

Book Searching Application Based On Location on Android Smartphone with Searching Feature Use Levensthein Distance Algorithm

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Book Searching Application Based On Location On Android Smartphone With Searching Feature Use Levensthein Distance Algorithm (Case Study: Gramedia Book Store)

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Abstract Technology growth based on high human needed for information. Smartphone present as new technology at class of mobile phone what can give easy access for information, everytime and everywhere. Based on questionnaire what disseminated to 100 respondents, 97 respondents said that they agreed for statement that, "book is important even scientific or non-scientific and demand the application based on smartphone that can give access information about books and it stock at nearby book store." Therefore, this application developed use location based service technology and levensthein distance algorithm for ask the people demand. Location based service have been used for give information about stock of books at nearby book store and levensthein distance algorithm have been used for minimize missed result of searching if user do mistake input string on searching field. In data collection for this research, used observation and questionnaire for get primary data and literature review use diving manual, online of literature, and study of similar literature for get secondary data. In system development method, used Rapid Application Development (RAD). More ever, this application developed by Java Android Programming Language so that this application only running on smartphone with Android operating system.

Keywords: Book, Location Based Service, Levensthein Distance, Rapid Application Development (RAD), Android.

1. INTRODUCTION

1.1. Background

Book is important even scientific or non-scientific. Even Internet can give more information, but book still needed because information that in Internet is not comprehensive information in the book (www.tempo.co). Conscious people of books can't denied, 97 of 100 people say agree for statement that, "book is

important even scientific or non-scientific and necessary the application based on smartphone that can give access information about books and it stock at nearby book store.

Technology growth based on high human needed for information. That was evidenced by the born of the new technology in class of mobile phone that has ability like handheld computer, that is smartphone. Smartphone can give access and data processing with data management application similar Personal Data Assistant (PDA) the following communication skills in multiple access wireless network (Feing, 2006).

In addition, the birth of a location-based technology (Location Based Service) is also one proof that the technology is growing following and meeting human needs for information is high. Location Based Service (LBS) is a technology that is able to provide services based on the position information, such as user position, the closest thing to the user, or how to get the location of the current user's position.

Scholastic is one of the largest book stores in Indonesia and many people choose Scholastic as a primary option bookstore to buy books because the collection is complete. The results of the questionnaire that the authors deploy stating that 74 of the 100 people said, Gramedia bookstore is one of the main options to search books. Therefore, the authors choose Scholastic as a case study in this research.

Looking at the issues and facts, the author felt the need to provide solutions that can meet the needs of the community will access the book search. Ie, by building a mobile app (smartphone) that is able to provide access to search and book at the nearest bookstore ketersediaanya anytime and anywhere by leveraging technology and Location Based Service Levensthein Distance algorithm to facilitate users in finding books searchable. Therefore, the authors compiled a study entitled "Location-Based Applications Book Search On Android Smartphone With Features Levensthein Search Algorithm Using Distance (Scholastic Case Study)". Distance Levensthein algorithm

is an algorithm that is used to measure the difference between two strings. This algorithm measures the smallest distance between two input strings a and b (Gilleland). Distance is a value indicating the minimum number of modifications that must be done to make changes one string to another string. Distance between two strings is determined based on the minimum number of changes needed to make the transformation from a form of string to another string form. The author uses Levenshtein distance algorithm to allow users to search book title in case of typing errors, authors, and publisher of books in the search field by the user. This algorithm is able to match the string title, author, and publisher of books that users input in the search field with the title, author, or publisher of books available in the database.

1.2. Problem Formulation

Based on this background exposure, the authors formulate the problem as follows:

1. How to build an application that is able to provide access to search and book ketersediaan the nearest bookstore and the information can be accessed anytime and anywhere?
2. How to build a search application that is capable of delivering results despite the differences between the string entered by the user in the search field strings that exist in the database?

1.3. Research Purpose

The purpose of this study was to build a book search application based on the location of the Android smartphone so that it can help people, especially Android-based smartphone users in the case of access to search and book at the nearest bookstore ketersediaan by using the search feature Levenshtein distance algorithm.

II. LITERATURE REVIEW

2.1. Location Based Service

Location-based technology or Location Based Service (LBS) is a technology that is able to provide services based on the position information, such as user position, the closest thing to the user, or how to get the location of the user's position (Mulyadi, 2010). LBS (Location Based Service) is actually a value-added provider of GSM services. LBS is not the system, but it is a service that uses additional system support GSM system.

2.2. Haversine Formula

Matematika haversine formula is an equation important in navigation, this formula gives the distance between two points on the ball of each circle longitude (Longitude) and latitude (Latitude). This is a special case

of a more general formula in spherical trigonometry circle, haversine formula associated with the sides and corners of the 'triangle' of the round circle (Wikipedia, 2012). Haversine formula for each point on the ball (<http://www.movable-type.co.uk>, 2013):

$$\begin{aligned} \text{haversin} \\ (dR) &= \text{haversin}(\varphi_2 - \varphi_1) + \cos(\varphi_1) \cdot \cos(\varphi_2) \cdot \text{haversin}(\psi_2 \\ &- \psi_1) \\ c &= 2 \cdot \text{atan2}(\sqrt{\text{haversin}(dR)}, \sqrt{1 - \text{haversin}(dR)}) \\ d &= R \cdot c \end{aligned}$$

where:

- Haversin is haversine function
- d is the distance between two points.

$$\text{haversin}(\theta) = \sin^2(\theta/2) = (1 - \cos(\theta))/2$$

- R is the radius of the globe the ball.
- φ_1 dan φ_2 is latitude point 1 and point 2.
- ψ_1 dan ψ_2 is longitude point 1 and point 2.

2.4. Levenshtein Distance Algorithm

Distance Levenshtein algorithm is an algorithm that is used to measure the difference between two strings. This algorithm measures the smallest distance between two input strings a and b (Gilleland). Distance is a value indicating the minimum number of modifications that must be done to make changes one string to another string. Distance between two strings is determined based on the minimum number of changes needed to make the transformation from a form of string to another string form. The author uses Levenshtein distance algorithm to allow users to search book title in case of typing errors, authors, and publisher of books in the search field by the user. This algorithm is able to match the string title, author, and publisher of books that users input in the search field with the title, author, or publisher of books available in the database.

III. DEVELOPMENT SYSTEM

3.1. Problem Identification

Identify the author is as follows:

1. Necessary Prototype Identification Needs of the prototype system (application) is as follows:
 - a. The application is able to provide information on the availability of searchable books Gramedia bookstore closest to the user's position.
 - b. The application is able to provide results even though there is a difference between the string the user entered in the search field with the string contained in the database.
 - c. Display interface (interface) is a user friendly application that allows users to operate the application.

2. Features Identification

At this stage, the authors identify the features of

the application based on the goals of the system (application). Based on the identification is done, obtained the following results. Application has three main menus, namely search menu, book collection, as well as about the application. Search menu is a menu that can be used to perform a book search using levenshtein distance algorithm to simplify the search in case of typing errors by the user. The menu is a collection of books that provide information menu book collection. About the menu is the menu that gives a brief description of the information and application versions. The application is able to provide information about the book along with the availability of books at the Scholastic-Scholastic closest position of the user. The application is able to provide service (steering direction) towards Scholastic that users want to visit.

3.2. Workshop Design

1. Searching Nearby Mechanism

The author uses the haversine formula in the formula are converted into SQL syntax (structure Query Language) to conduct a search of the nearest Scholastic user position.

Mechanism of running processes in determining the distance between the position of the user with the nearest Scholastic user position are as follows: Application requests the current latitude and longitude, position of the user to connect to the Internet through a network of base stations. Once the latitude and longitude values in the user's position can be, the application sends the value to the API application (server) that resides on the server. API contains equations haversine formula that has been converted into a MySQL query script. Then, API calculated the latitude and longitude values with the values the user latitude and longitude ever Scholastic that exist in the database. Calculation results are sorted based on the value of the nearest to the farthest distance.

MySQL query syntax which is the result of the conversion equation haversine formula to find the distance between the position of the user with the nearest AP is as follows:

```
SELECT ( 6371*ACOS(COS(RADIANS( $user_lat )) *
COS(RADIANS($latude)) *CO S(RADIANS($longtude)-
RADIANS($user_longtude))
+SIN(RADIANS($user_lat)) *
SIN(RADIANS($latude))) AS jarak
ORDER BY jarak ASC;
```

2. Levenshtein Distance Algorithm Mechanism

Here are levenshtein algorithm

used to find the distance between two strings where m is the length of the input string and n is the length of the string in the database.

```
function
LevDistance(input s: string [1..n], t: string [1..m])
Declaration
i, j = integer d[0..m, 0..n] = integer;
algorithm
1 for i from 0 to m [comparision with the blank]
d[i, 0] = i;
```

```
1 for j from 0 to n [comparision with the blank]
d[0, j] = j;
for i from 1 to m [ for i from 1 to m [ if s [i] = t [j] then d [i, j] = d [i-1, j-1] else
d [i, j] = min(d [i, j-1], d [i-1, j], d [i-1, j-1] + 1) (change)
d [i, j-1] + 1 (insert)
d [i-1, j] + 1 (delete)
]
]
return d [m, n]
```

3. UML Design

This application design using Unified Modeling Language tools (UML) which includes designing Use Case Diagram, Activity Diagram, Sequence Diagram and Class Diagram.

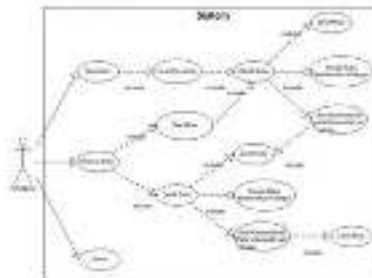


Fig. 3.1. Use Case Diagram

4. System Architecture Diagram

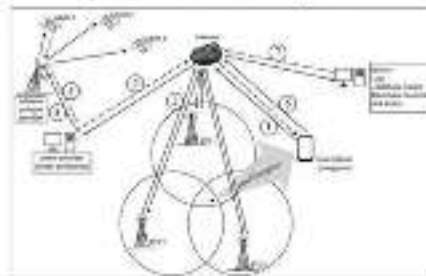


Fig.3.2. System Architecture Diagram

Processes on the system architecture diagram starts when the smartphone (Android) users have access to the internet because the system uses technology Assisted GPS (A-GPS).

3.3. Implementation

1 Installation

After the workshop the design phase is complete, the authors apply the results of the draft by doing the installation. In this phase, the authors do penginstalan activities as follows:

- a. Installation on the server database and API with

web pages <http://www.aderifidi.plt>

- b. Installation of native applications on Android GT-S5660 handset with Gingerbread operating system

2.Black Box Testing

Furthermore, the authors tested the application that was created with blackbox testing. Testing was conducted to determine whether the application can function correctly. In this method the test data generated, executed on the application and then check whether the output of the application has been as expected.

IV. CONCLUSIONS AND RECOMMENDATIONS

4.1. Conclusions

Based on the results of research by the author, the conclusions obtained are as follows:

- a. Location based book search application running on Android smartphones is an app that can give you access to search books whenever and wherever the user is located. These applications take advantage (teknologi Location Based Service) that this application can provide information that users are looking for availability of books at Scholastic closest position of the user. This application requires network access to the Internet in its operation because these applications require access to the Network Base (Cell Tower) to get the value of latitude and longitude position of the user-Scholastic Scholastic nearby. In addition, the book and the script database API used to display the application as well as the availability of information on the Scholastic book nearby could only be accessed through the Internet network.
- b. These applications utilize Levenshtein Distance algorithm in order to view the search results even though there are differences string the user entered in the search field with the existing string in the database because Levenshtein Distance algorithm capable of matching against the second string.

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