snkit: a spatial networks data cleaning toolkit

Tom Russell, Conrad Zorn, Aman Majid, Raghav Pant

Repository: https://github.com/tomalrussell/snkit/
License: MIT

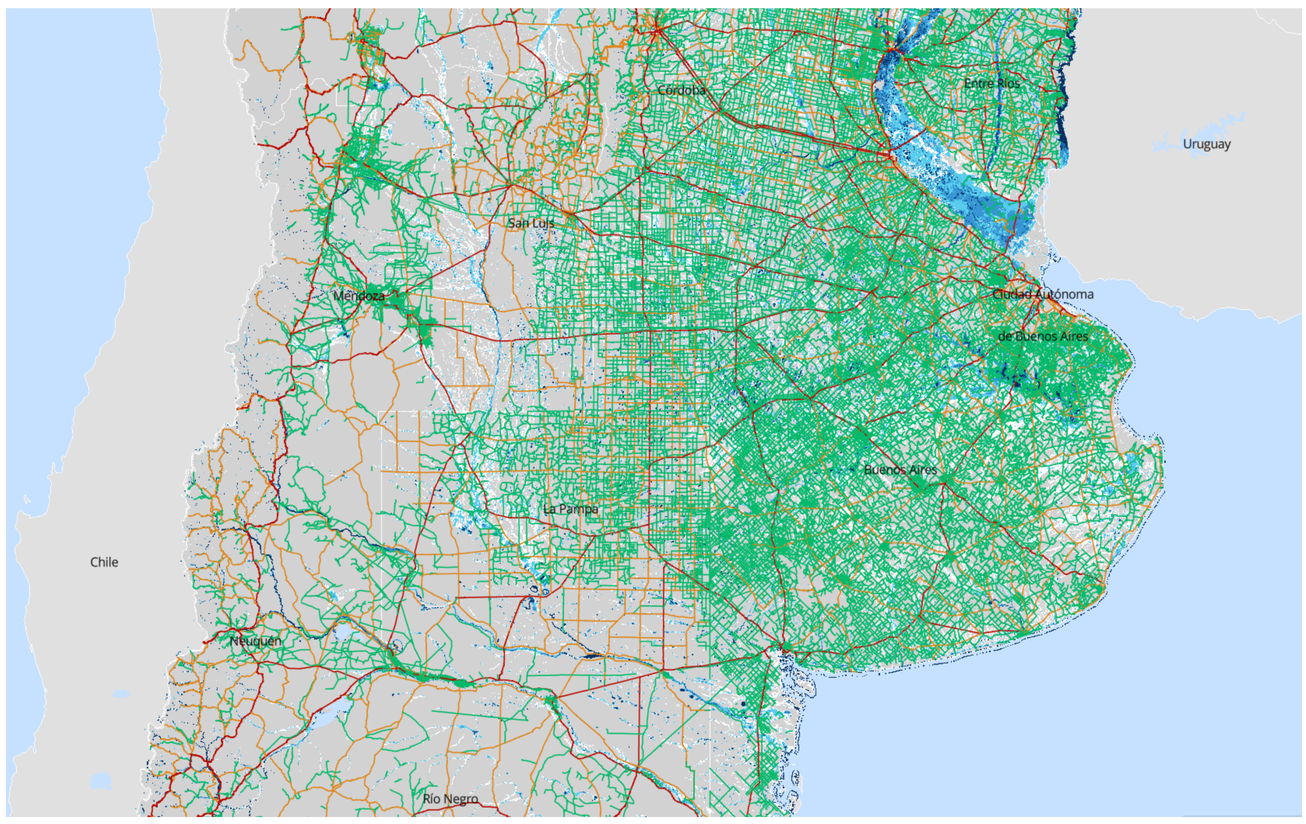
A typical geographical spatial network dataset may contain nodes (points in space), edges (lines in space) or both. It may have partial or no information about the topological connectivity (node ids, edge ids, from/to node ids for each edge).

snkit [1] has methods to: add endpoints to each edge, connect nodes to nearest edges, split edges at connecting points, create node and edge ids, and add adjacent (endpoint) node ids to each edge.

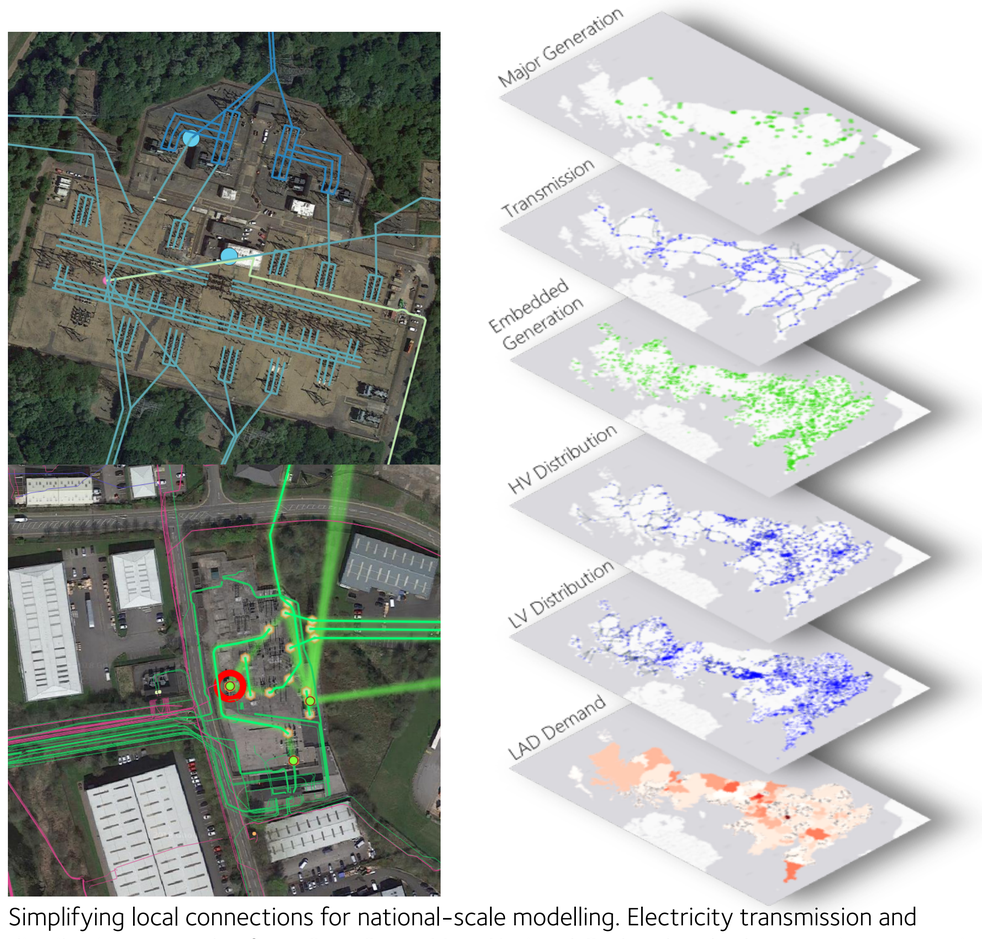
In particular, snkit aims to take care of the details arising from approximate point-to-line snapping and intersection.

snkit has been (or is being) used in several projects to prepare spatial networks data for further analysis:

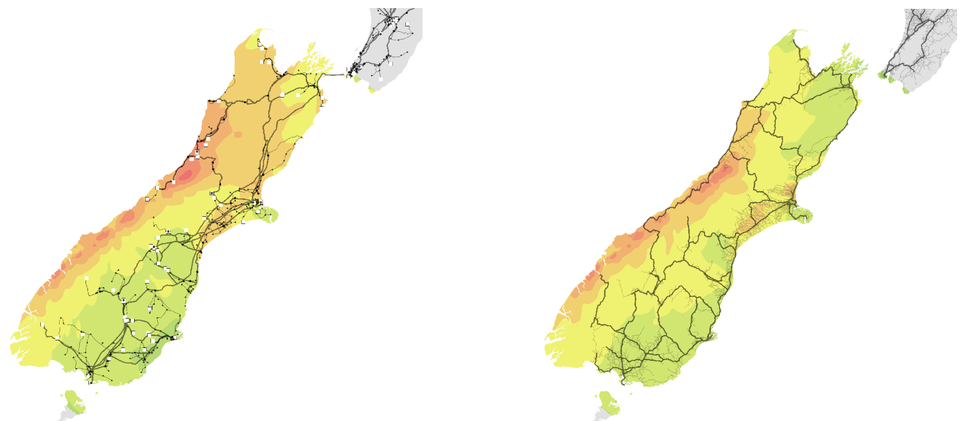
- transport networks in Argentina for a multi-modal flood risk analysis [2]
- fixed digital communications networks in the UK to look at fibre-to-the-x rollout costs and benefits [3]
- connected electricity, water and wastewater networks in Greater London for a multi-commodity flow simulation model to assess infrastructure policy interventions across sectors [4]
- energy, transport, water, waste and telecommunications networks in New Zealand to assess the resilience of interdependent networks exposed to earthquake hazards [5]



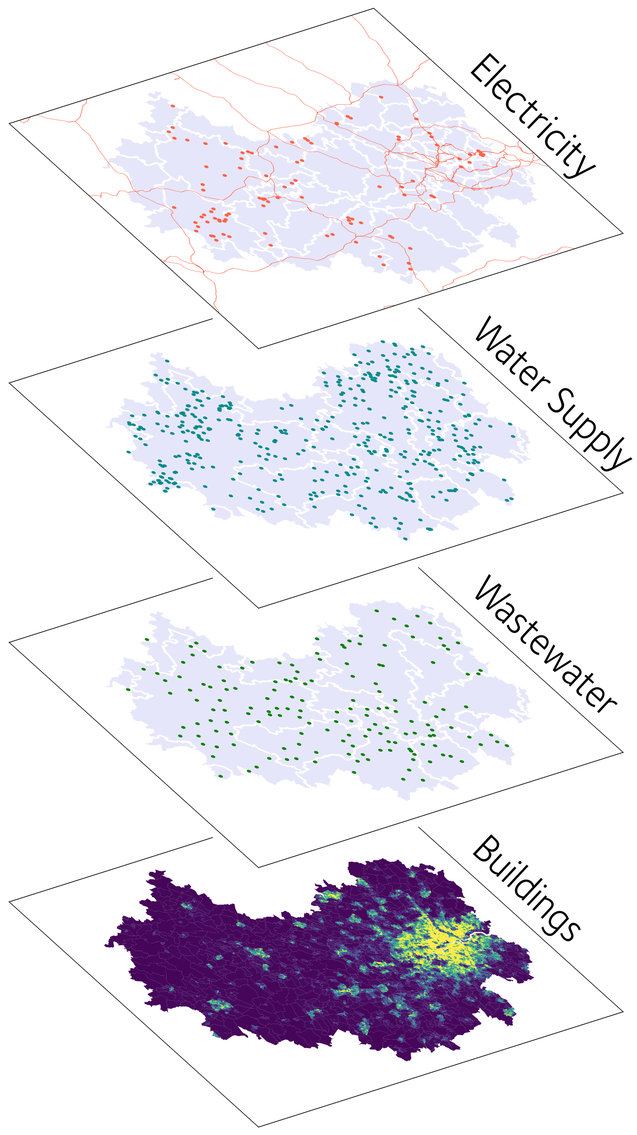
Connecting rural, provincial and national roads in Argentina for flow routing and intersection with flood hazards, from Argentina DNV and MoT and FATHOM Global flood hazard.



Simplifying local connections for national-scale modelling. Electricity transmission and distribution networks, from OpenStreetMap, National Grid and multiple operating companies.



Creating dependencies between networks for flow distribution and rerouting. New Zealand electricity and road transport networks, from asset owner/operator datasets.



Routing along road network to connect electricity water and waste water networks, from OpenStreetMap, Google Locations API, local water resource management plans and European Wastewater Treatment Directive database.

[1] Russell, T. and Koks, E.E. (2019) snkit, a spatial networks toolkit. DOI: 10.5281/zenodo.3269519

[2] Pant, R., Koks, E.E., Paltan, H., Russell, T. and Hall, J.W. (2019) Argentina - Transport Risk Analysis. Final Report, Oxford Infrastructure Analytics Ltd., Oxford, UK.

[3] Oughton, E., Schoenmakers, R., Usher, W. and Russell, T. (2019) Cambridge Communications Assessment Model DOI: 10.5281/zenodo.1468786

[4] Majid, A., Zorn, C., Parkinson, S., Ermolieva, T., Ermoliev, Y., Banares-Alcantara, R. and Hall, J. W. (2019) Simulating water-energy systems, a case study based in the United Kingdom. Presented at EGU General Assembly 2019. DOI: 10.13140/RG.2.2.23512.96008

[5] Zorn, C., Davies, A., Robinson, T., Pant, R., Wotherspoon, L. and Thacker, S. (2018) Infrastructure failure propagations and recovery strategies from an Alpine Fault earthquake scenario. In Proceedings of the 16th European Conference on Earthquake Engineering, Thessaloniki, Greece. DOI: 10.13140/RG.2.2.36794.24001

ITRC mistral
EPSRC Engineering and Physical Sciences Research Council
Environmental *Change* Institute
eci
University of Oxford