Azlizan Adila Mohamad et al., 2016

Volume 2 Issue 1, pp. 59-69

Year of Publication: 2016

DOI- http://dx.doi.org/10.20319/Mijst.2016.s21.5969

This paper can be cited as: Mohamad, A. A., Pugi, N. A., & Zainol, H., (2016). The GIS Application in Smartphone for Tourism. Matter: International Journal of Science and Technology, 2(1), 59-69.

THE GIS APPLICATION IN SMARTPHONE FOR TOURISM

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Abstract

Tourism industry is one of the important economic resources in Malaysia. Tourists from all over the world come to Malaysia to enjoy the beauty of this scenic and tropical country. Accordance to government's efforts in promoting 'Visit Malaysia', facilities and development of tourist places are rapidly developed. Due to this matter, the data available should be updated to ensure travelers receive the updated and accurate information of Malaysia. Common approach for field data collection was carried out using pen and papers that requires the field data collector to bring the map to the field and mark the data on the map. With the advance of technology, integration of smartphone and Geographic Information System (GIS) become popular approach in field data collection. The purpose of this paper is to identify interesting places and hotels in

Bandar Hilir, Malacca using GIS mobile data collection. The method of the research can be divided into three stages such as planning the data field, data acquisition and database development. The planning stage focuses on choosing data collection materials. The data acquisition stage is more on field data collection process and database development concentrates on creation of tourism database. ArcGIS software will be used for the study. The application of GIS can be very useful in tourism industry and offers tremendous opportunity in order to ensure better services and life quality.

Keywords

GIS, Mobile Data Collection, Tourism, Smartphone

1. Introduction

Tourism industry is one of the important economic resources in Malaysia. Tourism industry is assuming a greater role in stimulating the economy during the Eighth Plan period (Economic Planning Unit, 2014). Government is targeting 29.4 million foreign tourists with RM89 billion expected revenue, in conjunction with the programme such as 'Malaysia - Year of Festivals 2015'. In that programme, RM316 million is allocated under the Ministry of Tourism and Culture (Berita Harian, 2014). The increasing number of tourists visiting Malaysia leads to the growth of new hotels and interesting places in Malacca. This is because Malacca is one of the states that give higher contributions to the tourism sector in Malaysia. The rapid changes of development in Malacca require updated and accurate tourism data as well. Appropriate method of data collection is needed to ensure that the latest data can be provided.

Constantly with the latest technological developments, GIS becomes popular tools for many industries including tourism industry. Tourism is an emerging application in the field of GIS (Gill, & Bharath, 2013). GIS is a computer based tool for collecting, storing, transforming, retrieving and displaying spatial data from the real GIS world (Rusko, Chovanec. & Roskova, 2010). According to Sahu (2008) GIS is a system for capturing, storing, analyzing and managing data and associated attributes, which are spatially referenced to the earth. The ability of GIS to handle and process geospatial data makes, it suitable tools in this industry. Geospatial data or geographically referenced data describe both the locations and characteristics of spatial features (Chang, 2010).

Recent development in mobile technology leads to the expansion uses of mobile phone not only for phone but also to conduct field data collection. Mobile data collection becomes a very popular approach among the field data collector. Mobile data collection refers to the utilization of existing information technology products such as phones, smart phones and tablets (hardware), and a number of different possible programs (software), for data gathering. Smart phones and tablets become commonly used as geospatial data collection platforms. The uses of mobile phone data collection is more time consuming and suitable for real time data collection.
Integration between mobile devices and basic GIS data process and analysis makes them more popular in data collections. A mobile GIS for field data collection is a system which can facilitate the entire process from indoor preparation, data collection, to data processing. It is a combination of positioning and wireless communication technologies (Yang, Wu .& Ma, 2009). The usage of mobile GIS, combined with the measuring equipment and desktop GIS environment, can obviously make data collection more efficient and accurate (Zhang, Ma & Zhang, 2009).

The purpose of this paper is to identify interesting places and hotels in Bandar Hilir, Malacca using GIS mobile data collection. From the data gathered, GIS database for tourism applications can be developed. There are two hardware and two software used in this study. For the field data collection process hardware used is smartphone with GPS and internet access function while the software used is Mobile Data Collection software. Mobile Data Collection software is an open source software using Android Operation System. Laptop and ArcGIS 10.1 software were used for database development.

2. Study Area

The study area for the research is in Bandar Hilir, Malacca. Malacca is located in the west of Peninsular Malaysia between Negeri Sembilan in the north, Johor in the south and Straits of Malacca in the west. Malacca covered by 1652km2 area with a population of approximately 0.88 million people (Department of Statistics Malaysia, 2015). Malacca is one of the states that give highest contribution to the tourism sector in Malaysia. Malacca is also known as the Historical State that was declared as the Heritage City by UNESCO in 2008 (UNESCO, 2015). Rich with variety of historical places, Malacca is one of the famous attractions to the tourists.

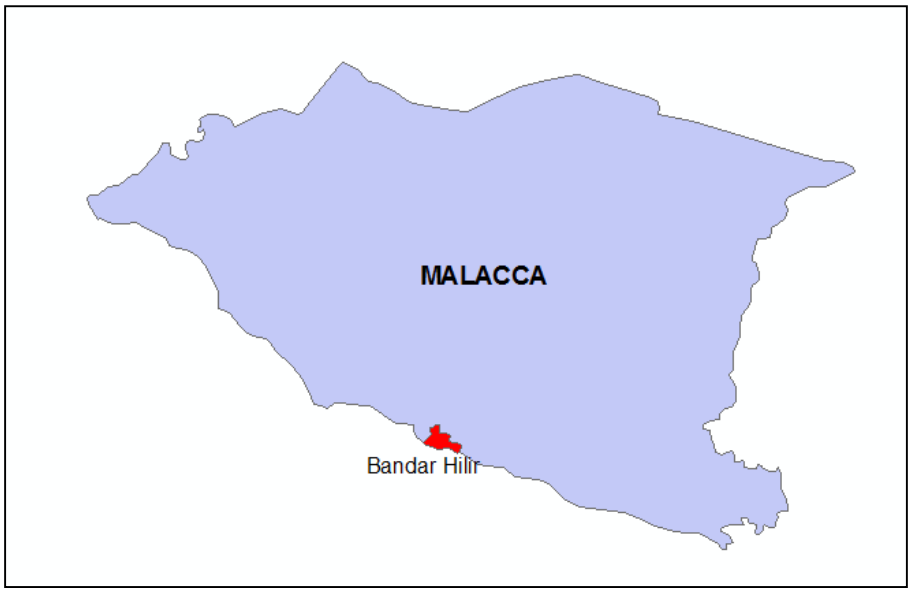

Figure 1: Map of Study Area

3. Methodology

The methodology of this study was divided into 3 phases; Planning Stage, Data Acquisition Stage and Database Development Stage.

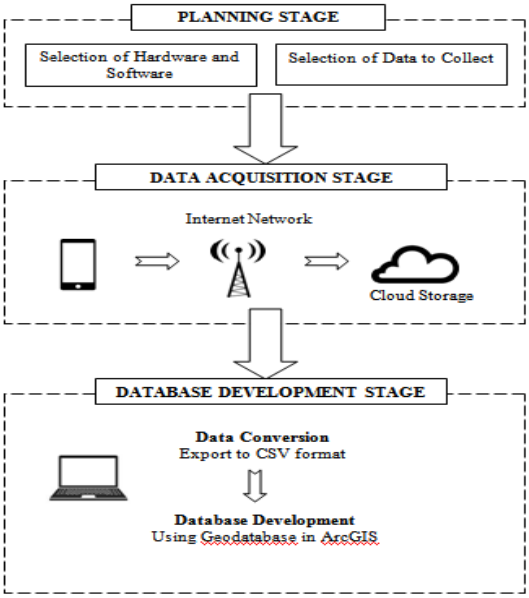

Figure 2: Flowchart of the Methodology Process

Planning stage is about the selection of suitable hardware and software to be used in this study and to plan suitable data in collecting during the data collection. Selection of suitable mobile device is very important to ensure it meets the requirement of this study. The most important requirement is the capabilities to run the software that will be used for data collection. This study also requires the mobile device that has a built-in GPS in order to locate the hotels and interesting places. A stable internet connection also is necessary because the collected data will be directly transmitted to the cloud storage via internet. In order to ensure the data collection fulfills the needs of the database. It is very important to choose the right data collection. In this study, data of locations, names, types, address, phone number and pictures are required.

Data acquisition stage was focused on field data collection processes. The data was collected using smartphone device with GPS functions. GIS mobile data collection software is installed into the smartphone to acquire point data during field survey. Before the field survey is done, electronic form was created to be filled during the survey. In the field area, field data collector will insert the Name, Types, Address, Phone Number, Description and Photos of the point data in the electronic form. At the same time GPS will register the location of the data. The location of the data and filled form were transmitted via internet access to the cloud for data storage.

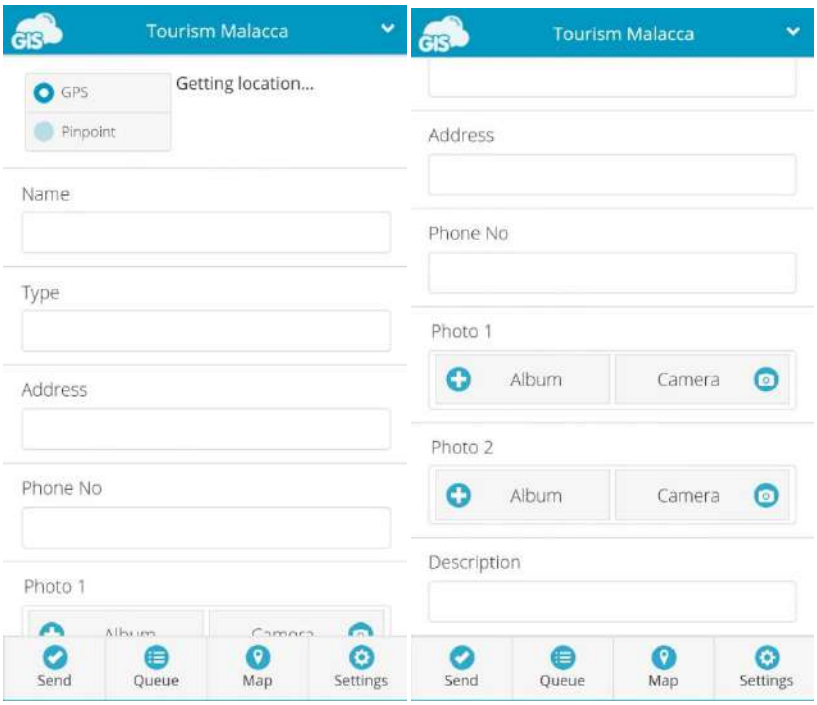

Figure 3: Mobile Data Collection Electronic Form

Database development concentrates on creation of database in ArcGIS 10.1 software. Data from cloud storage is converted into CSV format to open in ArcGIS software. The data then is grouped into two different layers name as Hotels and Interesting Places. Using Arc Catalog in ArcGIS, geo-database named as Malacca Tourism was created. Hotels and Interesting Places layers were exported to geo-database as featured class and data from electronic form will appear as attributes of the data. Geo-database data can be displayed in ArcGIS and attribute data editing can be done.

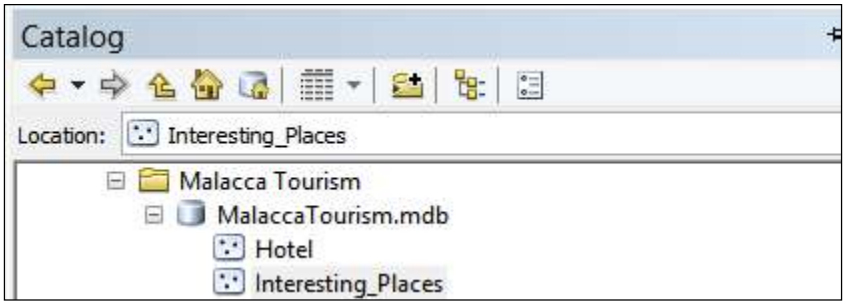

Figure 4: Geodatabase Development

4. Results and Discussion

Interesting places and hotels in Bandar Hilir, Malacca is identified using GIS mobile data collection. Data are collected using Mobile Data Collection software, which is installed in the smartphone. Coordinates of the point data is identified using GPS tracking on the smartphone.

In this study, data of locations, names, types, address, phone number and pictures were filled in the smartphone during the field survey. The coordinates will give the exact location of each data point and locate their locations while filled in data will becomes the attribute data.

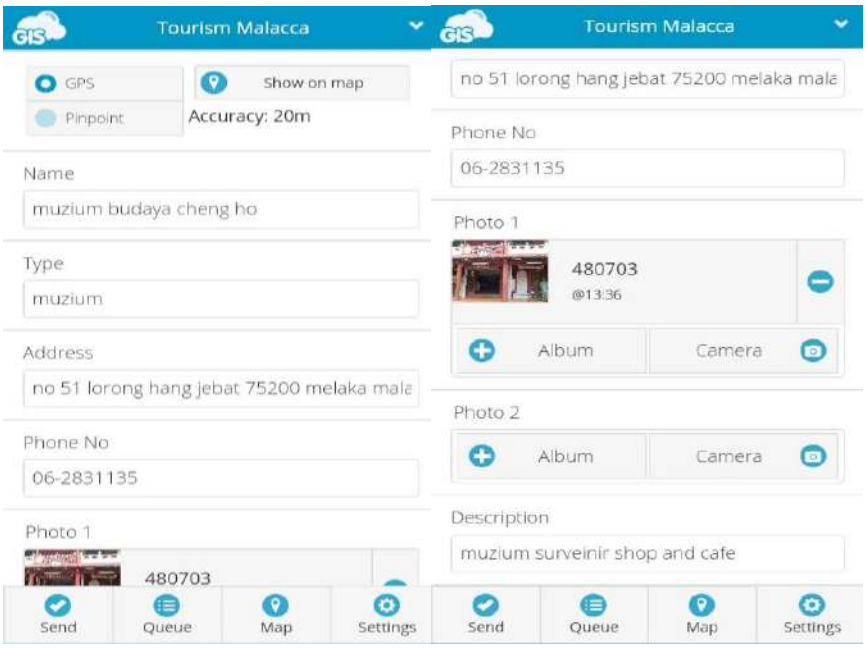

Figure 5: Required data acquired in Mobile Data Collection software

Field data collection using smartphone gives new platform in data collection process. Common approach using pen and paper are time consuming task. Mobile data collection allows users to immediate digitizing the collected data during the field survey. Manual digitizing task in the office after field data survey was done is no longer required. This will reduce a lot of time.

As data is entered directly into digital format mobile field data collection gives real time and ready used data. Data can be exported to suitable GIS software format and it allows user to directly use the data for analysis and application.

Other than that usage of cloud storage helps the data storage capabilities. Smartphone with large storage is not required during the field data survey. This is because the collected data will directly send to the cloud storage using internet access and not in the phone storage.

From the collected data, GIS database of interesting places and hotels around Bandar Hilir, Malacca are developed. This database showed the spatial and attributes data of each collected data. Spatial data showed the location of the point data meanwhile attributes data gives the description of the data.

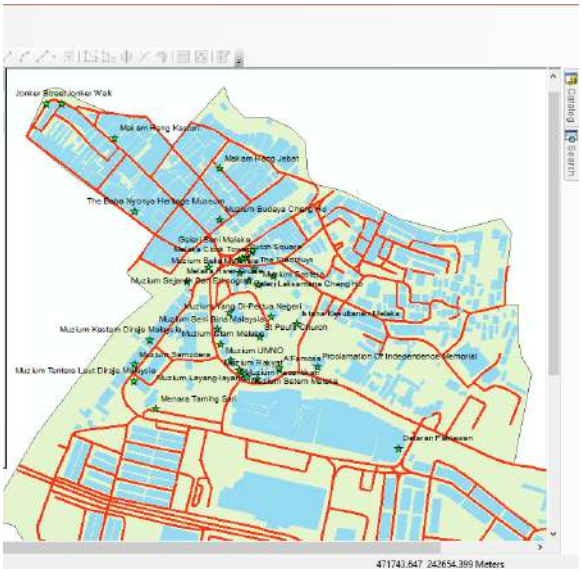

Figure 6: Spatial and Attributes Data of Interesting Places in Bandar Hilir, Malacca

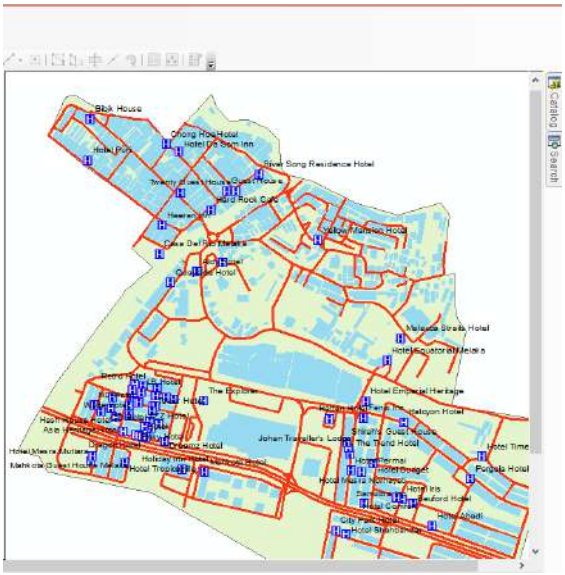

Figure 7: Spatial and Attributes Data of Hotels in Bandar Hilir, Malacca

There are numerous benefits of GIS database in tourism industry. Spatial Search can be used to search any information needed. The query can be done by the location or by attributes of feature in the database. Tourist will easily find the required information and know the location of the information requested.

Other than that, a thematic map can be created from the GIS database. The thematic map can be used for tourism information. Another application of GIS database is for network analysis either for finding the best routes from one location to other location or to find the nearest place from one location.

5. Conclusion

Traditional field data collection using pen and paper is a time consuming task. The development of smart phone has led to the other functions than telecommunication device. Integration between smart phone and GIS enables them to be one of data collection device. Using GIS mobile software and smart phone functions, the location of interesting places and hotels can be identified accurately. GPS in smart phone will track the coordinates of each data and attributes data through the devices. The usage of cloud storage enables the collected data to be store in other places without using the smart phone storage. The collected data later are used

for Tourism GIS database development. The database showed the location of interesting places and hotels together with their attributes data in the digital map. With the development of the database, numerous applications for tourism industry can be done. This contribution will enable to boost the tourism activities in Malacca. If the project is success this application will expand to other interesting places throughout Malaysia.

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