Vector topology in Context

"Topology expresses the spatial relationships between connecting or adjacent vector features (points, polylines, and polygons) in a GIS. Vector data has to conform to the topological model e.g. two lin"

In this module, we will inspect vector data for topology errors and explore ways in which to clean the dataset so that it conforms to the vector topology model.

You try:

Goal: To learn how the basics of maintaining vector topology.

- Open the named QGIS version and load the data in QGIS.
- Check for topology errors using **validity tools.**
  What kind of errors do you see for the road and polygon? Can you explain them ?
- Use the processing toolbox to delete duplicates from the roads layer.

What are duplicates?

- Reproject the road layer without duplicates and buildings to the specified **CRS.**
- Remove the unprojected layers from QGIS.
- In the processing toolbox use v.clean.snap algorithm with the roads layer.

What are the units are used in the algorithm?

- Determine what algorithm to use with the buildings layer.

Can you use v.clean.snap with the polygon ?

- Select Grass in the processing toolbox and choose v.clean and notice the tools that are available there.

NB: To run multiple tools at the same time use **v.clean.advanced**

- Investigate other plugins you can use to clean the vector layer

Name	Expectation

Background Layer	Google Satellite or appendix3-local-data/ 2821AD_21_2014_747_RGB_RECT.tif
data	roads_unclean,polygon_unclean
Validity tools (Plugins)	Topology checker,Geometry validity
CRS	EPSG:3857
Cleaning tools	V.clean,v.clean.snap
QGIS version	QGIS with grass

ℹ More about

Vector topology is important because it ensures data quality and integrity i.e. topology enables detection of lines that do not meet and lines that cross over each other. Vector data always follows a topological model which states that boundaries should not cross each other (boundaries that cross each other should be split at their intersections). Lines should also be split at the intersection by a single node. Two adjacent polygons should share a single boundary.

When the topological model is not adhered to it introduces error in the datasets and this inhibits spatial analysis to be done. Typical errors are:

- Undershoots - Occurs when digitised roads do not intersect.
- Overshoots - Occurs if a line ends beyond the line it should.
- Slivers - Occurs when the vertices of two or more polygons do not match up on their borders.

GRASS GIS is a fully topological GIS package and using the GRASS algorithms to check n an analysis.

✅ Check your knowledge:

1. Why is vector topology important:
    a. It enhances spatial analysis because distances across a road network can be accurate
    b. It ensures that the symbology of the layers is accurate
    c. It allows vector data to be converted into different formats i.e. KML

2. Which type of data should be checked for topology errors:
    a. A satellite image that contains roads
    b. All layers in QGIS should checked
    c. A GIS vector dataset where each polygon represents a type of building

3. When cleaning polygon is it important to activate snapping:
    a. True
    b. False

Further reading:

- Plugins_topology_checker: http://docs.qgis.org/2.14/pl/docs/user_manual/plugins/plugins_topology_checker.html
- Topology: https://docs.qgis.org/2.14/en/docs/gentle_gis_introduction/topology.html

Click here to download the sample data for the lesson.