

Software Instructions for Use

This tutorial makes it easy to use the Dgis program and the data it outputs. The demonstration is carried out taking as an example a random sector of the city of Cali, to represent how it works anywhere on the planet:

1. Double click on the file named Dgis.exe Figure 1 double click on the icon of the program



Figure 1 Double Click on the Program Icon

2. Once the program starts on your computer you will see something like Figure 2 program view

A screenshot of the Dgis program's main interface. At the top, it says 'By David Alejandro Ramirez Cajigas' and 'UNIVERSITAT POLITÈCNICA DE VALÈNCIA'. Below this, there are several input fields for configuration: 'limite inferior' (0), 'limite superior' (0), 'area de influencia en metros' (0), '% area alcanzada' (0), 'lado 1, metros' (0), 'lado 2, metros' (0), 'Area estudiada metros cuadrados' (0), 'Numero de paradas con al menos otra en rango' (0), 'Numero de paradas sin al menos otra en rango' (0), 'numero paradas/nodos a evaluar' (0), and 'area blanca de influencia nodos/paradas' (0). There is an 'OpenStreetMap' section with a search bar and an 'Exportar' button. The 'Exportar' section has fields for 'y1' (0.0000), 'x1' (0.0000), 'y2' (0.0000), 'x2' (0.0000), and 'y2' (0.0000). At the bottom, there are buttons for 'iniciar', 'cargar imagen', 'encontrar coordenadas', and 'Medidas Topologicas de Accesibilidad'. There are also social media icons for Instagram and LinkedIn.

Figure 2 program view

3. Now we should get coordinate data, for this example we will use the base OpenStreetMap data, as it is free to use.
4. We enter the web address <https://www.openstreetmap.org/>
5. We select the export button, then we click on select manually Figure 3 catch

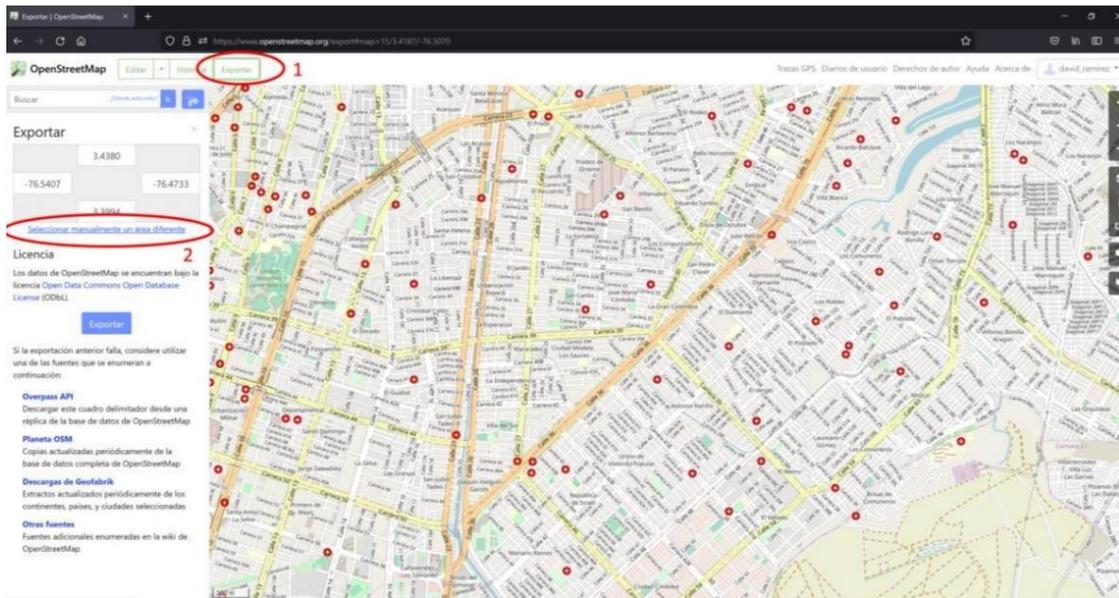


Figure 3 Capture

6. The area to be studied is chosen and the database file is downloaded by clicking on export and an image file as seen in Figure 4 capture

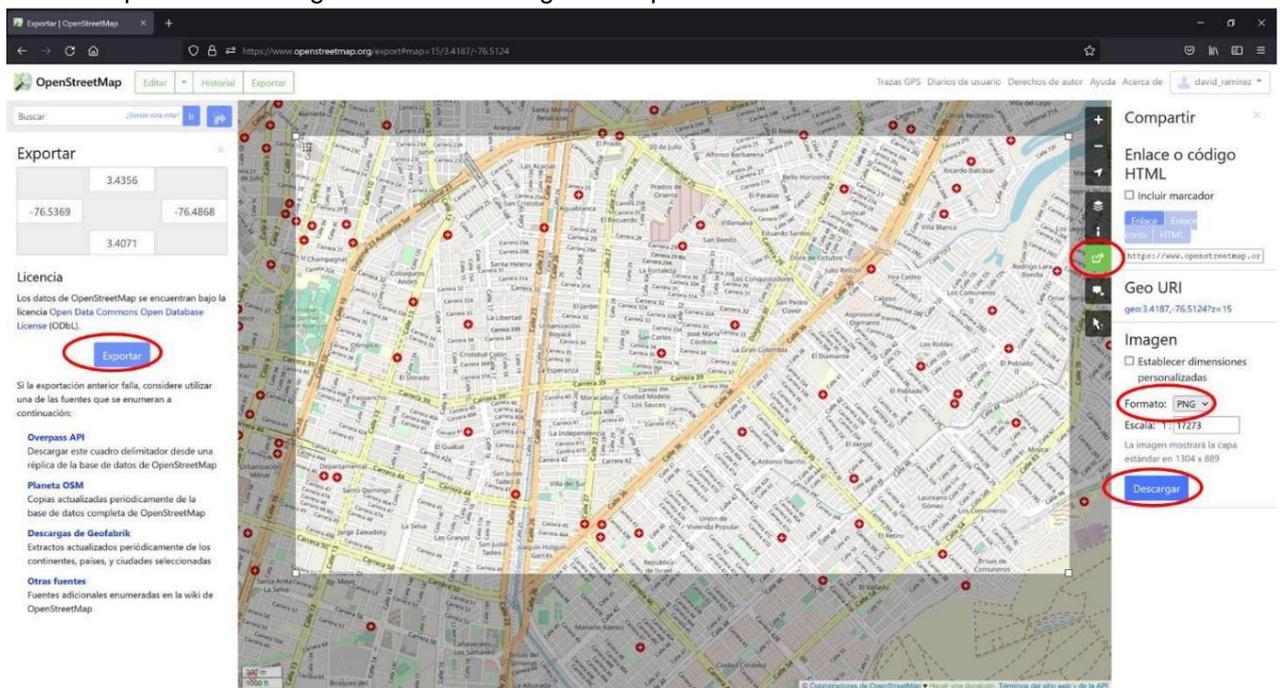


Figure 4 Capture

7. It is very important that you save the coordinate information of the image crop, which is located in the upper left corner Figure 5 capture



Figure 5 Capture

8. You will obtain two files, one with an .osm extension and the other with a .png extension, you can rename these files as you wish as long as you respect the extension, do not use spaces and make use of letters or numbers contained within the English alphabet, that is say do not use accents, umlauts, quotation marks, apostrophes, matches or special letters such as Ñ.

9. Now we enter the downloads folder and proceed to open the file with .osm extension with Excel, Libre office Calc, Open Office, Google Sheets, numbers or any other program for spreadsheets, in this example it will be explained how to use Excel because despite being paid it is an application with which many people they are familiar.

10. Right click on the .osm file that I downloaded from <https://www.openstreetmap.org/>, remember that you can rename the file as you wish with English characters and without spaces, choose to open with your favorite spreadsheet program Excel is used for this example
Figure 6 screenshot

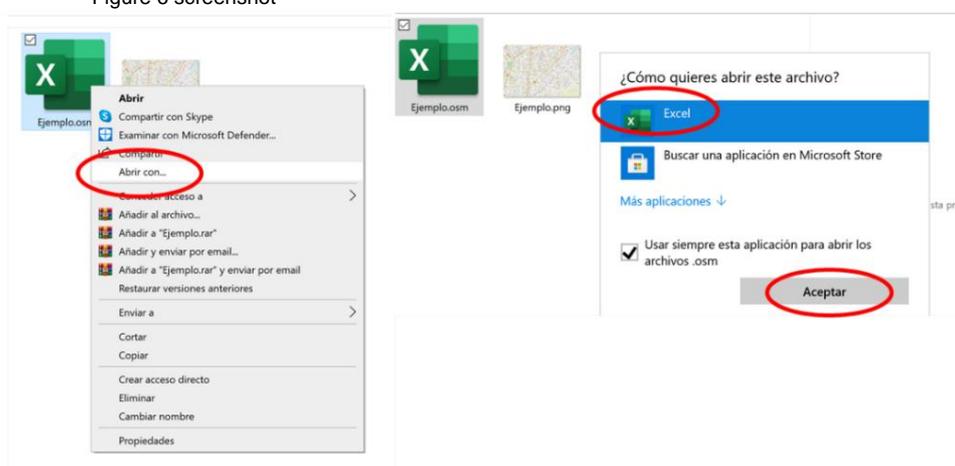


Figure 6 Capture

11. When opening with the spreadsheet program, we give it to take the data as a table XML, we accept Figure 7 capture

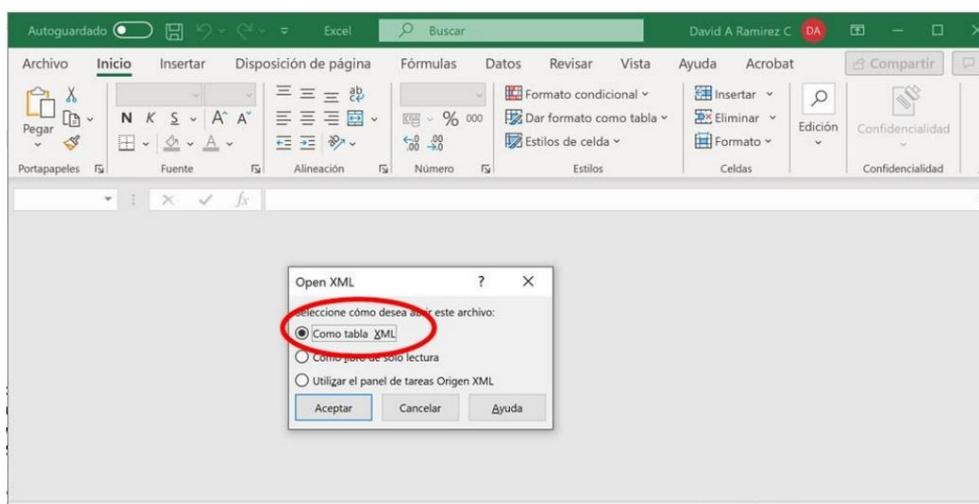


Figure 7 Capture

12. Once the program opens, we will see that there are several columns each with a title, we are interested in the column that is named with: "v" (corresponds to the name),

"lon" (corresponds to longitude), "lat" (corresponds to altitude), once these columns have been identified we will use the filter to extract all the data that we need, for this example we need the public transport stations and stops, in the city in which we are, the public transport stops have a name that begins with the word "MIO", then we locate ourselves in the name column "v" and there we select the filter "MIO". Figure 8 catch

uid	lat	lon	v	id3
927170	3.4310571	-76.5249196	Parada MIO - Carrera 25 entre Calle 18A y 18	
927170	3.4330517	-76.5281573	Parada MIO - Calle 13 entre Carrera 23D y Diagonal 23	
927170	3.4329578	-76.5278992	Parada MIO - Calle 13 entre Diagonal 23 y Carrera 23D	
226189	3.4259733	-76.5169571	Parada MIO - Calle 27 entre Carrera 31 y 31B	
927170	3.4141032	-76.5322045	Parada MIO - Carrera 44 entre Calle 13 y 13A	
927170	3.4132041	-76.5212801	Parada MIO - Calle 25 entre Carrera 42C y 42B	
927170	3.4147463	-76.5212292	Parada MIO - Calle 25 entre Carrera 42 y 41E	
927170	3.4200984	-76.5090573	Parada MIO - Carrera 39 entre Diagonal 40 y Calle 34C	
927170	3.4193326	-76.5304345	Parada MIO - Carrera 39 entre Calle 13A y 13	
927170	3.4191612	-76.5228856	Parada MIO - Carrera 39 entre Calle 19 y 18	
927170	3.4195618	-76.5180319	Parada MIO - Carrera 39 entre Calle 26D y 26C	
927170	3.4194799	-76.5200061	Parada MIO - Carrera 39 entre Calle 26 y 25	
927170	3.4197733	-76.514478	Parada MIO - Carrera 39 entre Calle 31A y 31	
927170	3.4199018	-76.5121552	Parada MIO - Carrera 39 entre Calle 32A y 32	
927170	3.4191972	-76.5076382	Parada MIO - Carrera 39 entre Calle 37 y 36	
927170	3.4186178	-76.5074345	Parada MIO - Carrera 39 entre Calle 37 y 38	
463504	3.4172711	-76.5061631	Parada MIO - Carrera 39 entre Calle 39 y 40	
927170	3.4174853	-76.5059834	Parada MIO - Carrera 39 entre Calle 40 y 39	
927170	3.4131446	-76.5021961	Parada MIO - Carrera 39 entre Calle 45A y 46	
927170	3.413158	-76.5019253	Parada MIO - Carrera 39 entre Calle 46 y 45A	
927170	3.410971	-76.5001202	Parada MIO - Carrera 39 entre Calle 48 y 49	
927170	3.4120227	-76.4916586	Parada MIO - Calle 55 entre Carrera 30 y 29	
927170	3.4146176	-76.4898963	Parada MIO - Calle 83 entre Carrera 28E3 y 28E	
927170	3.4187462	-76.5249977	Parada MIO - Carrera 39 entre Calle 17 y 16	
606974	3.4121893	-76.5258832	Parada MIO - Carrera 44 entre Calle 15 y 15Bis	
927170	3.4266255	-76.5285806	Parada MIO - Calle 13 entre Carrera 32 y 31	
3321532	3.4291025	-76.5167687	Parada MIO - Calle 27 entre Carrera 28 y 29	
3006839	3.4347968	-76.5141764	Hernán autos, Estación MIO - Santa Monica	
927170	3.4321028	-76.5101736	Estación MIO - Villanueva	
606974	3.4271533	-76.5053988	Estación MIO - Conquistadores	

Figure 8 capture

13. Now we simply transfer by copying and pasting the column named "v", "lon" and "lat", to a spreadsheet document and save it as an .xlsx extension, it is important not to put accents, spaces, umlauts, apostrophes or non-English language symbols Figure 9 screenshot

This document is very important because it is the document from which the program will take the necessary data to return the results, in fact you will be able to put new coordinates for existing points or future points from points of longitude and latitude that you can obtain from topographic stations, from Google maps, google earth, Bing maps, OpenStreetMaps or any other coordinate provider.

lat	lon	v
3.4310571	-76.5249196	Parada MIO - Carrera 25 entre Calle 18A y 18
3.4330517	-76.5281573	Parada MIO - Calle 13 entre Carrera 23D y Diagonal 23
3.4329578	-76.5278992	Parada MIO - Calle 13 entre Diagonal 23 y Carrera 23D
3.4259733	-76.5169571	Parada MIO - Calle 27 entre Carrera 31 y 31B
3.4141032	-76.5322045	Parada MIO - Carrera 44 entre Calle 13 y 13A
3.4132041	-76.5212801	Parada MIO - Calle 25 entre Carrera 42C y 42B
3.4147463	-76.5212292	Parada MIO - Calle 25 entre Carrera 42 y 41E
3.4200984	-76.5090573	Parada MIO - Carrera 39 entre Diagonal 40 y Calle 34C
3.4193326	-76.5304345	Parada MIO - Carrera 39 entre Calle 13A y 13
3.4191612	-76.5228856	Parada MIO - Carrera 39 entre Calle 19 y 18
3.4195618	-76.5180319	Parada MIO - Carrera 39 entre Calle 26D y 26C
3.4194799	-76.5200061	Parada MIO - Carrera 39 entre Calle 26 y 25
3.4197733	-76.514478	Parada MIO - Carrera 39 entre Calle 31A y 31
3.4199018	-76.5121552	Parada MIO - Carrera 39 entre Calle 32A y 32
3.4191972	-76.5076382	Parada MIO - Carrera 39 entre Calle 37 y 36
3.4186178	-76.5074345	Parada MIO - Carrera 39 entre Calle 37 y 38
3.4172711	-76.5061631	Parada MIO - Carrera 39 entre Calle 39 y 40
3.4174853	-76.5059834	Parada MIO - Carrera 39 entre Calle 40 y 39
3.4131446	-76.5021961	Parada MIO - Carrera 39 entre Calle 45A y 46
3.413158	-76.5019253	Parada MIO - Carrera 39 entre Calle 46 y 45A
3.410971	-76.5001202	Parada MIO - Carrera 39 entre Calle 48 y 49
3.4120227	-76.4916586	Parada MIO - Calle 55 entre Carrera 30 y 29
3.4146176	-76.4898963	Parada MIO - Calle 83 entre Carrera 28E3 y 28E
3.4187462	-76.5249977	Parada MIO - Carrera 39 entre Calle 17 y 16
3.4121893	-76.5258832	Parada MIO - Carrera 44 entre Calle 15 y 15Bis
3.4266255	-76.5285806	Parada MIO - Calle 13 entre Carrera 32 y 31
3.4291025	-76.5167687	Parada MIO - Calle 27 entre Carrera 28 y 29
3.4347968	-76.5141764	Hernán autos, Estación MIO - Santa Monica
3.4321028	-76.5101736	Estación MIO - Villanueva
3.4271533	-76.5053988	Estación MIO - Conquistadores
3.4285806	-76.490946	Estación MIO - Amanecer
3.4248889	-76.494516	Estación MIO - Troncal Unida

Figure 9 Capture

14. Now the program must be started, once it finishes loading, some data must be entered for its operation, which are the longitude and latitude coordinates that were obtained from the openstreetmap and can be seen in Figure 5 capture, The size of the buffer to be measured in meters must also be entered, in addition to the lower limit and upper limit that denote the range to be evaluated between stops, the

range is important to eliminate stops that are very close to each other, then the evaluation of the program is shortened, however it is possible to set the program to evaluate between 1 meter and 400 meters following the example described. Figure 10 Capture

By David Alejandro Ramirez Cajigas

rellene los valores , puede revisar el manual [Manual de usuario](#) [Recomendaciones](#)

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limite inferior % area alcanzada
 limite superior lado 1, metros
 area de influencia en metros lado 2, metros
 Area estudiada metros cuadrados
 Numero de paradas con al menos otra en rango
 Numero de paradas sin al menos otra en rango
 numero paradas/nodos a evaluar
 area blanca de influencia nodos/paradas

OpenStreetMap [Editar](#) [Historial](#)

Buscar [Ir](#) [ipb](#)

Exportar

y1 Y1
 x1 X1
 x2 X2
 y2 Y2

velocidad media Lo normal es que el valor sea 13km/h
 velocidad maxima Lo normal es que el valor sea 50km/h o 60 km/H

[Iniciar](#) [cargar imagen](#) [encontrar coordenadas](#) [Medidas Topologicas de Accesibilidad](#)

[Instagram](#) [Linked in](#) [LinkedIn](#)

Figure 10 Capture

15. Now you should click on the "start" button, once clicked the program will ask you to choose the .xlsx file that was generated in point 13, select the file and click on open, then you just have to wait for let the program work

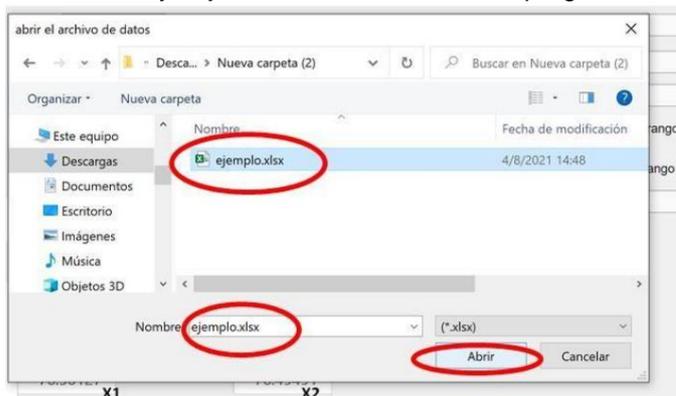


Figure 11 Capture

16. Now the program will process the information and display the results in its menu, in a window where you can see a graphical representation of the data and buffers, representing in black the area of influence reached and in white the area not reached and therefore The latter will throw a file with the name results.xlsx containing the results to be analyzed by the urban planner. Figure 12 Capture

Figure 12 Capture

17. The results.xlsx file returns information that can be seen in Figure 13 capture

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rellene los valores , puede revisar el manual Manual de usuario Recomendaciones

límite inferior 200 % área alcanzada 94.46

límite superior 450 lado 1, metros 3151

área de influencia en metros 400 lado 2, metros 5567

OpenStreetMap Editar Historial

Buscar ¿dónde está esto?

Exportar

y1 3.4356 Y1

x1 -76.5309 X1

x2 -76.4868 X2

y2 3.4071 Y2

velocidad media 0 Lo normal es que el valor sea 13km/h

velocidad máxima 0 Lo normal es que el valor sea 50km/h o 60 km/h

Inicio cargar imagen encontrar coordenadas Medidas Topológicas de Accesibilidad

Instagram LinkedIn

Figure 13 Capture

direccion_parada	longitud	latitud	Cantidad_paradas_cercanas
Estación MIO - Nuevo Latir	-76.486987	3.418598	0
Estación MIO - Amanecer	-76.490946	3.421817	0
Estación MIO - Troncal Unida	-76.494516	3.424869	0
Parada MIO - Calle 10 entre Carrera 38A y 38	-76.53486	3.421512	0
Parada MIO - Calle 13 entre Carrera 50 y 53	-76.535126	3.407231	0
Parada MIO - Carrera 39 entre Calle 42 y 43	-76.504355	3.415397	0
Parada MIO - Carrera 39 entre Calle 44 y 44	-76.503151	3.414438	0
Parada MIO - Calle 14 entre Carrera 47 y 50	-76.529595	3.410591	0
Parada MIO - Carrera 41B entre Calle 49 y 48	-76.505383	3.407863	0
Parada MIO - Calle 15 entre Carrera 23 y 23A	-76.526178	3.43559	0
Parada MIO - Calle 16 entre Carrera 46A y 46	-76.525537	3.41081	0
Parada MIO - Carrera 42B entre Calle 44 y 43	-76.510476	3.408055	0
Parada MIO - Carrera 46 entre Calle 40 y 39	-76.516509	3.408093	0
Parada MIO - Carrera 46 entre Calle 40 y 41	-76.515957	3.407223	0
Parada MIO - Carrera 46 entre Calle 39 y 40	-76.516399	3.407689	0
Parada MIO - Carrera 29 entre Calle 53 y 55	-76.491596	3.412563	0
Parada MIO - Carrera 31 entre Calle 45 y 48	-76.498008	3.416272	0
Parada MIO - Carrera 27 entre Calle 52 y 54	-76.499353	3.431844	0
Parada MIO - Carrera 27 entre Calle 70 y 56	-76.498055	3.431424	0
Parada MIO - Diagonal 24C entre Transversal 25 y 29	-76.511834	3.43446	0
Parada MIO - Carrera 39 entre Calle 33 y 34	-76.51039	3.41976	0
Parada MIO - Calle 10 entre Carrera 33 y 31	-76.53085	3.428547	0
Parada MIO - Calle 96 con Carrera 28E6	-76.487371	3.412158	0

Muestra todos los datos. Y sus coordenadas tanto métricas como geográficas.

Muestra el nombre y coordenadas de los elementos que no cumplen la condición dada.

Muestra la distancia espacial en metros que hay entre cada punto evaluado.

Muestra como verdadero las paradas que cumplen individualmente al relacionarlas entre si, como falso las que no cumplen. Es útil para identificar relaciones entre 2 paradas individuales.

18. The file generated in point 13, the data entry file can be modified at the user's whim by removing or adding coordinates and points according to be done, these coordinates can be obtained in various ways as seen above Even so, the program has a function to find points automatically, the button is called "Find Coordinates". Clicking on this button will display a window where the program requests the .osm file and the .NPG file that was downloaded in point 6. See Figure 14 capture

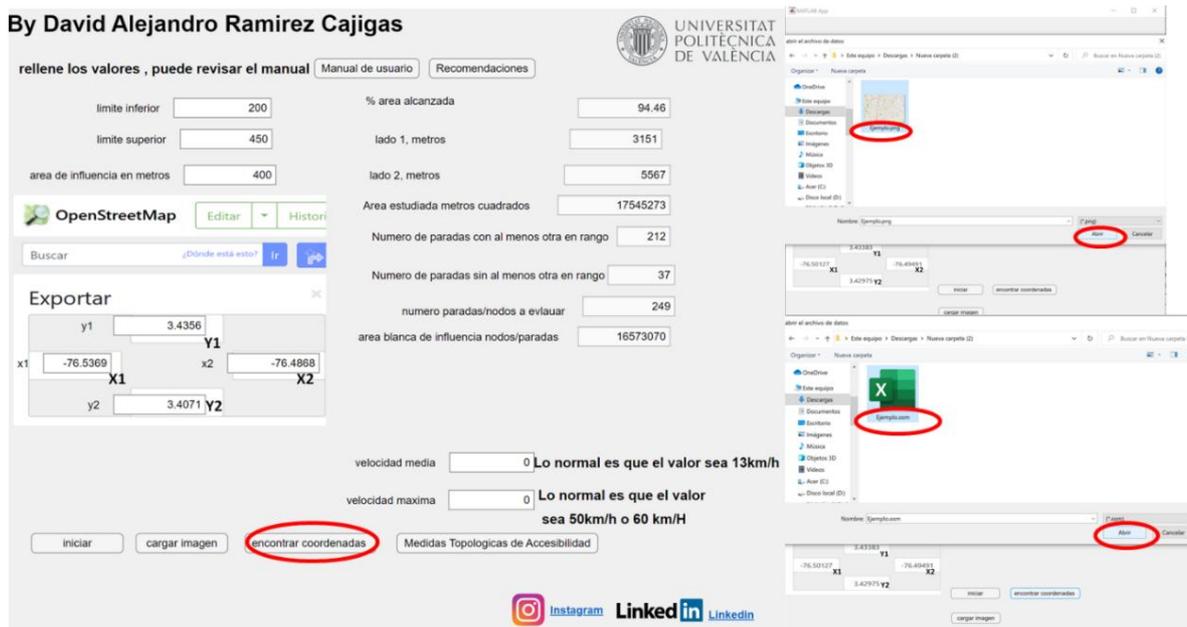


Figure 14 Capture

19. The program will process (this takes time according to the size of the file), the information and will display a map, with a pointer where the user clicks with the pointer will save a coordinate, when finished taking the necessary number of points, just close the window and a file will be automatically generated with the coordinates taken, these coordinates can be saved to be evaluated as those obtained in point 13. See Figure 15 capture

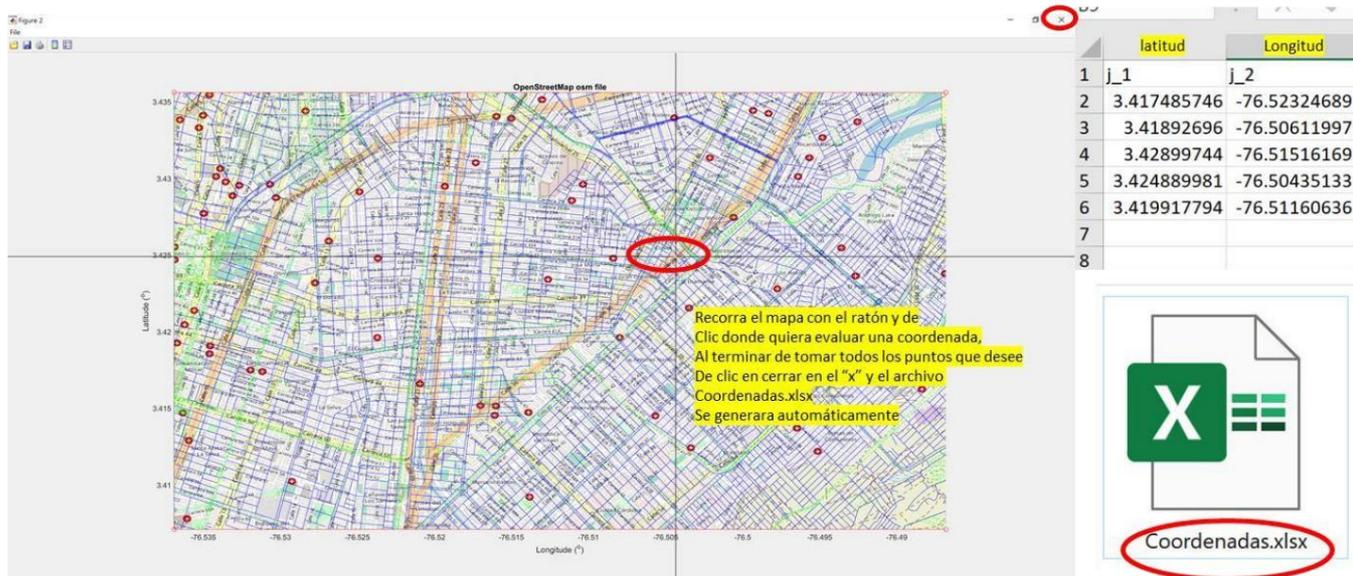


Figure 15 Capture

20. There is also a button where you can view the study map. The same data from point 18 must be loaded, but first clicking on the "load image" button, see Figure 16 capture

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rellene los valores , puede revisar el manual

limite inferior % area alcanzada

limite superior lado 1, metros

area de influencia en metros lado 2, metros

OpenStreetMap

Buscar

Exportar

y1 Y1

x1 X1 x2 X2

y2 Y2

Numero de paradas con al menos otra en rango

Numero de paradas sin al menos otra en rango

numero paradas/nodos a evaluar

area blanca de influencia nodos/paradas

velocidad media Lo normal es que el valor sea 13km/h

velocidad maxima Lo normal es que el valor sea 50km/h o 60 km/H

Figure 16 Capture

21. The accessibility topological measure meter has been implemented to measure routes, for this the user must know the transport route to be evaluated and its nodes.
22. The average speed with which the system to be evaluated moves in the traveled, in general this speed does not exceed 15km/h, but this can vary and must be entered by the researcher 23. It can measure an urban or interurban route, the minimum number of nodes must be 2 (origin and destination), there is no limit of nodes, however, the researcher can eliminate repetitive nodes or those that are on the same street, in parallel, thus avoiding evaluating the same node twice.
24. For this example, data from an urban public transport route within the city of Santiago de Cali will be used. The researcher needs data that is not publicly accessible in many cases.

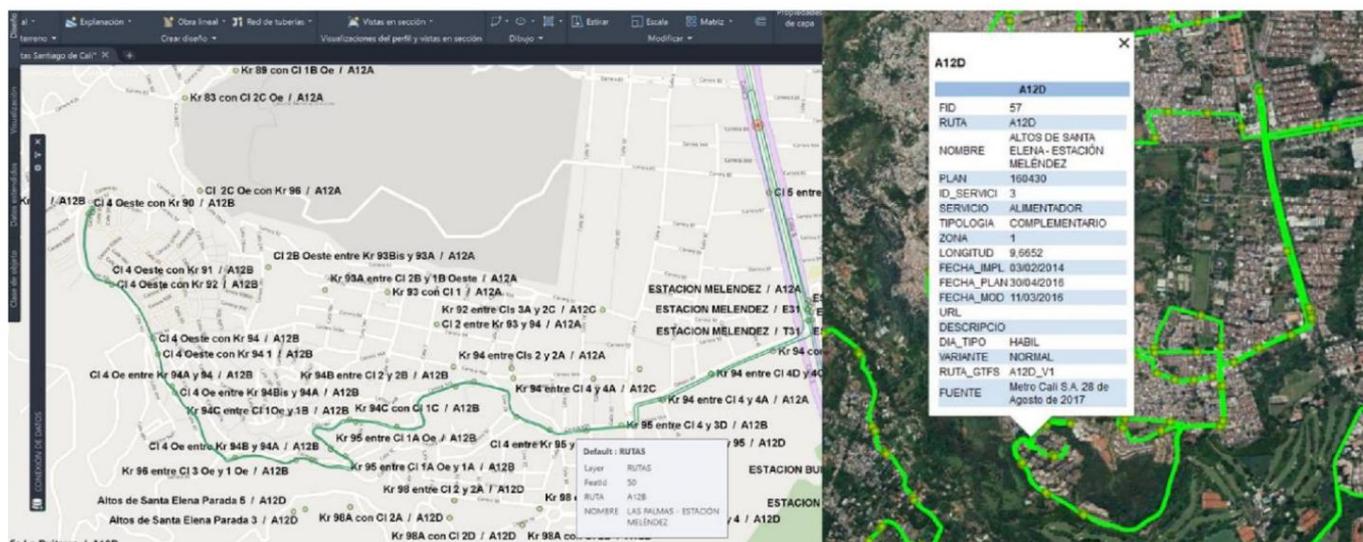


Figure 17 Capture of the route, using AutoCad Civil and Google Earth

25. Once the investigator has the route in mind, he must measure the distance that exists between each node you want to evaluate and the next one, always using kilometers, for this you can use multiple programs, AutoCad, Arcgis, Qgis, Google maps, Freecad, LibreCad, Qcad, Dragsight, BricsCad, etc. Figure 17 Capture of the route, using AutoCad Civil and Google Earth 26. You will need to create an .xlsx file like the one seen in Figure 18 Capture

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	
	ruta km	ESTACION MELENDEZ	Kr 94 entre Cl 4D y 4C	Kr 95 entre Cl 4 y 3D	Kr 95 entre Cl 3 y Kr 95A	Kr 94B entre Cl 2B y 2	Kr 94C entre Cl 2 y 1A Oe	Kr 94C con Cl 1C	Kr 95 entre Cl 1A Oe y 1A	Kr 96 entre Cl 1 Oe y 2 Oe	Cl 4 Oe	Kr 94B entre Cl 4 Oe y 94A	Kr 94A entre Cl 4 Oe y 94	Cl 4 Oeste con Kr 91	Cl 4 Oeste con Kr 89
1															
2	ESTACION MELENDEZ	0.00	1.66	1.99	2.20	2.49	2.82	2.95	3.15	3.35	3.58	3.88	4.25	4.48	
3	Kr 94 entre Cl 4D y 4C	1.66	0.00	0.33	0.54	0.83	1.15	1.29	1.49	1.69	1.92	2.21	2.58	2.82	
4	Kr 95 entre Cl 4 y 3D	1.99	0.33	0.00	0.21	0.50	0.82	0.96	1.16	1.36	1.59	1.88	2.25	2.49	
5	Kr 95 entre Cl 3 y Kr 95A	2.20	0.54	0.21	0.00	0.29	0.61	0.75	0.95	1.15	1.38	1.67	2.04	2.28	
6	Kr 94B entre Cl 2B y 2	2.49	0.83	0.50	0.29	0.00	0.33	0.46	0.66	0.86	1.09	1.39	1.76	1.99	
7	Kr 94C entre Cl 2 y 1A Oe	2.82	1.15	0.82	0.61	0.33	0.00	0.14	0.34	0.54	0.77	1.06	1.43	1.67	
8	Kr 94C con Cl 1C	2.95	1.29	0.96	0.75	0.46	0.14	0.00	0.20	0.40	0.63	0.92	1.29	1.53	
9	Kr 95 entre Cl 1A Oe y 1A	3.15	1.49	1.16	0.95	0.66	0.34	0.20	0.00	0.20	0.43	0.72	1.10	1.33	
10	Kr 96 entre Cl 1 Oe y 2 Oe	3.35	1.69	1.36	1.15	0.86	0.54	0.40	0.20	0.00	0.23	0.52	0.89	1.13	
11	Cl 4 Oe entre Kr 94B y 94A	3.58	1.92	1.59	1.38	1.09	0.77	0.63	0.43	0.23	0.00	0.29	0.66	0.90	
12	Cl 4 Oe entre Kr 94A y 94	3.88	2.21	1.88	1.67	1.39	1.06	0.72	0.52	0.29	0.00	0.37	0.61	0.85	
13	Cl 4 Oeste con Kr 91	4.25	2.58	2.25	2.04	1.76	1.43	1.29	1.10	0.89	0.66	0.37	0.00	0.24	
14	Cl 4 Oeste con Kr 89	4.48	2.82	2.49	2.28	1.99	1.67	1.53	1.33	1.13	0.90	0.61	0.24	0.00	
15															
16															
17															

<input type="checkbox"/> Nombre	Fecha de modificación	Tipo	Tamaño
coordenadas.xlsx	22/8/2021 14:59	Hoja de cálculo de M...	10 KB
distancia.xlsx	22/8/2021 14:59	Hoja de cálculo de M...	12 KB

Figure 18 Capture

27. Now you must generate an .xlsx file with the coordinates identical to the one in steps above, which columns are named v (for the name), lon (longitude) and lat (latitude), it will be very important that you respect the order you entered in the distance matrix. The coordinates can be obtained using the special function of the program for it or any other software or database. Figure 19 Capture

	A	B	C
	v	lon	lat
1	v		
2	ESTACION MELENDEZ	-76.542672824400000000	3.37703278363586000
3	Kr 94 entre Cl 4D y 4C	-76.545275130100000000	3.37562980769475000
4	Kr 95 entre Cl 4 y 3D	-76.547589687800000000	3.37428560619548000
5	Kr 95 entre Cl 3 y Kr 95A	-76.549438348800000000	3.37416176426338000
6	Kr 94B entre Cl 2B y 2	-76.551398678300000000	3.37541723096119000
7	Kr 94C entre Cl 2 y 1A Oe	-76.553389466400000000	3.37424108641294000
8	Kr 94C con Cl 1C	-76.554603107000000000	3.37443062930965000
9	Kr 95 entre Cl 1A Oe y 1A	-76.554713566300000000	3.37347622752640000
10	Kr 96 entre Cl 1 Oe y 2 Oe	-76.555583437700000000	3.37338029083596000
11	Cl 4 Oe entre Kr 94B y 94A	-76.557562347600000000	3.37343968912371000
12	Cl 4 Oe entre Kr 94A y 94	-76.559182921300000000	3.37529697753465000
13	Cl 4 Oeste con Kr 91	-76.560852754800000000	3.37803604125961000
14	Cl 4 Oeste con Kr 89	-76.561243564800000000	3.37984140753706000
15			
16			

<input type="checkbox"/> Nombre
coordenadas.xlsx
distancia.xlsx

Figure 19 Capture

28. Now you must mark the average speed at which the transport moves on the route to be evaluated, fill in the fields of the past steps, optionally fill in the coordinates field and after that you must click on topological accessibility measures Figure 20 Capture

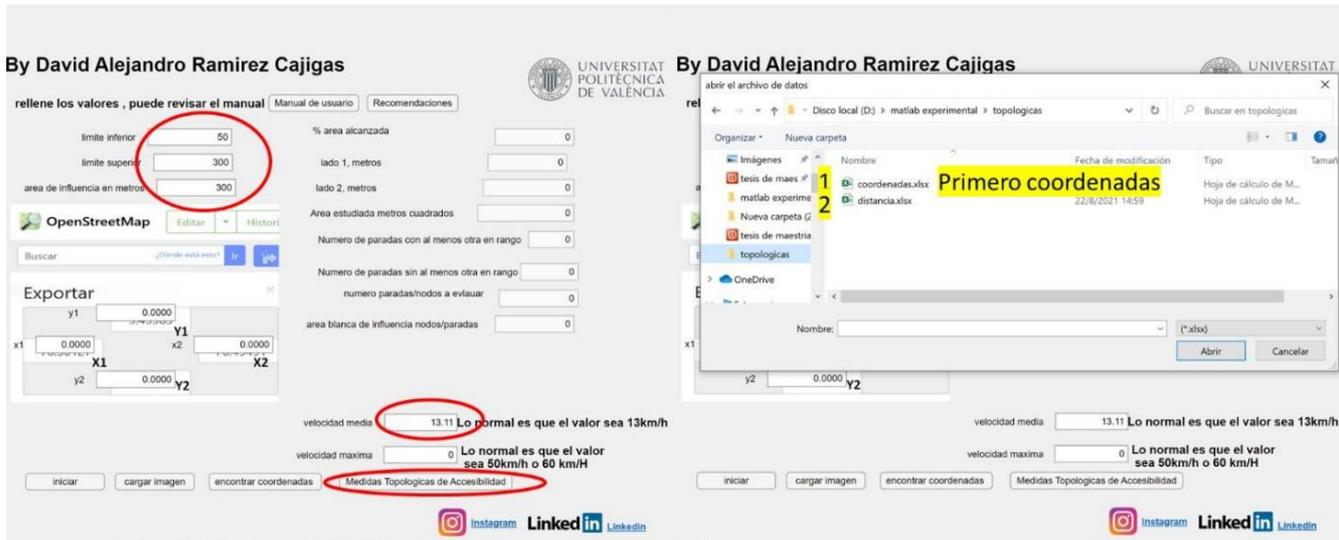


Figure 20 Capture

29. When clicking on Topological accessibility measures, a load menu is displayed, where you must first load the coordinates and then the distance matrix, the load order is very important.

30. Now the program will make the necessary calculations and then present the results on the screen and in a file named Topologicas.xlsx Figure 21 Capture



Figure 21 Capture

31. The generated file is made up of 13 pages, which contain useful arrays for the researcher to analyze the route, now the researcher can compare many routes or modify their nodes and evaluate their performance, the last page is a summary where, among other things, data such as travel time can be observed Figure 22 Capture

Suma_tiempo_recta	Suma_tiempo_ruta	Suma_Indice_TrazadoTv	Suma_Shimbel	Suma_Factor_ruta	uno_dividido_n_menos_1_Ri	uno_dividido_n	suma_tiempos_ruta_tiempos_recta	trazado_velocidad_nodo	Absoluto_Tiempo_Global	Tiempo_viaje_hasta_nodo_min	Factor_ruta_total
72.69691194	168.455913	30.90434347	78	30.90434347	0.012987013	0.40135511	0.012820513	2.31723616	0.029708156	168.455913	2.31723616
57.31270485	84.78210984	19.65111511	67	19.65111511	0.015151515	0.297744168	0.014925373	1.479289977	0.022078955	84.78210984	1.479289977
46.94617646	71.14597712	17.80835759	58	17.80835759	0.01754386	0.312427326	0.017241379	1.515479694	0.02612896	71.14597712	1.515479694
40.52064316	64.39916247	18.05006608	51	18.05006608	0.02	0.361001322	0.019607943	1.589292702	0.031162602	64.39916247	1.589292702
35.74895601	57.84675973	18.09790051	46	18.09790051	0.022222222	0.402175567	0.02173913	1.618138435	0.035176922	57.84675973	1.618138435
32.85754883	53.38381693	18.86258729	43	18.86258729	0.023809524	0.448109221	0.023255814	1.624704789	0.037783832	53.38381693	1.624704789
32.70352306	52.75875515	19.41057352	42	19.41057352	0.024390244	0.473428622	0.023809524	1.61324378	0.038410566	52.75875515	1.61324378
33.7223734	53.6689611	19.51326229	43	19.51326229	0.023809524	0.464601483	0.023255814	1.591264667	0.037006155	53.6689611	1.591264667
35.16815478	56.4646865	19.75693201	46	19.75693201	0.022222222	0.439042933	0.02173913	1.605562955	0.034903542	56.4646865	1.605562955
40.72397073	61.6664451	17.0314677	51	17.0314677	0.02	0.340529354	0.019607943	1.514254318	0.029691261	61.6664451	1.514254318
45.67777901	71.08710297	17.25375609	58	17.25375609	0.01754386	0.302697475	0.017241379	1.556273193	0.026832296	71.08710297	1.556273193
56.19462528	86.3415881	17.04167317	67	17.04167317	0.015151515	0.258207169	0.014925373	1.536474132	0.02293245	86.3415881	1.536474132
63.0144054	98.3346087	17.49122294	78	17.49122294	0.012987013	0.22715874	0.012820513	1.560509983	0.020006538	98.3346087	1.560509983

Figure 22 Capture

32. It is important to note that this feature is for researchers with access to route data and broader mathematical knowledge.