TRIBHUVAN UNIVERSITY

INSTITUTE OF ENGINEERING

HIMALAYA COLLEGE OF ENGINEERING

[CODE: CT-755]

A

FINAL YEAR PROJECT REPORT

ON

ADS NAVIGATOR

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A PROJECT SUBMITTED TO DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR BACHELOR'S DEGREE IN COMPUTER ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINNERING

LALITPUR, NEPAL

AUGUST, 2017

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A Major Project report submitted in partial fulfillment of the requirements for the degree of Bachelor in Computer Engineering.

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AUGUST, 2017

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ACKNOWLEDGEMENT

ABSTRACT

This proposal titled "Ads Navigator" is an introductory paper work for the location based recommender system of advertisements/places with navigation. Advertisements or vouchers are commonly used today to attract the attention and the purchase of consumers by providing discount or detailed description to customers. Typically, vendors use text to describe characteristic introductions and images to express appealing looks. In order to allow consumers to retrieve more information such as location of vendors, an advertisement publishing system should be improved to meet the consumers' requirements.

The prime objective of this system is to develop a recommender system which will provide recommendations and enable users to view and navigate the advertisements/places in real-time on a particular area saving their precious time. This system will provide location-based recommendations for advertisements/places. Combination of Collaborative Filtering and Pearson Correlation Coefficient algorithms will be used to recommend the advertisements/places. It will also show the location to the required advertisement/place based on user's current location by GPS. Also, to allow vendors to advertise their products for the improvement of their businesses. This app will have feature of location, search nearby, navigation, notification and many more.

Keywords: ***Ads Navigator, Location-based Recommender Systems, Collaborative Filtering Algorithm, Pearson Correlation Coefficient Algorithm***

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LIST OF ABBREVIATIONS

ACID	:	Atomicity Consistency Isolation Durability
API	:	Application Program Interface
App	:	Application
Er.	:	Engineer
ER Diagram	:	Entity Relationship Diagram
GPS	:	Global Positioning System
GUI	:	Graphical User Interface
IDE	:	Integrated Development Environment
IT	:	Information Technology
JSON	:	JavaScript Object Notation
JVM	:	Java Virtual Machine
MB	:	Mega Bytes
OS	:	Operating System
RAM	:	Random Access Memory
RSS	:	Rich Side Summary
SDK	:	Software Development Kit
SQL	:	Structured Query Language
UI	:	User Interface
XML	:	Extensible Markup Language

CHAPTER 1. INTRODUCTION

1.1 Background

Information technology has revolutionized life of human beings and has made the lives easier by the various kinds of application. In the light of rapid changes with the use of IT, there are many tools processes taken place at the same time within a place there is a for integrations of all processes, creation of paperless environment also ensures efficient task management. Nowadays all the business is shifting to computer based system. The purpose to having computer-based system is, it helps to increase the market share and it is very easy for commercial use. It is increasing the demand among the customers. The project is concerned with developing a system using Object Oriented Programing approach. In this project, we present a system that can be used with any current android mobile phone system to provide location based recommendations of advertisements/places to any mobile phone, equipped with the navigation feature.

This project describes mobile based data broadcast architecture. It is suitable for any sectors that require marketing like entertainment plazas, restaurants, real estate, shopping malls. The idea is to mark advertisements based on city perimeter so that the user can view and navigate advertisements locations near them [1].

1.2 Objectives

The main objectives of the project are:

- To develop a recommender system which will provide recommendations of advertisements/places to users.
- To develop a system which will enable users to view and navigate the advertisements in real-time on a particular area.
- To allow vendors to advertise their products for the improvement of their businesses.

1.3 Scopes

This app is primarily targeted for local vendors and users. It is focused to save time and increase efficiency. It makes the job of the vendors much easier and organized also, helping their business to flourish. This app will follow the steps and rules to meet user requirements on demand and on time. Apart from this, it will remove the difficulties faced by the users to find a place in an unfamiliar area or the product the user desires. In addition, it will provide useful recommendations of advertisements/places. This app will have a friendly UI, which will make it easy to use for the old and new user of this app.

1.4 Organization of the Report

In Chapter 1, the main concept of application has been covered. Here, the contextual problems in testing sector have been discussed. The main objectives of the application have been mentioned and its scopes have been clarified.

Chapter 2 discusses about the literature review. In this chapter, the related past and ongoing research in the field of test case generation and exploration has been mentioned.

Chapter 3 includes the requirement analysis and feasibility study of our project. This chapter contains functional requirements, non-functional requirement and system requirement. The feasibility study includes the technical, operational and economic feasibility.

Chapter 4 contains about the system design of our project where we have listed the features of our application for users, vendors and administrator and described about those features in detail in product overview.

Chapter 5 includes the methodologies that were implemented throughout the completion of the software. Various algorithms that are used in the project are explained in here.

Chapter 6 shows the various types of the diagrams used to design and describe our system. The diagrams are use case, system flow, ER, DFD, sequence, class and activity.

Chapter 7 mentions the results of our project along with the discussion

Chapter 8 discusses the limitations and future enhancement of our project.

Chapter 9 includes the conclusion of our project.

CHAPTER 2. LITERATURE REVIEW

2.1 Location Based Services

The use of mobile phones has increased many folds in several countries during last few years and in some countries, the mobile phone penetration is well poised to overtake conventional fixed lines. "Being mobile" is the single most important reason for this exponential growth of mobile phones.

"Location" is invariably a very strong component of "mobility". A rapid evolution in Location Determination Technologies coupled with the advances made in the field of wireless in recent years has given rise to the possibility of precisely locating a mobile phone. This has opened up a plethora of a new set of wireless applications, known as "Location Based Services" [2].

Location based services are have gained prime importance in our increasingly mobile and highly IT enabled world. With modern legislation and interest in utilizing Geo-spatial information for providing practically useful information to users of mobile services the scope and capability of informing, alerting and involving the user is evolving.

Location based services are considered as applications that deliver location-based information where and when it is needed. It is the ability to find the geographical location of the mobile device and provide services based on this location information. For example, a person in his car calls for the nearest hospital; he needs only paths and addresses of those hospitals, which are within his reach.

2.2. Recommender Systems

Recommender Systems are decision support tools aimed at addressing the information overload problem, providing product and service recommendations personalized to the user's needs and preferences at a particular request context

Recommender Systems were developed to overcome the problem of information overload by adding users in the search for relevant information and helping them identify which items (e.g. media, products, or services) are worth viewing in detail. This task is known as information filtering.

One of the major motivations for a recommender system is serendipity, i.e., to help the user make fortunate discoveries the user was not explicitly looking for. Compared to search and expect recommendations, recommender systems also have an advantage in that they are able to make personalize recommendations.

2.3. Existing Systems

There are a few mobile applications that provide a platform to manage different entities. The use of these types of applications has increased the ease to manage different location related areas. Some of these locations based applications [3] are:

CityGuide [4]: It is designed for PalmOS devices and helps tourists in finding attractions (such as restaurants) around a city. This recommender system uses the constraint-based filtering approach to control which attractions are shown on the map. In particular, the user, through the system's map interface, is asked to specify constraints on attraction type, restaurant cuisine and price. The system retrieves from the database only those attractions that satisfy the user's indicated constraints, and then ranks these retrieved attractions according to their match to the preferences stored in the user's profile. The system builds and updates the user's profile, which maintains her long-term preferences, by mining and interpreting the user's actions (such as writing a restaurant review, reading a review, viewing a restaurant's details, etc.) and collecting the user's ratings to the restaurants.

GasBuddy [5]: It is a mobile app that helps users track down the cheapest nearby gas station based on their present location. As many of the prices are based on user reports, GasBuddy rewards users with points for reporting and updating a station's prices. Those points make you eligible for regular raffles of prizes, such as free gas.

Waze [6]: Waze serves as a combination of social network and crowd-sourced traffic map, allowing drivers to report traffic conditions and incidents and share them in a living map to the benefit of all. In addition to live traffic maps, Waze also provides routing and turn-by-turn directions, with routes optimized based on current traffic data and automatic rerouting based on changing conditions. Additionally, the app learns your commuting hours, frequent destinations and preferred routes, which helps it better personalize its route plans and recommendations.

Uber [7]: It is an app which allows consumers to submit a trip request, which the software program then automatically sends to the Uber driver nearest to the consumer, alerting the driver to the location of the customer. Uber drivers use their own personal cars.

SparkStarter [8]: It is a match making mobile app in which users can connect for free with one other person once per day. The other person has 24 hours within which to respond. If the recipient is within close proximity, then they will only be notified once they have moved away.

CHAPTER 3. REQUIREMENT ANALYSIS AND FEASIBILITY STUDY

3.1 Requirement Analysis

Requirements analysis is a team effort that demands a combination of hardware, software and human factors engineering expertise as well as skills in dealing with people. After discussing about the development our project, we came up with the following requirements:

3.1.1 Functional Requirements

- Login verification
- Show recommendation
- View Ads
- Post new ads
- Navigation
- Notification
- Rate Ads

3.1.2 Non-Functional Requirements

- Secure login
- Manageability
- Performance
- User friendly

3.1.3 System Requirement

For the better and effective performance of the software, the computer should be of minimum requirement we specified.

Hardware Requirement

The minimum requirement of the hardware for the better performance of our software is as follows:

- Android Phone with minimum SDK 15

3.2 Feasibility Study

Feasibility study is to check the viability of the project under consideration. All projects are feasible-given unlimited resources and infinite time. This feasibility study report is in concern with the system analysis carried out for the project to make sure that the project being implemented is actually feasible. Theoretically, various types of feasibilities are conducted, but we have conducted four type of feasibilities explained as below.

3.2.1 Technical Feasibility

The new solution is feasible in all sense. The system will be developed using Android, XML, Java & JSON and, the database will be managed using Firebase which are implemented by most of the vendors meaning our system can be managed by most of the programmers available in the market. In addition, Android one of the leading platform for mobile and almost all the general people own an android smart phone. This application will be targeted for Android device using Jellybean and above which cover more than 98% of the android devices.

3.2.2 Operational Feasibility

The new app will require an android phone to work with this app as an android phone being an inexpensive device. This app will have an interactive and user-friendly user interface so; the person using this app will be able to figure out how to work with this app easily. In the system point of view, the app will need an internet connection to send the information to the server. As GPS is free. We need the server maintenance cost. This is the basic operational cost, which tends to very low.

3.2.3 Economic Feasibility

The project is economically feasible, as it only requires a mobile phone with Android operating system. This will help vendors to maximize their business productivity and helping app developers to get what they deserve for their work. The application is free to download once released into Android market. The users should be able to connect to internet through mobile phone and this would be the only cost incurred for the user.

3.2.4 Time Feasibility

The due date of this project submission is during mid of August, 2017.This is two semesters project so the Gantt Chart is divided for each semester. We will be able to complete this project at the start of August. The details of the tasks done during this project is shown in the Gantt Chart below:

ID	Task Name	Start	Finish	Duration	2016	2017		
					Dec	Jan	Feb	Mar
1	Study & Analysis	12/11/2016	12/18/2016	8d	■			
2	Requirement Collection & Analysis	12/15/2016	1/13/2017	30d	▬			
3	System Development	12/30/2016	3/4/2017	65d		▬▬		
4	Testing & Development	12/30/2016	3/4/2017	65d		▬▬		
5	Documentation	12/11/2016	3/4/2017	84d		▬▬▬		

Figure 3.2.4.1 Gantt Chart for IV/I semester

ID	Task Name	Start	Finish	Duration	2017					
					Mar	Apr	May	Jun	Jul	Aug
1	System Development	3/4/2017	5/13/2017	71d	▬▬					
2	Testing & Development	3/4/2017	8/4/2017	154d	▬▬▬▬					
3	Documentation	3/4/2017	8/24/2017	174d	▬▬▬▬▬					

Figure 3.2.4.2 Gantt Chart for IV/II semester

CHAPTER 4. SYSTEM DESIGN

Ads Navigator requires an administrator who monitors the advertisement posted by the vendors and their payment. A login name and a password needs to be entered in order to post the advertisement or to rate the business location or different products by the user. Then the administrator, vendors and users can perform the following operations:

Administrator

- Register/Login
- Monitor advertisement
- Manage vendor

Vendor

- Register/Login
- Submit advertisement details
- Post advertisement
- Edit advertisement

User

- Register/Login
- Category selection
- View advertisement
- Notification
- Navigation
- Rating

4.1 Thorough Overview

This report presents Ads Navigator, a mobile app targeted at Google's Android Platform. It provides a highly useful set of integrated location based services such as:

1. A recommender system that recommends relevant advertisements/places to user based on their behavior and rating.

2. Ability to navigate users to the desired destination from their current location.

3. An interactive local map that allows users to map their current location in real time, and view advertisements locations on the map.

4.2 Product Overview

This section discusses some interesting applications that the Ads Navigator app is envisioned for. We start by briefly describing the functionality provided by the different features of the app that highlight key requirements and design goals.

Features:

The user, admin and vendor must first login through their username & password and then use the system. The system enables the user to manage the inventory with its respective features:

Location

Here, user can view their location. When user will click on this option their location, information will be sent to the server. In turn, server will reply with the Google Map of the location, now user can view their location in the form of Google Maps.

Advertisement

User can find out different places around them using this service. User's location will be taken and information of shops near the user location will be sent to the user.

Recommendation

This feature helps the user make fortunate discoveries of advertisements/places that the user was not explicitly looking for. Compared to search and expect

recommendations, recommender systems also have an advantage in that they are able to make personalize recommendations.

Notification

This is the innovative service, which we have added to this application. This is a notification service which is based on the location entered by the user or when user arrives at a certain location perimeter in specified range. A notification about the category selected by the user will pop up in the screen. The user will enter the destination location and tentative time period required to reach, an alarm will be raised after arriving the required destination.

Search Nearby

Search Nearby features a powerful integrated search engine that allows users to find specific places such restaurants, bookstores, coffee-shops, gas-stations, etc., near their current geographic location using keywords. The results are displayed as a list, showing the name, street address, phone number and approximate distance in meters or kilometers from the current location of each place found.

Note that the functionality provided by this feature can also be accessed by performing a Google search using a web-browser app on the mobile phone. However, this requires considerably more typing, clicking, zooming, and waiting for the web load, making it very time-consuming and cumbersome to find things quickly. The search nearby feature provides an integrated mobile solution that makes it faster and easier to locate nearby places and find relevant information quickly.

Rating

The rating feature allows registered users to rate the advertisements according to their opinion. This feature will determine the order of the ads to be displayed on the app.

Advantages of the system:

- Android applications do not require distribution, technical support and marketing infrastructure. This makes this online application almost free and extremely manageable.

- This application will help business and organization to flourish without spending too much money.

- This application will help navigate people who are new to certain area and want to buy products or know about different place of interest.

- This application will save user's time by helping them discover places they were not explicitly looking for.

CHAPTER 5. METHODOLOGY

We went through lot of domains and topics before finalizing the topic. We developed interest in mobile application after studying its advantages and disadvantages. Then we finalized the topic of location-based services using mobile devices.

For the development of the system, we will be using java as our core programming language, XML for creating the user interface. The Android Material Design library will be used to make the app look attractive and user friendly. Google Firebase will be used as the back end of our app. Firebase will be used as web server, cache database and real-time database. Also additional features such as authentication, app monitoring will be done using Firebase. JSON will be used for asynchronous server communication. Android Studio will be used as the IDE for developing our application. When any actor logs in to our application the actor is redirected to Google login page and verified by Google. Google send backs token as user is redirected which is used by our server to get email and login to our server. Ads Navigator will also use Google API for its various features like displaying maps, searching places etc. In addition, Apache Mahout Library is used to include various algorithms like collaborative filtering, Pearson correlation coefficient will be used to provide recommendations of advertisements/places to the users based on user rating.

The administrator will be able to approve and monitor advertisement posted by the vendors. The homepage of the app will have the ads, which have been mostly viewed or navigated by other users and also the recently added advertisements.

Vendors must register or login and submit their advertisement detail and pay for the ads. In addition, they will be able to post and edit their previously posted ads. For better navigation, we will be using Google Maps API.

5.1 Algorithms

5.1.1 Collaborative Filtering

Collaborative filtering assumes a list of m users U = {u1,u2,…,u$_m$} and a list of n items I={i1, i2,…,i$_n$}. Each user u$_i$ has rated a list of items noted by I$_{ui}$. The purpose of this technique is to predict the ratings of unrated items by a given user and recommend the Top-N items. Two approaches for collaborative filtering, user-based and item based.

- Item Based Nearest Neighbor

  Item-based collaborative filtering makes use of the similarity available between two items. The similarity measures rely on the ratings available for two queried items. Prediction for a user u and item i is composed of a weighted sum of the user u's ratings for items most similar to i.

  $$pred(u,i) = \frac{\Sigma_{j \in ratedItems(u)} sim(i,j).r_{ui}}{\Sigma_{j \in ratedItems(u)} sim(i,j)}$$ ……………………………Equation (4.1)

- User-Based Nearest Neighbor

  User-based collaborative filtering utilizes the similarity computed between the active user and all other users. Generate a prediction for an item i by analyzing ratings for i from users in u's neighborhood.

  $$pred(u,i) = \bar{r}_u + \frac{\Sigma_{n \subset neighbor(u)} sim(u,n).(r_{ni} - \bar{r}_n)}{\Sigma_{n \subset neighbor(u)} sim(u,n)}$$ ……………...Equation (4.2)

5.1.2 Pearson Correlation Coefficient Algorithm

This similarity measure is based on how much the rating given by the common users for a pair of items deviate from average ratings for those items [9]. For example, we may have 2 users John, has given the following ratings to 5 advertisements: [1, 2, 3, 4, 5] and Mary, has given the following ratings to the same 5 advertisements [4, 5, 6, 7, 8]. The 2 users are very similar, as there is a perfect linear correlation between them, since Mary just gives the same rankings as John plus 3.

$$sin(i, j) = \frac{\Sigma_{u \in U}(R_{u,i} - \bar{R}_i)(R_{u,j} - \bar{R}_j)}{\sqrt{\Sigma_{u \in U}(R_{u,i} - \bar{R}_i)^2}\sqrt{\Sigma_{u \in U}(R_{u,j} - \bar{R}_j)^2}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\text{Equation (4.3)}$$

5.2 Tools Used

Android Studio

Android is free and an open platform built on Linux. It is also an open source solution for mobile devices offering a complete software stack including operating system, middleware and key mobile applications.

The demand for Android app development grew through its robust offerings with many new android devices[10]. Following are the advantages of android development:

1. Low Investment
2. Open Source
3. Easy to Integrate
4. Multiple Sales Channels
5. Easy Adoption

Google API

Google APIs is a set of application programming interfaces (APIs) developed by Google which allow communication with Google Services and their integration to other services. Examples of these include Search, Gmail, Translate or Google Maps. Third-party apps can use these APIs to take advantage of or extend the functionality of the existing services.

The APIs provide functionality like analytics, machine learning as a service (the Prediction API) or access to user data (when permission to read the data is given). Another important example is an embedded Google map on a website, which can be achieved using the Static maps API, Places API or Google Earth API.

Firebase

Firebase is a framework, which is help for building portable and web application for your business with real-time database, which implies when one user updates a

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record in the database, that update would be conveyed to every single user, be those users on a website, iOS or Android device. It gives a basic and unified platform with so many Google features packed-in. You do not need to configure your server when you use Firebase. Everything will be taken care of by Firebase automatically.

There are numerous elements that make working with Firebase marvelous from a developer's point of view, that pertain to the core technology of development. This helps in maintaining the state of harmony between the developer & the client by causing minimal delay of work. Following are the benefits of using Firebase:

1. Real-time Database
2. Hosting
3. Authentication
4. Storage
5. Cloud Messaging
6. Remote Config
7. Test Lab
8. Crash Reporting
9. Notifications
10. App Indexing
11. Dynamic Links
12. Invites
13. AdWords
14. AdMob

JSON

In computing, JSON (JavaScript Object Notation) is an open-standard format that uses human-readable text to transmit data objects consisting of attribute–value pairs. It is the most common data format used for asynchronous browser/server communication, largely replacing XML, which is used by Ajax.

XML

The design goals of XML emphasize simplicity, generality, and usability across the Internet. It is a textual data format with strong support via Unicode for different

human languages. Although the design of XML focuses on documents, the language is widely used for the representation of arbitrary data structures such as those used in web services.

Several schema systems exist to aid in the definition of XML-based languages, while programmers have developed many Application-Programming Interfaces (APIs) to aid the processing of XML data.

Java

Java is a platform Independent; platform independent means java can run on any computer irrespective to the hardware and software dependency [11]. Means Java does not depend on hardware means what type of processor, RAM etc. Java will run on a machine, which will satisfy its basic needs. Following are the advantages of java for android development:

- Android runs on many different hardware platforms. You would need to compile and optimize your native code for each of these different platforms to see any real benefits.

- There are a large number of developers already proficient in Java.

- Java has huge open source support, with many libraries and tools available to make developers life easier.

- Java protects you from many of the problems inherent in native code, like memory leaks, bad pointer usage, etc.

- Java allows them to create sandbox applications, and create a better security model so that one bad App cannot take down your entire OS.

Apache Mahout

Apache Mahout is a project of the Apache Software Foundation to produce free implementations of distributed or otherwise scalable machine learning algorithms focused primarily in the areas of collaborative filtering, clustering and classification. Many of the implementations use the Apache Hadoop platform Mahout also provides Java libraries for common math operations (focused on linear algebra and statistics) and primitive Java collections.

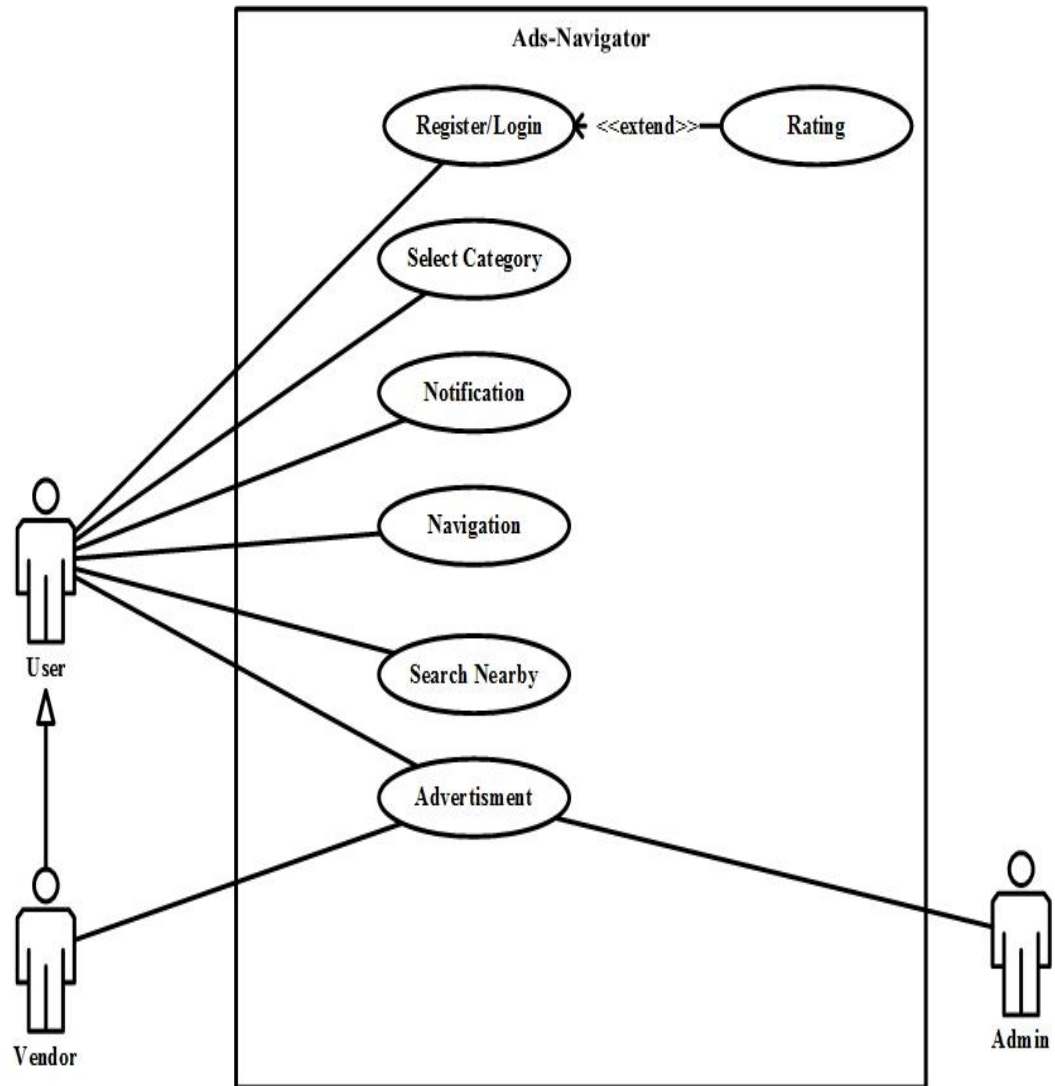# CHAPTER 6. DIAGRAMS

6.1 Use Case Diagram

Figure 6.1 Use Case Diagram
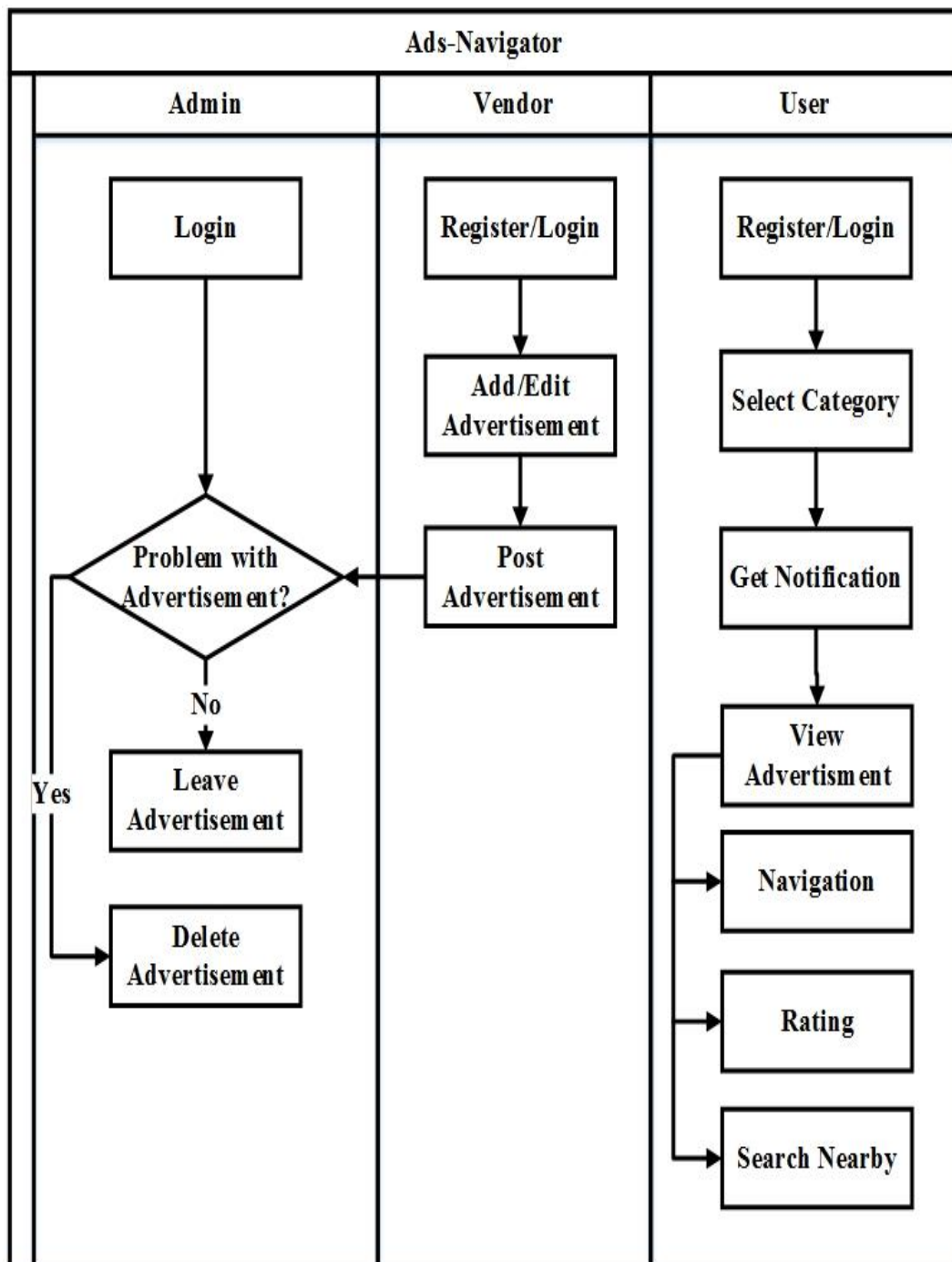
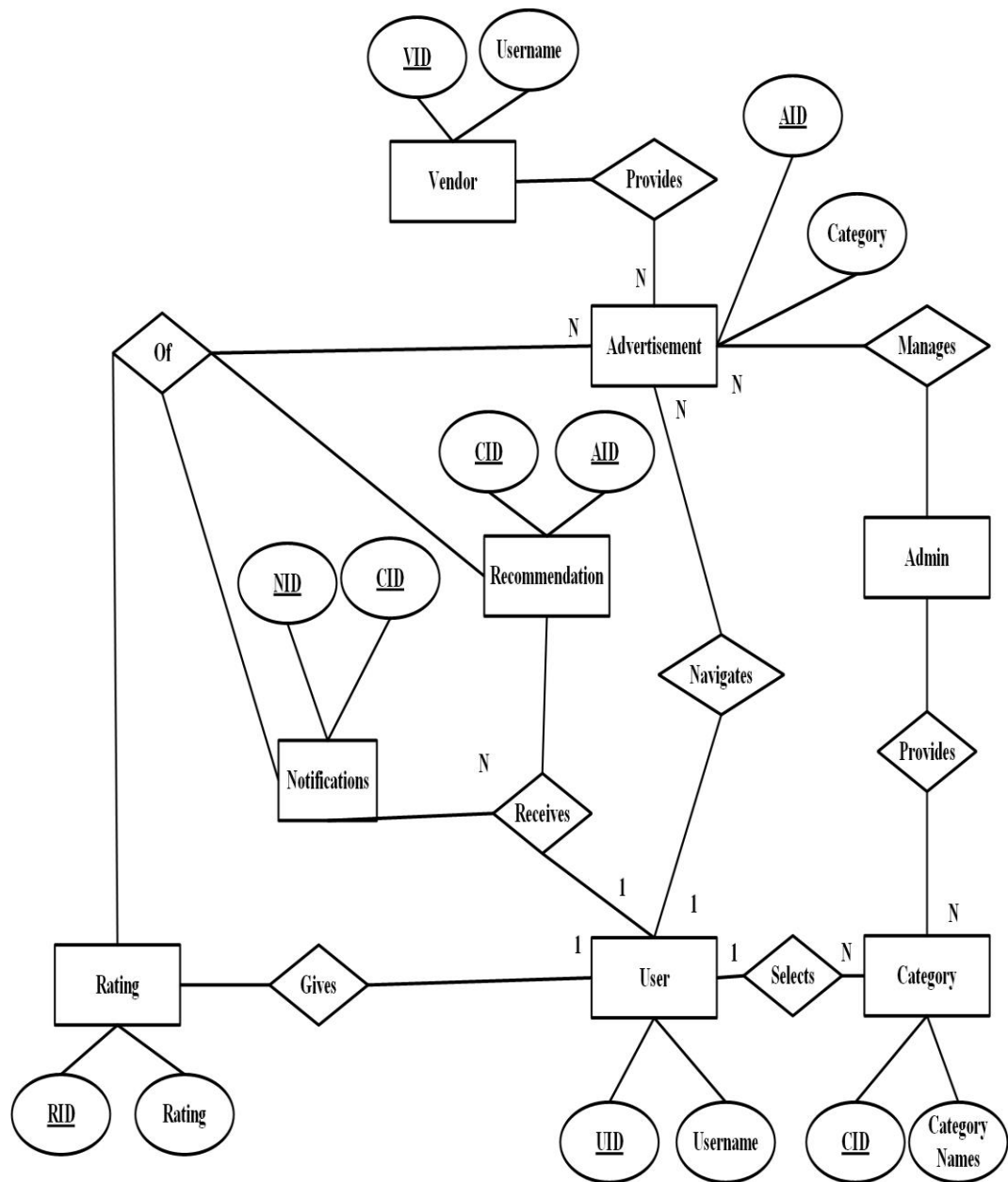## 6.2 System Flow Diagram

Figure 6.2 System Flow Diagram

6.3 ER Diagram

Figure 6.3 ER Diagram

6.4 DFD Diagram

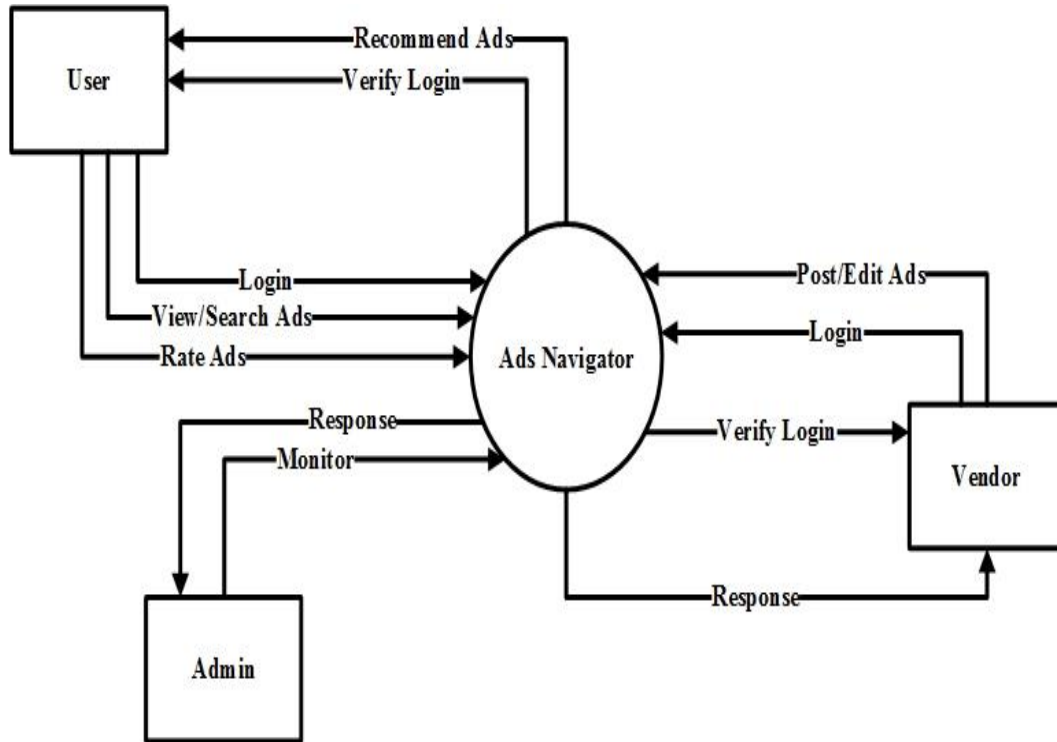### 6.4.1 DFD Level 0 Diagram

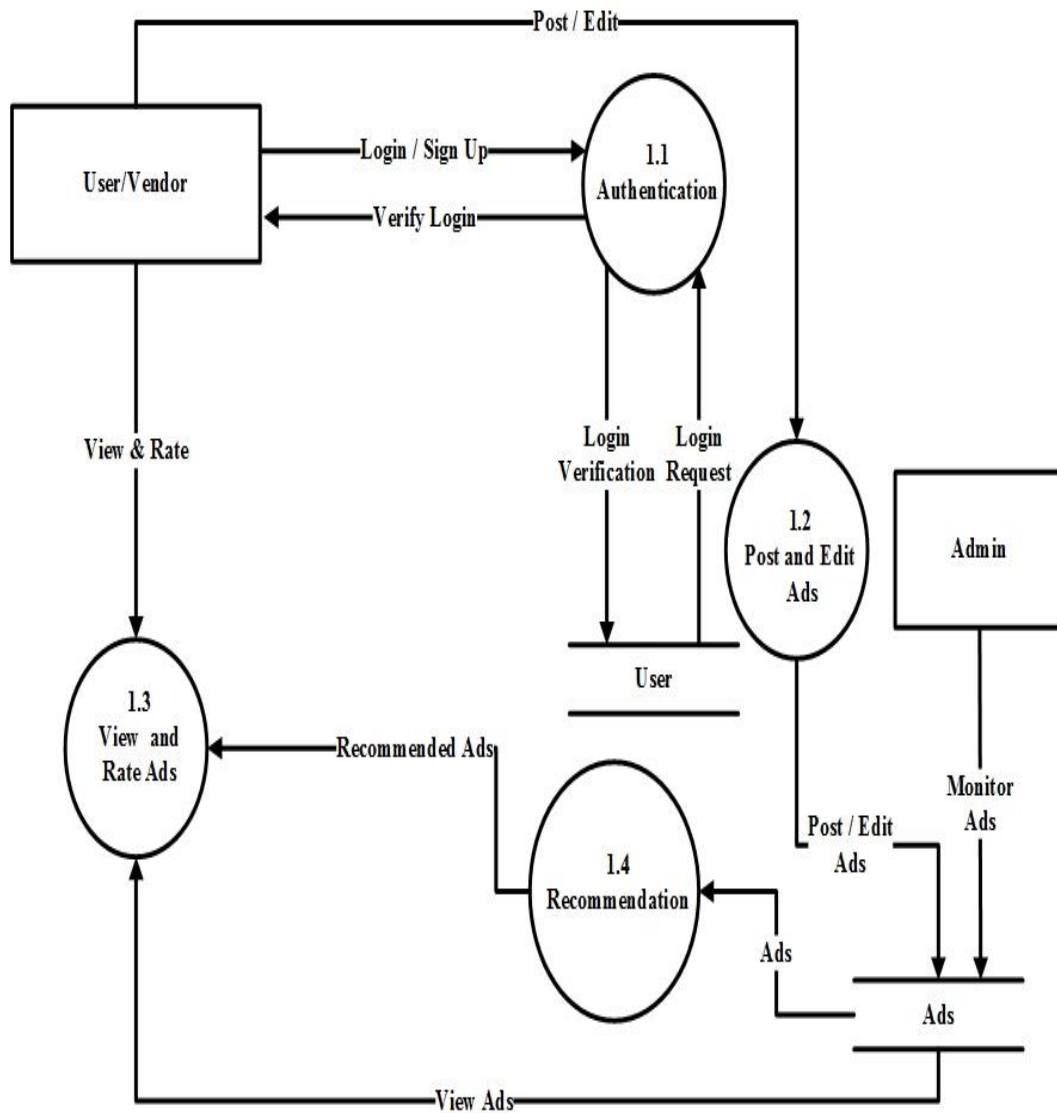**Figure 6.4.1 DFD Level 0 Diagram**

6.4.2 DFD Level 1 Diagram

Figure 6.4.2 DFD Level 1 Diagram
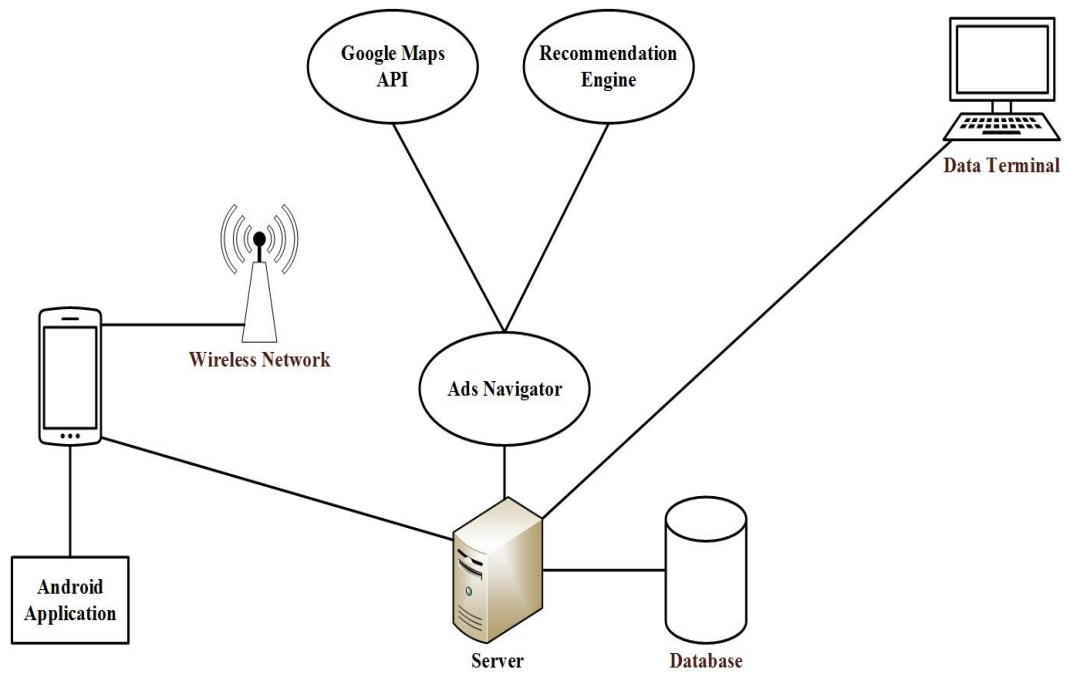
6.5 Process Diagram

Figure 6.5 Process Diagram
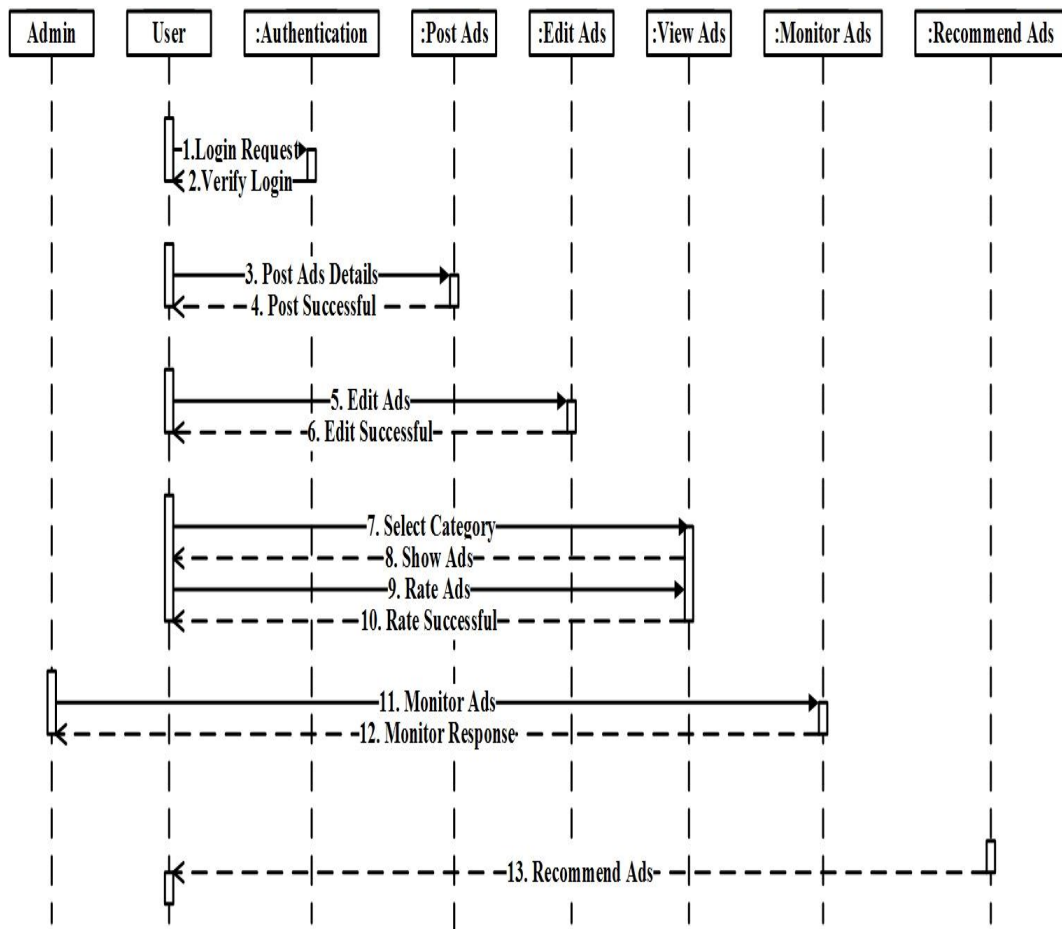
6.6 Sequence Diagram

Figure 6.6 Sequence Diagram
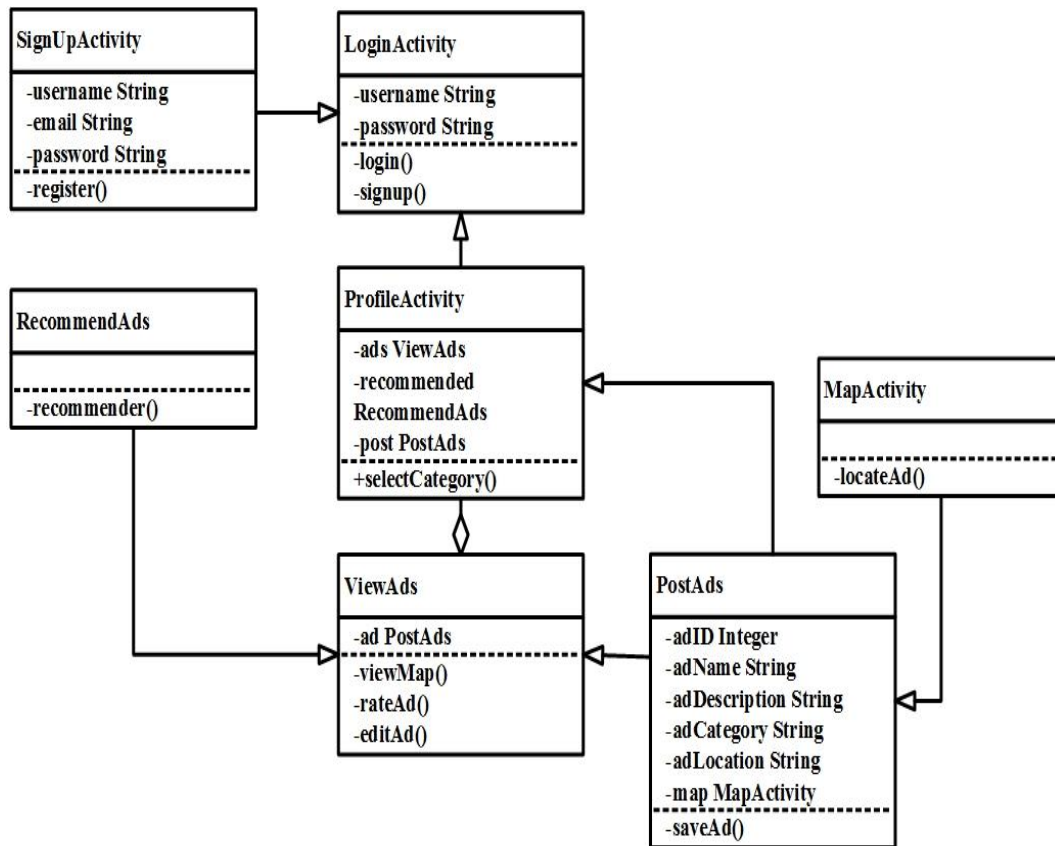
6.7 Class Diagram

Figure 6.7 Class Diagram
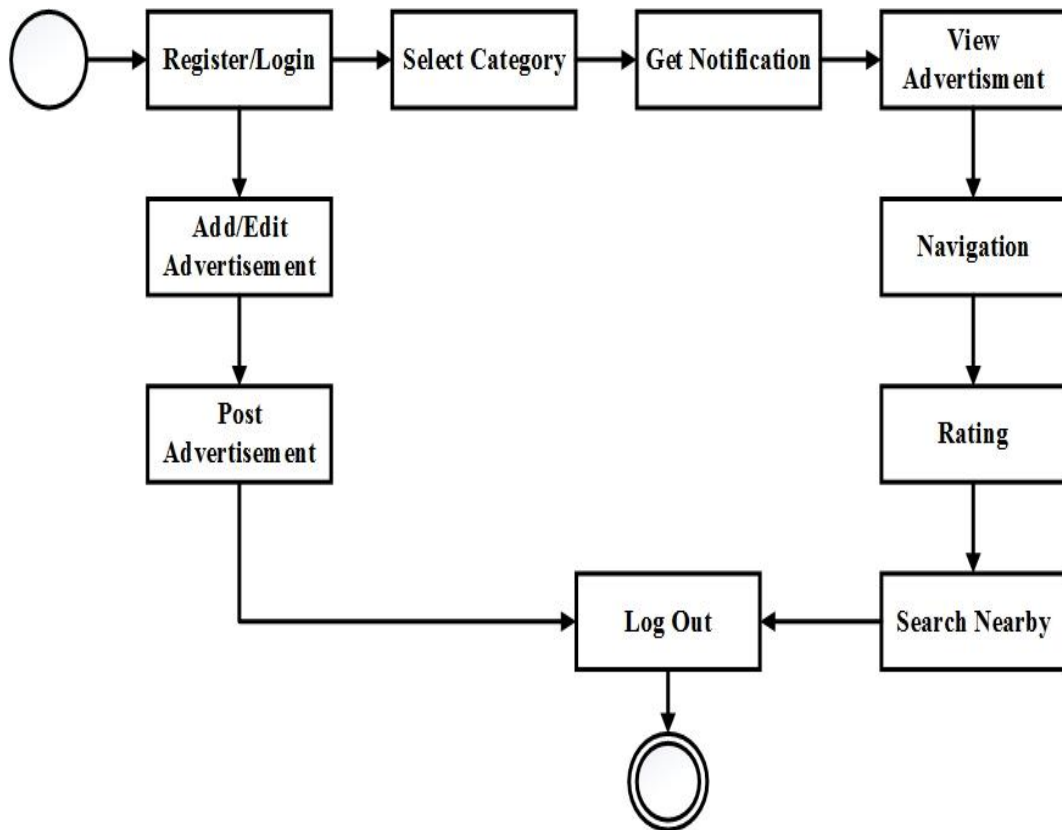
6.8 Activity Diagram

Figure 6.8 Activity Diagram

CHAPTER 7. DISCUSSION AND LIMITATIONS

7.1 Discussion

We have fulfilled all of our project objectives. First, the analysis phase of our project was completed. The use case diagram, system flow diagram, process diagram and the entity relation diagram of the application was designed. The user interface of our application is partially completed. The user registration, login and authentication feature is also completed. Among the features of our application, the search of places in the map was accomplished where a marker would mark the searched location. In addition, vendors are able to post advertisements and other vendors can rate those advertisements. The ads are then displayed in a list and can be sorted with various parameters like recommended ads.

The user interface of our application was designed using the Android Material Design make the app look attractive. Navigation bar and floating action button were used from this library. Authentication, app monetarization was done using Firebase analytics. Google maps API was used to display the map, geocoding was used to convert the input search string to the latitude, longitude coordinates, and markers were placed at the destination.

For recommendation, user's ratings on various places/ads were used as input for the recommendation engine. Apache Mahout library was used for implementing various algorithms like collaborative filtering and Pearson correlations coefficient. Then those input ratings were processed to generate recommendations to users about the unrated places/ads.

7.2 Limitations

The designed system's recommender may not be very much accurate, as we have used a single feature to generate recommendations. In addition, if an advertisement with inappropriate content has been posted then the system cannot detect it automatically, the administrator needs to monitor the posted ads and remove them manually. This application is limited to only some places of Kathmandu, Nepal.

CHAPTER 8. CONCLUSION AND FUTURE ENHANCEMENTS

8.1 Conclusion

Ads Navigator has been developed using various designing tools and software, frameworks, modules that enhanced our skill in the field of project development. This application is expected to meet the user requirements.

From a developer's perspective, we are not able to develop our project to the fullest extent. However, we fulfilled the objectives that we laid out at the beginning of our project. This app needs some enhancements as suggested by our supervisors and other teachers. We became familiar with researching the emerging needs in the field of engineering and technology along with implementing the research using different software technologies that helped us complete the project. During the development of this project, we got an opportunity to deal with different developing tools, frameworks, algorithms learnt to integrate them into a single application. Similarly, this project has taught us the importance of working in teams and dividing our work in order to complete them more easily, efficiently and in time.

This application has huge upgrade possibilities. With new feature and functionalities added it could work as a competitive application of its range in a current world market. As we know, the developing countries like Nepal are just entering into the fields of computer software and information technology. We hope that, this software will act as a milestone to these fields.

8.2 Future Enhancements

Currently, this is a mobile-based application that runs only on android platform but in future, it can be published in various platforms like iOS and windows. Furthermore, this application can be upgraded to an enterprise standard.

The user login and registration can be upgraded by allowing users and vendors to login or register the app using various platforms like google plus, Facebook, twitter etc. The navigation can be upgraded by using Google Directions API.

Various parameters such as demographic profile can be used to make the efficiency of recommendation more accurate.

Extra features such as bookmarks and reminder can be added to make the application more user friendly. Also, the payment module can be added for vendors to post the advertisement of places. This will commercialize our application and generate profit.

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APPENDIX

SCREENSHOTS