Construction of a OSM network of routes for the calculation of combinations

Bernard Houssais, *bh35@orange.fr* - February 2025

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A *network of routes* is a set of path, tracks, roads usable to build hiking routes by combining these ways (*combitrack* and *combibase* software). These ways are interesting paths in a given area (marked circuits, long-distance paths sections), to which unmarked junctions or small sections of roads can be added. The number of sections must be sufficient to obtain a fairly rich set of combinations, but not too many for fear of obtaining thousands! Starting or arrival points for the combinations must be selected and named. Some sections of routes can be designated as being able to be traveled in a return trip. The network should not include dead ends, unless they are used as access to circuits, or to reach a point of interest. These access routes must then be declared as return trips.

Network construction

The routes to be used are chosen on the OpenStreetMap (OSM) map. It is therefore necessary to first check that the circuits and paths envisaged are indeed present and correctly represented on this map. The presence of the paths can be verified on the mapping software offering the OSM base map. The different types of routes (road, path, trail) are distinguished by their representation on the map (single or double line, dashed, dotted). Their attributes (properties) are used to calculate the quality of the combinations, and to classify them according to their supposed interest. A path (*highway=path*) is better rated than a road (*unclassified*). Farm roads (*highway=track*) are frequently used: their quality is often specified by their *tracktype* attribute. This information is visible with the JOSM tool, which also allows them to be modified. Note that the constructed network will be based on the representation of the routes at the time of this construction. Their subsequent updates will only be taken into account after a new construction. For more details on the nature of the routes and the attributes, consult the wikis:

https://wiki.openstreetmap.org/wiki/FR:Key:highway
https://wiki.openstreetmap.org/wiki/FR:Key:tracktype

Construction steps

- with Overpass, define the limits of the area concerned, and extract from the OSM database all the routes and highways of this area
- with JOSM, load these routes and circuits, choose and "mark" the starting point nodes and the return routes, build a new relation called *network* grouping the circuits and routes constituting the desired network
- the supposedly complete *network* relation is copied into a new layer, which is saved under the name of the network file
- the layer containing all the routes and circuits (including *network*) is also saved for reuse during later edits.

Of course, the route modifications and the new relation are for personal use, and are therefore not sent to the OSM database!

The network builder is supposed to be familiar with the use of Overpass and JOSM.

Overpass

Launch : https://overpass-turbo.eu/

Search for the desired area for the network, and delimit it precisely by the rectangle of the search box (*bbox*, small rectangle in the menu on the left of the map). In the left column, replace the text with the following query:

// local hiking relations + other routes
(relation[route=hiking][network=lwn] ({{bbox}});
relation[route=foot][network=lwn] ({{bbox}});
way[highway] ({{bbox}});
);
out meta; >; out meta;

This query extracts from OSM the walking circuits (*route=hiking*) or the urban walks (*route=foot*) defined as local (lwn=local walking network). Added to this in the same rectangle are all the communication routes (highway),... from the path to the motorway. The long distance routes (*network=nwn* or *network=rwn*) are not searched at this stage, because they would take a long time to load, and would go far beyond the scope.

Click on *Run*. Ensure that the desired circuits and tracks are present.

Export them as *row data of OSM,* giving an *export.osm* file.

JOSM

This off-line editor loads a part of the OSM map (for example *export.osm*) in a layer. Additions and modifications are made to this layer. The modified layer is usually sent back to the OSM database for publication. But here **we will not send anything**, we will simply save this modified data in files.

Start by adding the planned starting points: zoom on the map and select the chosen point. In the *Attributes* window (often empty for points), add an attribute *start=* with the chosen name.The starting points selected will be listed by *combitrack* when analyzing the network. Then define the routes (or sections of routes) that can be traveled in a *return* trip. Cut the route beforehand when only part of this route is to be integrated into the network, whether in a return trip or not. Select the route (in red on the map), and add a new attribute : *return=yes*.

These attributes *start, finish, return* are not recognized by OSM, but the verification would only take place if these attributes were sent to the public database.

Some routes represented as relations may be adjusted, or cut and reduced to keep only the useful parts.

Create a new relation called *Network* of type *hiking route*. Add relations and ways making up the network. Different relations may contain the same ways. Parts of long-distance footpath must be added individually.

First save the entire *export.osm* layer by giving it a more meaningful name (*Name_base.osm*). So, this layer could be reloaded later if there are modifications, without needing to be rebuilt. To obtain only the network, we limit the saving to the Network relation only. Select it by clicking on its name, then on the "square" button. Type a CTRL-C to copy it. Then type a CTRL-N to create a new layer. A new black background appears, where the ways appear very attenuated. Hold down the CTRL and ALT keys and type a "v" (three fingers!). Only the ways of the network are copied in their place. Save it with the desired name for the network file.

Network testing

A new network must first be analyzed in *combitrack*, without setting a starting point. The most common anomaly is the reporting of dead-end roads, deleted by the software. Retrieve the *_Name.gpx* file, and display it in a multi-track mapping software (*EditGPX*). We visually identify the missing junctions between two intersections. Most often, it is a small section of road (a bridge?) that has been forgotten in a relation, which causes a break in continuity. It also happens that roads have been cut so that one of the parts is added to the network, and that the other useless section is also there. In the *_Name.gpx* file, the ends of the dead-ends are indicated by waypoints with the name *XX*, which makes it possible to locate the missing roads in the database, or the sections to be deleted. Remember to exit JOSM by *Exit now!* **without** sending the new features to the public base!

To publish the network, enter the file *_Name.gpx* in a mapping software. The return branches are colored in red, the others in purple. Also display in this software the starting points, defined as

waypoints with their name in the GPX file. Obtain the map by screenshot, or by a printing module.

Network update

Following modifications or additions in OSM, some ways in a network must be updated. If these modifications are minor, or only concern attributes (wrong highway, change of tracktype, modification of a circuit), take the file *Name_base.osm* in JOSM, retouch it, and recreate the new network.

If interesting lanes have been added or modified:

- recreate the new network of lanes with *Overpass*; the frame is that of the updated network; load the *export.osm* obtained in JOSM
- load the current *network* in another layer
- delete the lanes to be replaced in this layer; note the relations they were part of
- in the *export* layer, select the new tracks to introduce, then copy them (CTRL-C)
- return to the *network* layer and do a CTRL-ALT-V to add these tracks
- select each of the ends of the new tracks one by one (red dot), and type an M (like *Merge*) to merge it with the connection point of the pre-existing track (otherwise, the ends will remain distinct, and the new track will be seen as a dead-end)
- reintroduce the new tracks in their relations (circuits or network).
- save and test the new network; the file *Name_base.osm* is no longer up to date and can be deleted.