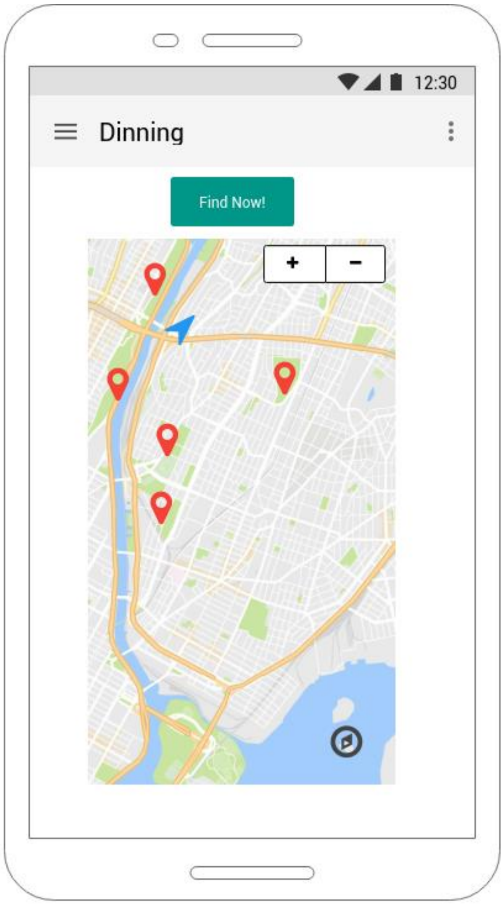

Figure 6: External interface Nearby Dinning

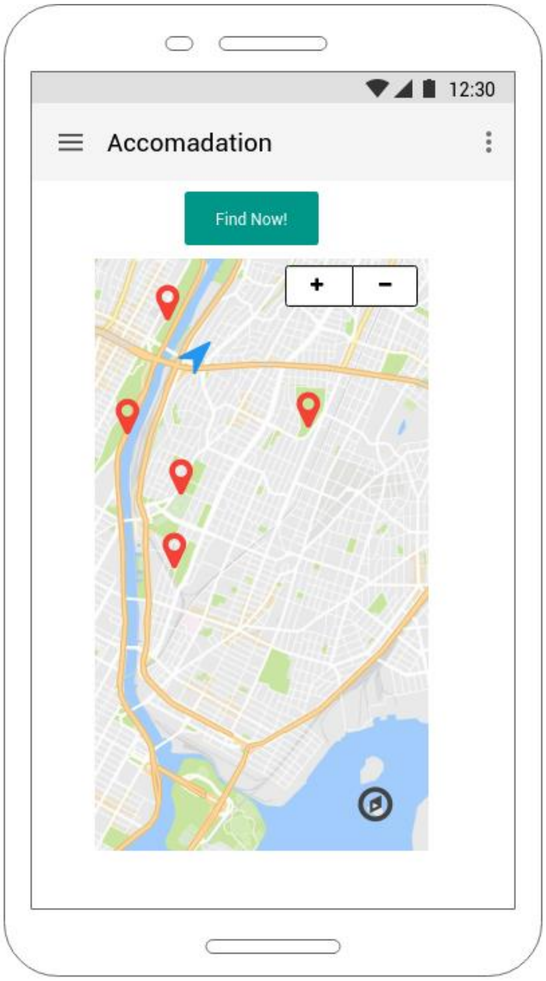

Figure 7: External interface Nearby Accommodation

Name of item	Find nearby Dinning
Description of purpose	Suggesting nearby dinning places (Hotels, Restaurants, Cafes) to the user matching to their preferences.
Source of input or destination of output	Basic user selection and preferences
Valid range, accuracy and/or tolerance	100%
Units of measure	-
Timing	-
Relationships to other inputs/outputs	User data from Twitter
Screen formats/organization	Screen is organized in a mobile view
Window formats/organization	-
Data formats	Alpha numeric

Table 3: nearby dinning interface

Name of item	Find nearby Accommodation
Description of purpose	Suggesting nearby places for accommodation (Hotels, lodging places) to the user matching to their preferences.
Source of input or destination of output	Basic user selection and preferences
Valid range, accuracy and/or tolerance	100%
Units of measure	-
Timing	-
Relationships to other inputs/outputs	User data from Twitter
Screen formats/organization	Screen is organized in a mobile view
Window formats/organization	-
Data formats	Alpha numeric

Table 4: nearby Accommodation interface

3.1.2 Hardware interfaces

Server Side Hardware Interfaces

- For the server side there should be a server space with minimum 1GB. Also the server should run with Firebase. As the database server DB, firebase must have installed in the server.

Hardware Interfaces for the Development team

- Development team must have a computer that has 1.6GHz processing power in order to do this project. Minimum 10GB of disk space and 5400 RPM hard disk drive also can consider as hardware requirements.
- For the testing purposes development team requires a mobile device to run the mobile application. And also the mobile device must compatible with android.

3.1.3 Software interfaces

Name	**Version**	**Purpose**
Android Studio	V.2.3.3 and above Platform	Used for develop the mobile App
Google Maps API	V.3.31	Used to show the map in the mobile application
Android run time Environment		performs the translation of the application's bytecode into native instructions that are later executed by the device's runtime environment.
Firebase	V 5.0.0	Used for database management

Table 5: Software requirements

3.1.4 Communication interfaces

An internet connection will be needed by the customers as well as for the development purposes. Since the mobile application deal with the web server, there should be an internet connection.

A Wi-Fi connection will be used to communicate in between two applications and the server.

HTTP protocol will be used to communicate between android application and Back End REST Web service

3.2 Classes/Objects

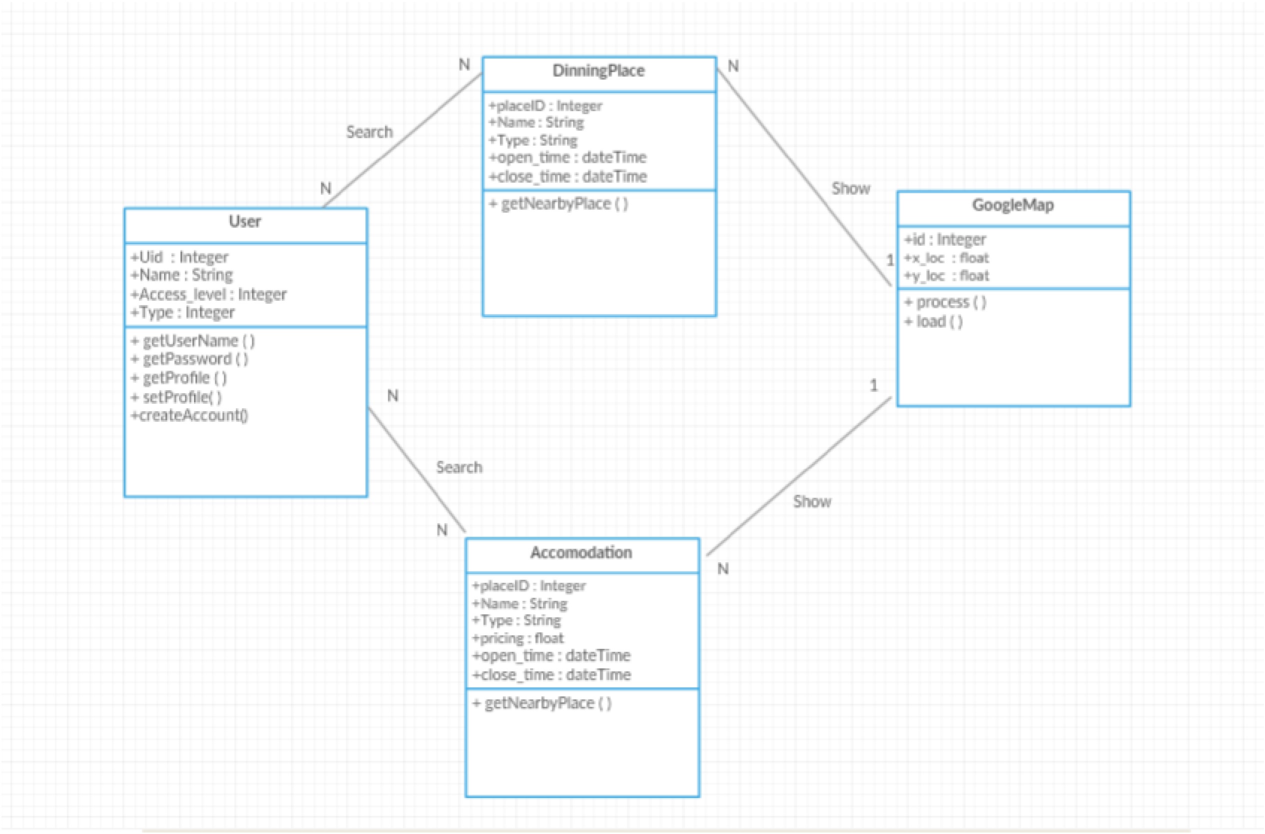

Figure 8: Class diagram for finding dinning and accommodation

3.3 Performance requirements

- The delay between the request from the android application and the response from the web server should be less than 1 second.
- Back End should be able to handle multiple request at a time.
- The mobile device should be contained with a good battery since it uses the internet connectivity.
- User-interface screen should respond within 5 seconds.
- There should be a proper internet connection to work with mobile in the beginning process.
- The server should be equipped with a decent processor and minimum of 4GB RAM which can handle the heavy processes.

3.4 Design constraints

In designing this system, we have to consider about mobile application designing. Travel enthusiasts are the primary users of the mobile application and it means a large variety of audience. This means they are not fond of complex interfaces. Thus all the interface designs have to be simple as well as attractive. Using bright and more colors will drag away user friendliness; therefore, interfaces must be light colored.

3.5 Software system attributes

In this section, we are explaining the attribute that we are going to offer through the system. There are some explanations in follow.

3.5.1 Reliability

Reliability of a system is the ability to perform its normal operations with minimum failures over a specified time in a given environment.

- The reliability of providing and classifying results of nearby dinning and accommodation places to a particular landmark will be achieved by using Naïve Bayes algorithm and the Logistic Regression algorithm.
- The required information by the users should be provide within minimum time without any failure
- The applications will be tested using several testing techniques to make sure it’s probability of failure is very low value.
- All the validations should be done to data before entry to the database
- At a time of a failure, there should be a proper mechanism to notify the all users (notifications)

3.5.2 Availability

Availability of a system is the possibility that a system will work as required during the point of time and it should be able to deliver the requested service. That is a services should be available with minimal system down time or without having any system failures for longtime.

The application must be available to download and to use at any time without any crashes

3.5.3 Security

Security of a system is an attribute which reveal ability to resist unauthorized usage while still providing its services to legitimate users and it can protect itself from external assaults. In this component any authorize user should be able to use the mobile application

- The development team must consider about the security of the user's data. Because all the users provide their private data to the system. There for the database security must be on a higher place.
- The system must use HTTPS protocol. It will give more secure data transaction by considering to other protocols
- Passwords should be stored in database using an encryption method
- Sessions will contain a timeout
- Maintains strong server-side controls

3.5.4 Maintainability

Maintainability of a system means handling the system with new requirements in order to enhance the performance and capabilities of the application and making sure that new errors shall not be prone in the system because of the changes. That means the proposed system can be maintained easily if it needs some modification without causing any damage or interrupt to other system functionalities. As well as modifications can be done through low cost solutions. It is also a somewhat important feature to having a high maintainable system

In case of a failure, a re-initialization of the program is recommended.

- "GOexp" app does not have a fixed client or a customer. Therefore, the maintenance requirements are handled by the development team by considering the future potential use of the mobile application. The application is designed in a way that it assists for updates of the software in future. The code will comment wherever it is necessary, especially in critical and complex code segments. This will help the developers or maintaining team for modifications in future.

4. References

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