Power Grid Modelling: How Open Geoinformatic Data Benefits Security Research

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SBA Research

Motivation

- **Detailed models** of the power grid are **inaccessible for the security community**. However, power lines, substations and plants appear to be well documented by OpenStreetMap.
- **Is open geodata a reliable source of information**? Does open geodata provide worthwhile insights for adversaries?
- In this work, we **model** the Austrian power grid based on **OpenStreetMap Data**.

Processing the data in GIS

- **Import data** for each state where **"power" is the key attribute** and "line", "minor line", and "substation" are the values.
  Clipping all vector layers, as the data are not linked to each other.
- **Generate geometric measurements** based on a selected CRS.
- **Calculate a buffer of 1km** for all substation objects to find out which lines might be connected to them.
- **Clipping all lines with the municipalities** where they run through.

Terms & Definition

Geographic Information System (GIS)

- Computer-aided system
- Model and process spatial data

Geodata

- Describe an object, either directly (by coordinates) or indirectly (e.g., by postal code), a landscape or by its position in space
- Can be linked to each other in order to create detailed queries and analyses

OpenStreetMap

- Built by a community of mappers that contribute and maintain open data about objects on the earth's surface

QGIS

- Open source GIS for viewing, editing, and capturing spatial data
- OSM plugin allows the access to up-to-date OSM data, and simple export to an easy-to-use Shapefile or SQLite database

Maps & Tables

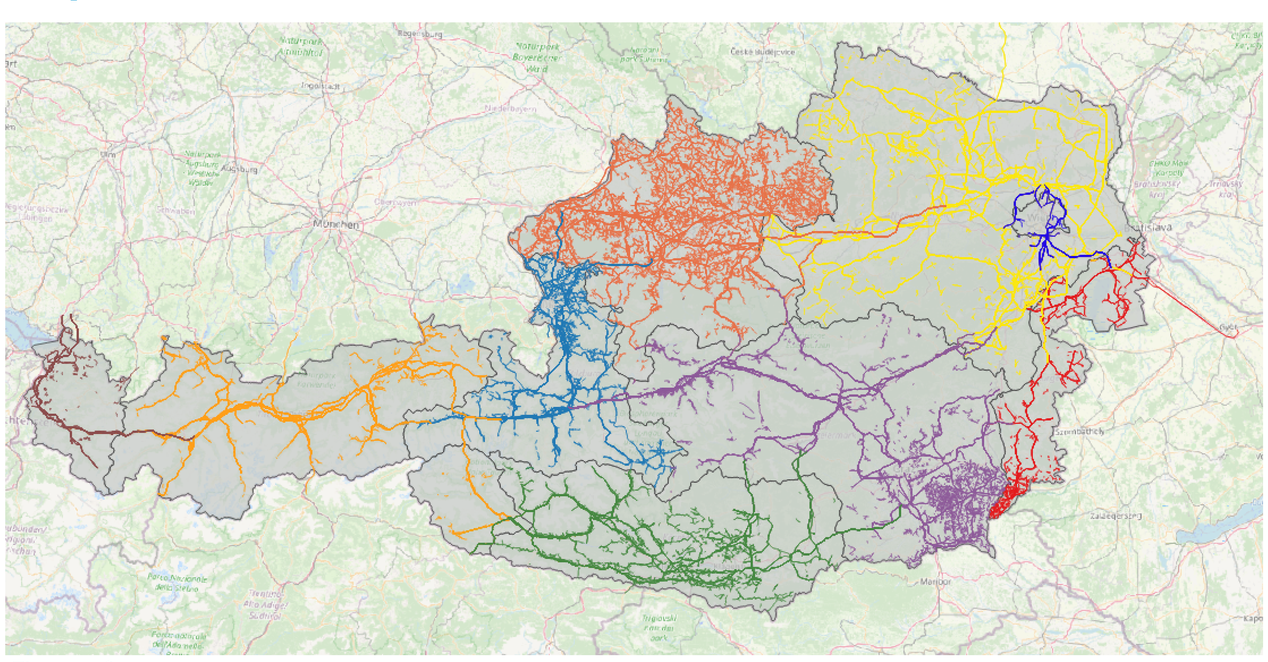

Figure 1: OpenStreetMap power lines Austria

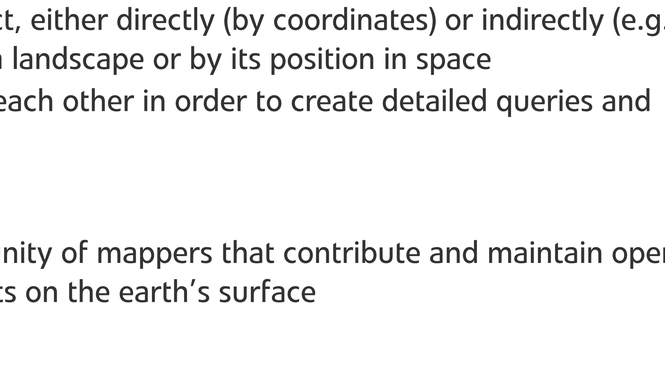

Figure 4: Attribute table QGIS – power lines

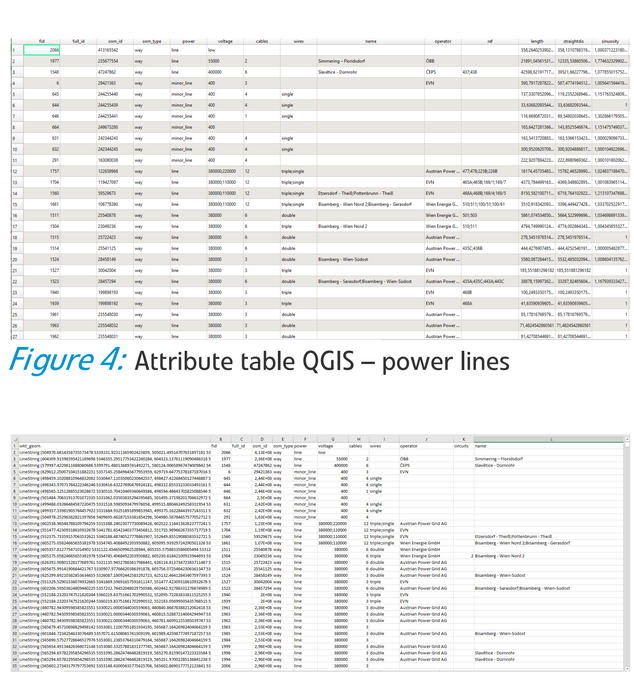

Figure 5: Exported attribute table – including coordinates

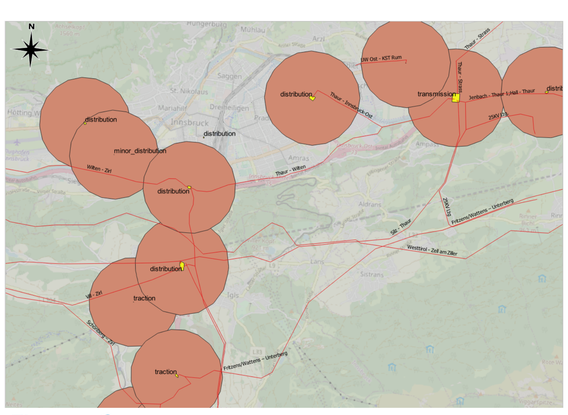

Figure 2: Buffer around substations

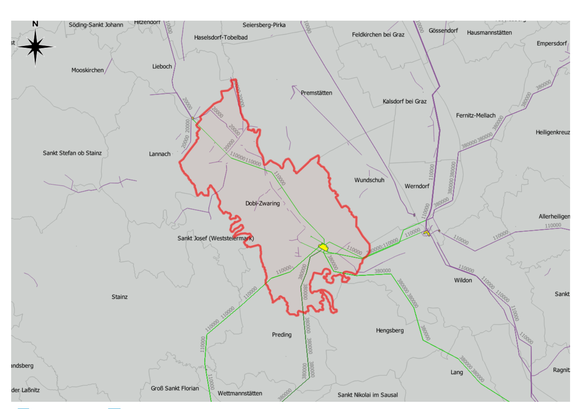

Figure 3: Power lines clipped with municipalities

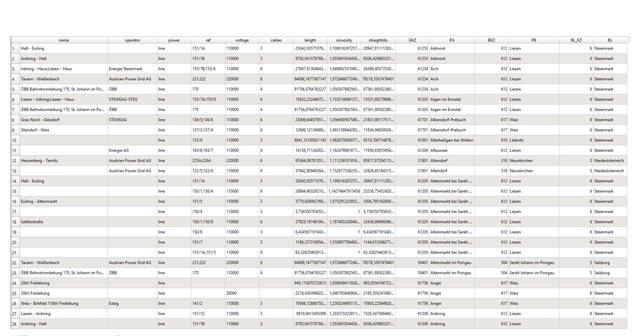

Figure 6: Attribute table QGIS – power lines clipped with municipalities

Conclusion & Future Work

- Based on the wide range of accessible geodata, we were **able to model the Austrian power grid**.
- Based on this model, we plan to **investigate attack strategies** using network analysis in the future.
- **Geodata provides** worthwhile **insights** for the security community and adversaries alike.
- Security-by-obscurity **cannot protect large-scale critical infrastructures** like the power grid.

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netidee OPEN INNOVATIONS

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