Development and implementation of mapping application program after COVID-19 pandemic in Malang City, of Indonesia

Rusdijanto Rusdijanto[1*], Pungky Eka Setyawan[2], Dewi Izzatus Tsamroh[2]

[1]Department of System Information, Faculty of Information Technology, University of Merdeka Malang

[2]Department of Mechanical Engineering, Faculty of Engineering, University of Merdeka Malang

Malang, East Java

Indonesia

_____

ABSTRACT

Malang is a city that is very well known for its history and tourism objects. Not only visited by domestic tourists but also many foreign tourists who come to enjoy the beautiful city of Malang. During the Covid-19 pandemic there was a decrease in tourist visits to Malang City by up to 66%. Currently, with various policies related to health protocols, many tourists are starting to return to visit Malang City. To make it easier for tourists to find accommodation in the city of Malang, it is necessary to analyze data on lodging places, facilities, and locations. Then after all the data has been collected, the information will be grouped according to hotel facilities and location, then a hotel mapping application is made with several icons: Malang city map, hotel icon, hotel information data form using MapInfo pro. The hotel mapping application is designed to make it easier for users to search for lodging in the city of Malang, especially in the new normal era after the Covid-19 pandemic.

Key Words*: Geographic Information System (GIS), Mapping, Information, MapInfo Pro.*

_____

1. INTRODUCTION

The great potential for tourism in Malang City, makes many entrepreneurs from outside the city develop their business. Likewise, shopping areas and special lodging places are hotels, therefore to facilitate the search for lodging places by comparing locations, systems, facilities and other star hotels. The existence of a mapping system application will make it easier for visitors to access the search for lodging in the city of Malang [1].

However, since the beginning of 2020, due to the Covid-19 pandemic, tourist activities have tended to decrease due to the many policies related to lockdowns and activity restrictions [2]. The Covid-19 pandemic has affected various fields, one of which is in the tourism sector [3]. Where there is a decrease in tourists coming to Malang up to 66%. However, at the end of 2021, policies related to health protocols have been relaxed, so tourism activities are also experiencing development. One of them is the emergence of tourism activities in Malang City, where many tourists are starting to arrive for a vacation in Malang City. With this activity, of course, many tourists are looking for lodging in Malang City, so we need an application that can provide recommendations to Malang City visitors to choose a hotel as their place to stay [4].

The mapping application is an application that is made to facilitate the search for lodging places in Malang City, by grouping data information including tariffs, facilities, locations and users, namely employees to serve visitors or clients as information needed as a whole about lodging in Malang City. So far, tourists who have just visited the city of Malang find it very difficult to find lodging according to their own opinion. From the description of the problem above, the author designed the application using a professional info map 7.5 in mapping the hotel as visitor material for tourists in the city of Malang [5].

The research objectives of the application using Map Info Professional 7.5 are firstly to provide a positive impact on tourism in the city of Malang and increase people's income and increase the interest of visitors who will come to visit the city of Malang, secondly to improve quality and make it easier for users to operate mapping applications and provide convenience for visitors in finding information about lodging, namely hotels in the city of Malang [1].

Regarding the definition Geographic information system is a form of computer technology that has been widely used to improve regional and urban planning processes, many implementations of GIS have shown significant improvements and improvements in the decision-making process because GIS can provide quantitative information needed for regional planning [6]. as well as the city. Among others:

a. Aronaf is a geographic information system based on computer work that includes, manages, manipulates, analyzes data and provides descriptions.
b. Burrough is a geographic information system that is useful for collecting, generating, retrieving the desired data and displaying missing data from the real world.
c. Gitutu is a geographic information system that can support spatial decision making and is able to integrate location descriptions with the characteristics of phenomena found at that location. A complete GIS includes the necessary methodologies and technologies, i.e. spatial data of hardware, software and organizational structures
d. Marble et al. Geographical Information System is a spatial data handling system.
e. Linden is a Geographic Information system for managing, processing/manipulating, analyzing and displaying data spatially with the earth's surface.

Information system is a set of components that make up a system that has a link between one component and other components that aim to produce information in a particular field. In the information system, it is necessary to classify the flow of information, this is due to the diversity of needs for information by information users [7]. The Criteria of the information system, among others, is flexible, effective and efficient. System classification by point of view:

a. Abstract System and Physical System
Abstract systems are systems that cannot be seen with ordinary eyes and are usually in the form of thoughts or ideas. An example of this system is philosophy. Physical systems are systems that can be seen with the ordinary eye and are usually used by humans. An example of this system is the accounting system.
b. Natural System and Artificial System
Natural systems are systems that occur due to natural influences, such as the earth's rotation system, the earth's gravity system. While artificial systems are systems designed by humans. An example is the payroll system.
c. Closed System and Open System
A closed system is a system that is not related to the outside of the system and is usually not affected by conditions outside the system. While the open system is a system that is related to the outside of the system.

Someone who has the ability to analyze a system which includes studying the problems that arise and determining the needs of the system user is called a systems analyst. A systems analyst has the following duties:

1. Collecting and analyzing all documents, files, forms used on the running system
2. Compiling a report on the system that has been running and evaluate what deficiencies exist in the system. Next, report all these deficiencies to the system user
3. Designing improvements to the system and develop a new system
4. Analyzing and compiling an estimate of the costs required for the new system and provide arguments about what benefits can be obtained from using the new system.
5. Supervising all existing activities, especially those related to the implementation of the new system.

The information system cycle itself consists of the following activities:

1. Planning
2. Data Collection
3. Analysis
4. Design

2. RESEARCH METHODS

To carry out a mapping model, complementary materials are needed, including:

a. The data is a map of Malang City as a digitizing material
b. Data on hotel names in the city of Malang are complete including roads, star class, hotel facilities and hotel capacity
c. Creating data tables through several steps, namely table maintenance, table structure, View Modfy Tables, create browser tables

d. Creating a new browser is entering data so that the browser table is formed
e. Creating a data Query, namely select query/select, enter the Klojen Syntax in the Column that statisfy, display from data also in the same way query for star hotels
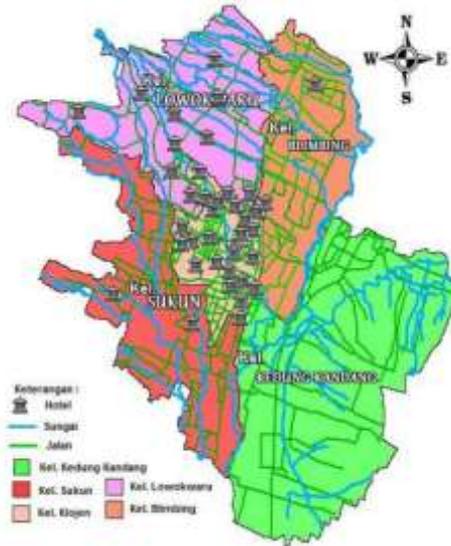f. Next, creating graphics and display the desired layout

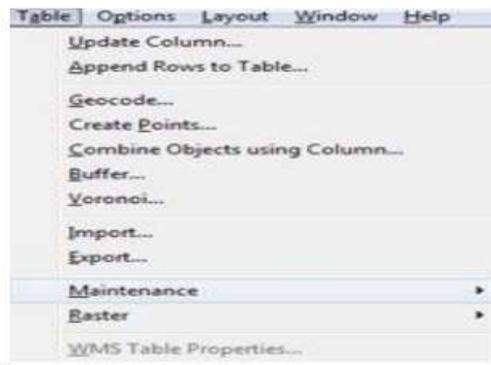**Figure 1: Mapping of digitized result**
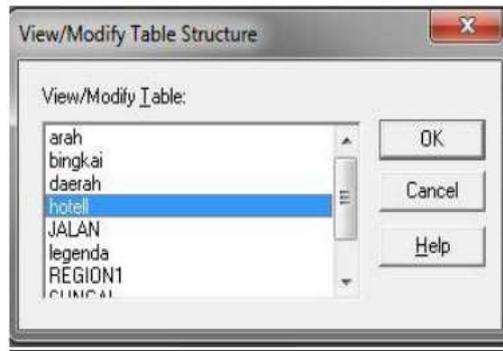

Figure 2: Maintenance Table

Figure 3: Structure Table

Figure 4: View Modify Table
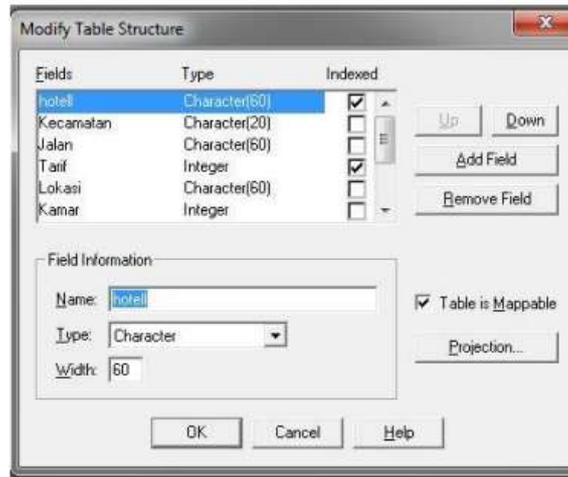
Figure 5: Modify Table Structure

Description:
- Name, generates the name that will be used in the data
- Type, choose the character to be used
- Width, used for many and the least number of letters that will be used

Figure 6: Table Structure

Figure 7: Browse Table

Figure 8: Data Browse Table

Figure 9: Query Select

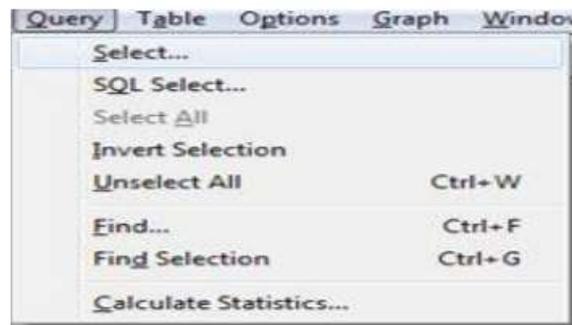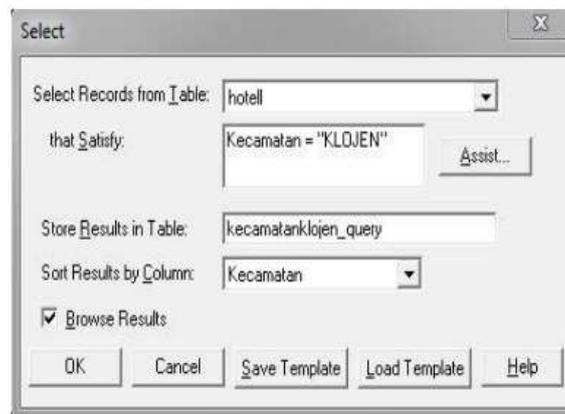**Figure 10: Query Column**

Description:

- Select Record from Table, choose the type of criteria to be entered
- That Satisfy, generates the syntax for the data name that will appear (/error in the syntax makes the data not run properly)
- Store Results in table, member name from which will appear from the data to be stored
- Ort result By Column where data is selected and to be displayed

hotell	Kecamata	Jalan	Tarif	Kelurahan	Kamar
HOTEL OLINO GARDEN MALANG	KLOJEN	JL ARIES MUNANDAR NO 41–45 MALANG-JAW	435.000	SUKOHARJO	32
GAJAHMADA GRAHA HOTEL	KLOJEN	JL DR CIPTO NO 17 MALANG-JAWATIMUR 6511	454.545	KLOJEN	86
HOTEL MANDALA PURI	KLOJEN	JL PANGLIMA SUDIRMAN NO 76 MALANG-JAW	266.942	KLOJEN	44
WILIS INDAH HOTEL	KLOJEN	JL DR WAHIDIN NO 40 MALANG-JAWATIMUR65	296.000	KLOJEN	21
AMARIS HOTEL MALANG	KLOJEN	JL LETJEND SUTOYO NO 39 MALANG-JAWATI	322.314	KLOJEN	20
HOTEL PURI PERDANA	KLOJEN	JL LETDA ASMOYO NO 23 MALANG-JAWATM	432.248	GADING KASRI	111
KERTANEGARA PREMIUM GUEST HOUSE	KLOJEN	JL SEMERU NO 59 MALANG-JAWATIMUR 65	512.461	GADINGKASRI	43
ARMYN LUXURY GUEST HOUSE	KLOJEN	JL TELOMOYO NO22 MALANG-JAWATIMUR 65	183.885	GADING KASRI	23
DEWARNA HOTELS SUTOYO	KLOJEN	JL LETJEN SUTOYO NO 22 MALANG-JAWATM	329.752	RAMPALCELAKET	15
HOTEL MEGAWATI MALANG	KLOJEN	JL PANGLIMA SUDIRMAN NO 99 MALANG-JAW	181.488	RAMPALCELAKET	70
REGENT'S PARK HOTEL	KLOJEN	JL JAKSA AGUNG SUPRAPTO NO 12-16 MALAI	412.397	RAMPALCELAKET	40
SPLINDID INN	KLOJEN	JL MAJAPAHIT NO 2-4 MALANG-JAWATIMUR	223.314	KIDUL DALEM	99
DEWARNA HOTEL	KLOJEN	JL ZAINUL ARIFIN NO 55 MALANG-JAWATIMUR	346.116	KIDUL DALEM	20
HOTEL SANTOSA	KLOJEN	JL KH AGUS SALIM NO 24 MALANG-JAWATIML	261.653	KIDUL DALEM	48
MUTIARA HOTEL	KLOJEN	JL JAKSA AGUNG SOEPRAPTO NO 23 MALANG	181.818	SAMAAN	66

Figure 11: Data Query "Klojen"

The entire data that will be displayed is data that uses the Klojen syntax "and as many as 23 hotels which are included in the Klojen area are displayed in the data. Then in the same way for the syntax "Star 3" and the syntax "Lowokwaru." Obtained as follows;
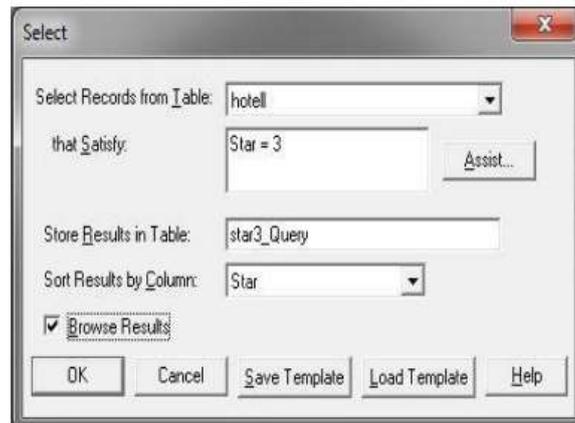

Figure 12. Query Column "Star 3"

hotell	Kecamatan	Jalan	Tarif	Star	Kelurahan	Kamar
HOTEL PURI PERDANA	KLOJEN	JL LETDA ASMOYO NO 23 MALANG-JAWATM	432.248	3	GADING KASRI	111
KERTANEGARA PREMIUM GUEST HOUSE	KLOJEN	JL SEMERU NO 59 MALANG-JAWATIMUR 65115	512.461	3	GADINGKASRI	43
DEWARNA HOTELS SUTOYO	KLOJEN	JL LETJEN SUTOYO NO 22 MALANG-JAWATM	329.752	3	RAMPALCELAKET	15
REGENT'S PARK HOTEL	KLOJEN	JL JAKSA AGUNG SUPRAPTO NO 12-16 MALAI	412.397	3	RAMPALCELAKET	40
MERBABU GUEST HOUSE	KLOJEN	JL MERBABU NO 26 MALANG-JAWATIMUR	412.461	3	SAMAAN	52
HOTEL KARTIKA GRAHA	KLOJEN	JL JAKSA AGUNG SOEPRAPTO NO 17 MALANG	868.421	3	SAMAAN	14
HOTEL SAHID MONTANA	KLOJEN	JL KAHURIPAN NO 9 MALANG-JAWATIMUR	367.769	3	ORO-ORO DOWO	12
THE GRAND PALACE HOTEL MALANG	KLOJEN	JL ADE IRMA SURYANI NO 23 MALANG-JAWAT	806.907	3	KAUMAN	60
GAJAHMADA GRAHA HOTEL	KLOJEN	JL DR CIPTO NO 17 MALANG-JAWATIMUR 6511	454.545	3	KLOJEN	86
UBUD HOTEL& Villas	LOWOKWARU	JL BENDUNGAN SIGURA-GURA BARAT NO 6 M	475.900	3	KETAWANG GEDE	40
U6 HOTEL	LOWOKWARU	JL MT HARYONO NO 169 MALANG-JAWATIMUI	600.000	3	SUMBERSARI	39
D'FRESH GUEST HOUSE AND RESTO	LOWOKWARU	JL CANDI TROWULAN NO 12 MALANG-JAWATI	352.893	3	MOJOLANGU	20
GRIYADI MONTANA	LOWOKWARU	JL CANDI PANGGUNG MALANG-JAWATIMUR	295.900	3	TANJUNG SEKAR	39

Figure 13. Data Query "Star 3"

Overall data displayed is data that uses star-3 syntax and as many as 13 hotels including 3-stars are displayed in the table.
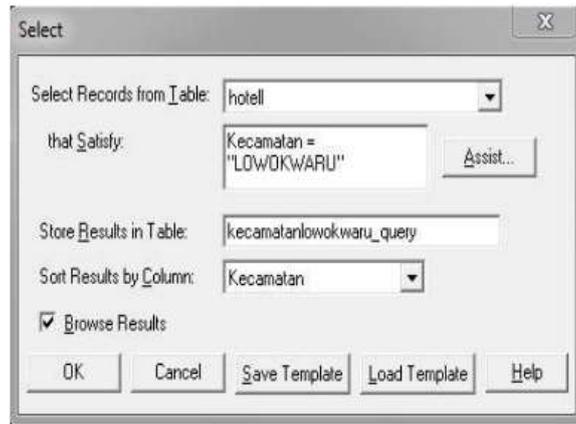
Figure 14. Query Column "Lowokwaru"

hotell	Kecamatan	Jalan	Tarif	Lokasi
PADI CITY RESORT	LOWOKWARU	JL REGULUS 9 MALANG-JAWATIMUR 65144	227.273	TLOGOMAS
UBUD HOTEL& Villas	LOWOKWARU	JL.BENDUNGAN SIGURA-GURA BARAT NO 6 M.	475.800	KETAWANG GEDE
OMAHKOE GUESTHOUSE	LOWOKWARU	JL.BENDUNGAN SIGURA-GURA IV NO 1 MALAN	278.926	KETAWANG GEDE
SANTIKA PREMIERE MALANG	LOWOKWARU	JL.LETJEN SUTOYO NO 79 MALANG-JAWATIM	1.338.843	JATIMULYO
UB HOTEL	LOWOKWARU	JL.MT HARYONO NO 169 MALANG-JAWATIMUR	600.000	SUMBERSARI
GUEST HOUSE SIMPANG BOROBUDUR	LOWOKWARU	JL.SIMPANG BOROBUDUR UTARA 4/8 MALANG	82.645	JATIMULYO
D'FRESH GUEST HOUSE AND RESTO	LOWOKWARU	JL.CANDI TROWULAN NO 12 MALANG-JAWATI	352.893	MOJOLANGU
SANDUBAYA GUEST HOUSE	LOWOKWARU	JL.PERUMAHAN ISTANA GAJAYANA NO 65 MA	164.463	MERJOSARI
SAVANA HOTEL	LOWOKWARU	JL LETJEND SUTOYO NO 32-34 MALANG-JAWA	527.273	LOWOWARU
GRIYADI MONTANA	LOWOKWARU	JL. CANDI PANGGUNG MALANG-JAWATIMUR	295.000	TANJUNG SEKAR

Figure 15. Data Query "Lowokwaru"

The entire data displayed is data that uses the "Lowokwaru" syntax and 23 hotels belonging to the Lowokwaru area are displayed in the data. The results of creating a New graph include:

Figure 16. New Graph Window

Figure 17. Create Graph
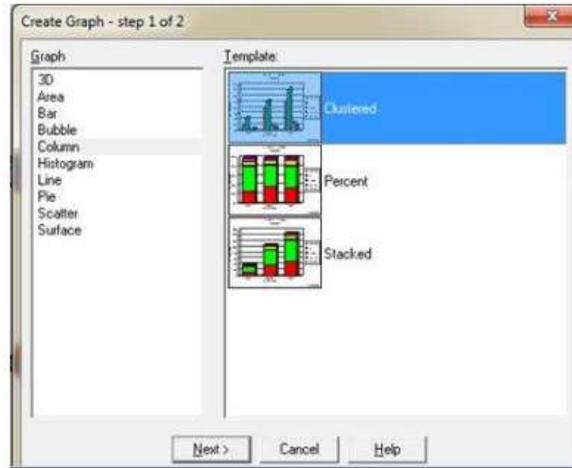
Description:

- Graphs and templates can be adjusted to the wishes that make and can be changed.
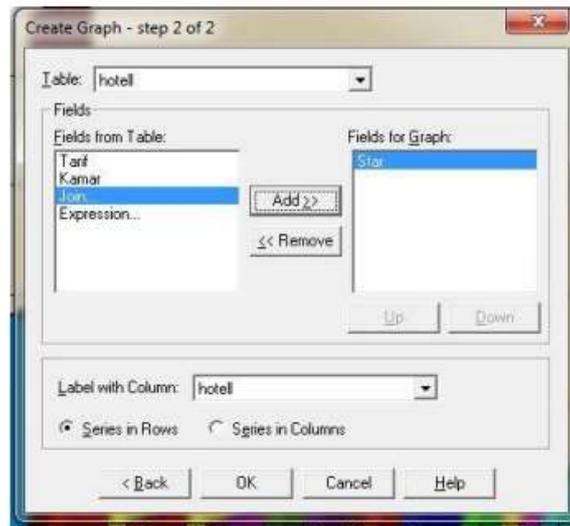
Figure 18. Create Graph "Star"

Description:

- Table, to select the data to be displayed
- Field From Table, the desired data to create a graph after that the data in ADD enter the For Graph field
- Label With column, serves to select column data.
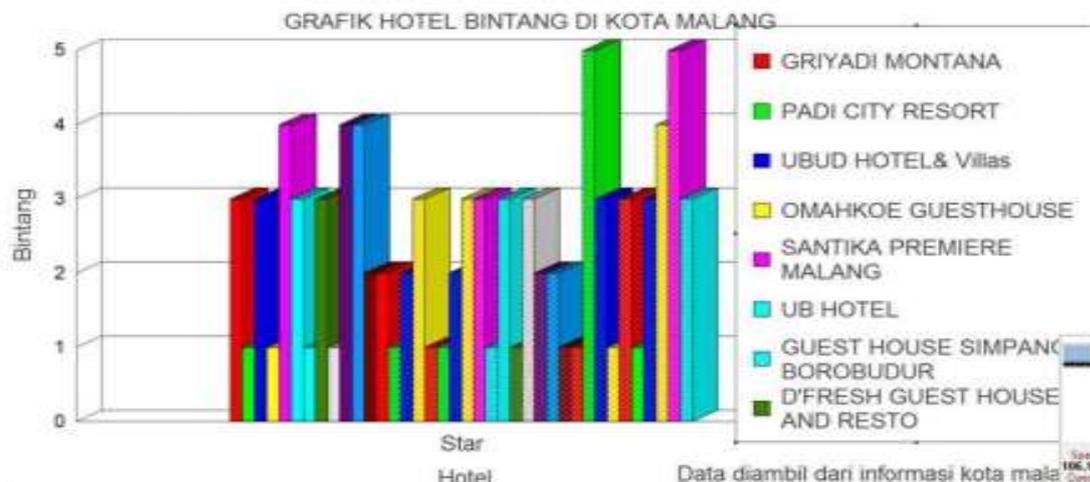
Figure 19. Graph of "Star"

Description in the same way to create a graph for the choice of rooms, the resulting graph below.

Figure 20. Graph of "Room"

Result of display Data calculate Column Statistics.

Figure 21. Calculate Column Statistics

Figure 22. Statistics Data Display

Hotel report data results using MapInfo Professional is showed as below:

hotell Report 2
26/06/2013

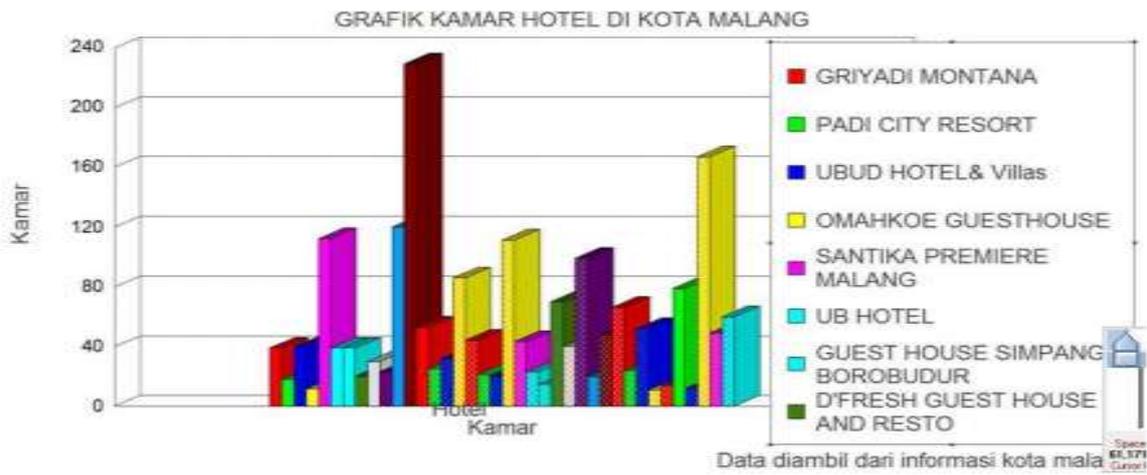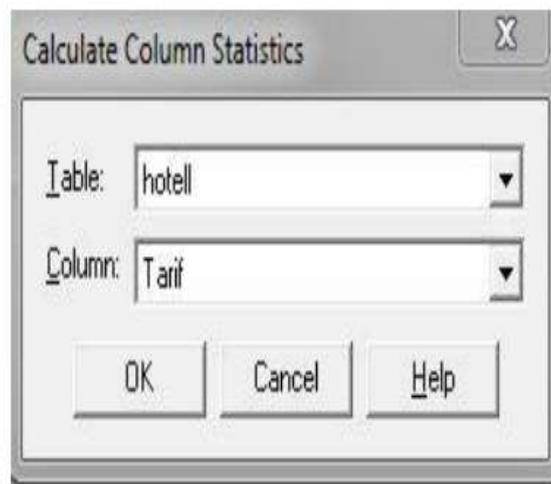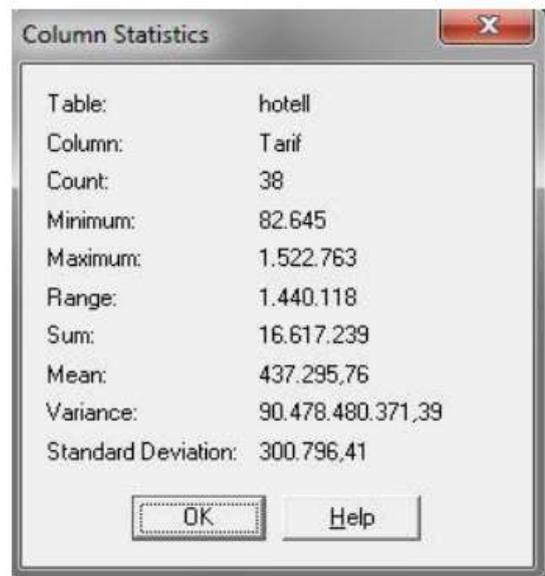| Hotel	Lokasi	Jalan	Tarif	Kamar	Star	NoTelp
GRIYADI MONTANA	TANJUNG SEKAR	JL CANDI PANGGUNG MALANG-JA	95.000	39	3	0341-4
PADI CITY RESORT	TLOGOMAS	JL REGULUS 9 MALANG-JAWATIMU	27.273	15	1	0341-5
UBUD HOTEL& Vilas	KETAWANG GEDE	JL BENDUNGAN SIGURA-GURA B	75.800	40	3	0341-5
OMAHKOE GUESTHOUSE	KETAWANG GEDE	JL BENDUNGAN SIGURA-GURA I	75.926	12	1	0341-5
SANTIKA PREMIERE MALAN	JATIMULYO	JL LETJEN SUTOYO NO 79 MALAN	38.843	112	4	0341-4
UB HOTEL	SUMBERSARI	JL MT HARYONO NO 169 MALANG-	00.000	39	3	0341-6
GUEST HOUSE SIMPANG B	JATIMULYO	JL SIMPANG BOROBUDUR UTAR	82.645	39	1	0341-5
D'FRESH GUEST HOUSE AN	MOJOLANGU	JL CANDI TROWULAN NO 12 MALA	52.893	20	3	0341-5
SANDUBAYA GUEST HOUS	MERJOSARI	JL PERUMAHAN ISTANA GAJAYAN	64.483	30	1	0341-5
SAVANA HOTEL	LOWOWARU	JL LETJEND SUTOYO NO 32-34 M	27.273	23	4	0341-5
HARRIS HOTEL & CONVENTI	ARJOSARI	JL JEND. A YANI UTARA PERUM R	11.570	120	4	0341-2
HOTEL TRIO INDAH	MULYOREJO	JL BRIGJEN SLAMET RIADI NO 1-	53.000	229	2	0341-3
HOTEL ALOHA MALANG	SUKUN	JL GAJAH MADA NO 7 MALANG-JA	68.182	53	2	0341-3
HOTEL TOSARI MALANG	SUKOHARJO	JL KH AHMAD DAHLAN NO 31 MAL	30.248	25	1	0341-3
HOTEL OLINO GARDEN MAL	SUKOHARJO	JL ARIES MUNANDAR NO 41-45 M	35.000	32	2	0341-3
GAJAHMADA GRAHA HOTEL	KLOJEN	JL DR CIPTO NO 17 MALANG-JAWAT	54.545	86	3	0341-3
HOTEL MANDALA PURI	KLOJEN	JL PANGLIMA SUDIRMAN NO 76 M	66.942	44	1	0341-3
WILIS INDAH HOTEL	KLOJEN	JL DR WAHIDIN NO 40 MALANG-J	98.000	21	1	0341-4
AMARIS HOTEL MALANG	KLOJEN	JL LETJEND SUTOYO NO 39 MALA	22.314	20	2	0341-3
HOTEL PURI PERDANA	GADING KASRI	JL LETDA ASMOYO NO 23 MALANG	32.248	111	3	0341-0
KERTANEGARA PREMIUM G	GADINGKASRI	JL SEMERU NO 99 MALANG-JAWA	12.481	43	3	0341-3
ARMYN LUXURY GUEST HO	GADING KASRI	JL TELOMOYO NO22 MALANG-JA	83.885	23	1	0341-5
DEWARNA HOTELS SUTOY	RAMPALCELAKET	JL LETJEN SUTOYO NO 22 MALAN	29.762	15	3	0341-8
HOTEL MEGAWATI MALANG	RAMPALCELAKET	JL PANGLIMA SUDIRMAN NO 99 M	81.488	70	1	0341-0
REGENT'S PARK HOTEL	RAMPALCELAKET	JL JAKSA AGUNG SUPRAPTO NO	12.397	40	3	0341-4
SPLINDID INN	KIDUL DALEM	JL MAJAPAHIT NO 2-4 MALANG-J	23.314	99	2	0341-3
DEWARNA HOTEL	KIDUL DALEM	JL ZAINUL ARIFIN NO 35 MALANG-	46.116	20	2	0341-7
HOTEL SANTOSA	KIDUL DALEM	JL KH AGUS SALIM NO 24 MALANG	81.653	48	1	0341-8
MUTIARA HOTEL	SAMAAN	JL JAKSA AGUNG SOEPRAPTO N	81.812	66	1	0341-8
THE GRAHA CAKRA	SAMAAN	JL CERME NO 16 MALANG-JAWATI	16.529	24	5	0341-7
MERBABU GUEST HOUSE	SAMAAN	JL MERBABU NO 26 MALANG-JAW	12.461	52	3	0341-8
COZY GUEST HOUSE	SAMAAN	JL TGP NO 9 MALANG-JAWATIMU	88.430	11	1	0341-9
HOTEL KARTIKA GRAHA	SAMAAN	JL JAKSA AGUNG SOEPRAPTO N	69.421	14	3	0341-8
BANDOENG GUEST HOUSE	PENANGGUNGAN	JL BANDUNG NO 20 MALANG-JAW	19.009	79	1	0341-8
HOTEL SAHID MONTANA	ORO-ORO DOWO	JL KAHURIPAN NO 9 MALANG-JAW	67.789	12	3	0341-7
ARIA GAJAYANA HOTEL	BARENG	JL KAWI NO 24 MALANG-JAWATIMU	22.763	1ST	4	0341-8
TUGU MALANG HOTEL	KAUMAN	JL TUGU NO 3 MALANG-JAWATIMU	47.901	49	5	0341-5
THE GRAND PALACE HOTE	KAUMAN	JL ADE IRMA SURYANI NO 23 MAL	06.907	60	3	0341-5
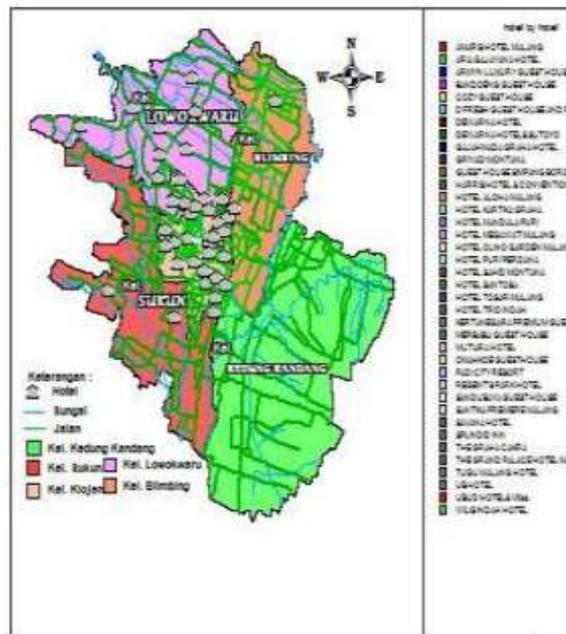
Figure 23. Mapping Hotels in Malang City

Description:

- Information on the right is a list of hotel village names in Malang city
- Information on the left, includes hotels, roads, and urban villages

3. RESULT AND DISCUSSION

The results of this hotel mapping were made using MapInfo Professional 7.5 with a database query database in the application, so that in the process of installing the application on a Personal computer (PC) it is very easy and fast to run. The mapping of the hotel is carried out easily without other devices to support it and is used as a means of tourism information who will visit Malang City.

4. CONCLUSION

By implementing a mapping application program in Malang City, it is hoped that this mapping application will be more helpful and facilitate the search for lodging places for domestic and foreign tourists who will visit Malang City.

This Mapinfo application has advantages compared to similar applications, namely the ability to process data bases including SQL processes, queries that are not found on other devices. Weaknesses do not have the ability to analyse spatial overlays and do not have the ability to perform roster to vector processes using algorithms for comparison. The overall information graph is recommended to use the arc view application which is more detailed for working on Geographic information systems (GIS).

REFERENCES

[1] I. Arischa, "Impact of Covid-19 on the Tourism Sector," IMPACT OF COVID_19 ON Sect. TOURISM Iis, vol. 6, pp. 1–6, 2020.

[2] I. D. G. Sugihamretha, "Policy Response: Mitigation of the Impact of the Covid-19 Outbreak on the Tourism Sector Policy Response: Mitigation of the Impact of the Covid-19 Outbreak on the Tourism Sector," Indonesia. J. Dev. Plan., vol. IV, no. 2, pp. 191–206, 2020.

[3] A. Susilo et al., "Coronavirus Disease 2019: Review of the Current Literature Coronavirus Disease 2019: Review of Current Literatures," vol. 7, no. 1, pp. 45–67, 2020.

[4] Satrio, "Use of mapinfo program for mapping of isotope and chemical variables in hydrological studies," Center for Research and Development of Teknol. isot. and Radiation-BATAN, 2011.

[5] A. T. Intarto, B. Alam, and D. Hermanto, "An Android-based geographic information system for hotel mapping in Palembang city," no. x, pp. 1–9, 1978.

[6] Kholil, "Utilization of Geographic Information Systems (Sig) in Android-Based Crime Reporting and Tracking Applications," J. Teknol. inf. Dan Commun., vol. 6, no. 1, pp. 51–58, 2017.

[7] G. P. Indrasmoro, "Geographic Information System (GIS) for Landslide Prone Area Detection Case Study in Karang Anyar Village, Gunung Semarang," J. GIS Landslide Prone Detection, pp. 1–11, 2013.