

## IMPLEMENTATION OF HOSPITAL SEARCH APPLICATION IN BINJAI AREA USING METHOD DIJKSTRA

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**Abstract:** *The advancement of information technology has contributed significantly to the development of navigation and location search systems. One of the challenges faced by the community is the difficulty of finding the nearest hospital quickly and efficiently, especially in urban areas such as Binjai. This study aims to design and implement a hospital search application using the Dijkstra method to find the fastest route. The Dijkstra method was chosen because of its accuracy in determining the shortest path from one point to another in a graph, which in this context is used to find the optimal route to the hospital based on the user's location. This application is implemented in the form of a web-based application that allows users to enter their location and obtain a list of the nearest hospitals along with the fastest route displayed on a digital map. System trials show that this application can accurately provide shortest route information in seconds. Thus, this application is expected to make it easier for the Binjai community to get access to health services more quickly and efficiently.*

**Keywords:** Search Application, Hospital, Dijkstra, Shortest Route, Binjai

**Abstrak:** Kemajuan teknologi informasi telah memberikan kontribusi yang signifikan terhadap perkembangan sistem navigasi dan pencarian lokasi. Salah satu tantangan yang dihadapi masyarakat adalah sulitnya mencari rumah sakit terdekat dengan cepat dan efisien, terutama di wilayah perkotaan seperti Binjai. Penelitian ini bertujuan untuk merancang dan mengimplementasikan aplikasi pencarian rumah sakit menggunakan metode Dijkstra untuk mencari rute tercepat. Metode Dijkstra dipilih karena keakuratannya dalam menentukan jalur terpendek dari suatu titik ke titik lain dalam suatu grafik, yang dalam konteks ini digunakan untuk mencari rute optimal menuju rumah sakit berdasarkan lokasi pengguna. Aplikasi ini diimplementasikan dalam bentuk aplikasi berbasis web yang memungkinkan pengguna untuk memasukkan lokasinya dan memperoleh daftar rumah sakit terdekat beserta rute tercepat yang ditampilkan pada peta digital. Uji coba sistem menunjukkan bahwa aplikasi ini mampu memberikan informasi rute terpendek secara akurat dalam hitungan detik. Dengan demikian, aplikasi ini diharapkan dapat memudahkan masyarakat Binjai mendapatkan akses layanan kesehatan dengan lebih cepat dan efisien.

**Kata kunci:** Aplikasi Pencarian, Rumah Sakit, Dijkstra, Rute Terpendek, Binjai

### INTRODUCTION

Efficient and prompt healthcare delivery is a critical need in modern society. Easy and quick access to healthcare facilities, such as hospitals, can play a significant role in saving lives, especially in emergencies. However, in many cities including Binjai, people often

face difficulties in quickly finding the nearest hospital. This challenge is further exacerbated by dense city traffic, lack of knowledge about the location of hospitals, and the absence of information on the quickest routes to these facilities. This leads to delays in seeking medical care, which can be fatal for critically ill patients. (Izhari & Dhany,

2023)(Hendrawan, Perwitasari, & Ritonga, 2023)(Syahputra Novelan & Putra, 2020)

Information technology offers a solution to this problem by providing tools that can speed up the search and navigation process. Technology-based search applications, especially those equipped with intelligent algorithms, have proven to be very useful in various navigation contexts, from public transportation to the health sector. One of the most popular algorithms for solving the shortest path search problem is the Dijkstra method. This method is able to determine the shortest route between two points in a graph network, such as a road network in a city. With this ability, the Dijkstra method is very suitable for application in hospital search applications, where the main goal is to provide the fastest route to a medical facility from the user's location. (Rizal & Fachri, 2023)(Rizal et al., 2022) (Septian Hardinata et al., 2022)(Supiyandi et al., 2022)(Bangun Sistem et al., 2019)

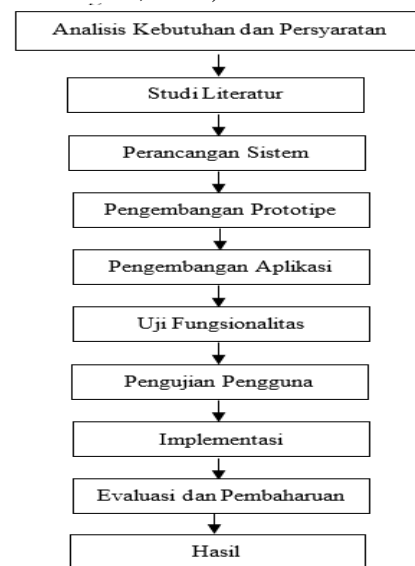
The application of the Dijkstra method in the context of searching for hospitals in the Binjai area is very relevant because this algorithm is able to calculate the optimal path efficiently. By using geographic data of the city of Binjai and information on hospital locations, this application can direct users to choose the fastest route and avoid delays. In addition, this application can also take into account other important factors, such as traffic conditions or the closest distance, all of which affect the user's decision in choosing a path to the hospital. (Hendrawan, Perwitasari, & Arifin, 2023)(Tasril, 2018)(Hasan Putra & Syahputra Novelan, n.d.)

With the hospital search application based on the Dijkstra method, it is hoped that the problem of access to health services in Binjai can be resolved better. The public will find the nearest hospital more easily and quickly, thus minimizing the risk of delays in getting medical care. In addition to being useful in emergencies, this application can also be

used in non-emergency conditions, where users can plan visits to the hospital more effectively. Overall, this application aims to improve the accessibility and efficiency of health services in the Binjai area, which ultimately contributes to improving the quality of life of the community. (Fachri, 2018)(Informatika & Hasan, n.d.)(dan Pembuatan Aplikasi Manajemen Peminjaman Kendaraan Berbasis Web Dengan et al., n.d.)

## METHOD

The research methodology for designing a drug data processing information system at a health center can involve several steps including planning, development, implementation, and evaluation. Here are some research methodologies that you can consider. (Rahmat et al., 2019)



**Figure 1.** Research Stages

Based on Figure 3.1, the following is an explanation of each process of the research stages, including:

1. Needs and Requirements Analysis  
Identify application needs and requirements by communicating with principals and potential users. Determine key features, data security, and desired user

scale.(Penjualan Online Berbasis Website et al., 2019)

2. Literature Study  
 Conduct a literature study to understand the current trends in drug data processing applications in health centers and relevant technologies, such as websites. And the challenges they face in adopting digital technology. (Fauzi Siregar & Sari, 2018)
3. System Design  
 Create an application system design, including application architecture, user interface, and integration with Firebase Realtime Database and Cloud Computer. Determine how data will be stored, managed, and accessed.
4. Prototype Development  
 Build a prototype of your app to test your concept and get feedback from potential users. Make sure the prototype includes the key features you have identified.
5. Application Development  
 Implement applications based on tested prototypes. Integrate database systems for data storage and Cloud Computer to improve scale and performance.
6. Functionality Test  
 Perform functional testing to ensure that all application features are working properly. Identify and fix any bugs or technical issues that may arise.
7. User Testing  
 Perform functional testing to ensure that all application features are working properly. Identify and fix any bugs or technical issues that may arise.
8. Implementation  
 After passing the test and testing, implement and launch the application publicly. Ensure adequate technical support is available.
9. Evaluation and Update  
 Conduct a post-launch evaluation to identify potential improvements or

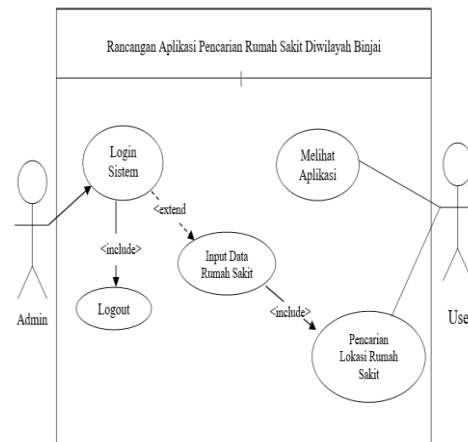
enhancements. Get feedback from users and make updates as needed.

## 10. Result

In this application, we will explain the hospital search application design system in the Binjai area.

## System Design

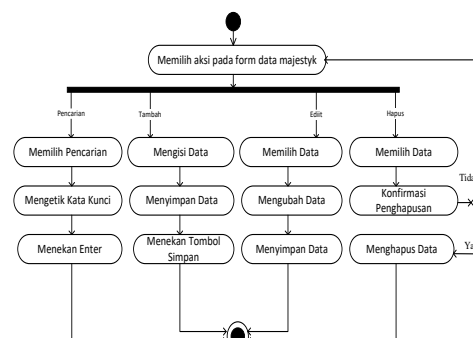
Use case is a modeling that displays the flow of the digital report application system in vocational high schools. The use case design can be seen in the image below.



**Figure 2.** Use Case Diagram Study

## 1. Activity Diagram

Activity Diagram explains the activities carried out by the admin on the system. This diagram will explain how the process of processing hospital data in the Binjai area. Figure 3 is an Activity Diagram of the Data Processing system.



**Figure 3.** Data Processing Activity Diagram

## 2. Sequence Diagram

Sequence Diagram is a sequence of activities carried out by the admin in

running the data collection of the Binjai City Hospital. Figure 5 is a sequence diagram for data processing in this study.

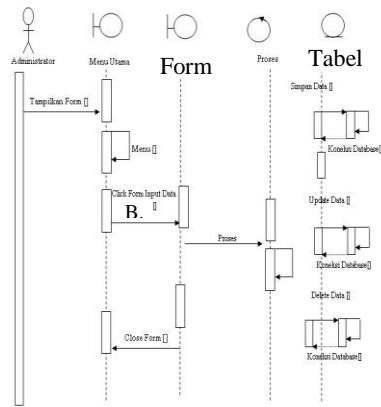


Figure 5. Sequence Diagram

### 3. Class Diagram

Class Diagram is a specification that will produce an object and is the core of object-oriented development and design. Class describes the state (attributes/properties) of a system.

The following is a Class Diagram for the Design of a Hospital Search Application in the Binjai area.

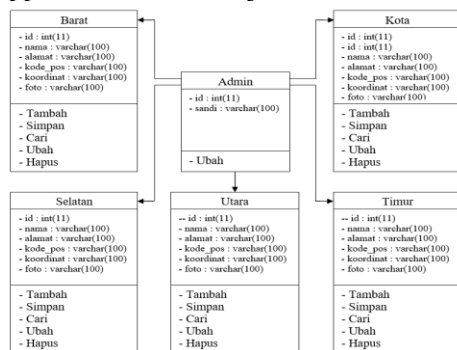


Figure 6. Class Diagram

## RESULTS AND DISCUSSION

The results and discussion are the results of the implementation of the Hospital Search Application Design in the Binjai area. The author conducted a trial using data provided by the company. However, before conducting the test there are several device requirements for the information system.

### Algoritma Dijkstra

Dijkstra's algorithm is an algorithm to determine the shortest path between nodes based on the calculation basis "from one node to all nodes". Dijkstra's algorithm is included in the Link State algorithm type, namely considering the total distance and route to be traversed. Basically, there are several main notations in the implementation of this Dijkstra Algorithm:

For the initialization process, an array/set N is formed with members s (s is a symbol for a source node). The value of D is the distance that will be available in the algorithm result table, while C is the distance value on the available map. So at this initialization stage, the value of  $D_j$  (the distance in the table results between node s and node j, with j not equal to s) is entered as the actual value. If it is not directly connected, it will be considered undefined. For the distance  $D_s$ , of course, it has a value of 0.

The iteration of each row is entered into node i which is not yet included in the array/set N for later node i to be used as an "extension" of node s, with node i also being a neighboring node of node s. Node i is entered into set N based on the smallest distance to node s. And if all nodes have entered set N, then the iteration will stop. For each node j (in the results table: each column) the smallest value is updated, namely by comparing the previous  $D_j$  value with the sum ( $D_i + C_{ij}$ ), which is the sum of the distance from node s to node i with the actual distance from node i to node j.

The same network as in the previous Bellman-Ford post:

In the Dijkstra method, points or distances are used because the Dijkstra method uses directed graphs in determining the shortest route path.

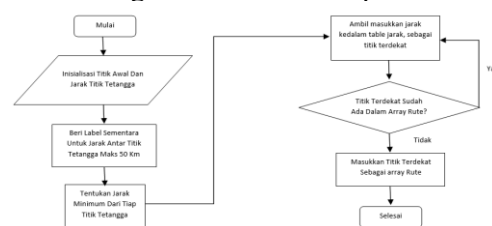


Figure 7. Flowchart Algoritma Dijkstra

### Flash Menu Display

The result of the display on the Flash Menu Form is a Flash display on this application is the first display that appears when the User opens the program. On this display there are several menus that can be selected by the User.



Figure 8. Flash Menu View

### Main Menu Display

On the main menu display, the menu is there when the application is clicked, then the flash and application will appear and after that the main menu will appear on the display below. There are several menus that can be accessed by the user. The form of the Main Menu Form Results in the Implementation of the Hospital Search Application in the Binjai Region Using the Dijkstra Method.

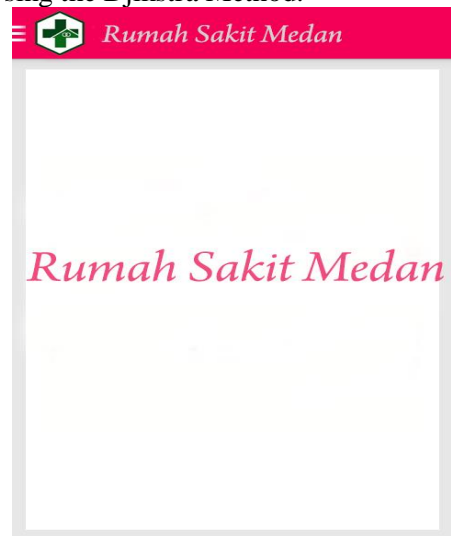


Figure 9. Main Menu View

### Display of the Selection Menu

On the menu selection display, there are 5 menus that can be accessed by the user. The menus that can be accessed are hospital maps, nearest hospitals, hospital galleries, terrain maps and about the application. The form of the Results of the Menu Selection Form on the Implementation of the Hospital Search Application in the Binjai Region Using the Dijkstra Method.

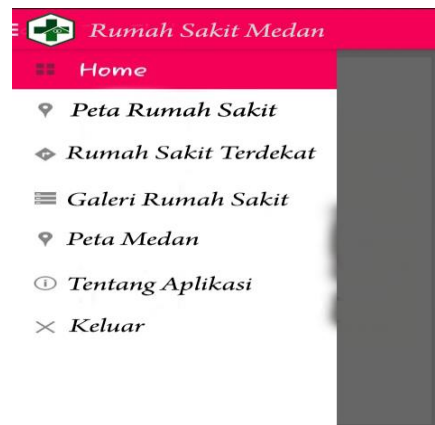


Figure 10. Display Options Menu

### Hospital Map Menu Display

On the hospital map menu page, there are several hospital points in the city of Medan. The points can be seen in detail where the hospital is located. And at that point, the user can also access it directly, there are directions that have been facilitated by Google Maps. The form of the Results of the Application Form for Searching Hospitals in the Binjai Region Using the Dijkstra Method.

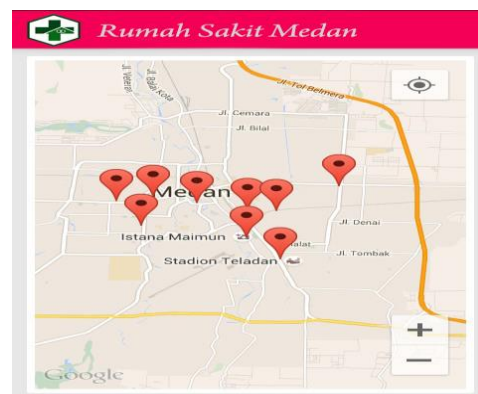


Figure 11. Hospital Map Menu View

### Field Map View

On the map display of the field there is where the center point of the city of Medan is located. And on this menu there is also the location of the user where because the point adjusts the GPS location of the user. The form of the Results of the Application Form for Searching Hospitals in the Binjai Region Using the Dijkstra Method

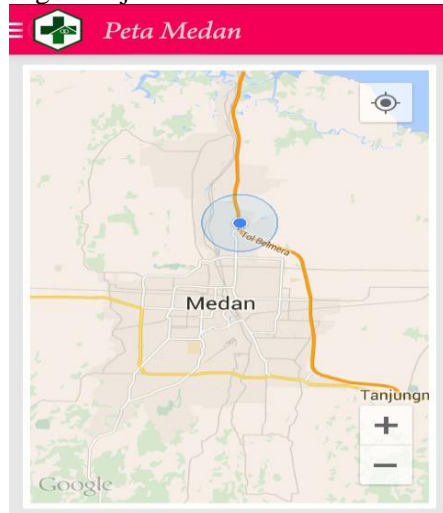


Figure 12. Field Map View

### CONCLUSION

The Implementation of the Hospital Search Application in the Binjai Region Using the Dijkstra Method has several conclusions that can be presented, including:

- This application successfully implements the Dijkstra algorithm to find the shortest route to hospitals in the Binjai area, helping users find hospitals with optimal time and distance.
- The system is able to provide accurate and fast search results, thanks to an algorithm that prioritizes the shortest path by utilizing real-time distance data between locations.
- This application is designed with a user-friendly interface, so that users can easily access information about the nearest hospital and get directions quickly and efficiently.

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