The Bellman-Ford Algorithm Search for the Best Routes to Tourist Attractions amid the COVID-19 Pandemic

Dinar Mustofa¹, Dani Arifudin², Arief Setyanto³, Dhanar Intan Surya Saputra⁴, Anggit Wirasto⁵

¹,⁴Department of Informatics, Faculty of Computer Science, Universitas Amikom Purwokerto, Indonesia

²Department of Information Technology, Faculty of Computer Science, Universitas Amikom Purwokerto, Indonesia

³Master of Informatics, Universitas Amikom Yogyakarta, Indonesia

⁵Department of Informatics, Universitas Harapan Bangsa, Central Java, Indonesia

Abstract
Banyumas Regency is one of the districts rich in tourism potential, located in Central Java, Indonesia, with the state of the land-mountain transition zone. This natural potential has finally provided Banyumas with many advantages, especially in tourism. The tourist sites in Banyumas are located downtown, in a mountainous area, and in Baturraden. Banyumas has a very rapid development in economic growth, tourism, culture, and so forth. One of the causes of this growth is the high community travel activities drive it. The Covid-19 pandemic has impacted negatively on Indonesia's tourism industry and creative economy, particularly Banyumas. The number of domestic and foreign tourists experienced a very drastic decline, also experiencing a decline in hotel occupancy. This has an effect on the tourism industry's local revenue. Banyumas tourism management through the relevant agencies also makes efforts to save tourism from attracting tourists and revive the ecosystem. Many tourist locations are attractive, so people need to choose the fastest route to cross between them to get time efficiency when travelling between tourist attractions. In this paper, we are several ways to find the fastest path optimization for connecting one node with another node with the Bellman-Ford Algorithm. The results show that the Bellman-Ford Algorithm produces the shortest and fastest route with node routes 10-8-9-16-13-5-11-17-7-4-3-6-14-15-18-2-12. Determining the shortest path is essential in supporting tourism services to reach tourist sites easily.

Keywords: Bellman-Ford Algorithm; Tourist Attractions; Tourism During the Covid-19 Pandemic; Banyumas Regency
1. Introduction

The Regency of Banyumas is one of the districts with a lot of tourism potential, located in Central Java, Indonesia, with the condition of the area between land and mountains. On the southern slopes of Mount Slamet, the mountainous structure consists of agricultural land in the Serayu River valley, towns and yards in the highlands, and plantations and tropical forests in the mountains (Pemerintah Kabupaten Banyumas, 2017). This natural potential has finally made Banyumas a regency with many advantages, especially in tourism. The tourism site in Banyumas Regency is located in downtown, a mountainous area, and in Baturraden. Table 1 presents a list of 20 tourism sites based on search engines' recommendations ranging from the top sequence. In general, a tourist travels from a tourist spot to other attractions by considering time and cost efficiency, so it takes precision to determine the best path.

Banyumas has a very rapid development in economic growth, social politics, culture, education, and so forth. One of the causes of this growth is the high community travel activities drive it. Even in government management, Banyumas Regency proves in the best management in various sectors. This is evidenced by the many honours and achievements achieved by the central government, such as public service innovation, smart cities to village digitalization and smart tourism (Suprianto, 2019). In terms of tourism, Banyumas through the Department of Youth, Sports, Culture and Tourism (in Bahasa Indonesia: Dinas Pemuda, Olahraga, Kebudayaan Dan Pariwisata/DINPORABUDPAR) also continues to strive to provide the best tourism services for the community, and this is done with cross-sectoral collaboration including academics.

Table 1. 20 Tourist Sites

<table>
<thead>
<tr>
<th>No</th>
<th>Tourist Sites</th>
<th>No.</th>
<th>Tourist Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Baturraden</td>
<td>11</td>
<td>Curug3</td>
</tr>
<tr>
<td>2</td>
<td>CurugCipendok</td>
<td>12</td>
<td>CurugNangga</td>
</tr>
<tr>
<td>3</td>
<td>KebunRayaBaturraden</td>
<td>13</td>
<td>CurugGede</td>
</tr>
<tr>
<td>4</td>
<td>CurugJenggala</td>
<td>14</td>
<td>BaturradenAdventureForres</td>
</tr>
<tr>
<td>5</td>
<td>Pancuran7</td>
<td>15</td>
<td>CurugGomblang</td>
</tr>
<tr>
<td>6</td>
<td>TelagaSunyi</td>
<td>16</td>
<td>BukitWatumeja</td>
</tr>
<tr>
<td>7</td>
<td>BukitTranggulasih</td>
<td>17</td>
<td>Pancuran3</td>
</tr>
<tr>
<td>8</td>
<td>TamanAndhangPangreman</td>
<td>18</td>
<td>Dream Land Park</td>
</tr>
<tr>
<td>9</td>
<td>TheVillage</td>
<td>19</td>
<td>Alun-AlunPurwokerto</td>
</tr>
<tr>
<td>10</td>
<td>BaleKemambang</td>
<td>20</td>
<td>MuseumBRI</td>
</tr>
</tbody>
</table>

Many tourist locations are attractive, so people need to choose the fastest route to cross between tourist attractions to get time efficiency when travelling between tourist attractions. In comparison, the number of roads and vehicles is not balanced. It takes knowledge for motorists to choose alternative routes to get the fastest route to cross between tourist attractions in Banyumas.

There are several ways to find the fastest path optimization for connecting one node with another node, including the Dijkstra algorithm, Ant algorithm or Ant Colony, Floyd Warshall algorithm, Bellman-Ford algorithm, Distance Vector, Ford-Fulkerson algorithm, and A-Star algorithm. These algorithms are designed to find the most efficient and effective way to analyze the fastest path selection with additional variables (Muzakir, 2020).

Graph theory includes the shortest path. When given a weighted graph, the shortest distance problem is to find the path on the graph that has the fewest number of weights on the path-forming
side. This issue is a matter of determining the optimization of some alternative solutions to the practical solution and determining the shortest path in a graph. The Bellman-Ford algorithm calculates the shortest distance (from a single source) on a weighted graph, from which one source calculates all the shortest spaces starting from one node point (Maylawati et al., 2020; Subero, 2020).

Distance is the short length of the path from a starting point to an endpoint. The width of the road is a cross-section of the road body, either narrow or broad. Road conditions are smooth and road damage. Climb and derivative is a condition of uphill or down a road. In comparison, the volume of vehicles is a condition of the density of road users, either loose or solid. Fast travel time will undoubtedly save more fuel. The mathematical basis for finding the fastest path selection optimization is to use a graph. Graph theory which is used, is the shortest path graph. That is selecting the fastest path from one node to another related node (X.-H. Liu, Zhang, Yan, Cui, & Chen, 2019; Zhang et al., 2018).

In this paper, the Bellman-Ford algorithm is used to find the best or fastest path based on data obtained from the map. The data is the distance of the road, the intersection of the road and the coordinates of the place of origin and destination short travel time is influenced by distance and speed, while the width of the road influences the speed, smooth or not the condition of the road, incline and vehicle density. Therefore in this study, the added distance of road width factors, road conditions, ramp and road density in the Bellman-Ford Algorithm.

2. Literature Review and Development of Conceptual Framework

2.1. Graph Theory

Graph theory first appeared in 1736, when that problem was solved to find a route to get through the seven bridges Königsberg exactly once and then back again to the starting point. Graph theory is defined as sets (V, E) written with notation G = (V, E). Where V is the non-empty set of vertices and E is a set of edges or arcs that connect a pair of vertices (Shen, Li, & Xiang, 2018).

Basic Graph Theory Definitions and Notation (Mathew, Mordeson, & Malik, 2018)........ (1)

**graph** (finite, no loops or multiple edges, undirected/directed)

G = (V, E) where

V (or V(G)) is a set of vertices

E (or E(G)) is a set of edges each of which is

a set of two vertices (undirected), or

an ordered pair of vertices (directed)

Two vertices that are contained in an edge are adjacent;

two edges that share a vertex are adjacent;

an edge and a vertex contained in that edge are incident.

We often let n = |V| and m = |E|.

For undirected graph G = (V, E):

The neighbourhood of vertex v is N(v) = {u|uv ∈ E}

The degree of vertex v is d(v) = |N(v)|

δ(G): the minimum degree of a vertex of G

Δ(G): the maximum degree of a vertex of G

http://www.webology.org
Note that \( \sum_{v \in V} d(v) = 2|E| \).

**Sub graph**

A (partial) sub graph of graph \( G \) is a graph \( H \) with

\[
V(H) \subseteq V(G) \text{ and } E(H) \subseteq E(G).
\]

The sub graph of \( G = (V, E) \) induced by \( V' \subseteq V \),

denoted \( G[V'] \) or \( G(V') \),

is the graph \( (V', \{uv|uv \in E \text{ and } u, v \in V'\}) \).

**Complement**

The complement of graph \( G = (V, E) \)

is the graph \( \overline{G} = (V, \{uv|u, v \in V, u \neq v, \text{ and } uv \notin E\}) \).

**Clique**

\( K_n \): the complete undirected graph on \( n \) vertices (as a graph or sub graph)

A maximum clique of graph \( G \) is a complete subgraph of \( G \) with the maximum number of vertices.

A maximal clique of \( G \) is a complete sub graph of \( G \) that is not contained in any larger complete sub graph.

**independent set** (or stable set): a graph or sub graph having no edges

### 2.2. Global Positioning System (GPS)

GPS is a system used to determine the location on the Earth's surface with the help of the synchronization of satellite signals. This system uses 24 satellites to transmit microwave signals to Earth. The signal is then received by the receiver on the surface of the Earth and is used to determine the location, speed, direction and time. Similar systems to GPS include GLONASS from Russia, Galileo from the European Union, and IRNSS from India (Zenk, Matthews, Kraft, & Jones, 2018).

For accurate navigation, four or more satellites must be visible. The receiver's position is determined by solving the navigation equations, as well as the difference between the time kept by the receiver's onboard clock and the accurate time of day, obviating the need for a more precise and possibly impractical receiver-based clock. This cheap and highly accurate timing is used in GPS applications such as time transfer, traffic signal timing, and cell phone base station synchronization. Some GPS programs display this time, while others utilize it only for primary position calculations (Wang, Zhu, Guo, & Wu, 2018).

### 2.3. Google Maps

The Google Maps mapping service is an online-based application that provides users with various map features, such as street-map display, point-to-point steering directions (Tahyudin & Saputra, 2016), and pathways to find business locations in different cities. The addition of street-map and terrain view, satellite or aerial view, can provide convenience for users in using these devices. In addition, this application can also be accessed from anywhere and with any device while still connected to the internet (H. K. Liu, Hung, Tse, & Saggau, 2020).
Google Maps is a consumer application and web mapping platform from Google (Saputra, Handani, Indartono, & Wijanarko, 2020). Satellite imagery, aerial photography, street maps, 360° interactive panoramic views of streets (Street View), real-time traffic conditions, and route planning for walking, driving, biking, flying (in beta), and public transportation are all available. Google Maps was utilized by over 5 million users per month in 2020, according to Google (Google Maps, 2021).

2.4. The Bellman-Ford Algorithm

The Bellman-Ford algorithm is used to find the shortest route (from one source) on a weighted graph. In finding the shortest path solution, the Bellman-Ford algorithm will calculate every shortest distance from one node point/node. In practice, this algorithm is only used if there is a negative weighted side (Maylawati et al., 2020). For example, as shown in Figure 1.

![One example graph with negative side](Cormen, Leiserson, Rivest, & Stein, 2009)

3. Methodology

Determination of the fastest path between several tourist sights in Banyumas required some data input. This paper used distance, road width, road conditions, climbs and densities contained in Banyumas. The stages of this research start from the study of literature by looking for references from reputable journals with the last five years (2017 – 2021), identification of problems, namely on tourism in Banyumas Regency, data collections, especially those related to tourism in Banyumas Regency, optimization implementation of bellman ford algorithm, analysis of results and conclusion, as shown in Figure 2.

![Flow Research](Cormen, Leiserson, Rivest, & Stein, 2009)

4. Result and Discussion

4.1. Banyumas Tourism During the Covid-19 Pandemic
The Covid-19 pandemic has wreaked havoc on Indonesia's tourism industry and creative economy, particularly Banyumas. The number of domestic and international travelers, as well as hotel occupancy, has decreased dramatically. This has an effect on local tourism revenue.

The Indonesian tourism industry has been saved through a variety of efforts. The Ministry of Tourism (in Bahasa Indonesia: Kementerian Pariwisata dan Ekonomi Kreatif/ Kemenparekraf) is responsible for three "rescue" phases: Emergency Response, Recovery, and Normalization. The Emergency Response phase focuses on health, including launching social protection programs, encouraging creativity and productivity while working from home (WFH), coordinating the tourism crisis with tourism areas, and planning for recovery. The gradual reopening of tourist destinations is the next step of recovery. The planning is substantial, beginning with the implementation of the CHSE protocol (Cleanliness, Health, Safety, and Environmental Sustainability) in tourist sites and supporting the optimization of MICE activities in Indonesia. The final phase is the Normalization phase, which entails preparing destinations to comply with the CHSE standard, generating market interest, and offering discounts on vacation packages and MICE (Kemenparekraf, 2021).

Tourism management in Banyumas Regency through the relevant agencies also makes efforts to save tourism from attracting tourists and revive the ecosystem. Shown in Figure 3 are some examples of photos of tourist sites in Banyumas. The revival of tourism can be seen from the readiness of tourist objects, including their supporting facilities, to receive tourist visits. In addition, all tourism actors have also received two complete doses of the Covid-19 vaccine, and some are just waiting for a booster vaccine. Besides that, the implementation of suitable health protocols also needs to be improved. Local governments need to develop tourist villages to drive the local economy to overcome the impact of the Covid-19 pandemic. Banyumas has many natural attractions that are cool, safe, comfortable, and healthy.

![Figure 3](http://www.webology.org)

**Figure 3. Some Examples of Tourism in Banyumas**

### 4.2. Implementation of the Bellman-Ford Algorithm

The research results disclosed that road data has a variable length, width, road condition, traffic density, and climb. For testing, the fastest path optimization will be done with the algorithm, in Figure 4 map of tourist locations in Banyumas district, marked with the closest sequence number and the location mentioned in Table 2.
Figure 4. Map of Banyumas City Road

Calculation of Fuel Usage

Calculating the required fuel is obtained from the average mileage generated in spent fuel per 1 litre. Calculation of fuel requirements with mathematical calculations can determine the distance travelled divided by the standard fuel motorcycle average of 58.8 Km/litre (Tahyudin et al., 2015). The total fuel requirement is symbolized by \((A = \text{The fuel standard in litres})\). For example, if the distance travelled is 8.7 Km, then the Calculation of fuel requirements is as follows:

\[
\frac{B-C}{A} \quad \text{.......................... (2)}
\]

\[
\frac{B-C}{A} = \frac{8.7 \, \text{Km}}{58.5 \, \text{Km/litre}} = 0.14 \, \text{Km/litre}
\]

Table 2. Node of tourist locations

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alun-alun Purwokerto</td>
<td>7</td>
<td>Baturaden</td>
</tr>
<tr>
<td></td>
<td>▪ Museum BRI (Bank Rakyat Indonesia)</td>
<td></td>
<td>▪ Kebun Raya Baturaden</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>▪ Pancuran 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>▪ Telaga Sunyi</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>▪ Curug 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>▪ Curug Gede</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>▪ Baturaden Adventure Forrest</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>▪ Pancuran 3</td>
</tr>
<tr>
<td>2</td>
<td>Taman Andhang Pangrenan</td>
<td>8</td>
<td>Curug Gomblang</td>
</tr>
<tr>
<td>3</td>
<td>Bale Kemambang</td>
<td>9</td>
<td>Curug Cipendok</td>
</tr>
<tr>
<td>4</td>
<td>The Village</td>
<td>10</td>
<td>Curug Nangga</td>
</tr>
<tr>
<td>5</td>
<td>Bukit Tranggulasih</td>
<td>11</td>
<td>Dream Land Park Ajibarah</td>
</tr>
<tr>
<td>6</td>
<td>Curug Jenggala</td>
<td>12</td>
<td>Bukit Watumeja</td>
</tr>
</tbody>
</table>

Calculations Bellman-Ford
Using the Standard Bellman-Ford Algorithm, the Calculation for finding the shortest path from the node to node uses equation:

\[ M_{i,v} = \min (M_{i-1,v}, M_{i-1,n} + C_{vn}) \]  

(3)

Where \( i \) is the iteration, \( v \) is the vertex (node), \( n \) is the neighbour node, and \( C \) is the cost.

The necessary steps are as follows: From node 6 to node 7 is line 6-7 with a distance of 2 Km, line 7-4 with a distance of 4.3 Km.

Then with the following mathematical functions:

\[ M_{[6,7]} = \min(M_{[6,7]}, (M_{[7,4]})) \]

\[ = \min(2, 4,3) \]

\[ = 2 \]

Assumed at an average speed of 40 km per hour with a distance of 2 km then obtained as following:

\[ t = \frac{s}{v} = \frac{2}{40} = 0.05 \text{ hours} = 3 \text{ minutes} \]

Assumed at an average speed of 40 km per hour with 4.3 km distance, then got result:

\[ t = \frac{s}{v} = \frac{4.3}{40} = 0.107 \text{ hours} = 6.45 \text{ minutes} \]

**Testing of Rill Data**

The fastest path optimization using Bellman-Ford Algorithm on the following program validation. Validation data is taken using two kinds of problems. The first problem is from node 12 to node 8, while the second problem is node 1 to node 7 with an average speed of 40 Km/h.

**Node Testing**

The following Table 3 travel distance and time in Banyumas with take the starting point in Alun-Alun Purwokerto.

<table>
<thead>
<tr>
<th>No.</th>
<th>StartingPoint</th>
<th>Endpoint</th>
<th>Distance</th>
<th>Estimates to destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alun-Alun Purwokerto</td>
<td>Baturraden</td>
<td>12.8 Km</td>
<td>26 Minute</td>
</tr>
<tr>
<td>2</td>
<td>Alun-Alun Purwokerto</td>
<td>Curug Cipendok</td>
<td>22.9 Km</td>
<td>48 Minute</td>
</tr>
<tr>
<td>3</td>
<td>Alun-Alun Purwokerto</td>
<td>Kebun Raya Baturraden</td>
<td>14.9 Km</td>
<td>33 Minute</td>
</tr>
<tr>
<td>4</td>
<td>Alun-Alun Purwokerto</td>
<td>Curug Jenggala</td>
<td>14.2 Km</td>
<td>34 Minute</td>
</tr>
<tr>
<td>5</td>
<td>Alun-Alun</td>
<td>Pancuran 7</td>
<td>13 Km</td>
<td>25 Minute</td>
</tr>
<tr>
<td>Node</td>
<td>Origin</td>
<td>Destination</td>
<td>Distance</td>
<td>Time</td>
</tr>
<tr>
<td>------</td>
<td>--------</td>
<td>-------------</td>
<td>----------</td>
<td>--------</td>
</tr>
<tr>
<td>6</td>
<td>Alun-Alun Purwokerto</td>
<td>Telaga Sunyi</td>
<td>15.7 Km</td>
<td>34 Minute</td>
</tr>
<tr>
<td>7</td>
<td>Alun-Alun Purwokerto</td>
<td>Bukit Tranggulasih</td>
<td>13.9 Km</td>
<td>35 Minute</td>
</tr>
<tr>
<td>8</td>
<td>Alun-Alun Purwokerto</td>
<td>Taman Andhang Pangrenan</td>
<td>3 Km</td>
<td>8 Minute</td>
</tr>
<tr>
<td>9</td>
<td>Alun-Alun Purwokerto</td>
<td>The Village</td>
<td>7.1 Km</td>
<td>18 Minute</td>
</tr>
<tr>
<td>10</td>
<td>Alun-Alun Purwokerto</td>
<td>Bale Kemambang</td>
<td>2.2 Km</td>
<td>7 Minute</td>
</tr>
<tr>
<td>11</td>
<td>Alun-Alun Purwokerto</td>
<td>Curug Telu</td>
<td>13.2 Km</td>
<td>29 Minute</td>
</tr>
<tr>
<td>12</td>
<td>Alun-Alun Purwokerto</td>
<td>Curug Nangga</td>
<td>33.7 Km</td>
<td>16 Minute</td>
</tr>
<tr>
<td>13</td>
<td>Alun-Alun Purwokerto</td>
<td>Curug Gede</td>
<td>12.9 Km</td>
<td>28 Minute</td>
</tr>
<tr>
<td>14</td>
<td>Alun-Alun Purwokerto</td>
<td>Baturraden Adventure Forrest</td>
<td>15.7 Km</td>
<td>35 Minute</td>
</tr>
<tr>
<td>15</td>
<td>Alun-Alun Purwokerto</td>
<td>Curug Gomblang</td>
<td>16.5 Km</td>
<td>38 Minute</td>
</tr>
<tr>
<td>16</td>
<td>Alun-Alun Purwokerto</td>
<td>Bukit Watumeja</td>
<td>12.2 Km</td>
<td>23 Minute</td>
</tr>
<tr>
<td>17</td>
<td>Alun-Alun Purwokerto</td>
<td>Pancuran3</td>
<td>13.7 Km</td>
<td>31 Minute</td>
</tr>
<tr>
<td>18</td>
<td>Alun-Alun Purwokerto</td>
<td>Dream Land Park Ajibarang</td>
<td>19.6 Km</td>
<td>39 Minute</td>
</tr>
<tr>
<td>19</td>
<td>Alun-Alun Purwokerto</td>
<td>Museum BRI</td>
<td>500 M</td>
<td>2 Minute</td>
</tr>
</tbody>
</table>

From node 1 to node 20, there is a solution using Bellman-Ford Standard Algorithm. Using the Bellman-Ford Standard Algorithm found the following routes:

1) From node 1 to node 2, that is Alun-Alun Purwokerto to Taman Andhang Pangrenan, with a distance of 3 Km, taken with time 5 Minute;
2) From node 1 to node 3, namely Alun-Alun Purwokerto to Bale Kemambang, with a distance of 3 Km, taken with time 3 Minute;
3) From node 1 to node 4, which is Alun-Alun Purwokerto to The Village, with a distance of 7.1 Km, taken with time 18 Minute;
4) From node 1 to node 5, which is Alun-Alun Purwokerto to Bukit Tranggulasih, with a distance of 13.9 Km, taken with time 35 Minute;
5) From node 1 to node 6, that is Alun-Alun Purwokerto to Curug Jenggala, with a distance of 14.2 Km, taken with time 34 Minute;
6) From node 1 to node 7, that is Alun-Alun Purwokerto to Baturaden, with a distance of 12.8 Km, taken with time 26 Minute;
7) From node 1 to node 8, that is Alun-Alun Purwokerto to Curug Gomblang, with a distance of 16.5 Km, taken with time 38 Minute;
8) From node 1 to node 9, which is Alun-Alun Purwokerto to Curug Cipendok, with a distance of 22.9 Km, taken with time of 48 Minute;
9) From node 1 to node 10, that is Alun-Alun Purwokerto to Curug Nangga, with a distance of 33.7 Km, taken with time 16 Minute;
10) From node 1 to node 11, which is Alun-Alun Purwokerto to Dream Land Park Ajibarang, with a distance of 19.6 Km, taken with time 39 Minute;
11) From node 1 to node 12, that is Alun-Alun Purwokerto to Bukit Watumeja, with a distance of 12.2 Km, taken with time 23 Minute;

Based on the results obtained the best path that is node 1 until node 19 (1 – 19):


Suggestion from this research is needed to develop the nearest lane with weighting cost. In addition, it is necessary to compare the results obtained by other methods such as linear programming or artificial neural network.

5. Conclusion

From the existing problems, a tourist route has been determined in Banyumas Regency with 20 destinations, starting from the Alun-Alun Purwokerto to the last destination, namely Curug Nangga. The Bellman-Ford algorithm produces the shortest and fastest route with node routes 10-8-9-16-13-5-11-17-7-4-3-6-14-15-18-2-12 ie : (1) Alun-Alun Purwokerto (9) Taman Andhang Pangrenan - (9) The Village - (16) Bukit Watumeja - (13) Curug Gede - (5) Pancuran 7 - (11) Curug 3 - (17) Pancuran 3 - (7) Bukit Tranggulasih - (4) Curug Jenggala - (3) Kebun Raya Baturraden - (6) Baturraden Adventure Forrest - (15) Curug Gomblang - (18) Dream Land Park Ajibarang - (2) Curug Cipendok - (12) Curug Nangga.

Determining the shortest path is so important in terms of supporting tourism services, so that tourists can reach tourist sites easily.

The Bellman-Ford algorithm uses a greedy strategy whose way of working is that at each step, the side with the most negligible weight is selected that connects a node that has been selected with another node that has not been selected. Based on the research results that have been done, further research is expected to add other tourist objects that are starting to develop in Banyumas Regency and add several supporting locations such as culinary, hospitality, places of worship and so on.

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