

# Android-Based Sewing Service Application Using Dijkstra's Algorithm (Case study: Pancoran Sub-district area)

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## Abstract:

Fashion development is getting more trendy and modern. As a result, the increasing need for clothing increases the need of sewing services as well, especially if we want to remodel the clothes to be worn immediately. We will certainly look for the nearest sewing service. This situation triggers some problems, namely we do not know the operating hours of the sewing service and the tailor's availability to receive orders. This research aims to measure the shortest distance of the nearest sewing service location from the sewing service' users by applying Dijkstra's algorithm. According to the previous research that has applied this algorithm, there is a better distance optimization. Thus, it is expected that this algorithm can solve the problems faced by sewing service's users who need sewing services in certain conditions. The implementation of this research is in the form of a prototype of an Android-based application.

*Keywords* — *Dijkstra's Algorithm, Sewing Services, Android, Graph*

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## 1. INTRODUCTION

Clothing is one of the three basic human needs. Clothing is an item that functions to cover the human body. Nowadays, fashion development is getting more trendy and modern. As a result, the increasing need for clothing increases the need of sewing services as well, especially if we want to remodel the clothes to be worn immediately. We will certainly look for the nearest sewing service.

This situation triggers some problems, namely we do not know the operating hours of the sewing service and the tailor's availability to receive orders. Finally, we have to search for another tailor. Finally, it causes ineffectiveness and inefficiency.

Therefore, the problems can be solved by designing an android-based sewing service

application by using Dijkstra's algorithm in searching for the nearest sewing service. Meanwhile, the use of android technology for this application makes the users easier to access the application in searching for the nearest sewing service and communicating with the tailor about their availability to receive order.

## 2. THEORY AND METHOD

### 2.1 Shortest Path

The process of measuring the shortest route is the process of finding the shortest distance or the lowest cost of a route from the initial node to the destination route in a network. In the process of measuring the shortest route, there are two kinds of process, namely labeling process and node

examination process. Labeling method aims to identify each node in network.

In most of the shortest route measurement algorithm, there are three information labels managed for each node I in the labeling process, namely distance label (i), parent node p (I), and status node S (i). Algorithms that can be used to find the shortest path have been widely studied. Some algorithms that can be used to solve the shortest path are dijkstra’s algorithm, bellman-ford’s algorithm, a\* search algorithm, dan floyd-warshall algorithm.<sup>[11]</sup>

## 2.2 Dijkstra’s Algorithm

In the stage of designing application, the application first requires an algorithm <sup>[2]</sup>. Dijkstra’s shortest path algorithm was found by Edsger Wybe Dijkstra in 1959<sup>[3]</sup>. Dijkstra’s algorithm is a very popular shortest path search, especially for researchers in the field of Mathematics or Computer Science<sup>[4]</sup>. This algorithm can solve the problem of finding the shortest path of a graph at each node with no negative value of the Graph <sup>[5]</sup>. Dijkstra’s algorithm compares the possible route to be traveled and calculated for every possible distance. The route with the shortest distance will be the best choice <sup>[6]</sup>. Dijkstra’s algorithm is considered suitable because the users can use it easily by only determining the starting point and destination point <sup>[7]</sup>.

The example of the graph to be solved by Dijkstra’s algorithm can be seen below:

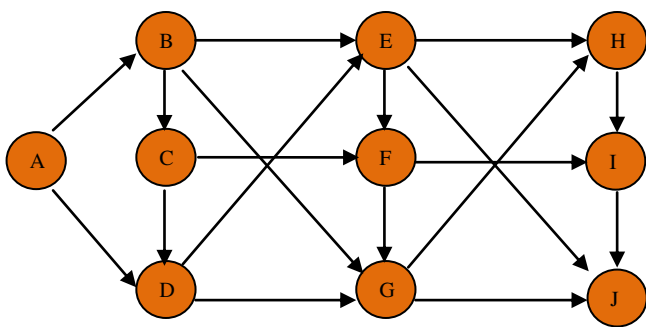


Figure 1. Graph for Dijkstra’s Algorithm <sup>[5]</sup>

## 2.3 Android

Android Operating System (OS) is built based on Linux platform, which is open source, so Android is also open source <sup>[1]</sup>. Android is a Linux-based operating system designed for touch screen mobile devices like smartphones and tablet computers. Android was originally developed by Android, Inc. with financial support from Google, that later bought it in 2005 <sup>[8]</sup>.

## 2.4 Android Studio

Android Studio is an Integrated Development Environment (IDE) for Android application development based on IntelliJ IDEA. In addition to being an IntelliJ code editor and powerful developer tools, Android Studio offers more features to increase productivity when creating Android applications, namely Gradle-based version system that is flexible, a fast and feature-rich emulator, a unified environment for development for all Android devices, instant Run to drive changes to running applications without creating a new APK, code templates and GitHub integration to create the same application features and to import sample code, extensive testing tools and frameworks, Lint tools to improve performance, usability, version compatibility, and other problems, C++ and NDK support, built-in support for Google Cloud Platform, that make it easy to integrate Google Cloud Messaging and App Engine <sup>[1]</sup>.

## 2.5 Tailor

According to the Great Dictionary of the Indonesian Language (*Kamus Besar Bahasa Indonesia*), tailor is a person whose job is to sew clothes such as shirts, pants, skirts or suits, both for men and women. In other words, tailor is a profession in the field of services that provides sewing services <sup>[9]</sup>.

## 2.6 Sewing

Sewing is an activity of connecting fabric, fur, leather, stems, and other materials that can be passed through the needles and threads. <sup>[9]</sup>.

## 2.7 Types of Research

The type of research that the writer uses is applied research (Applied Research) because the results of the research can be directly used/applied

to solve the problems faced. The results of this research is an Android-based sewing service application design

### 2.8 Research Method

A research method will be applied until the stage of system implementation. The research methodology used is quantitative method applying case study. This research was conducted in Pancoran Sub-district area. The steps of research process are presented below:

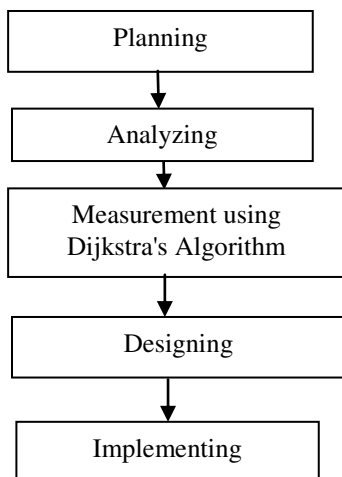


Figure 2. The Steps of Research Process

### 2.9 Data Collection

Research instruments used for collecting data are:

1. Observation  
Observation is a method of data collection conducted through direct observation and by getting involved in sewing service as the user.
2. Interview  
Interview is a question and answer activity between two parties, namely interviewer and interviewee to obtain information or opinion on certain thing. During the interview, the writer will ask the tailors about the products that they produce, types of service that they offer, and other information about sewing service.
3. Literature Review

Literature review is conducted by collecting data in the references related to dijkstra’s algorithm applied on the nearest location search.

## 3. RESULT AND DISCUSSION

There are some algorithms that can be used to determine the shortest path. One of them is dijkstra’s algorithm. This algorithm has been widely used in determining the shortest route or path based on certain criteria used as the limitation<sup>[10]</sup>.

For example:

$$V(G) = \{v_1, v_2, \dots, v_n\}$$

$L$  = the set of points  $\in V(G)$  that has been selected in the shortest path.

$D(j)$  = the smallest number of path weights from  $v_1$  to  $v_j$ .

$W(i,j)$  = line weight from point  $v_1$  to  $v_j$

$w^*(l,j)$  = smallest number of path weights from  $v_1$  to  $v_j$ <sup>[10]</sup>

This algorithm aims to choose the shortest path based on the smallest weight from the final point (predecessor). The following is the determination of the shortest path for searching for the nearest herbal shop using dijkstra’s algorithm. The steps of the research are:

### 3.1 Planning

In this step of planning, the researcher has conducted interview with sewing service owners and obtain data related to the sewing service. Some sewing services have name, but the others do not have. Thus, the writer determines that the name of the sewing services uses the initialization of the Number and the point of the sewing service is given Alphabet initialization. After that, the starting point is given the initialization A. The data obtained is as follows:

TABLE  
LIST OF SEWING SERVICES

Name of Sewing Services	Address	Point of Sewing Services
Sewing service 1	Jl.Pancoran Barat X	B
Sewing service2	Jl. Pancoran Barat IX E	C
Sewing service 3	JlPancoran Barat IX F	D
Sewing service 4	JlTriloka XI	E
Sewing service 5	JlTriloka X	F

Sewing service 6	JITriloka VIII	G
Sewing service 7	JIPancoran Barat IV	H
Sewing service 8	JITriloka IX	I
Sewing service 9	JITriloka VI	J
Sewing service 10	JIPancoran Barat IV C	K

I – J	1.5
I – K	1.1
J – K	2

Based on the table above, Sewing Services can be presented in the following map:

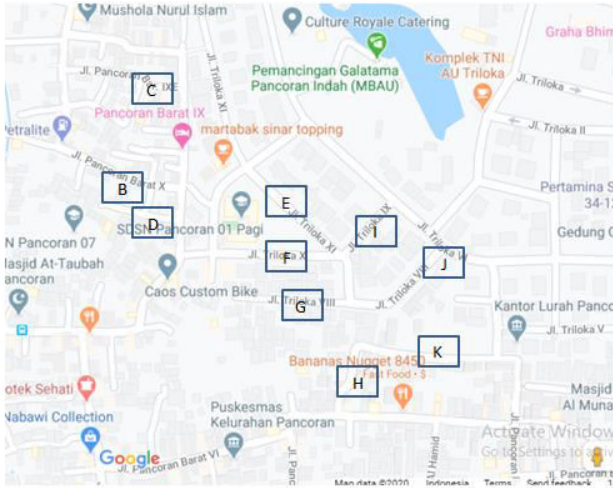


Figure 3. Map of Sewing Services

### 3.2 Analyzing

In this step, the analysis is performed using odometer (a measure of distance on a vehicle) based on the data of sewing services and the illustration on the map of sewing services. Data of distance obtained is presented below:

TABLE OF DISTANCE BETWEEN THE POINTS OF SEWING SERVICES

Point of Sewing Services	Distance
A – B	1
B – C	1
B – D	1.2
C – D	1
C – E	1
C – F	1.4
D – E	1.2
D – F	2
E – F	3
E – H	3
E – G	1
F – G	2
F – H	2
G – H	1
G – I	1
G – J	1.5
H – I	2
H – J	3

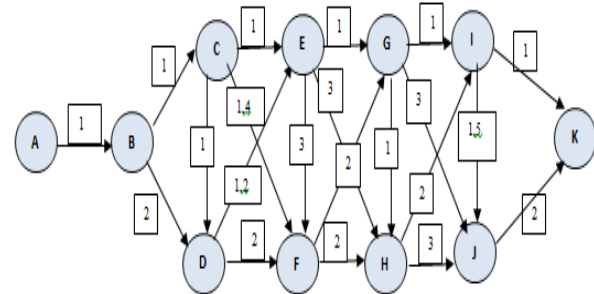


Figure 4. Map of Sewing Services

### 3.3 Testing the Dijkstra’s Algorithm

The steps to determine the shortest distance from node A to node K using Dijkstra’s algorithm based on the graph above are:

1. The initial value of the node status that has not been selected is given the value “0” while the selected one is given the value “1” starting from node A.
2. Weight is given according to the table of distance between points of sewing services starting from the node directly connected to the source node, that is, node A.
3. Predecessor (source node) is from node A, B, is node A because the distance is measured from node A, so node A is called predecessor (source node). Meanwhile, node B and so on are initialed with “-” because there is no path (arc) that directly connects with node A, so the distance does not exist.

ITERATION TABLE 1

Node	A	B	C	D	E	F	G	H	I	J	K
Status	1	0	0	0	0	0	0	0	0	0	0
Weight	-	1	-	-	-	-	-	-	-	-	-
Predecessor	A	A	-	-	-	-	-	-	-	-	-

ITERATION TABLE 2

Node	A	B	C	D	E	F	G	H	I	J	K
Status	1	1	0	0	0	0	0	0	0	0	0
Weight	-	1	-	-	-	-	-	-	-	-	-
Predecessor	A	A	-	-	-	-	-	-	-	-	-

ITERATION TABLE 3

Node	A	B	C	D	E	F	G	H	I	J	K
Status	1	1	1	0	0	0	0	0	0	0	0

Weight	-	1	1	-	-	-	-	-	-	-	-
Predecessor	A	A	B	-	-	-	-	-	-	-	-

ITERATION TABLE4

Node	A	B	C	D	E	F	G	H	I	J	K
Status	1	1	1	1	0	0	0	0	0	0	0
Weight	-	1	1	1.2	-	-	-	-	-	-	-
Predecessor	A	A	B	B	-	-	-	-	-	-	-

ITERATION TABLE5

Node	A	B	C	D	E	F	G	H	I	J	K
Status	1	1	1	1	1	0	0	0	0	0	0
Weight	-	1	1	1.2	1	-	-	-	-	-	-
Predecessor	A	A	B	B	C	-	-	-	-	-	-

ITERATION TABLE6

Node	A	B	C	D	E	F	G	H	I	J	K
Status	1	1	1	1	1	1	0	0	0	0	0
Weight	-	1	1	1.2	1	1.4	-	-	-	-	-
Predecessor	A	A	B	B	C	C	-	-	-	-	-

ITERATION TABLE7

Node	A	B	C	D	E	F	G	H	I	J	K
Status	1	1	1	1	1	1	1	0	0	0	0
Weight	-	1	1	1.2	1	1.4	1	-	-	-	-
Predecessor	A	A	B	B	C	C	E	-	-	-	-

ITERATION TABLE8

Node	A	B	C	D	E	F	G	H	I	J	K
Status	1	1	1	1	1	1	1	1	0	0	0
Weight	-	1	1	1.2	1	1.4	1	1	-	-	-
Predecessor	A	A	B	B	C	C	E	G	-	-	-

ITERATION TABLE9

Node	A	B	C	D	E	F	G	H	I	J	K
Status	1	1	1	1	1	1	1	1	1	1	0
Weight	-	1	1	1.2	1	1.4	1	1	1	1	-
Predecessor	A	A	B	B	C	C	E	G	G	G	-

ITERATION TABLE10

Node	A	B	C	D	E	F	G	H	I	J	K
Status	1	1	1	1	1	1	1	1	1	1	1
Weight	-	1	1	1.2	1	1.4	1	1	1	1	1
Predecessor	A	A	B	B	C	C	E	G	G	G	I

The program will stop after all nodes have been selected. Thus, it will result the shortest path from node A to each existing node. The paths that have been selected can be traced from their predecessor, as seen below:

- A - B : 1
- A - B- C : 1
- A - B - D : 1
- A - B - C - E : 1,2
- A - B - C - F : 1,4
- A - B - C - E - G : 1
- A - B - C - E - G -H : 1
- A - B - C - E - G -I : 1
- A - B - C - E - G -J : 1
- A - B - C - E - G - I - K : 1

### 3.4 Designing

The following is the step of designing the application to be built:

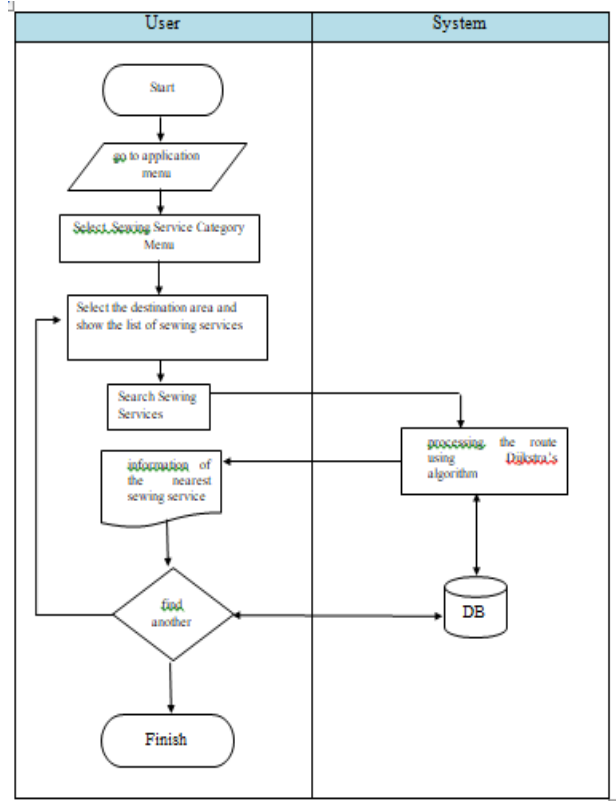


Figure 5. The Step of Designing The Application To Be Built

### 3.5 Implementing

The following is the step of implementing the application in the form of android-based prototype. User menu search for the nearest sewing service starts from the point of sewing service’s user:

#### 3.5.1 Login Menu

User who has been registered needs to log in first to use the application. User who has not registered needs to create an account first.

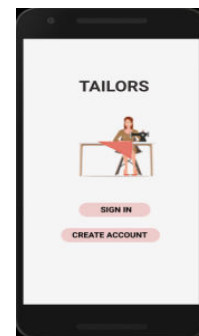


Figure 6. The Initial Display of the Application



Figure 7. Create Account Menu

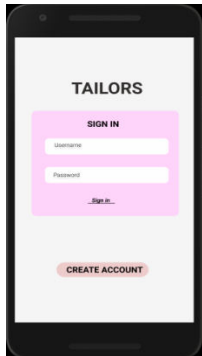


Figure 8. Sign in Menu

### 3.5.2 Display of Selecting a Sewing Service

In this menu, user has to select the category of sewing service.

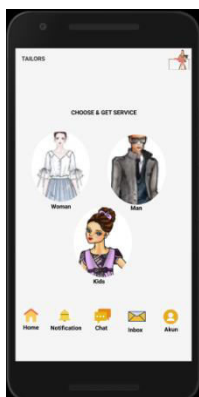


Figure 9. Sewing Service Category Menu

### 3.5.3 Display of Sewing Service Search

It is a display used to search the nearest sewing service based on the point of the application user when it is visible from the view of the user's application location and displays a list of sewing services around the location, and the user can

search for sewing services from the search menu on the application.

In this menu, user can also see the information of sewing services' operating hours and their full address. It also provides the user with home menu and notification for message, chat, inbox, and user account.

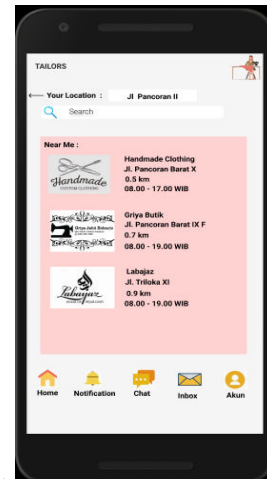


Figure 10. Sewing Service Search Menu

### 3.5.4 Display of Sewing Services Detailed Information

In this display, the user can see the products and full address/location of the sewing services. User can also chat with the administrator of the sewing service.

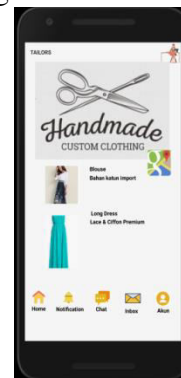


Figure 11. Display of Sewing Service Detailed Information

## 4. CONCLUSION

Based on the results of the research, it can be concluded that:

1. Dijkstra's algorithm is very effective to help find the nearest sewing service. It can be seen from the list of sewing services near the user.



2. This application helps the sewing service's user. In addition to finding the nearest sewing service, the user also knows the operating hours and does not need to waste their time to ask for the tailor's availability to receive an order because this application is provided with a chat feature to communicate with the administrator of the sewing service.

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