

**GEOTRAVEL: HARVESTING AMBIENT GEOGRAPHIC
FOOTPRINTS FROM GPS TRAJECTORIES**

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GEOTRAVEL: HARVESTING AMBIENT GEOGRAPHIC
FOOTPRINTS FROM GPS TRAJECTORIES

LIEW LI CHING

This report is submitted in partial fulfillment of the requirements for the
Bachelor of Computer Science (Artificial Intelligence)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
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2014

DECLARATION

I hereby declare that this project report entitled
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STUDENT : _____ Date:
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SUPERVISOR : _____ Date:
(ASSOC. PROF. DR.GOH ONG SING)

DEDICATION

This project is dedication to my family who always give me support throughout the whole project. Besides that, this project also dedicated to my supervisor and my helpful friends that help during this project developed.

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to my supervisor Assoc. Prof. Dr Goh Ong Sing for his patience, motivation, enthusiasm, and immense knowledge in these 6 months. His guidance helped me a lot all the time in completing my project and report.

Beside my supervisor, I would like to thank my family for supporting me spiritually and encouraging me with their best wishes throughout this project. They always are my motivation in completing the project.

Furthermore, I would like to take this chance to thanks my friends and seniors for giving me guide and supporting me along my project completion, and thanks for their help in testing the system during user acceptance testing.

Last but not least, I would like to express a very special thanks goes out to all the people that guiding me directly or indirectly along the project that I hard to mention here one by one. Thanks for their time and effort.

ABSTRACT

The study is about harvesting point of interest from GPS trajectories. Trajectories are the paths that moving objects move by follow through space in a function of time while GPS trajectories generally are point-sequences with geographic coordinates, time stamp, speed and heading. User can get information from GPS enable device. For example, user can acquire present location, search the information around them and design driving routes to a destination and thus design travel itineraries. By sharing GPS logs among each other, people are able to find some places that attract them from other people's travel route. Analysis on the GPS logs can get the point of interest that is popular. By present the point of interest, user can choose travel place easily and the travel itineraries is plan based on the user preferences.

ABSTRAK

Projek ini adalah tentang analisis data daripada GPS trajektori. Trajektori adalah laluan sesuatu objek mengikut ruang tertentu pada masa tertentu manakala GPS trajektori adalah urutan yang terdiri daripada geografi koordinat, masa, kelajuan dan penerusan. Pengguna boleh mendapat maklumat dari alat GPS. Contohnya, seseorang boleh mengenalpasti lokasi dia dalam bentuk geografi koordinat, carian maklumat dan merancang laluan jalan ke satu destinasi dan seterusnya boleh merancang jadual perjalanan semasa melancong. Perkongsian GPS trajektori antara pengguna, seseorang dapat mencari tempat pelancongan daripada analisis data GPS. Selain itu, analisis log GPS dapat mengemukakan tempat-tempat menarik yang selalu dikunjungi. Pengguna boleh pilih tempat-tempat pelancongan dengan lebih mudah dengan menggunakan sistem yang dibangunkan. Pengguna boleh merancang jadual perjalanan mengikut rujukan yang dicadangkan. Oleh itu, satu aplikasi mudah alih yang menggunakan hasil penyelidikan telah dibangunkan.

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LIST OF ABBREVIATIONS

ADT	–	Android Development Tools
API	–	Application Programming Interface
APK	–	Android Application Package File
DFD	–	Data Flow Diagram
GPS	–	Global Positioning System
IDE	–	Integrated Development Environment
JDK	–	Java Development Kit
JDT	–	Java Development Tools
MB	–	Megabytes
OS	–	Operating System
POI	–	Point of Interest
SDK	–	Software Development Kit
SDT	–	Software Development Team
UI	–	User Interface
UML	–	Unified Modelling Language
XML	–	Extensible Markup Language

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CHAPTER 1

INTRODUCTION

1.1 Project Background

Smartphones nowadays are integrated with advanced technology that make smartphone is not a wanted item but is a needed item. Smartphone make people life more convenient and easy, everything become simple once you own a smartphone. People can use smartphone to surf internet, pay bill, e-learning and many thing else. One of the important thing that can be done by smartphone is smartphone can act as a GPS (Global Positioning System) device. A lots of GPS navigator software are available in the market. The GPS navigator navigate the route from one place to another place. The shortcoming of the GPS navigator software is the user do not know how other people travel or what is the suggested route. People may want to know how other people travel and where is the interesting place.

Trajectory mean path of moving object that follows through space as a function of time while GPS trajectories is the point sequences with geographic coordinate which someone had travel along. GPS device is one of the examples of location-acquisition technologies. By using GPS device, people will be able to record their journey or location history with a sequence of time-stamped. From other people GPS trajectories, someone can know life interests and preferences of that user, thus faciliated people to do things. Trajectories can link peopele in the physical world by location.

Personal GPS tracking trajectories generally are point-sequences with geographic coordinates, time stamp, speed and heading. Automatic recorded GPS travel data can not only reduce the burden of persons who participant in travel survey, but also provided detailed and accurate information in time, geo-locations and route choices. However, several data processing steps are required to explore knowledge hidden in raw GPS trajectories. One of these procedures is Activity Identification which aims at discovering activities in trajectories since travel purposes are obviously not included in GPS traces. And as the volume of historic data keep increasing, completely computer aided methods are need.

By analysis on GPS trajectory, people city travel sequence can be known. This is different from the traditional travel data. The raw GPS trajectories do not contain information about trip purpose or activity, it just include GPS coordinate and time. Earlier studies addressed this issue through a combination of manual and computer-assisted data processing steps. Nevertheless, geographic context databases provide the possibility for automatic activity identification based on GPS trajectories since each activity is uniquely defined by a set of features such as location and duration. Increasing in the usage of GPS capabilities device, positions of mobile objects can be detected.

GeoTravel in harvesting ambient geographic footprints from GPS trajectories project is about analysis GPS trajectories form various user and getting the POI (point of interest) of the users. Stay point is detected from the GPS trajectories and the result is clustered by density based clustering (OPTICST). GeoTravel application can detect the location of the user automatically and therefore can give some suggestion on interesting locations. Classical travel sequences by the users can be known by GPS trajectories. This will help people who wish to plan travelling trip by themselves.

In conclusion, the dataset of GPS trajectories will be first collected and follow by analyzed. From the analysis, we will get the top interesting location (point of interest) and travel sequence among location. From that, we can transfer the point of interest into customize itinerary which will generates multiday itineraries for the users.

1.2 Problem Statements

Here discuss with the problem statements that happen in the real life scenarios that proves the need of building a GeoTravel application to make the trip planning easier.

i. Users need a system that can auto detect their location

The users need to enter the location in order to search the interesting place in some of the system/apps. It is time wasted and complicated if the users want to search the place of interest which is nearby them.

ii. Users need effective system that can suggest the place of interest and live event

Most of the traveling planner application do not include live event. The live event that held in a place is important for a travelers because some of the traveler especially backpacker may want to join local event to gain more experience.

iii. Users especially backpacker need an efficient and economic trip plan application

Creating and efficient and economic trip plan is the most annoying job for a backpacker traveler. Although travel agency can provide some predefined itineraries, they are not tailored for each specific customer.

iv. Users or travelers need a system that can generates multiday itineraries

In most of the existing itineraries planning system, it only provides single day itineraries but in the real world, most of the people will travel in one place more than one day. Therefore, travelers need a system that can help them plan a multiday trip.

v. **A traveler used application could be better**

There are similar applications for travelers use is published in Play Store. However, that is still not good enough for travelers. It should be more user-friendly and cover more things about the point of interest of the place.

1.3 Objective

The problem stated perhaps can be solved by developing this application for travelers. Here states with the objectives of building this application.

i. **To access user location by IP address and GPS trajectories**

The system should be able to get the users/travelers location automatically so that it can suggest the place of interests to the users based on the location. This will save the time of the user on insert the location manually.

ii. **To understand GPS trajectories**

Study and understand GPS trajectories from previous travelers not only can know the life interests and preferences of the traveler, it also facilitated people to do many things. From the GPS trajectories, we can suggest the traveler the common travel plan and include live event in the place of interests list.

iii. **To build an efficient and economic trip plan application**

Analysis the data of GPS trajectories will give popular places that traveled by most travelers. Recommendation is made based on the analysis result. User can plan their trip base on the recommendation.

iv. To build a system that can generate multiday itineraries

In most of the existing application, it only provides single day itineraries. This application can generate multiday itineraries with no repeat of place of interest. This helps most of the users because normally a trip would not be only one day.

v. To build a user friendly and high effective application for traveler use

This application will focus on graphical presentation. That is, interesting icons and colourful features are introduced in the application to attract users' eyesight. Other than just plan the itineraries of the trip, this application also give recommendation on the traffic.

1.4 Scopes

i. User

The system is mainly developed for the users such as below:

- **Backpacker**

They are one of the main end-users of this application which the function of the system is built especially for their usage. They can plan their multiday itineraries based on the point of interests that provided by this application. Besides that, they also can include the live events that occur at that time into their trip. This application will calculate the shortest path to use for the users.

- **Local Traveler**

Local traveler is the people that wish to travel in his own place. Usually local people aim is to find the live event or restaurant in the town. This application provide point of interests include restaurant and live event for the user to choose. This application will plan the itineraries based on the user selection, therefore different user preferences will not affect other.

ii. Platform

- Web-based

This system is a web-based system. User can surf the website by internet browser. Every information can be look through the web site. User can plan their trip by using web system.

- Android

In order to simplify the system, android application is built. This android application can run on all android base smart-phone. Other platform such as Mac OS is not available for this moment.

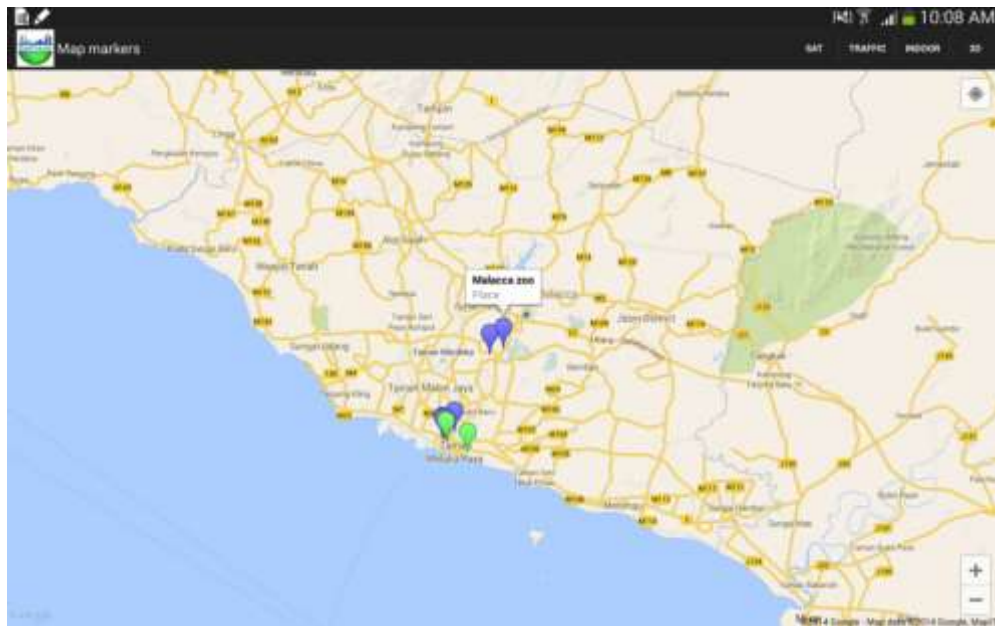
1.5 Project significance

GeoTravel Application is built to improve the efficiency for travelers especially backpackers to plan their multiday itineraries. The point of interests that suggest to the user is based on other people trajectories history. This application provide several features like

- Get the users location
- Get the users GPS trajectories
- Analysis the GPS trajectories from other travelers
- Suggest point of interest and live events
- Perform multiday itineraries based on the user preference
- Suggest the best route for the user
- Advice user on the traffic
- Cost estimation

GeoTravel Application used a useful method to analyze the GPS trajectories from other traveler. It will give the result of the top interesting location and common travel sequence among location. It is easy to plan your own trip with this system. User only needs to select the point of interest that wish to travel and the system will automatic give the itineraries as the result.

7. User can view the detail by click the marker.



8. Direction and Distance is show when user clicks the button at menu.

