Task 1: Preparing and analysing axial models

Description

This exercise offers the experience of a complete workflow of space syntax axial and segment analysis using the Space Syntax Toolkit for QGIS. It involves the preparation of the axial model, correcting the axial and unlinks maps, followed by the analysis of the model using axial topological and segment angular analysis. The results of different network measures are displayed in the end.

Note: It is a set of minimal instructions, assuming basic familiarity with the QGIS environment and the space syntax (depthmapX) terminology. Participants can work through the various steps in groups.

Stage 1 – Project preparation

1) **Prepare the project**

   a) Download the sample data from the repository:

   https://github.com/SpaceGroupUCL/qgisSpaceSyntaxToolkit/releases/download/v0.2.0/sample_data_0.2.0.zip

   b) Unzip and open the sample data project in QGIS (sample_data.qgs)

   c) To get the "classic" Depthmap look go to 'Project' > 'Project Properties…'

   d) In the 'General' tab set et the 'Background colour' to black

   e) Set the 'Selection colour' to magenta

Stage 2 – Model preparation

2) **Make an axial map**

   a) Activate the Google Maps background layer in the legend

   b) Create a new shape file layer, 'Layer' > 'Create Layer' > 'New Shapefile Layer…'

   c) Select 'Line' type

   d) Call it 'axial_map_new'

   e) Set the CRS to: EPSG 27700

   f) Draw some axial lines, zooming into the Barnsbury area (defined by other layers)

3) **Make unlinks**

   a) Create a new vector layer (shape file format)

    b) Select 'Point' type

    c) Call it 'unlinks_new'

    d) Set the CRS to: EPSG 27700

    e) Draw some unlink objects where some axial lines intersect

4) **Update axial "id" colum**

    a) Select the newly created axial layer

    b) Choose the 'Field Calculator' tool in the QGIS toolbar (abacus icon)

    c) Check 'Update existing field' and select the id column

    d) Or check 'Create a new field' and name it 'id'

    e) Use the expression "$id" (function in the Record group)

    f) Click OK

    g) This populated the id column with unique ids for every line created

Stage 3 – Model verification

5) **Verify the axial map**

    a) Hide the "_new" layers

    b) Display the "axial_errors" and "unlinks_errors" layers

    c) Start the "Graph analysis" tool from SST

    d) Choose the 'Map' tab

    e) Select the "axial_map_errors" layer

    f) Click the 'Verify' button in the 'Verify layer' tab

    g) This results in a list of errors

6) **Correct the axial erros**

    a) Make the "axial_map_errors" layer editable

    b) Select each error from the report

    c) Edit the axial line accordingly (delete, extend, move)

    d) Save the "axial_map_errors" layer edits

7) **Verify the unlinks**

    a) Choose the 'Unlinks' tab

    b) Select the "unlinks_errors" layer

    c) Click 'Verify' in the 'Verify layer' tab

    d) Notice the error message about IDs

    e) Update the unlink IDs

    f) Click the Verify button

8) **Correct the unlinks errors**

   a) Make the "unlinks_errors" layer editable

   b) Select each error in the report list to zoom to the problem

   c) Edit the unlink point accordingly (delete, move)

   d) Save the "unlinks_errors" layer edits

9) **Iterate the verification process**

   a) Choose the Map tab

   b) Verify the axial map again

   c) Correct errors if necessary

   d) The verification process is only complete when there are **no errors** on **both** layers

Stage 4 – Model analysis

10) **Run axial analysis**

   a) In the "Map" tab select the "axial_map" layer (no errors)

   b) In the "Unlinks" tab select the "unlinks" layer (no errors)

   c) Select the "depthmapX remote" tab

   d) Type values in the Radius field: "2, 4,n"

   e) Type new name for the Output table (optional)

   f) Click Calculate

   g) Notice the warning message

   h) Start the depthmapX software

   i) Click Calculate

   j) Open the Attribute Table of the axial layer or the newly created layer

11) **Run segment analysis**

   a) Still in the "depthmapX remote" tab...

   b) Select the segment option

   c) Type values in the Radius field: "400, 800" (n can be slow)

   d) Check the "Weight" box and select "Segment Length"

   e) Click the Settings button

   f) Check the "Calculate full set of measures" (optional)

   g) Click "Ok" to close the "Advance Settings" dialog

   h) Type new name for the Output table (optional)

   i) Click "Calculate"

   j) Wait...

k) Open the Attribute Table of the newly created layer

l) Switch off all "axial" map layers, leaving only the segment layer

m) Notice the difference in the model: trimmed line ends

n) Select individual axial segments (Select Features tool)

o) Activate the 'Map Tips' tool to see the values of the selected attribute (defined in the 'Layer Properties' > 'Display' tab)

Stage 5 – Results visualisation

12) **Visualise axial analysis results**

a) Close the "Graph Analysis" SST tool

b) Open the "Attributes Explorer" SST tool

c) Select the "axial_map" layer to explore

d) Select the "INTrN" attribute

e) This shows the measure using the default space syntax style

f) Select other measures in the list

13) **Visualise segment analysis results for choice**

a) Select the "axial_map_segment" to explore

b) Select the "CHr400m" attribute

c) Increase the line width to 0.75

d) Set intervals to "Custom (Equal)"

e) Change the Top value to 20

f) Click the "Apply Symbology" button

g) This is the standard depthmapX display for the Choice measure

h) Save an image of the map window

i) Set intervals to "Natural breaks"

j) Click the "Apply Symbology" button

k) Set intervals to "Quantiles"

l) Click the "Apply Symbology" button

m) Save an image of the map window