

# UTILIZATION OF QGIS CLOUD FOR MAPPING ACCIDENT-PRONE AREAS IN CIREBON CITY

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## Abstract

Cirebon city is one of the cities located in West Java Province, Indonesia. This city is on the northern coast of Java Island or known as the pantura line, this path is one of the lanes that are very high accident-prone. But information related to points or areas that are considered high in accidents cannot be conveyed thoroughly to

road users, this is because there is no media that can provide such information. Therefore, in this study conducted analysis and manufacture of mapping of accident-prone areas with QGIS technology which is often known as Geographic Information System (SIG) to plan and provide information sparsely that can provide any point or area that is highly rated accident. The methods used in making this mapping use spiral methods, the process begins with planning, risk analysis, engineering, and evaluation by the user (including planning and management). The results of mapping accident-prone areas in the pantura lanes of Cirebon City can provide different patterns in providing information to road users by utilizing QGIS technology online, to provide convenience for road users to know which points or areas are classified as high accident rates, this can provide warning for road users to be careful in driving.

**Keywords:** Accident, QGIS Cloud, Prototyping Quantum GIS, Geographic Information Systems (SIG)

### **Introduction**

Transportation is a very important part of human life. In transportation, safety and security is serious problem and must be considered by service users. According to Law No. 1 of 1992 on Traffic and Road Transport, the purpose of transportation is to facilitate traffic and highway transportation, safe, comfortable, safe, fast, orderly, and efficient, blend other transportation models and reach all corners of the city. This makes the security aspect a big concern[1].

According to World Health Organization (WHO) estimates, traffic accidents will be the fifth leading cause of death in the world by 2030[2]. Who points out that worldwide 1 million people die each year in traffic accidents, 0% of whom are by the age of 25. Meanwhile, millions of others were seriously injured and physically disabled as a result of the accident. Judging by the number of traffic accidents and the international world view of the state of road safety in Indonesia, road safety issues can no longer be considered a mere problem. The dimensions of the problem have been expanded to include social, economic, environmental, health, investment, national, and political issues.

he city of Cirebon is located in the eastern part of West Java Province and is on the mainline cross pantura Form Cirebon city area extends from West to East about 8 kilometers and from North to South about 11 kilometers with an altitude of sea-level  $\pm 5$  meters, this path is one of the lanes that belongs to the path with a high accident rate.

According to data from the Cirebon Police Traffic Unit throughout 2018 [3], there was a decrease of 312 cases. The number of accidents is the number of accidents recorded in the Cirebon Police Traffic Unit, the number of accidents may be higher because there are still people who do not report accidents that occur to the authorities. Therefore, efforts are needed to reduce the number of accidents. Efforts that may be able to reduce the number of accidents include identifying and providing information that is up to date with the area of accident risk, one of which is by making mapping accident-prone areas better known as Geographic Information Systems (GIS) using QGIS technology. This is expected to provide accurate information for road users, especially in the pantura lane as a warning for road users to be careful in driving and as input from local governments to see traffic problems and also overcome these problems.

### **Literature Review**

Geographic Information Systems (GIS) is a computerized cartography information system used to enter, store, retrieve, process, analyze and generate geographic internal data or geospatial data for decision making in the planning and management of land use, natural resources, environment, traffic, cities to support

other institutions and public services. Geographic information systems technology can also be used for scientific research [4-8].

resource management, land use planning, mapping, and route planning. The final result of the GIS process is presented in the form of a map or graph. Maps are very effective in storing, displaying, and providing geographic information. This training program consists of two stages. FUNDAMENTAL GIS studies desktop GIS with ArcView and Advanced GIS studies web-based GIS with MapServer.

Web GIS application or digital cartography that uses internet network as a means of communication used to distribute, publish, integrate, communicate and provide information in the form of text, digital maps and to perform analytical and consulting functions in Connection with GIS over the internet network [9, 10].

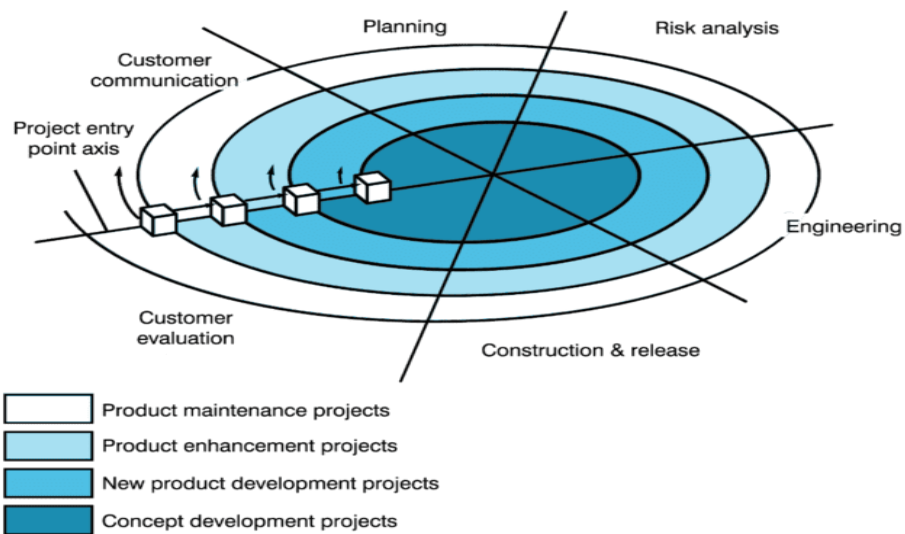
Quantum GIS or better known by the abbreviation QGIS is an open-source Geographic Information System (GIS) software that is licensed under the GNU General Public License and can run on various operating systems. QGIS aims to be an easy-to-use GIS by providing common functions and features. QGIS is a project of the Open Source Geospatial Foundation (OSGeo), whose original purpose was gis data representation. QGIS runs on Linux (Ubuntu), Unix, Mac OS, Windows, and Android and supports many vector, raster, and database data processing formats and functions [11-16].

**Methodology**

The development of the Spiral model system according to [9, 17] is the development of models that adopt important features of waterfall models and prototype models. But this model also has characteristics, not a model that is a reference for risk analysis (risk analysis). The development methods used Use the model in this research spiral[10].

The development method used in this study uses the Spiral model as seen in Figure 1. Here are the phases in the Spiral Methodology and the activities that occur in them:

1. Planning, Estimated costs, schedules, and resources for iteration.
2. Risk Analysis, Analysis to estimate the level of risk.
3. Engineering, This includes testing, coding, and application of software
4. Evaluation by the user (including planning and management)



**Figure 1. Model Spiral**

This research was conducted on several roads in the city of Cirebon. To find out how many accidents, the victim died, severe injuries, minor injuries, and material losses suffered by accident victims. The overall research framework can be seen in Figure 2.



**Figure 2.** Research Framework

***Finding and Discussiosns***

**Data Collection**

The collection of data is done by collecting data that has been obtained by the Cirebon police chief who has provided accident data information around the streets of Cirebon city. The data that has been provided there is a number of information such as the number of accidents, fatalities, severe injuries, minor injuries, and the number of material losses on all roads of Cirebon city. Here is a table of accident data on several roads in the city of Cirebon[18].

*Table 1*

**Accident Data**

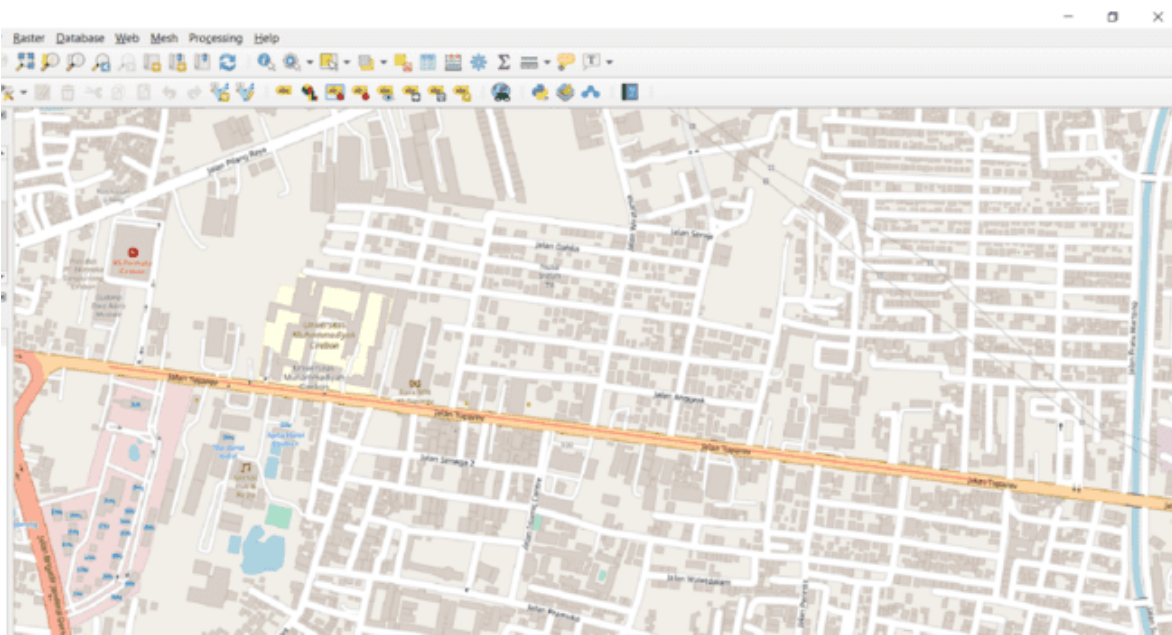
NO	Nama Jalan	Kejadian	Meninggal	Luka Berat	Luka Ringan	Material
1	Jl. Tuparev	13	1	3	16	0
2	Jl. Cipto Mangunkusumo	61	18	39	31	0
3	Jl. Kartini	33	4	11	22	0
4	Jl. Pemuda	19	0	3	8	0
5	Jl. Siliwangi	15	4	15	20	1
6	Jl. Pekiringan	23	4	6	9	2
7	Jl. Karangates	23	4	6	17	3
8	Jl. Pasuketan	10	10	5	3	1

**Digitization with Quantum GIS**

In the digitization process using Quantum GIS (QGIS), excel files must first be converted to .csv type (comma separated). Then after saving in CSV format in the next step, use the button to open the file with the QGIS menu Add layer text delimit.

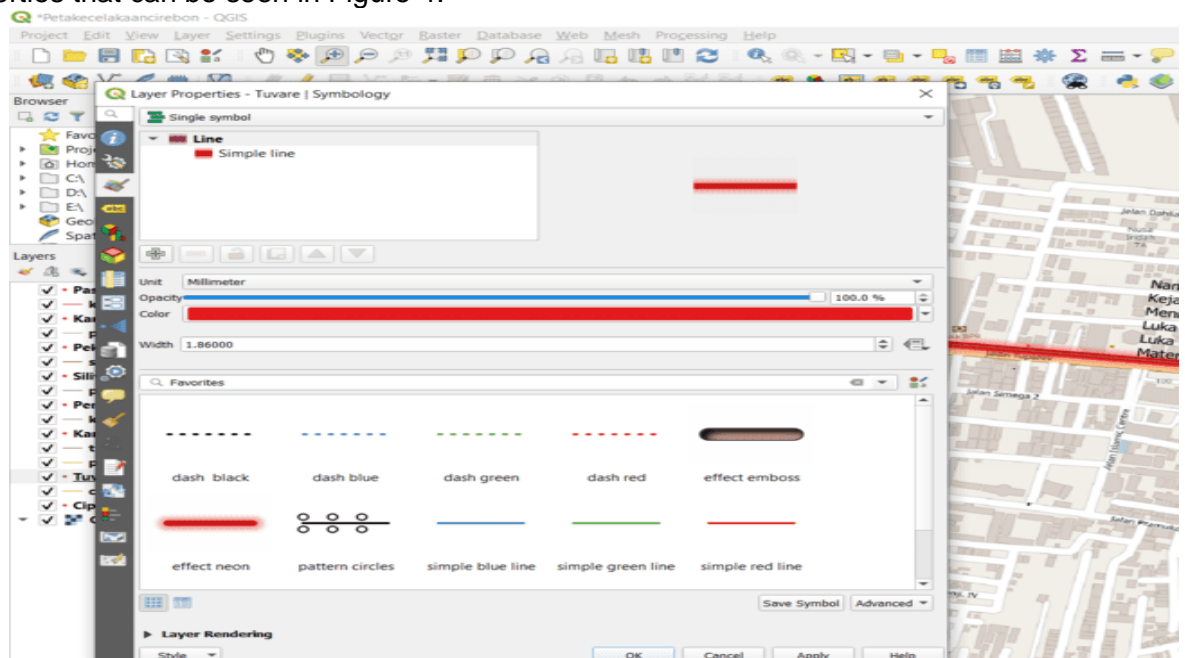
**A. Mapping Process with QGIS**

The first implementation was carried out, namely the process of mapping accident-prone areas in the city of Cirebon using the QGIS application version 3.6. The first step is to create a road line around the city of Cirebon. The process of making a road is done by outlining every road contained in the data that has been obtained. So that forms a straight red line. The results can be seen in the figure 3.



**Figure 3.**

Naming names, colors, histograms at each coordinate can be done using layer properties that can be seen in Figure 4.



**Figure 4.**

The next step is to fill in the data on each path that has been marked. In the line that has been marked, there is information on the incident of the accident, namely the incident, the victim died, severe injuries, minor injuries, and losses. This data filling uses layer properties that can be seen figure 5.



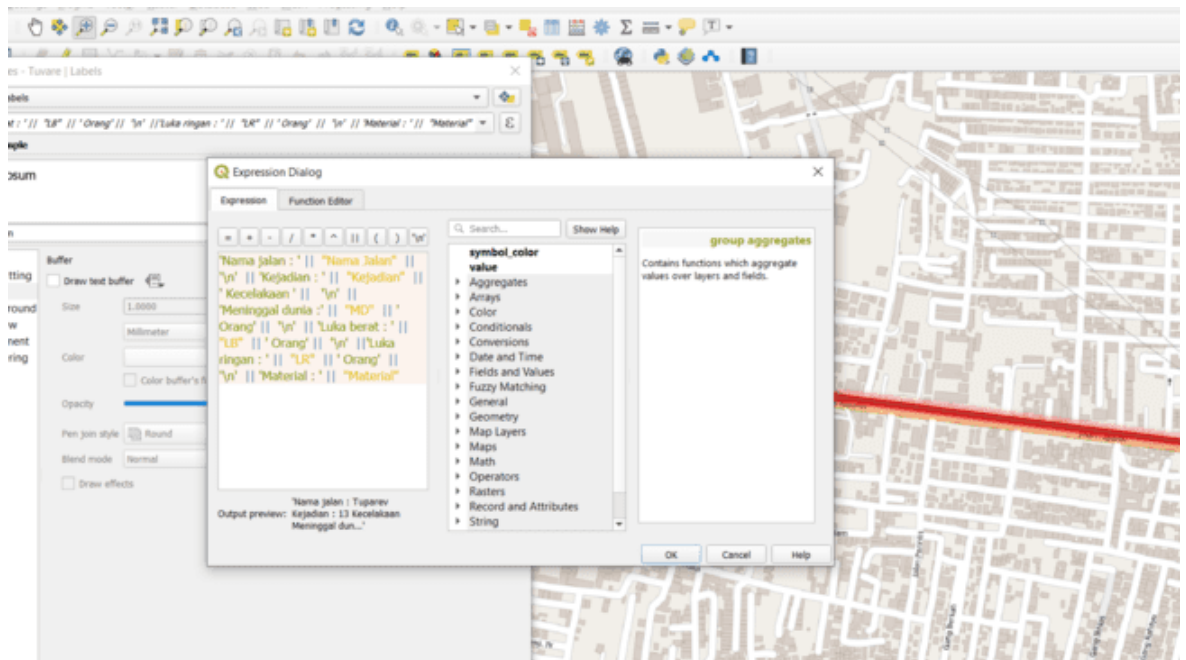


Figure 5.

Once all the layers for each accident-prone area mapping have been created, the next step is to set up the view to create a web map using the QGIS2WEB plugin in the QGIS app. Once the display settings are complete, the final step is to export to the web map that can be seen in Figure 6.

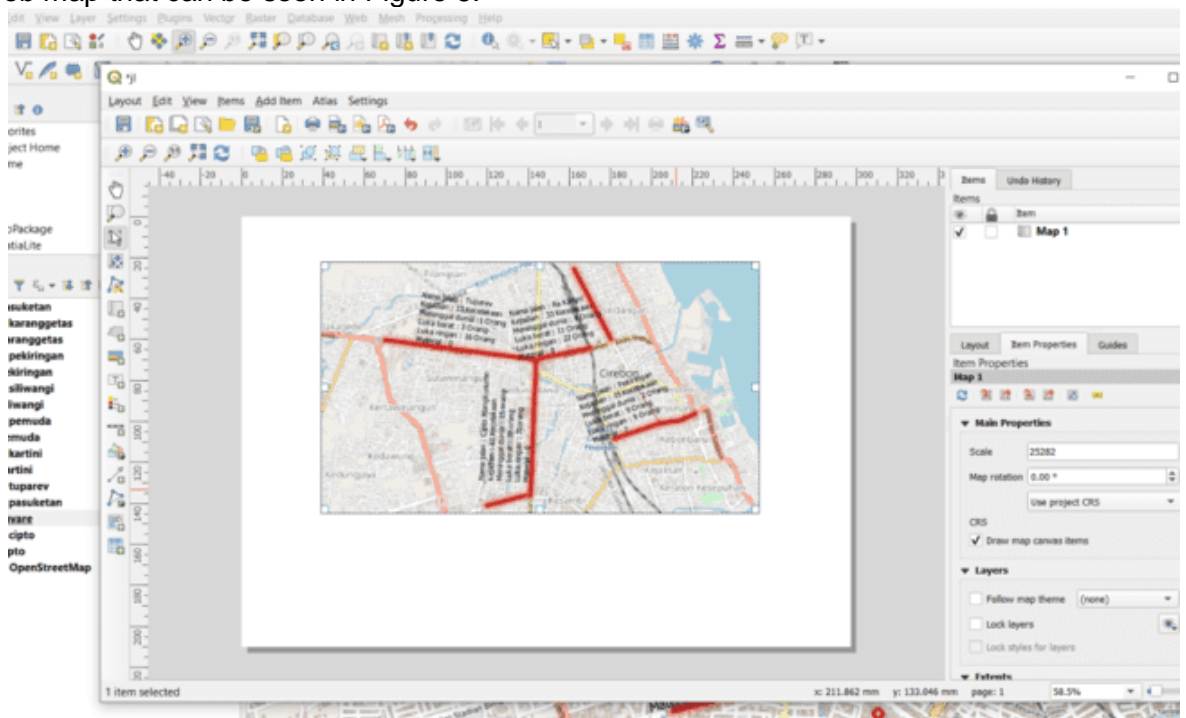


Figure 6.

B. Web GIS

Judging from the results of digitization, maps need to be online, called GIS networks. In the QGIS application, there is a plug-in that supports us to directly create a Web GIS, namely QGIS Cloud. To be able to run QGIS Cloud, you must first register online at [www.qgiscloud.com](http://www.qgiscloud.com). If you already have a QGIS Cloud account, you can directly log in through the QGIS cloud plug-in, then upload a map of road locations that often occur in accidents in Cirebon. The digital map upload results are shown in Figure 7 & Figure 8. Here is the URL address of accident-prone roads in Cirebon City displayed by QGIS Cloud after uploading.

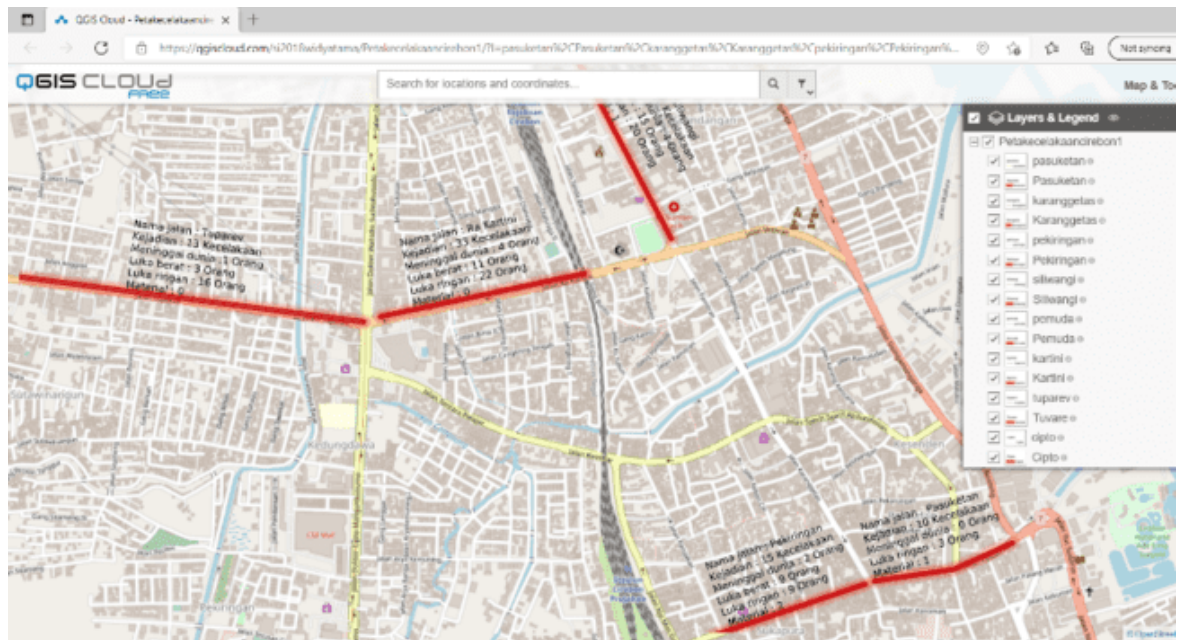


Figure 7. Uploaded Digitization Map in QGIS Cloud.

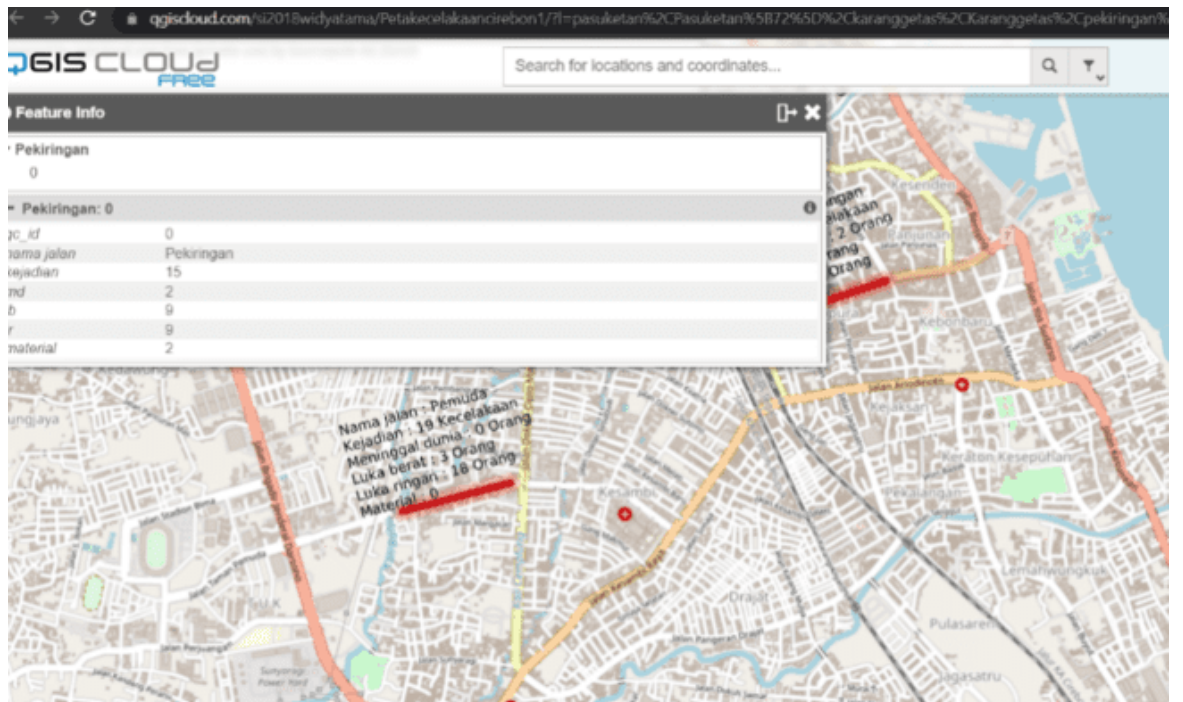
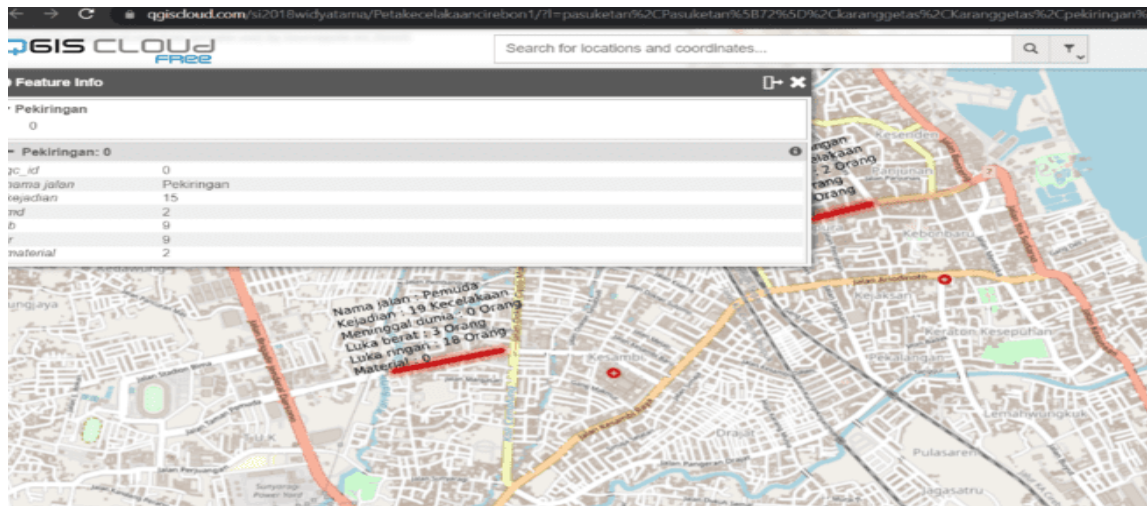


Figure 8. Accident Data Information Window on Cirebon City Street.



**Figure 9.** Data window of accidents on the streets of Cirebon city

### Conclusion

The results of this study based on the description discussed in the previous section can be described as follows:

The information presented can be close to the accuracy, while generating information that is close to the user's expectations. Search results in addition to text data are also generated in visual form (location map). Data in visual form (location map) shows on the map where the position or location of the road is prone to accidents. The system is expected to work on computers with low resources.

The availability of a mapping system for accident-prone areas in the city of Cirebon with Quantum QIS is expected to help the Police Chief and the Cirebon community to monitor the number of accidents and the number of victims. The resulting Geographic Information System (SIG) can display the geographic information of the area that often occurs accidents in the city of Cirebon, especially in the pantura line. While the details of data and accident numbers can be displayed on each road in the form of Giscloud web. The information displayed can be selected depending on the point you want to select looking for that information.

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