### Network Analysis in Context

> *"A network is a set of connected lines. The networks are usually used to delineate rivers, road network. Network analysis studies the relationship between connected lines in terms of distance and time."*

Network analysis aims to establish if you can move from A to B and from B to C and is it possible to move from A to C. Network analysis is a type of connectivity analysis. Network analysis varies from simple analysis to complex analysis.

Complexity is achieved by analysis of the network and checking for features that give resistance to a route. Examples of features that bring resistance are the number of traffic lights and terrain, and this affects determining the shortest path between two points in a network. Traveling costs also vary because of these factors.

In this module, we look at how we can use QGIS to plan a route based on the shortest distance or the shortest time it takes to travel between two connected lines
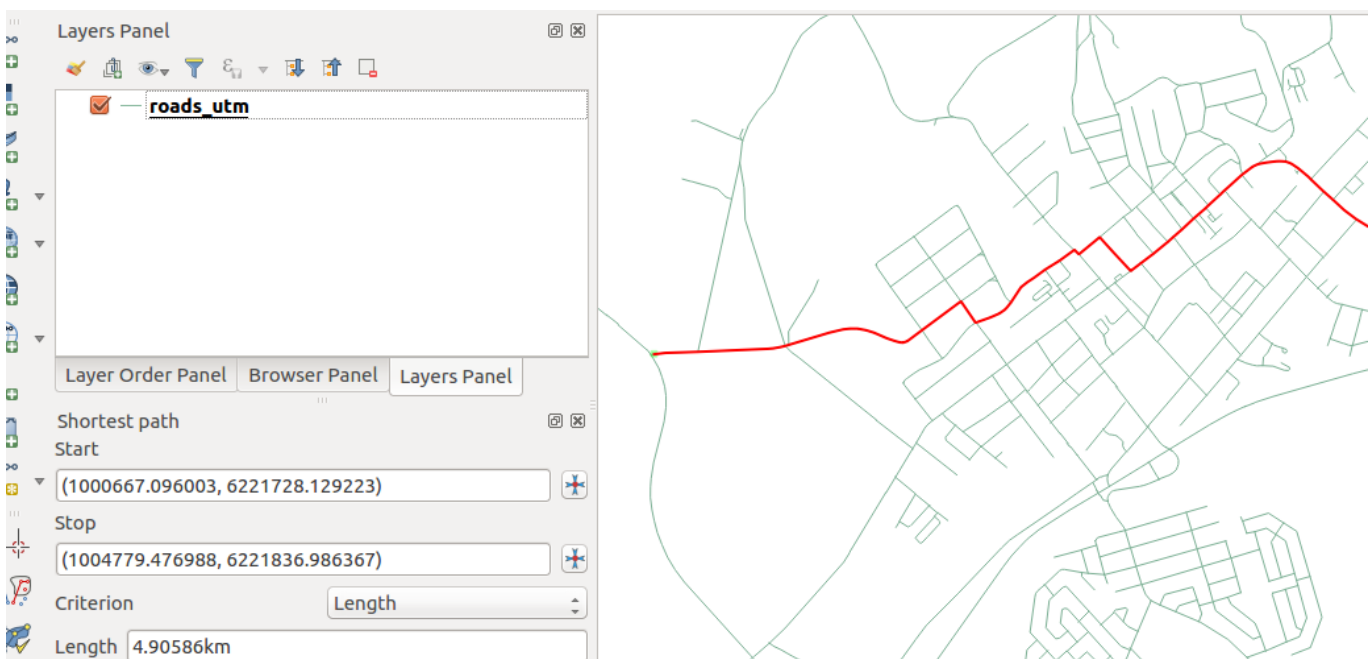
You try:

Goal: To learn how to use the road graph plugin to calculate routes between two places.

Data: appendix3-local-data

- Open a new project and load the network layer.
- Open the Processing Toolbox
- Project the network layer to the specified CRS (name the resultant layer roads_utm_33s)
- Navigate to the Network analysis algorithms
- Open the Shortest path (Point to Point) algorithm

- Click on a Start point in the panel and choose a starting point on the network/roads layer (Use the projected layer)
- Click on Endpoint in the panel and choose an ending point on the network/roads layer (Use the projected layer)
- Repeat the procedure using different criteria.
  NB: Explain your results in terms of distance and time

Name	Expectation
Speed	60 km/hr
Network layer	roads_osm.shp
CRS	UTM 33S WGS 84
Criterion	Length/time

✅ Check your knowledge:

1. Which of the following statements is true:
   a. *A network should be uni directional. All roads should be travelling in the same direction*
   b. *A road network can be bi directional. A road that goes in both direction*
   c. *A vector layer that has units as decimal degrees can be used when estimating distances*

2. Can a river be described as a network in the same way a road is:
   a. *No we cannot determine the shortest path between two points because people do not travel in a river*
   b. *Yes, a river is a network and all operations done on roads can be done here*
   c. *A river is a GIS data depicting natural phenomenon so it cannot be used*

3. Plugins are only installed when online:
   a. *True*
   b. *False*

▶ Module video tutorial:

- https://www.youtube.com/watch?v=kqOvYUjDS0E

🗏 Further reading:

- Grass.osgeo.org: https://grass.osgeo.org/grass73/manuals/wxGUI.vnet.html
- Vector_network_analysis: https://grasswiki.osgeo.org/wiki/Vector_network_analysis
- Network_analysis: https://docs.qgis.org/2.14/en/docs/training_manual/vector_analysis/network_analysis.html

Download the sample data for the lesson from http://changelog.qgis.org/media/images/lesson/worksheet/external_data/caa736ff463ea205f724611f9add80f172a4b80a.zip.