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The Development of Masjid Nearby Mobile Application

Muhamad Zaman Huri B. Mohd Nor Liew

This project is submitted
in partial fulfilment of the requirement for a
Bachelor of Science with Honours
(Cognitive Science)

Faculty of Cognitive Sciences and Human Development

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(2015)

The project entitled ‘The Development of Masjid Nearby Mobile Application’ was prepared by Muhamad Zaman Huri B. Mohd Nor Liew and submitted to the Faculty of Cognitive Sciences and Human Development in partial fulfillment of the requirements for a Bachelor of Science with Honours (Cognitive Science)

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ABSTRACT

Every year, UNIMAS will receive a new cohort students that comes from across Malaysia either East Malaysia or West Malaysia. UNIMAS also accept registration from international student that want to further study in UNIMAS. A lot of them are not familiar with UNIMAS location as they are new in Kota Samarahan and Kuching Sarawak. For Muslim student, one of the problem that arises from this issue is they do not know the location of Mosque when they hangout or do a field work. A lot of times wasted just for looking a nearby mosque through asking people. This research comes in handy in which it helps to overcome this problem by providing an application that runs on mobile phone. Masjid Nearby is an application that runs on Android platform that provide navigation function for the user from his current location to the selected nearby Masjid. In order to develop this mobile application, the researcher have been using few programming software such as Android SDK, Eclipse and integrated it with Google Maps. The final product of the application have been evaluated with 20 respondent in UNIMAS by using modified Questionnaire of Technology Acceptance Model (TAM). The Masjid Neaby Mobile Application as final product have been successfully develop.

Keywords: Android, Mobile application, Eclipse, Google Maps, Mosque, Navigation, Technology Acceptance Model

ABSTRAK

Setiap tahun, UNIMAS akan menerima sejumlah besar pelajar baru yang datang dari seluruh Malaysia sama ada dari Semenanjung mahupun dari Sabah Sarawak. UNIMAS juga menerima pelajar antarabangsa yang datang dari pelbagai Negara lain. Sebahagian besar daripada pelajar baru ini tidak biasa dengan lokasi baru UNIMAS yang terletak di Kota Samarahan dan Kuching Sarawak. Untuk pelajar muslim, isu yang timbul dari permasalahan ini ialah kesukaran untuk mencari masjid berdekatan apabila mereka berada di luar UNIMAS. Banyak masa yang diperuntukkan untuk mencari masjid terdekat dengan cara bertanya pada orang sekeliling. Kajian ini menjadi manfaat kepada semua sebagai satu jalan penyelesaian dengan menghasilkan satu applikasi yang boleh digunakan dengan telefon pintar. Masjid Nearby ialah satu applikasi telefon pintar yang boleh digunakan di Android platform yang menyediakan navigasi dari lokasi pengguna ke lokasi masjid terdekat. Software seperti Android SDK dan Eclipse digabungkan dengan Google Maps untuk menghasilkan Masjid Nearby Mobile Application. Applikasi ini juga telah diuji dengan Technology Acceptance Model dan respondent untuk kajian ini ialah 20 orang pelajar baru UNIMAS. Masjid Nearby Mobile Application telah berjaya disiapkan dan applikasi berfungsi seperti yang telah direncanakan.

Kata Kunci: Android, Mobile application, Eclipse, Google Maps, Mosque, Navigation, Technology Acceptance Model.

CHAPTER ONE

INTRODUCTION

Background

The big picture of this research is to invent a mobile application that can function as navigation or recommender system to the targeted user. It comes from a real issue that happens to new students that just registered in UNIMAS. Many of the students comes from everywhere either from peninsular even from Borneo itself. UNIMAS also accept registration new student from international. UNIMAS itself is located in huge area at Kota Samarahan, Sarawak (Laman Rasmi Majlis Daerah Samarahan, n.d.).

From this issue, as they are still new to this location, they do not specifically know the specific location such as mosque. This research focus on recommender system for mosque. This is because to help new student locate the nearest mosque to their location. It is really hard to find the nearest Mosque especially when the new student is outside from campus. Student tends to get lost because the fact that they are not familiar with the area. In fact, searching the nearest mosque can takes a lot of times. Due to this issue, some student takes this factor as an excuse to leave Solat. It should not happen as Solat is a must in Islam. It is really awful as not to complete the prayer simply because they cannot find the Mosque.

In order to prevent this problem or difficulty which is to navigate to the nearest Mosque, the researcher takes an initiative to invent a mobile applications that can works as navigation tool for new student. Basically, the application will works as a helping tool that can display map and the list of nearest mosque to the current location of user. To make this success, the researcher will use few programs that works together such as Eclipse software, Android SDK and Google Maps API. Eclipse can be defines as a bundle tools that provide function or

access to the developer that works as for writing, modifying, compiling, debugging and deploying the software (Tony De Vita, 2014). While Android SDK is a set of development tools used to develop applications for android platform (Techchopedia, n.d.). Android SDK itself can write the coding for development of software but usually the programmer tends to integrates this Android SDK with others integrated development environment (IDE) such as Eclipse software. Next, the Google Maps API provide free function to display maps and the nearest location. The developer need to register email as a condition to use this function. Some algorithm that used by Google Maps API is Dijkstra's Algorithm. This algorithm is created by Dijkstra himself by identifying the location based on other location and find the shortest path between the locations (Teresco, 2010).

In addition, to make this research more reliable, some of the research has been conducted based on keywords such as mobile application, Google Maps API and the recommender system. Some of recognized research that have a bit similarity based on the researcher ideas is Learning and Recognizing the Places We Go (Hightower, Consolvo, LaMarca, Smith, & Hughes, 2005). This research used Beacon Print as a tool to detect, and display map based on the user location. Plus, through this algorithm, they can collect and detect by using WIFI and GSM radio. These method can happen as they collected all the information needed from personnel mobile devices. Then the algorithm itself will learn the geometry and waypoint of the targeted locations. The next research is Sharing the Square (Brown et al., 2005). This research is more simplified compared to the previous version. The developer will tracked the user location by using GPS. They are using George Square System and EQUIP that enable the usage of GPS for tracking the current location. Moreover, the researcher also provided extra function in the application by letting the user to share photograph and voice chatting among the user. There is more research that seem a like to the developer research, Masjid

Nearby Application. All the research will be discussed in more details at Literature Review's part.

Statement of Problem

No such study has been conducted specifically for Masjid Navigation.

After the researcher finds some basic ideas through the research, it comes out that, there is no similar study that have the same objective as the researcher wants to do. However, there is a lot of research that are found a bit same but have different perspective towards the research itself. For example, there is a research that did almost same as what the researcher is doing. The research is the Development of Web Application for Muslim Traveller with Emphasis on Social Networking (Gunawan, Kartiwi, & Omar, 2012). Although this research is almost the same, but the ways is different. This research is focus on social networking such as Facebook and etc. While the development of Masjid Nearby Mobile application is focus on the mobile application itself. Though, the researcher of this research provide a lot of others functions such as time prayer but, it is connected to the social networking. There is no specific research that solely focus on the navigation tools for masjid finder as what the researcher trying to invent.

Most of previous research is focus on tourism area.

As been discussed before, through the collecting information via previous research, there is a lot of research regarding the recommender system and etc. However, there is a gap through all the research. Basically all of these recommender system is focusing on tourism area. There is insufficient or lack of information about the recommender system towards mosque. Due to this factor, the researcher take the challenge to invent one of the application that apply recommender system specifically to navigate Mosque.

It cannot be denied that previous research about recommender system is very excellent research such as Learning and Recognizing the Places We Go (Hightower, Consolvo, LaMarca, Smith, & Hughes, 2005) and Focused Palmtop Information Access through Starfield display and Profile Matching (Dunlop et al., 2004) and many more. But all of these research was intended to specifically cover for tourism area such as historical places and interesting places. However, the basic and design research is still the same. Thus, in order to make this Masjid Nearby mobile application success, the researcher will try to adopt few things that can be applied in the research.

Research Objective

Main Objective:

- To help new UNIMAS student to find nearby Masjid location to perform their prayer.

Specific Objective:

- To design mobile application for recommender system locating the masjid.
- To develop Masjid Nearby Mobile application that functionally works.
- To evaluate Masjid Nearby Mobile Application by using Technology Acceptance Model (TAM).

Significant of Study

- a) Helps worldwide in term of recommender system specifically towards mosque compared to other research which more focus on tourism area.
- b) With the invention of Masjid Nearby mobile application, it solved new students problem regarding on finding the nearest masjid to perform prayer.

- c) With the aids of the navigation tool, Masjid Nearby, there is no excuse for not to perform prayer based on the reason of there is no mosque or do not found any nearest mosque.

Scope of Study

This research, the development of Masjid Nearby Mobile Application is only focusing on the navigation from user current location to the nearest mosque nearby. Although there is a lot of others functions such as time prayer display, chat box among the user and etc it will not be the focus or attention of the researcher. The research solely will adapt based on the recommender system based on previous research and integrated it with Google Maps API. The research itself is to develop mobile application that will be used in Android System. Web development such as on laptops, computers will not be the researcher attention. Moreover, there is other systems such as ios, blackberry and etc system that can also be used in mobile application. However, it will not be executed by the researcher. This is because the researcher will use Android SDK as development tools that limit the usage to Android user only.

Definitions of Terms

In this research, there will be three important terms that will be defined as the progress of this research:

- a) Mobile Application

Mobile application can be defined as any application that will used mobile or smartphones to runs the system on it. There is a lot of system such as ios, android, blackberry and etc. Those system is not the same as one another. If the application is designed for android system, only android phone can be used the application.

b) Recommender System

It can be defined as a system / engine for information filtering system that seek to predict preference from the user. It have two main categories. The first categories is collaborative by predicting what users will like based on other users actions. While the second categories is content based. The content based is algorithm that will recommend items or preferences that are similar to user liked / actions in past or present.

c) Google Maps API

Basically it is a functions that provided by Google corp that display the maps and works as navigation tool for the user. It used Dijkstra's algorithm shortest path to decide the pathway between the locations. It also works on waypoint by deciding the shortest coordinates (latitude / longitude). It is free to use but the API key must be obtained by developer through e-mail registration on Google.

CHAPTER TWO

LITERATURE REVIEW

Introduction

Basically in literature review part, the researcher will discuss and gather all required information that will help to achieve the researcher objective. The objective is clear, to develop an application (mobile application) that navigate user to the nearest mosque. In order to do that, this part will have several main parts that work critically to make this project success. The parts are the related studies, the Recommender system, the Android and Mobile Application, and GPS with Google Maps API. All of these parts will be discussed and explained clearly to enhance the understanding regarding this matter.

Related Studies

Focussed Palmtop Information Access through Starfield Displays and Profile Matching

This research is about Taeneb CityGuide that uses technology Starfield to display it on palmtop services. Basically, this research provides a guide and navigator that specifically for tourism purposes. The suggestion will be made based on user's previous interactions and the rating from other viewer. Starfield display technology can be defined as a fast and dynamic to large amount of complex data through scatter-plot and dynamic queries (Ahlberg, & Shneiderman, 1994). In this research, the research targeted place is in Glasgow and focus on restaurant as a guide for the tourist. Meanwhile, the suggestion will produce to the user for restaurant guide, few other interesting places will also be suggested in the system such as cinemas, theatres and pubs. With all this layout display of Glasgow, the researcher aim is to support tourist's unstructured searching by developing a mobile application. Although it is a mobile application, it only can be run on palmtop. Other platform such as Android, Windows

Mobile and etc cannot use this facilities because it is not supported. Due to this fact, it brings to us a few weaknesses that was found in this research. The first weakness is the Starfield itself only can be display on large color screens. Thus, for small mobile application, it is not suitable to use this technology. The second weaknesses is it only can be run on palmtop OS. It really give a big effect to the usage since the other technology such as Android and iOS for Apple keeps increasing. The researcher should develop or build a hybrid application that can runs on all platform or choose the most popular among the user.

Sharing the Square: Collaborative Leisure in the City Streets.

The next related studies is from this paper. This paper is about the collaborative filtering algorithm uses historical data of previous user to recommend places (Brown et al., 2005). In this paper, the suggestion place is still focus on tourism area. The developer have been developing this mobile application that allows the users to collaborate to each other through sharing experiences. They can share pictures and voice among each other in term of interested place. All of this experiences to the user is as leisure that take benefits from an access mobile user collaboration. If the mobile application have a lot of user, the leisure will increase as they can shared even more with user. In this research, there are 4 important criteria to make this mobile application a success. The first one is user's location are tracked with GPS and will be display on the map. Next, the user can capture the pictures from the interested places then shared it with others. Third, from all of experiences from the user, the system will analyses and make a suggestion of interested places that will be displayed on the map. Lastly, to enhance more collaborative leisure among user, the developer allows voice-over-IP to support chat among user. The system developed is George Square system that works for outdoors as long as connection is available. Although it is a good system that provide access to the user as guideline and navigator tool, a disadvantage have been found on this mobile application. The main weakness is as it is a collaborative system, the user only

can only be shared with others that have install the application in their mobile phone. If the user did not install it, the shared place or event cannot be seen. Even the pictures and voice talk will not be recorded into the George System.

Development of Web Application for Muslim Traveller with Emphasis on Social Networking

The next related studies is a bit similar to the researcher area. This paper focus on developing web application for Muslim traveller (Gunawan, Kartiwi, & Omar, 2012). The different things between this paper with the researcher research is this paper more emphasis on Social Networking such as Facebook. Moreover, it also provided a lot of other access such as finding the mosque, prayer time, Qibla direction and halal food. All of this access can be achieve because it link with the social network. The online application and social network will verify the user's location then provide or suggest to the user the required information. This web application is develop by using Unified Modelling Language (UML) as it design for computer uses. The target audience is larger as the user can connect from the social networks. However, this application is not accessible through mobile application. It is a bit offside as the researcher area. The guideline and the way of this research still can apply as it show a similarity to the research.

Location Based Services to Improve Public Transportation

The next research is focusing on mobile application that provide info about the state public transport (buses) for the selected route (Srinivasan, 2011). The researcher take benefit from Location Based System (LBS) to optimize city bus services. The main objective of this research is to help the user by providing information regarding the public transport. To achieve that, the researcher have develop a mobile application. This mobile application is also using GPS based system that can determine the current location of the user. After the

current location have been identified, a map interface will display important information such as potential bus stop. Moreover, the list of directions also will be appeared to be access to the user. The researcher have decided to run this mobile application on Android system mobile phone compared to other system such as iOS and Blackberry. The choosing of Android platform compared to others is because the Android is more marketable and free access to developer also to the user. To develop this mobile application, the researcher also use Android SDK, Eclipse and Google Maps. The disadvantage of this mobile application is as it build for Android user, other user platform such iOS, Windows phone, Blackberry and etc cannot use this application on their phone.

Recommender System

As navigation tool, recommender system is crucial to makes this happen. It can be defined as an information filtering that allow machines learn and analyse data of user experiences then suggests or recommends places based on the input data (Hsu, Lin, & Ho, 2012). With the aid of this system, the user can get the important information such as where is the mosque location based on the data input. The data input is generating by machines that learns from past user experience. Means, if the data input learns by the machines increasing, the feedbacks or decision makes also become more complex as the system growing larger. To makes the system as simple as possible, it only required data which selected such as the distance of the current user location to the nearest mosque.

A lot of previous research stated that the recommender system have two different approaches that work differently but have the same objective, to produce decision makings to the user (Hofmann, 2004; Shahabi & Chen, 2003). The first approach is content-based approach and can be known also as feature-based or cognitive filtering that derived from information retrieval method (Ansari, Essegaier, & Kohli, 2000). It focus and emphasize the

analysis of an item. By studying the characteristics of an item and differentiate to user profile, the system suggest to the user appealing items (Hsu, Lin, & Ho, 2012). This algorithm try to recommend items that are similar to user liked in past or present. Next, the second approach is collaborative filtering approach. This approach uses collective information from other users to determine a suggestion to targeted user. Because of this, it is important to make sure that the system itself enable to detect community with a common interest and similar characteristics then assimilate the result as request from the user. Fail to determine the community will ruins suggestion from the system. For example, the research interest is mosque, producing the result that shows tourism interest is not allowed at all.

One of the example application that use recommender system is Sharing the square: Collaborative Leisure in the City streets from (Brown et al., 2005). This research is focus on tourism area such as historical or interested places. The system use collaborative method in recommender system to suggest interested places to the user. As been discussed before, as collaborative system, it generate the suggestion based on data that have been liked by others user. The place will be a highly recommended if it get higher rating by previous user. This research success to allow city visitors to share their experiences with other users through tablet or smartphones. There are 3 main steps involve to make this collaborative method success. The first one is users' locations are tracked using GPS and displays it on map. Next, users share pictures from their smartphones. Lastly, users' behaviour and experiences is recorded and compared to the other user past behaviour. These data will be used to produce suggestion or recommend place to the next user that want to use this decision method.

Android and Mobile Application

Android is a software platform developed by combination of Google and The Open Handset Alliance that consist approximately 30 organization (Industry Leaders, n.d.). This

Android is an open-source software that contain operating system, middleware and key mobile applications that can shape mobile application into new areas (Meier, 2012). Several companies such as Google, HTC, Motorola and etc joned together to shape a new product 'Android'. The combination of this 'Android' is an open-source software platform built on Linux kernel version (Hartman, Greg, & Kroah, n.d.). In addition, Android also has a set of applications that consists of an email clients, calendar, maps browser and more. All of these applications is written in Java language or C++ language. The Android have been selected or to be the most selected choice from the developer. There are two main reasons why this occur. The first reason is Android provide access to technical advantages. As been told, android was created by using Java language, which is powerful and can be adopted language in the global development community. The second advantage is business advantages. All of the Android application can be sell on Android market Google's open source. As Google set simple rules and procedure as a condition to be allowed the application in Google Market, a lot of developer takes this access to produce more creative mobile application in Android Market (Butler, 2011).

As been discussed before, the research idea is to develop an application that works on mobile phones (android phone). Working platform is based on mobile application, others platform such as computer or etc will not be included. The reason behind this is because there is more and more user using their phone. The factors that makes this happen is the phone itself is easy to carry away and it have wireless communication (Park, Hong, & Cho, 2007). Thus, it helps the user to search on interest place by only using their phone. For example, by using smartphone, the user is able to search interesting place and navigate to that place. As researcher interest, the targeted place will be the mosque as it use mobile to navigate to the mosque location. However, since there are a lots of information can be retrieve, it is difficult to find a proper place to one's preferences time (Park, Hong, & Cho, 2007). To avoid this

happen, recommender system comes in handy like “MovieLens Unplugged” use this system to help the user to choose the suitable movies based on their preferences (Miller, et al., 2003).

Moreover, mobile application also have advantages through the Global Positioning System (GPS) that covers most of the earth’s surfaces (Hightower, Consolvo, LaMarca, Smith, & Hughes, 2005). By using this advantages, some researcher takes fully benefits because through GPS, location-enhanced is possible. These location technologies makes researcher easier to integrate the system with applications such as mapping and way-findings. One of the example is BeaconPrint (Hightower, Consolvo, LaMarca, Smith, & Hughes, 2005). This BeaconPrint is most suitable as it associate mobile, GPS and WIFI radio fingerprints to automatically learn the places they go and then detect when they return to those places (Hightower, Consolvo, LaMarca, Smith, & Hughes, 2005). However, the BeaconPrint have its own weaknesses. This technology does not automatically assign names or semantics to places. It only detect latitude and longitude if a place is selected. For example, if a user select the nearest mosque to his current location, the BeaconPrint is unable to give response in semantics name such as Masjid Darul Iman.

Next, some researcher also try different approach on how to take benefits by using mobile. Through the mobile, some researcher develop application but in web form. Means, the user can use the application, but must go through Web in their phones. One of the example is the development of web application for muslim traveller with emphasis on social networking. The different between those researches with current research is that they use web and emphasis it on social network while this research is solely specific on mosque navigation in mobile application. There are a lot of integrate function as they use social networking such as findings the mosque to pray, praying time, qibla direction and halal foods. As their platform is web-based using UML (Unified Modelling Language) compared with the mobile-based that used Android SDK application.

On the other hand, mobile phones also can be integrate with location-based services (LBS) by using GPS and web services. Location-based services can be defined as a set of applications that exploit the knowledge of the geographical position of a mobile device in order to provide services based on that information (Singhal, & Shukla, 2012). It is working by providing the mobile clients personalized services according to their current location. This is very helpful as it can detect the current location for the user. The display of the location can be display in term of spatial location or text description. In term of spatial location, it represented as latitude-longitude-altitude coordinates num5. This way of display can makes the user confuses as they are not used to read coordinates. The text description is more to be choose as its more convenient as it display a street location and address. It can help the user navigate easier to the nearest mosque by displaying the address of the mosque rather than the coordinates.

Moreover, the usage of mobile also have some weaknesses as navigation tool. These weaknesses have been discusses broadly by Cena et al. (2006) in their research. One of the limitations are mobile services is different from the usual access from standard personal computer. They defines it as the interaction of the user with the system itself. The user may have difficulty to interact with the mobile because the limitation of the screen that display lows pieces of information as size of screen is limited. Next, it is also state that connectivity constraints also play important role in mobile application. The connectivity via mobile devices is expensive and bandwidth is low and not always reliable. These connectivity issues may affect the interaction of user with mobile application especially in navigation. It is urge that all of these factors must be overcome first to make sure the efficiency of the mobile application.

GPS and Google Maps API