Mobile Application Development for Tourist Guide in Pekanbaru City

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Abstract. Pekanbaru City is a place that has a huge tourism potential. Pekanbaru is very strong with the Malay culture that is proven that Pekanbaru has many Malay style tourism buildings. The culture of Pekanbaru city has different attraction for tourists. Various information about tourism developments, supporting facilities, tourism objects, visitor information about the locals is important information to know. However, many unknown places are worth a visit but people do not know about their existence, because of the lack of public information. The purpose of this research is to design an application on an Android smartphone for Tour Guide Pekanbaru. The system will use GPS to find the user point and can provide information about tourist attractions, hotels, restaurants and shopping so that they can use the time in Pekanbaru effectively. The recommendation would be to use the neighboring K-nearby algorithm (KNN) to determine the closest place. The result of this tour guide is the user can detail information about tourist attractions, hotels, places to eat and shopping centers in the city of Pekanbaru as desired by the user. Tourist attraction information and directions with minimal GPS accuracy error 10 meters distance and maximum error 40 meters. The speed of the application in determining the user position depends on strong network signal and the condition of the surroundings.

1. Introduction
The rapid development of information and communication technology makes tourists easily informed. Internet ease makes travellers find interesting information and planning their activities [1]. The last decade saw a revolution in information communication technology, which not only changes the everyday behavior of people but also affects the way they interact with each other [2]. One of the areas of human life that desperately needs information is the field of tourism. Whether in terms of entrepreneurs or stakeholders who want to market their tourism products and tourists people who want to enjoy their products [3].

Mass tourism has declined and certain types of tourism have increased, especially smaller groups with certain interests and remain more often shorter [4]. In the tourism industry, information technology has also been developed for travel and tourism sectors [5]. The tourism sector is capable of generating approximately 11% gross domestic product and employs 200 million people and serves tourists 700 million people worldwide [6]. Contributions from the tourism industry support about 13% of the total work and that accounts for more than half of the total exported service [7].

Pekanbaru City is a place that has a huge tourism potential. The number of foreign tourists year 2018 to Pekanbaru soared 30 percent as many as 146,935 people. The figure exceeded the previous 2-year achievement. In 2016 it recorded 66,130 people and 2017 reached 91,484 people [8]. Various information about tourism developments, supporting facilities, tourism objects, visitors to information about the locals is important information to know. However, many unknown places deserve to be visited.
but people do not know about their existence, because of the lack of public information. Due to the lack of information on the tourist sites, some visitors should inquire directly with the locals or rent a tour guide to get information about the tourist location.

There is a lot of research on tour guides and City recommends and still growing until now [6][9] [10] [11]. The purpose of this research is to design an app on an Android smartphone for Tour guide Pekanbaru. This system will use GPS to find the user point. The system will provide Information about the tourist attractions, hotels, eateries and shopping venues so they can use Time in Pekanbaru effectively. The recommendation will be to use the K-Nearest Neighbor (KNN) algorithm to determine the closest place. The working principle of KNN is finding the closest distance between the data to be evaluated with its closest neighbors in the training data.

2. Literature Review

In a previous study that made a tour guide application using informative, interactive augmented reality technology and user-specific experiences [11] [12]. Tourism Tamil Nadu E-Guide proposes a Mobile tour guide system architecture capable of providing tourism information to mobile users easily developed using Java as the Front end and SQL as the back end [13]. Mashup technologies that can incorporate more than one data to create value-added services by taking advantage of light-weighted can provide information for tourism guides [14][15].

Prototypes of tourist guide applications were developed using the Smart Space infrastructure to facilitate the integration of the services and internal processes in the system that enable up-to-date information retrieval complete with recommendations and personalised service [1]. Integration of travel guides with social networks and a unique set of options offered in the app [15]. The Mobile travel guide system with three layers of web development architecture was developed to help travellers on their travel [16]. The Global Positioning System (GPS) mobile phone provides a location-based travel guide application for indoor or Outdoor environments [17].

3. Research Methodology

Data collection methods used using interviews, library studies and field observations. The interview is done to get information about the details of the tourist spots and observations to see where the attractions are directly. Methods of collecting data using interviews and field studies. The interview is done to the tourist attractions to get information about the tourist spots. The study of the library is useful to look for references from previous research. In addition, this research also uses KNN algorithm in its implementation. The KNN algorithm is used to classify objects based on the learning data that are closest to the object. The working principle of K-Nearest Neighbor (KNN) is to find the closest distance between the data to be evaluated with its closest neighbor in the training data

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d_i = \sqrt{\sum_{i=1}^{n} (x_{2i} - x_{1i})^2}
\]

The steps in kNN are:
1. Specify the k parameter where k = number of neighbors closest.
2. Calculates the Euclidean distance squared of each object against the given sample data.
3. Sort each object into a group that has the smallest Euclidean distance.
4. Collecting classification categories nearest neighbour (Y).
5. Use the majority of the classification to obtain the classified data

4. Result and Discussion

4.1 Analysis

Analysis of several functions required in the application of the tour guide based on the results of field studies, the minimum functions needed in this application include:
1. Users can get information about tourist sites, markets and culinary places in Pekanbaru city.
2. Users can get access information to tourist sites, markets and culinary places Pekanbaru city.
3. Users can get tourist location information, market and culinary places Pekanbaru city

4.2. Design
This design phase include Unified Modelling Language (UML) design, interface design, and database design. Use case diagram aims to explain the relationship between the user and the system to be created, that is to explain about everything the system will be created and its function. With the use-case diagram can provide an overview of all the uses of the system that include the system will be used for the everyone and what functions.

![Use Case Diagram](image)

**Figure 1** Use Case Diagram

The activity Diagram illustrates the various activities in the system that are being designed, how each flow begins, the decision that may occur, and how the activity ends. The Activity diagram focuses more on the system not on its actors. Where to explain all activities undertaken by the system
Sequence diagrams are used to describe the activity of objects in usecase. Where any messages sent and received on the object are described at this stage.

The user opens the tour guide application, then the system will display the main menu, where there are several menus in the main menu. The user selects the Tour menu then the system will display the tourist data list to the user. The user selects one of the tourist data list to view the tourist information and the system will display the existing tourist attraction info to the user.
Figure 4. Interface Main Menu Design

The main menu page is the start page that will appear when the tour guide app is run. In the main menu, there are several menu options that can be selected by the user. Menu in main Menu interface include Tourist menu, Culinary menu, Market menu and Hotel menu. Each menu has its own function.

Figure 5. Database design

4.3 Implementation

The implementation process is done using Sublime Text's code Editor using Android studio as the application's framework. The display of the application Layout page is created in several XML files containing the respective content, among others Activity_kuliner, Activity_maps, Activity_main, Activity_pasar_modern, Activity_pasar_tradisional, Activity_wisata_alam, Activity_wisata_Culture, Activity_detail_wisata, Activity_detail_pasar, Activity_detail_kuliner, Row_kuliner, Row_pasar and Row_wisata.
The main menu is the first page that appears when a user enters into the application of this tour guide. In the main menu, there are several menu such as Tourist menu, Culinary menu, Market menu and Hotel menu. If the user enters the tourist menu, it will perform a tour that is in the city of Pekanbaru. If the user chooses culinary, it will perform the location of the dining place in Pekanbaru city. If the user chooses the market, then the system will show the shopping place in Pekanbaru City and if the user chooses the hotel menu, then the system will display a list of hotels in Pekanbaru City and exit menu to exit the app.

Figure 6. Snippet of application Layout Script

Figure 7. Main Menu Implementation Display
4.4 Testing

These tests are more focused on the functional requirements of the system. This test is used to generate analyses that are later required to work on all functional requirements of the program. This test serves to find errors that occur on the system so that it is expected to generate error-free systems. In the application of Testing tour guide with Blackbox method in focus on the functional needs of the software.

| Table 1 Blackbox Testing Table |
|-------------------------------|
| Testing | Test Form | Expected results | Test Result |
| Testing apps pekanbaruguide. apk | Clicking the Pekanbaru Guide app icon on the smartphone | The main menu display appears | Successful |
| Travel Menu Testing | Clicking the Tour Menu | The View list shows nature tourism and cultural tourism | Successful |
| Testing the Nature Tourism menu | Clicking the Natural menu | View list of natural attractions | Successful |
| Testing the Cultural Tour menu | Clicking on the Culture menu | View of cultural tourism list appears | Successful |
| Tour detail Menu Testing | Clicking one of its tourist options | view of the selected tour and tourism information | Successful |
| Testing the Culinary menu | Clicking the Culinary menu | Show Culinary List View | Successful |
| Testing the Culinary Detail menu | Clicking one of its culinary options | The appearance of selected culinary displays with culinary information | Successful |
| Market Menu Testing | Clicking on the Market menu | Show list view of modern and traditional market | Successful |
| Clicking one of the market options | Clicking one of the market options | Display the selected market with its marketplace information | Successful |
| Map Testing | Clicking on the Folder menu | Show Route view location to tour/culinary/market | Successful |

5. Conclusion

The application of the tour guide as a result of this research works to facilitate tourists in Pekanbaru. Users can detail information about tourist attractions, hotels, places to eat and shopping places in the city of Pekanbaru as desired by the user. In addition, tourists also easily get detailed information about the tourist attractions so that tourists have knowledge about the tourist attractions before arriving at the location. With the recommendations of nearby locations, travellers can also easily find their closest locations so it saves them time. Tourist attraction information and directions with minimal GPS accuracy error 10 meters distance and maximum error 40 meters. The speed of the application in determining the user position depends on strong network signal and the condition of the surroundings.

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