DATA MANAGEMENT

Lab 3

NoSQL : graph databases using Neo4J

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Goal

Model the main features of Switzerland's railway network in the form of a graph using Neo4J

- The **vertices** of the graph will represent the **cities**
- The **edges** will represent the railway lines connecting them

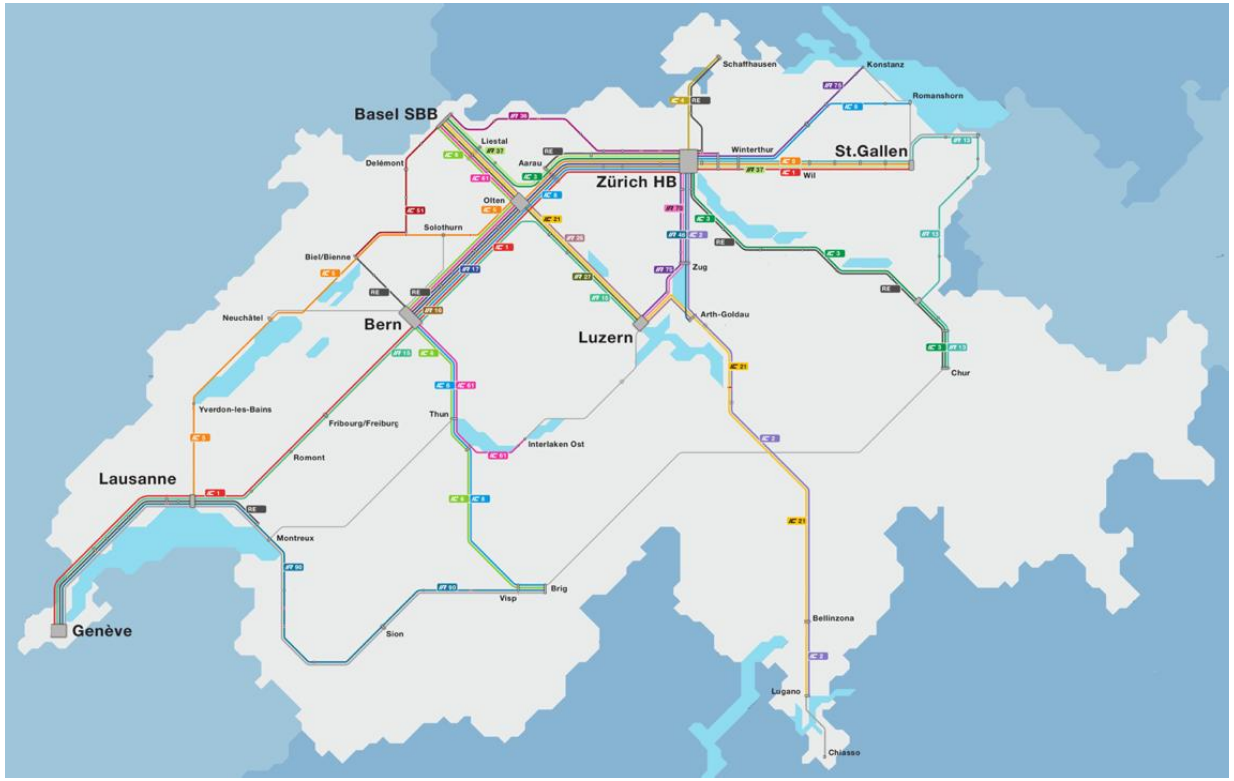

Fig. 1: Simplified illustration of the Swiss railway network

Given code

The given project can currently create the vertices within the database and create a map displaying them.

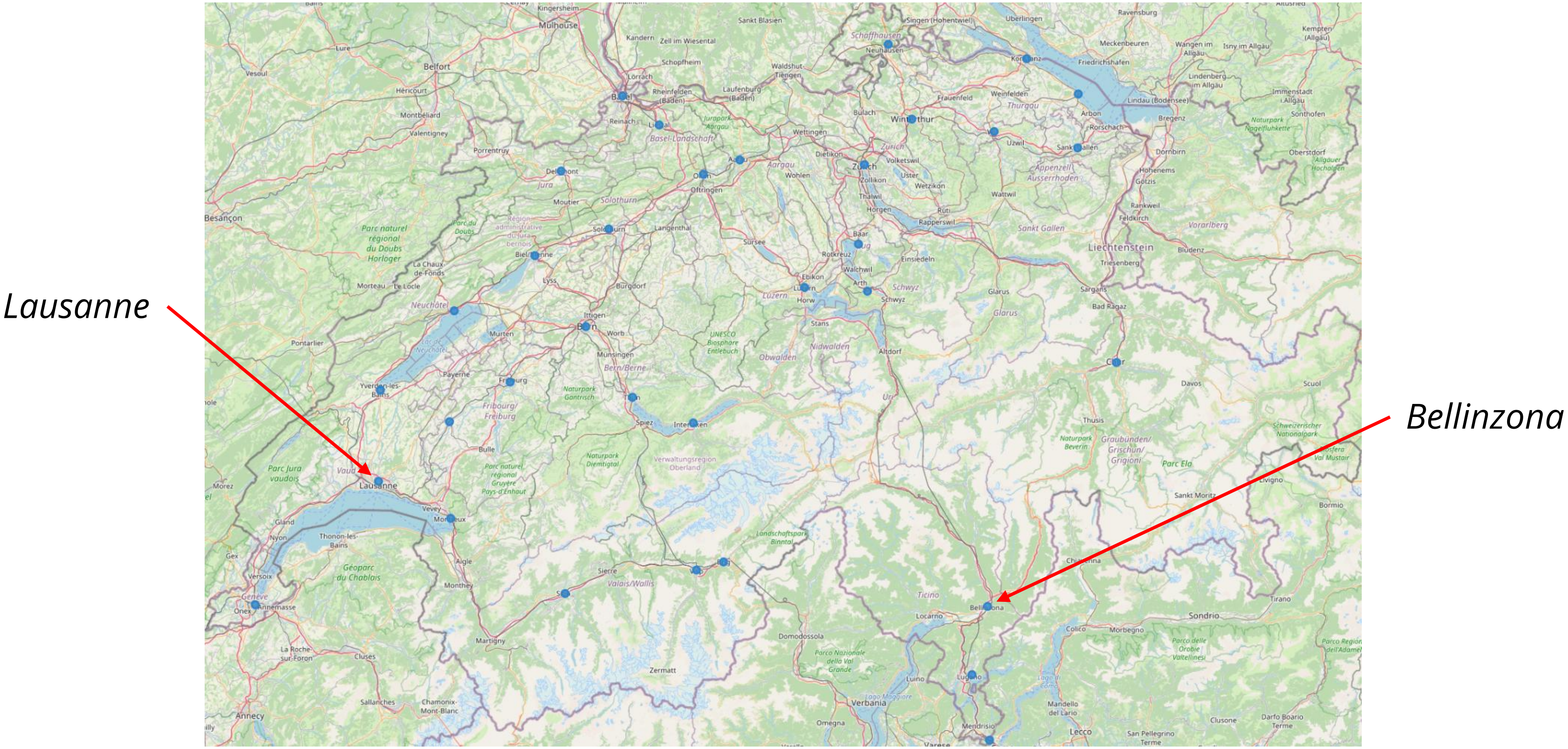

Fig. 2: generated map showing the cities (blue dots)

Task 1: add the railway

Create relationships in the database between the existing nodes, then fetch and display both the cities and the newly adddded railway lines on the map

Lausanne-Yverdon

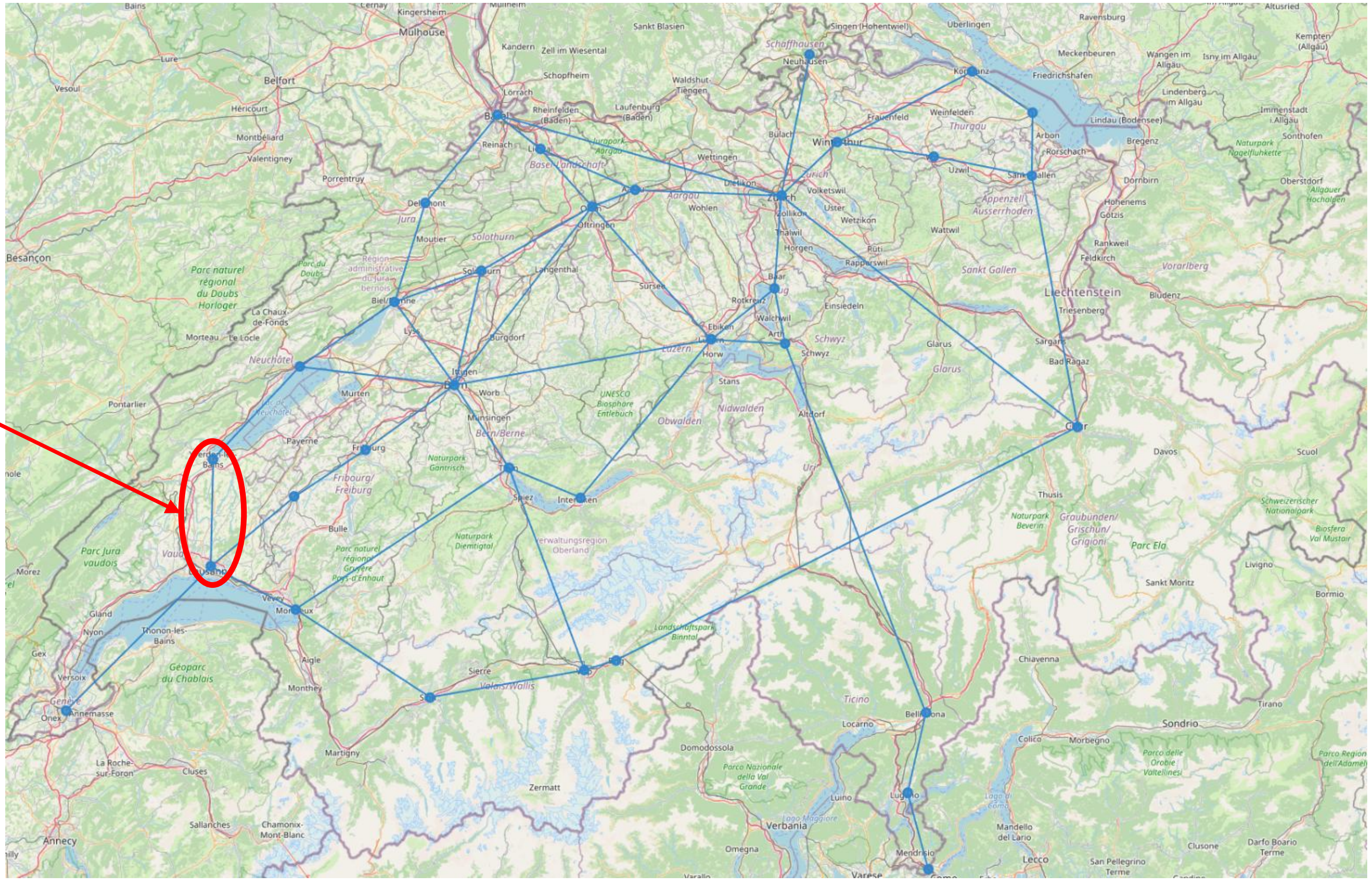

Fig. 3: generated map showing the cities and the railway lines

Task 2: query on cities

Fetch cities in the database that follow certain criteria and display them on the map

Bern

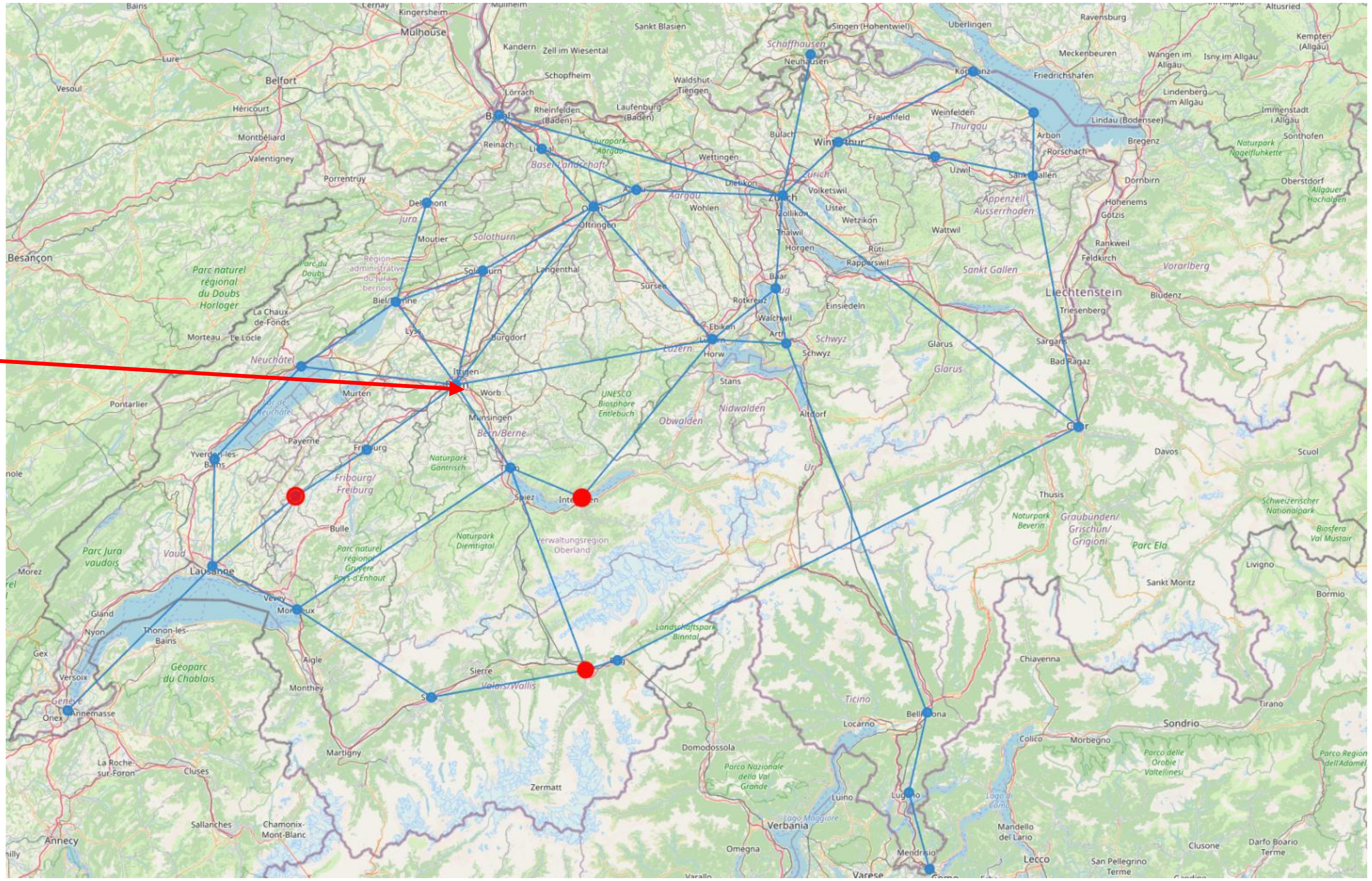

Fig. 4: Generated map highlighting cities with less than 10,000 inhabitants that are located at two stops of fewer from Bern

Task 3: Shortest path

Find the shortest path between two cities and displays it on the map. You will run the algorithm twice, using two different criteria: shortest distance then shortest travel time.

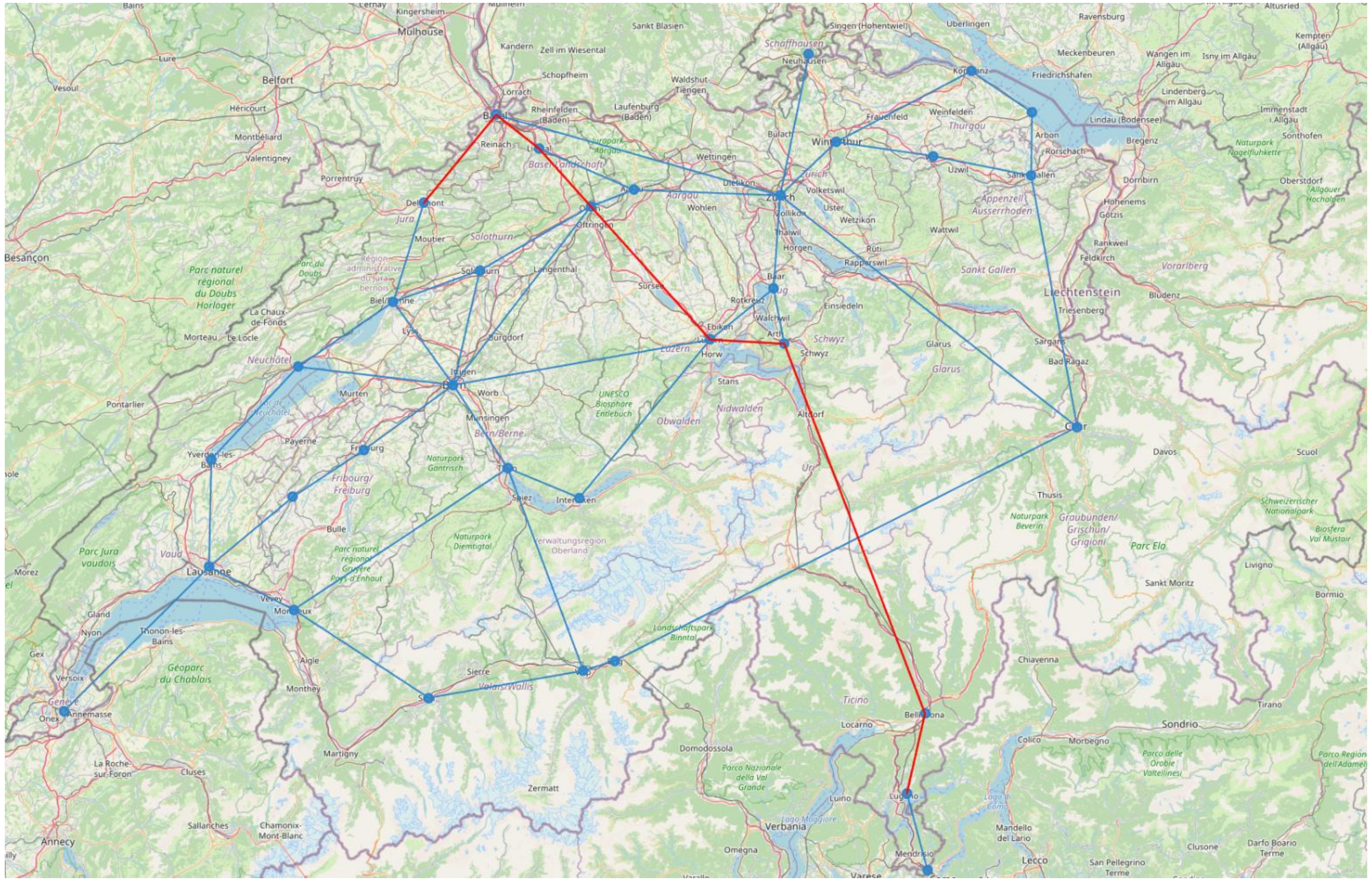

Fig. 5: *generated map highlighting the shortest path between Delémont and Lugano using the distance in kilometers as criterion.*

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Task 4: Minimum spanning tree

Generate a minimum spanning tree using a new edge property called “cost”, which will represent the renovation cost associated with each line (as defined in the lab instructions

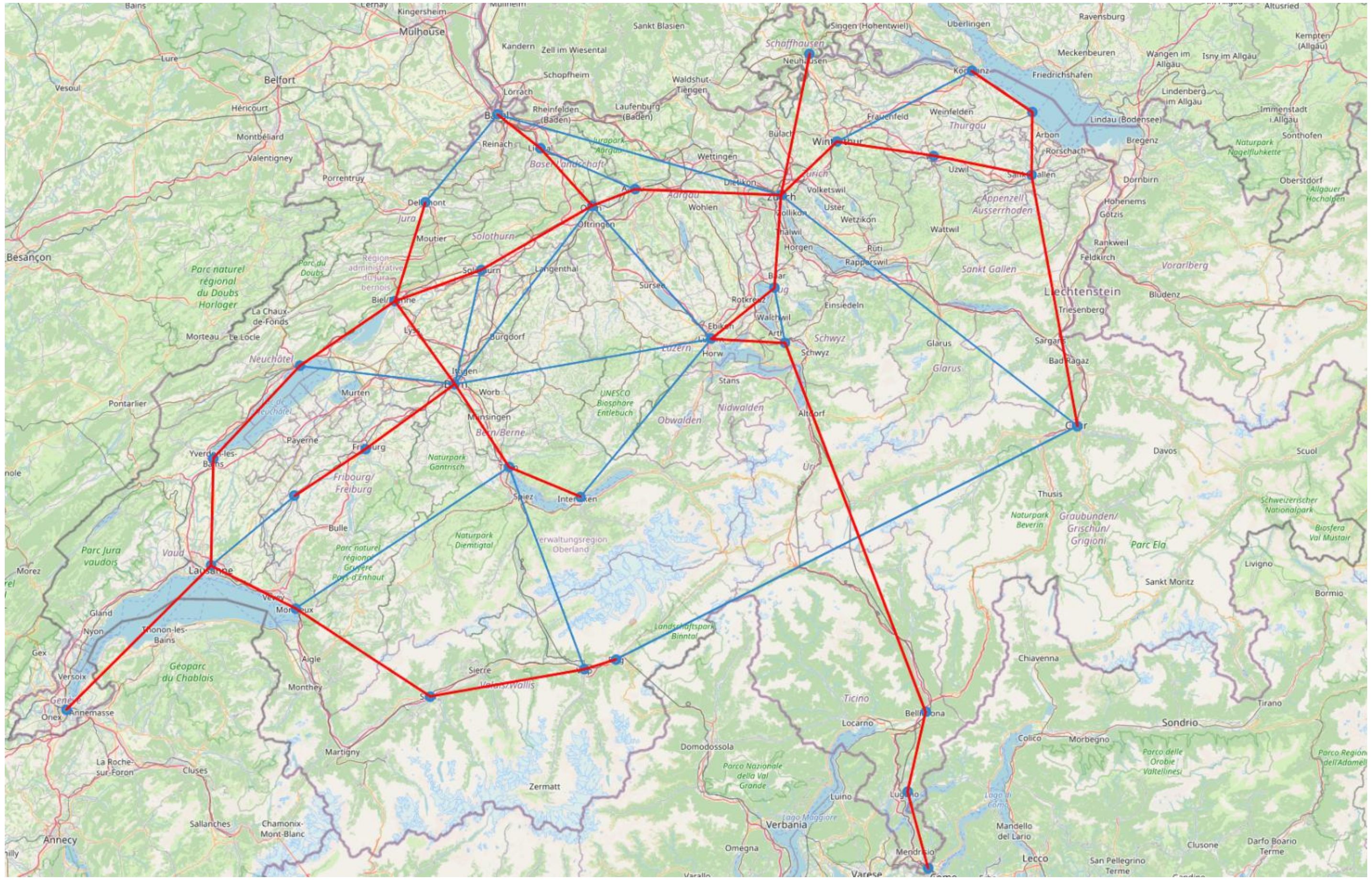

Fig. 6: generated map showing a minimum spanning tree using the distance in kilometers as weight criterion. The source here is Chiasso.

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