

Depth map manual for "DUMMIES"

(...or for those of us with limited computer knowledge...)

Version 14

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Important preparations for axial analyses:

Downloading Depthmap software:

Go to the site:

<https://github.com/SpaceGroupUCL/Depthmap>

Click on the download button, or go to:

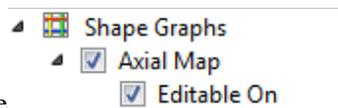
<https://github.com/SpaceGroupUCL/depthmapX>

and download the DepthmapX file

Draw an axial map on a separate layer in Autocad, Vector works or adobe illustrator. It is IMPORTANT that you use a "single line" instead of a "multiple line". And make sure that all lines are well connected!!! Export only the axial lines layer as a **dxg file**.

Making axial analyses:

1. File + new
2. Map + import (choose one of your dxg files with axial lines)
3. Map + convert drawings map. Under "new map type", choose "axial map".
4. Tools + Axial/Convex/Pesh + run graph analyses. Set radius n or 3 or 5 etc. Then just wait. The larger file, the longer time to wait. The local integration values like 3, 5, 7, 10 etc takes short time. On the left side, all the processed maps are presented. Radius "n" means global integration or "integration [HH]" as shown on the left side, radius 3 means local integration with radius 3 or "integration [HH]R3" etc.
5. In order to identify unlinks, click on "node count" on the left side. If there are any unlinks, most of the axial lines are red and the unlinked ones are blue. Correct the unlinked lines in your dxg file from autocad, adobe illustrator, vector works...etc. If all lines are linked, then all the lines are coloured in green. Another way is to go to "window + table". Under the connectivity column with values 0 are the unlinked lines. Likewise, lines with the value -1 under the column integration [HH] are also unlinked lines. Highlight all the lines under the references numbers. Then go to "window + 1 untitled map" and then the line is highlighted.
6. Draw extra lines or remove lines. Check on the "editable" on the folders on the left side (where you see the processed data). This step is important, otherwise you can not edit the axial map.



Which are show like  ,then you can edit the axial map.

Click on the axial line you want to remove or make longer. For deleting lines: Edit + clear. Click on the line if you want to draw an extra line. After finishing this, run all the axial analyses again (important). Undo, use ctrl + Z (for pc users only).

7. File + save as (give the city name or the area name, for example "delft.graph")



8. Unlink lines: Click on the "unlink" button. Then click the first line, and then click the second line.



9. Re-link lines: Click on the "link" button.
Then click the first line and then the second line.
OBS! You can only re-link or unlink 2 lines at the time.
10. Making bridges or tunnels: click on the link button, then click on the first line and then on the second line.
11. Remove bridges and tunnels: click on the unlink button, then click on the first line and then on the second line.

Use the folders on the left for looking at various integration values:

Global integration: "integration [HH]" – show how each street is connected to all others in a whole city in terms of the maximum possible direction changes.

Local integration with radius 3: "integration [HH]R3" - show how each street is connected to its vicinity in terms of three times direction changes.

Local integration with radius 7: "integration [HH]R7" - show how each street is connected to its vicinity in terms of seven times direction changes.

The red lines show the streets with the highest integration values, while the blue ones shows the most segregated ones. Put the cursor on the axial lines in order to get the various integration values (in numbers).

Recentre the image

12. Click on the recentre button  in order to fit the map to the screen.

Making Axial step depth analyses:

13. Select a line or several lines (then you must use the "shift" key). Then click on the "step depth" button .

Making angular analyses: Before doing the angular analyses you must run the axial analyses!!!!

14. Map + convert active map. Under "new map type", choose "segment map".
15. Tools + segment + run Angular segment analysis. Set the radius (n=global integration, 3=local integration with radius 3 etc...). There are different options you can test out. The most common is to click on "Angular" and use the radius like 3 (it shows the local angular analyses)
16. Use the folder on the left and click on the Total Depth folder or Total depth R3 or R5 etc. There you will see the results of your analyses.

Segment Step Depth Analyses (+Angular Step/ +Topological step/ +Metric step)

17. You choose one line (a street segment) or several lines (streets), then go to --> Tools + segment + Step depth + **Angular step**. On the left side, the arrow is on the Angular step depth column . The result shows the values of Angular changes of streets net from the Chosen street.
18. You choose one line or several lines, then go to --> Tools + segment + Step depth + **Topological step**. On the left side, the arrow is on the Topological step depth column . The result shows the value of the directions changes of streets net from the Chosen street, which is Axial map based result.
19. You choose one line or several lines, then go to --> Tools + segment + Step depth + **Metric step**. On the left side, the arrow is on the Metric step depth column . The result shows the pure metical value of streets net from the

Chosen street.

Adding metrical radiuses and metrical properties to the axial analyses

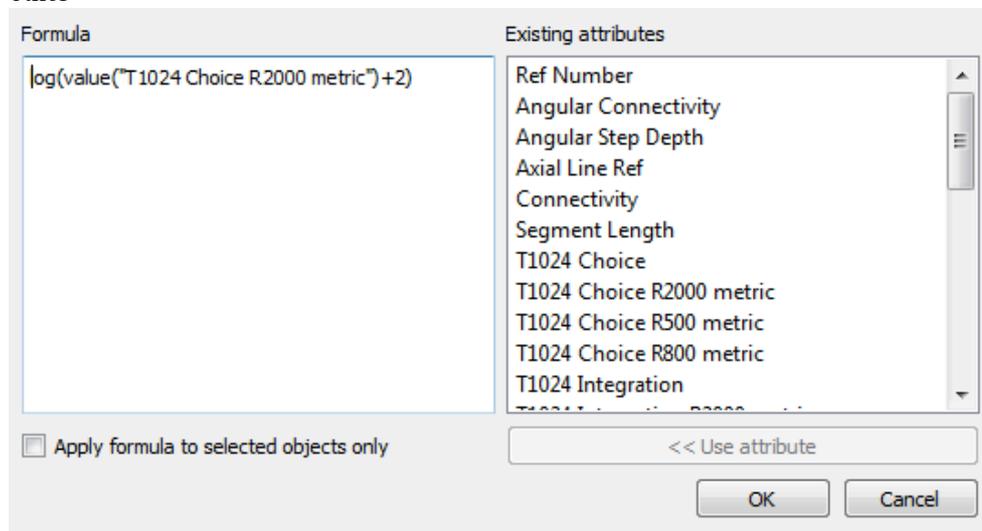
20. Tools + segment + Run Topological or metrical analyses.
21. Click on topological. You need to type value in *Radius (metric units)*". The value you type in *Radius(metric units)* is dependent on the middle coordinates which displayed at the lower right corner of the software display window.

5539	208.139 x 252.236	226.018, 152.733
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 For example, if it shows 208.139 x 252.236, you have to take the first number. Here in this case is 208.139, and before the point is 208. In this case you can take 208 for high value, and 10% of high value 200, which is 20, for low value.). In this example, you can type radius 200 and 20 in *Radius(metric units)*. Put only one radius at a time. Then click "ok".
22. In the folders on the left side, you find the various measurements with your metrical radiuses. Click on the "topological choice" with the various radiuses, you will find the results from your analyses where angular choice, topological distance combined with metrical radiuses are shown. When you click on the "metric choice", the metrical shortest routes combined with angular choices are shown.
23. For running several metrical radii at the same time, go to: Tools + segment + run Angular segment analysis. Tick under Radius Type on Metric. Type under Radius/List of radii all the radii you want to use. For example in the case mentioned above, type 200,20 and then click ok. For the topological, you can for example type n,8,7,4,3,2 and then ok.

Normalising the angular choice analyses

24. Go to Attributes + Add Column. Give it a new name, like for example log Choice 200. Use the same radii you used under point 21. Attributes + Update Column. Under the field Formula, write: log(then click under Existing attributes T1024 Choice R2000 metric or you can type it into the field. Then type)+2) and then ok. Do the same steps for all the other radii.



Adjusting colours for highlighting the analyses or for making grey scales images

25. Click on window + colour range. There you can choose between black and white, or adjust the colours in order to highlight the integrated structure in your analyses.

Use Invert color range bottom  can simply reverse red to blue color.

Exporting data:

26. Edit + export screen (an eps file will be made). The file can be imported into various

photoshops programs or powerpoint. Edit + copy screen is useful for pasting images directly into powerpoint files. Under “layer + export” you can export map info (.mif) files or txt files useful for GIS, autocad, adobe illustrator or vector works.

Making scatter Plot:

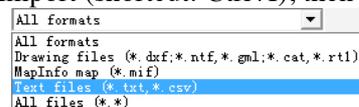
27. Click on window + scatter Plot. Then a window will be opened with various options. The most usual is to show the correlation between integration [HH]R3 and integration [HH]. This measures the degree of synergy between them. The correlation between integration [HH] and connectivity shows the degree of intelligibility of a built environment.
28. By clicking on the R2 button R^2 , the correlation coefficient is shown between the chosen measurements.
29. For comparing variables from the segment analyses, click on segment. There it is possible to reveal the correlation between “Mean Depth R 3 metric” on the vertical axe, and “Mean Depth R n metric” on the horizontal axe. Or look at the correlation between the analyses with a low and a high metrical radii.
30. The scatter Plot are also useful for identifying unlinked lines that are hard to see on the axial map (because they are very small). Use node count on both axes and mark the blue one. Then the unlinked line (or lines) are marked and you can choose to delete them or correct them (see point 5.)
31. For showing the correlation coefficient for a particular area within a city, first select the lines of this area. Then, Edit + Selection to layer. Add the new layer name. Then the same as mentioned under point 27, 28 and 29.

View the table:

32. Click on window + table. There you will see all the processed values. If you want the variables of a particular line, click on the line before you open the table. Then the relevant line will be on the top in the table.
33. In large cities, for selecting the values for only one neighbourhood, first select the lines on the map. Then, Edit + Selection to layer. Write the name of the new layer + ok. Then, Map + Export and save the file as .txt. Right click the .txt file (open with excel). Mark everything (all layers) and then double click the divider line button. Save as excel file.

Import/Export data from GIS:

34. Map + Import (shortcut: Ctrl+I), then a window will pop up, you can choose the typology



of data, All files (*.*) *.txt or *.mif, which you exported from GIS. For example, you can import the unlinks file as a txt file to Depthmap from GIS.

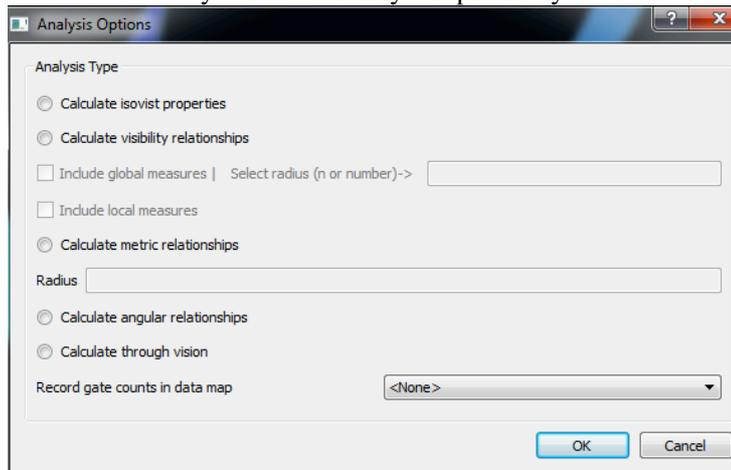
35. Map + Export (shortcut: Ctrl+E), then a window will pop up, you can choose the typology of data to export to GIS or other programs.
36. Another option is to export the depthmap file in .mif format and then in map info convert the .mif file into shapefile in MapInfo. Then it is easy to open it in ArcMap. For exporting from ArchMap to Depthmap, do the opposite – export a shape file into MapInfo, convert it into .mif file in MapInfo, and then import the .mif file in Depthmap.

Important preparations for all lines, isovist and point depth analyses

Draw a map with all obstacles (building, trees, water etc) with CLOSED polygons of a local area on a separate layer in Autocad, Vector works or adobe illustrator. It is IMPORTANT that you use multiple lines. Do NOT use the circle when you place the trees. Export only the closed polygon layer as a **dxg file**.

Making visibility graph analyses:

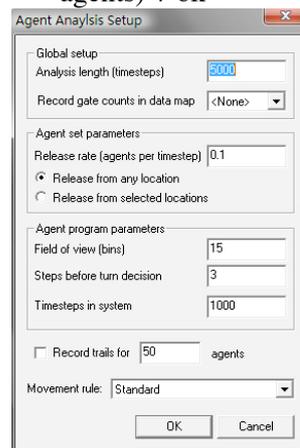
37. File + new
38. Map + import
39. Tools + visibility + set grid (various options). Or you can press the set grid bottom .
40. Click on the fill button  and then your mouse sign will show as , click on the "public spaces" on the drawing
41. Tools + visibility + make visibility graph.
42. Tools + visibility + run Visibility Graph Analysis. Then a window appears.



43. You can choose between metrical relationships, visibility relationships with a radius like "n" or 3, 5, etc, or isovist relationships. Then click ok. It will take a long time – depending on how fine-grained the grid is.
44. View + show grid (in order to remove the grid)

Making agent based modelling analyses:

45. Tools + agent tools + run agent analyses + set a number of agents (use for example 5000 agents) + ok



Field of view =15 , Steps before turn decision =3

46. Click outside the drawing (then you see their traces). Use “view + show grid” in order to remove the grid.
47. In order to put in individual “moving agents”, use “window + 3D view”. Click on the . Then you can click on the public spaces in your drawing in order to place a set of agents.

Their movement traces can be seen if you press the agent trace bottom . More detail explanation about the bottoms show in the software:

You can use the bottoms to start , pause  or stop  the movement of the agents. You can rotate  the analysis, move the analysis by Pan tool bottom , Zoom the analysis by zoom bottom  and Camera the view from distance by click bottom .

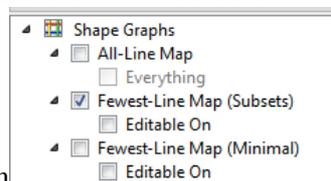
You can also change the analysis background into color based by click on bottom . If you finished your agent analysis, you go to “window + 3D view”, then you'll be back to former 2D analysis again.

Making all lines analyses:

- 48. File + new
- 49. Map + import
- 50. Click on the all lines button  and then your mouse sign will show as , click on the "public spaces" on the drawing.

Making axial and segment map from all lines analyses:

- 51. Tools + axial/convex/push + reduce to fewest line map.
- 52. Click on the fewest line map (minimal) folder on the left side
- 53. Tools + axial/convex/push + run graph analyses + set radius (n=global integration or integration HH, 3=local integration with radius 3 or integration (HH)R3 etc....).
- 54. Click on “node count” on the left in order to look for unlinks. If there are no unlinks, the lines inside the map is coloured green, otherwise they are coloured red. Then you click on bottom "+",  **Fewest-Line Map (Minimal)** which shows in the first place in the **Fewest-Line Map(Minimal)** folder on left side. Then it will become "-", which will show “Editable on” below **Fewest Line Map(Minimal)** folder

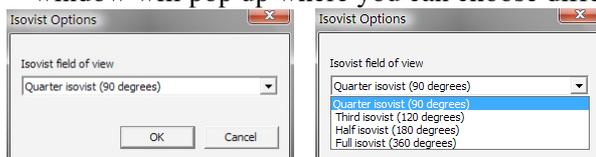


column . (Important! When it is "Editable off", you cannot edit the map!) Now you can start to delete these unlink lines. You mark the line, then use “edit + clear”. Then the line will disappear.

- 55. For making **angular analyses**: Map + convert Active layer. Under “new layer type”, choose “segment map”. Then use tools + segment + run Angular segment analyses. (use the steps described in the angular analyses, point 13-15)

Making isovist analyses:

- 56. File + new
- 57. Map + import
- 58. Click on the isovist button  and then your mouse sign will show as , click on the "public spaces" on the drawing where you want the root of the isovist. There will be a window will pop up where you can choose different degrees.



then click OK.

You can choose between 90 degrees, 120 degrees, 180 degrees or 360 degrees from the window.