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Research Article

Geographic Information System of College of Banyumas Regency Based on Android

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ABSTRACT

Banyumas Regency is a student city in Central Java which has 21 tertiary institutions, consisting of state and private tertiary institutions, spread throughout the Banyumas region. With so many PTs available, it is often difficult for prospective students from out of town to get locations, so by building an Android-based Geographic Information System for Banyumas Higher Education Institutions that is built to help and facilitate the community or prospective students. With the prototype method with steps (communication, planning, modeling, prototype formation, and evaluation). The scope of the system includes the GPS assistance facilities. The main menu contained in the application of PTN and PTS about the brief description of information about tertiary institutions, facility menus from the ATM, gas station and hospital sub menus, emergency call menus containing important telephone numbers such as the police and fire department, and help menu how to use the application. Conclusions The study states that HI was accepted, namely "There is a significant time difference in the process of finding the location of tertiary institutions before and after using the Geographic Information System for Higher Education in Banyumas Regency on Android". Then based on the results of product tests that have been done show that the product test value to determine the quality of the system being built is 96.85, the value is greater than the feasibility limit of 75. Thus, the system built is suitable for use by the wider community.

Keywords: *Geographic Information Systems, Higher Education, Android, GPS, Google Maps.*

Introduction

Background

Very rapid technological advances have driven various researches including in the field of geographical sciences. In its development, geographical science can be integrated with information technology that is very beneficial for human life. In addition, smartphones become a very important tool in people's lives, especially among adolescents and adults to obtain various

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information. According to digital marketing research institute Emarketer estimates that in 2018 the number of active smartphone users in Indonesia will be more than 100 million people.

(Source https://id.techinasia.com)

Figure 1. Graphic Smartphone Users in Indonesia

Banyumas Regency is one of the student cities in Central Java consisting of PTN (2) and PTS (19). With so many universities there, often prospective students who come from outside the city, many have difficulty finding the location of the college.

Therefore, it is necessary to have a system that can help solve problems in finding the location of higher education and the route taken to get to the college, especially for prospective students who come from outside the Regency of Banyumas. This system uses the Android operating system and utilizes technology from Google, Google Maps, which is a virtual and online map service. Besides that, internet access and Global Positioning System (GPS) can also be used to detect location data of users who will use this system to search for the location of the intended college and there are also some additional features such as gas stations, ATMs and emergency call lists to make it easier for users to find important place in the region of Banyumas Regency.

Formulation of the problem

In this research, the formulation of the problem raised is how to design and build a geographic information system for higher education in Banyumas Regency based on Android to make it easier for users to find the location of the tertiary institution and the route to get to the tertiary institution?

Scope

The scope of this research are**:**

a. The system created is only a process of finding the location of tertiary education institutions, both state and private tertiary institutions. In addition this system can also display maps and road routes to the location of the tertiary institution and other supporting facilities for prospective students especially those from outside the city such as ATMs, Hospitals and gas stations.
b. The geographic information system of this university only displays information and does not produce reports.
c. The system can only be used if the smartphone is connected to the internet.
d. The system requires GPS access to detect the user's position.

Aim

The geographic information system development of Banyumas regency based on Android to provide convenience and efficiency to

users, especially those from outside the Banyumas Regency, in searching for locations to colleges in the Banyumas district area by utilizing Google Maps API, GPS and internet with the prototype system development method.

Theoretical Basis

Geographic Information System

According to Sutabri (2012: 46), "Information Systems is a system within an organization that meets the needs of daily transaction processors that support the organization's operational functions that are managerial with the strategic activities of an organization to be able to provide certain external parties with the necessary reports ". Based on the above definition, it can be concluded that the information system is a set of interconnected components for processing data so that it has added value to assist managers in making decisions. Geographic Information System (GIS) is a computer system that has the ability to retrieve, store, analyze, and display information with geographical references (Budianto, 2010). Geographical Information System of Higher Education in Banyumas Regency is a system built to make it easier for users to find the location of tertiary institutions by utilizing Google Maps API and Android-based Global Positioning System with a client-server network where data displayed on smartphones is taken from databases located on a server using an internet connection.

Andriod

According to Zamrony P. Juhara (2016: 1), android is a Linux-based operating system that is modified for mobile devices consisting of operating systems, middleware, and main applications.

Eclipse Integrated Development Environment (IDE)

According to Zamrony P. Juhara (2016: 19), Eclipse IDE is a place where you will write program code. This application is free open source which was originally developed by IBM, then managed and further developed by the Eclipse Foundation.

Android Development Tools

ADT is an Eclipse IDE plugin that adds android application development functionality in the Eclipse IDE. ADT allows you to compile program code through Eclipse IDE (Zamrony P. Juhara, 2016: 20).

JSON

According to Yusuf Mufti (2015: 206), Json (read Jason) is short for JavaScript Object Notation (JavaScript object notation). JSON is a computer data exchange format that has simple, lightweight, and does not depend on a programming language. JSON is an ideal data exchange language because besides being young read, it is also flexible for all programming languages.

Google Maps

According to Yusuf Mufti (2015: 3), Google has provided services for Android application developers to use the Google Map API in their applications. The API itself stands for Application Programing Interface. There are two types of use of the Google Map API, the standard Google Map API and the Google Map API for business.

Global Positioning System (GPS)

Positioning Global Positioning System (GPS) is a collection of satellites and control systems that allow a GPS receiver to get its location on earth's surface 24 hours a day (Kasman, 2013).

UML (Unified Modeling Language)

According to Rosa (2013: 133), "Unified Modeling Language (UML) is one of the language standards that is widely used in the industrial world to identify, requirements, make analysis & design, and describe architecture in object-oriented programming".

Prototype System Development

Method According to Pressman (2012: 50), in designing a system that will be developed can use the prototype method. This method starts with gathering user needs, in this case the user of the device being developed is the community.

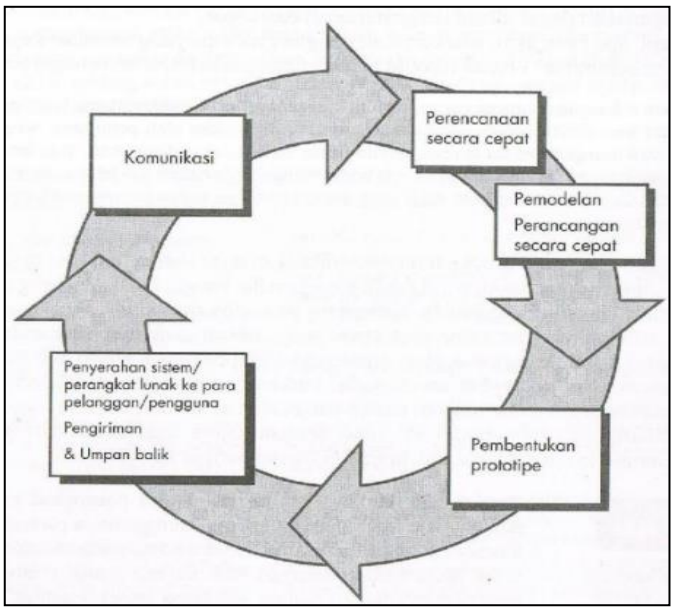

Figure 2. Paradigm Making of Prototype (Pressman, 2012: 51)

System Development Method

In this research activity researchers used the prototype method, with the following stages:

a. Communication

In this stage the researchers conducted an analysis of the needs of the system to be designed and built so that this research could provide solutions to the problems raised in this research activity in the form of data.

b. Planning quickly

In this stage, researchers conduct planning activities based on data that has been obtained previously to determine what needs are needed in the next process.

c. Modeling design quickly

In this stage, namely making a general design for further development. This stage includes making system display design, use case diagrams, activity diagrams, sequence diagrams and class diagrams to explain the flow of the system to be run by the user

1. Usecase Diagram

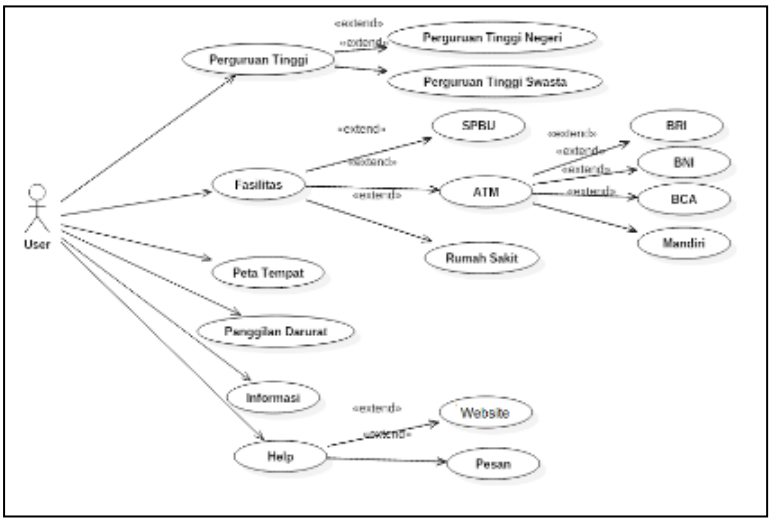

Figure 3. Usecase User

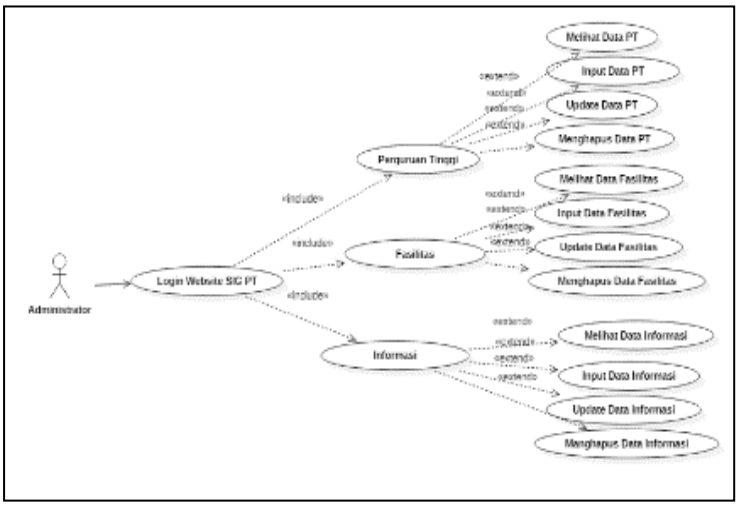

Figure 4. Usecase Admin

2. Interface Website Administrator Plan

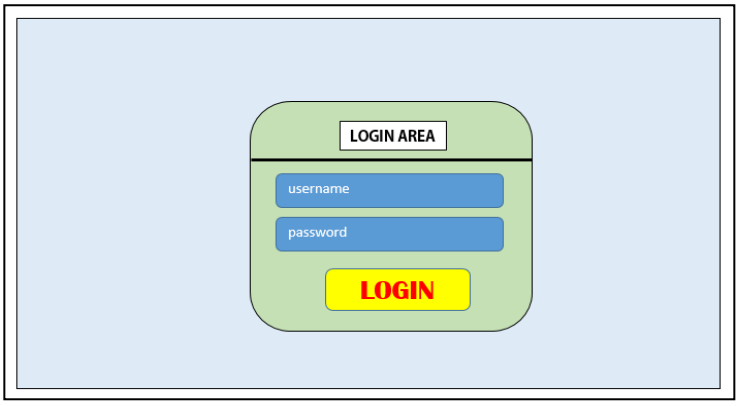

Figure 5. Login Page

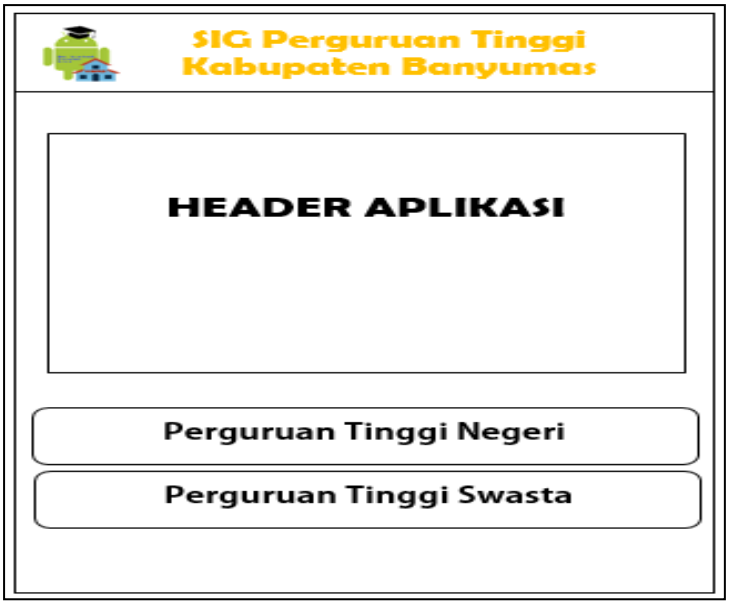

Figure 6. Home Page

3. Perancangan *Interface* Android

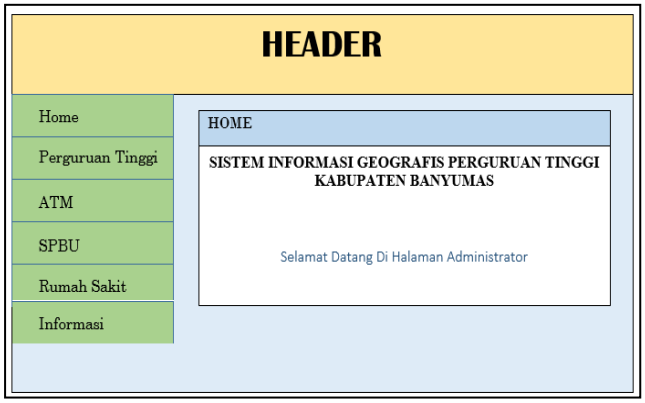

Figure 7. Campus Menu

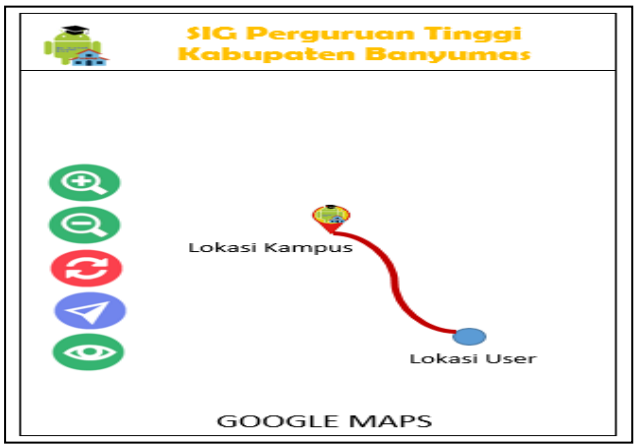

Figure 8. Location Route

4. Class Diagram

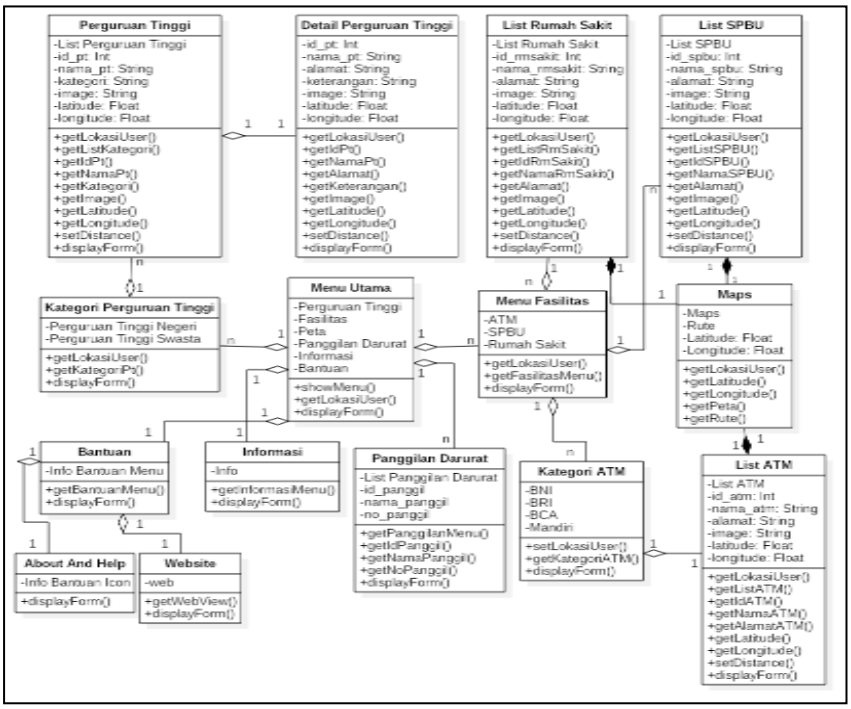

Figure 9. Class Diagram

d. Prototype formation

This stage is the manufacture of prototype devices including testing and refinement. In this stage the researchers began coding the system built using Eclipse ADT with the Java programming language on the user side and PHP on the server side. As for the database, researchers used PhpMyAdmin.

System testing is done by using the Black-box Testing method to test the function of each menu and its attributes whether it can run properly.

e. Delivery of system / software to customers or users as well as delivery and feedback

In this stage, researchers evaluate the prototype and refine the analysis of user needs. After that, the researcher enters into the repair phase by making the actual type based on the results of the prototype evaluation which includes repairing errors in the coding and testing before the system enters the final production stage. And in the final production phase is the process of producing devices properly in the form of .apk so that it can be used by users

Results and Discussion

Results of Interface Design Implementation

The Geographic Information System of the University of Banyumas Regency consists of two systems namely a website server that functions to input data by the administrator and an android application that is used by the user to access the information in the application.

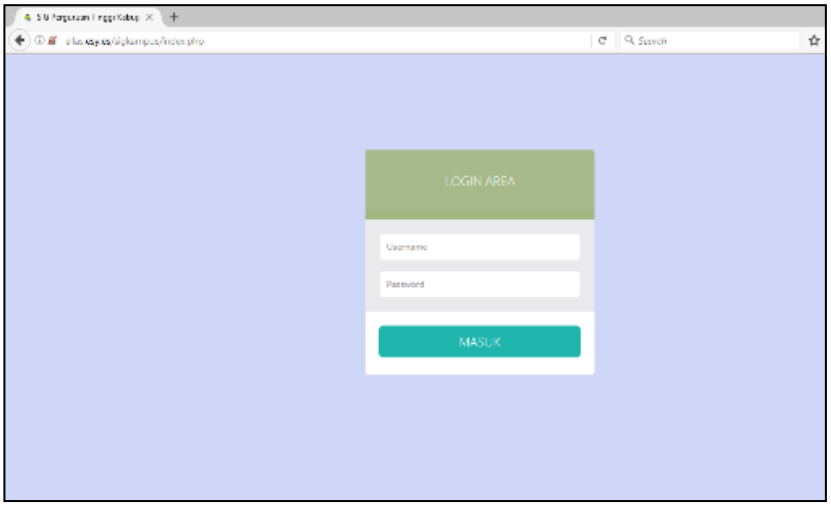

Figure 10. Login Page Implementation

Figure 11. Home Page Implementation

Figure 12. Campus Menu Implementation

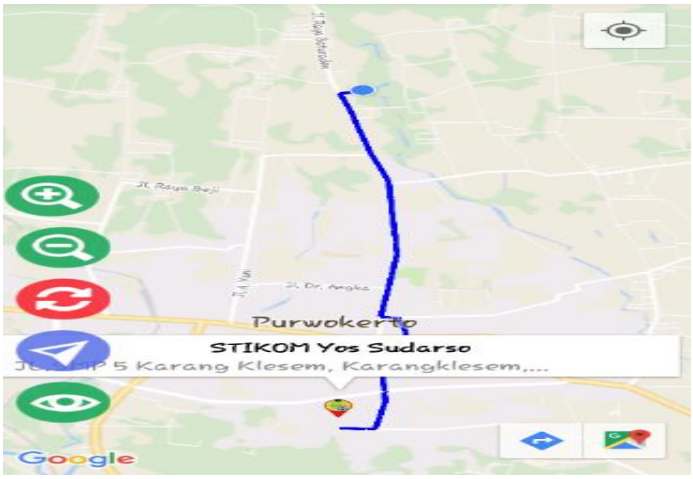

Figure 13. Location Route Implementation

System Testing

After the system is finished, the system is then tested. In this study, researchers used Blackbox Testing to test the Geographical Information System of Higher Education in Banyumas Regency. Blackbox testing is done to find out whether the system is running well according to researchers' expectations or not. The tool for testing this Blackbox is to use test case. Following below is test case from Blackbox Testing:

Tabel 1. Blackbox Testing

No.	*Test Case*	Hasil Yang Diharapkan	*Output*	Hasil Uji
1.	Salah memasukkan username atau password pada saat *login* ke *website server administrator*	Muncul pesan peringatan *error*	Muncul pesan peringatan *error*	Sesuai

2.	*Username* atau *password* benar pada saat *login* ke *website server administrator*	Tampil halaman beranda *website*	Tampil halaman beranda *website*	Sesuai
3.	Memilih *logout* dari *website* kembali ke halaman sebelumnya	Tidak bisa kembali halaman sebelum dan harus *login* kembali dengn memasukkan *username* dan *password*	Tidak bisa kembali halaman sebelum dan harus *login* kembali dengn memasukkan *username* dan *password*	Sesuai
4.	Memilih menu fasilitas	Menampilkan menu fasilitas yaitu ATM, SPBU dan Rumah Sakit	Menampilkan menu fasilitas yaitu ATM, SPBU dan Rumah Sakit	Sesuai
5.	Memilih button rute	Menampilkan rute lokasi yang dituju	Menampilkan rute lokasi yang dituju	Sesuai
6.	Memilih menu button Perguruan Tinggi Negeri	Muncul list perguruan tinggi negeri	Muncul list perguruan tinggi negeri	Sesuai

Conclusion and Suggestions

Conclusion

Based on the results of the discussion in this study it can be concluded that the Geographic Information System of Higher Education in Banyumas Regency Android-Based can provide a significant influence on the process of finding the location of higher education in the Banyumas Regency so that it becomes faster than before using the system. This is proven by the results of testing the hypothesis that the value of Sig. 0.200 or greater than 0.05 which means H1, "There is a significant time difference in the process of finding the location of higher education before and after using the Geographic Information System of Higher Education in Banyumas Regency based on Android" can be accepted. Then based on the results of product tests that have been done show that the product test value to determine the quality of the system being built is 96.85, the value is greater than the feasibility limit of 75. Thus, the system that has been built has been appropriate for use by the wider community.

Suggestion

In this research there are a number of suggestions that can be developed for further research activities, namely:

1. The design of the user interface is made more user friendly, so users can understand the system easily. Especially in the user location notification which still raises the coordinates in the form of numbers, this can be developed so that the user's location notification can be changed to the location name in accordance with coordinates (not in the form of numbers).
2. It is expected that in future research, to be able to use Google Maps API Premium so that users get the maximum benefit when using the system.
3. Further system development, is expected to add a feedback menu from the user to the

system so that the information contained in the system becomes more precise and accurate. In addition, the feedback menu also makes it easy for administrators to update data provided by users through the system.

4. Add voice feature to give directions (turn right / turn left / straight) to the user in finding the location to be addressed. With the addition of the voice feature, users do not have to always look at the smartphone screen to see the path that must be traversed.
5. One direction that cannot be passed by the user, so the user does not feel confused when he has to follow the route that has been made.

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