Carrying on: georeferencing

Summer School on Digital Humanities

Course material available at

https://github.com/AugustoCiuffoletti/DHSS_2025

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Carrying on: georeferencing

- Georeferencing consists of transforming an image into a map
  - giving each pixel in the image a geographic coordinate
- To this end we need the geographic coordinates of a (small) number of points of the map image
- Using this input a georeferencing tool infers the coordinates for all the pixels in the image
  - in principle only two points are needed, in practice accuracy improves with the number of points
  - possibly the image needs to be morphed (non-linear transform)
  - good reference points are distant and non-aligned
- To simplify the task of finding the reference points coordinates
  - associate points on the image with corresponding points of an accurate reference raster (e.g., the OSM one)
- QGIS can do that

Georeferencing: preparation

- Create a new project with the reference raster (OSM)
- Scale it to match the area in the map
- Notice the code shown in the bottom right corner: EPSG3857 (WGS84/Pseudo-Mercator)
  - the standard projection to display maps on a plane
- Select Raster -> Georeferencer...: a new window appears
- In the *Georeferencer* window select File -> Open Raster
  - browse your directories to find the image file you want to georeference and double-click on it
- In the *Georeferencer* window select Settings -> Transformation Settings
  - Transformation type is the kind of morphing: TPS is OK
  - Check the SRS is EPSG:3857 - WGS84/Pseudo-Mercator
  - Define a target file for the result
  - Tick "Load in QGIS when done"
  - Click OK and return to the Georeferencer window

Matching points

- Repeat the following steps for at least three (distant and non-aligned) points on your image map
  - Find a detail on the map image that you can later locate also on the raster
    - e.g., in an ancient map of France *Lutetia* corresponds to Paris
    - to precisely hit the point you can move the map using keyboard arrows, zoom with mouse wheel, but you can't click!
  - Click when the crosshair is on the detail (*Lutetia*)
  - A new window shows up for the coordinates of the point
  - Here, hit the From Map Canvas button
  - The map and the dialog disappear and you are brought back to the OSM raster with a crosshair pointer
  - Find the corresponding point (*Paris*) on the raster and click
  - QGIS acquires the geographical coordinates from the raster
  - ... and your map re-appears with such coordinates in the boxes
  - Hit OK and repeat for three or more points

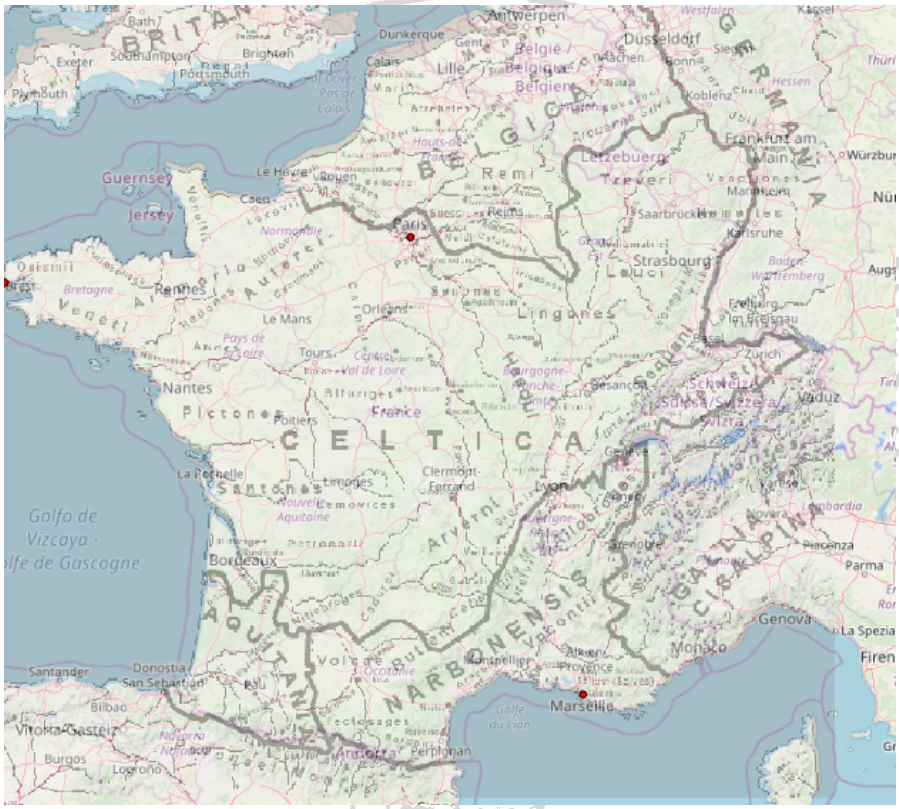
Run the georeferencer

- Once you have finished matching points from the image to the raster, you are ready to apply the geo-referencing algorithm
- Hit the green triangle in the toolbar of the *Georeferencer* window
- A pop-up informs you when the process terminates
- Do not close the georeferencing dialog yet, but go to the main window to inspect the result

Inspecting the result

- The image is pasted as a new raster in the main window
- To evaluate the work of the georeferencer we need to render the new layer as semi-transparent
- Right-click on the new layer (in the Layers frame) and select Properties -> Trasparency
- Regulate Global Opacity around 50% and hit OK
- The next slide shows the OSM raster of France with a georeferenced map of ancient french tribes
- The three reference points are in Paris, Marseille and Bretagne
- Notice the North coastline, which differs in the two maps
- If you are not satisfied with the result,
  - remove the layer,
  - go back the *Georeferencer* window to add new points and
  - repeat the georeferencing

Georenferencing result



More resources

- Find accurate tutorials about QGIS at `https://www.qgistutorials.com/en/`
- Relevant geographic data (of the kind of OpenStreetMap) are found on regional and global basis. E.g:
  - e.g., the `https://earthexplorer.usgs.gov/` (give a look at the *datasets* available)
  - `http://wms.pcn.minambiente.it/mattm/servizi-di-scaricamento/` to download ”WFS” resources that you can import in QGIS
- An interesting exercise is `https://www.qgistutorials.com/en/docs/3/working_with_terrain.html` that teaches how to add contours to QGmaps