Second Summer School on Digital Tools for Humanists

Instructions for the hands-on tutorial on GIS

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Abstract

- This document contains a series of exercises for the students of the second Summer School on Digital Humanities.
- The materials for carrying out the exercises is found at the following address: `https://tinyurl.com/gisdhss18`
- Suggested progression:
  - (sect. 1) create (without recording) a point in OpenStreetMap `https://www.openstreetmap.org/#map=12/43.7184/10.4350`
  - (sect. 2) create a vector layer in qGis containing the same point
  - (sect. 5) create a vector layer containing the same point in uMap
  - (sect. 3) import one of the GLX traces (in Tracce_glx directory) in a qGis map
  - (sect. 4) geo-reference one of the maps (in Mappe_jpg directory)
  - (sect. 6) select a nearby point of interest (e.g., found in the POI-list file), locate on the map, reach the point recording a track in a geopaparazzi project, take a "image note" and record a waypoint with geopaparazzi, export the project as a gpx file, extract the coordinates of the POI (in geopaparazzi), create and submit a new point to OSM (registration required). For accurate placement, copy the coordinates from geopaparazzi to the "Search" box in ID: note, reverse coordinates. **Double check before submitting**.
- Preparation:
  - install qGis (recommended version 2.8 Wien)
  - install "OpenLayers Plugin" and "Georeferencer GDAL plugins" ("Plugins" → "Manage and install plugins")
  - simplify qGis desktop: de-select all panels, except "Layers" and "Layers order" ("View" → "Panels")
  - simplify qGis desktop: de-select all toolbars, except "Map Navigation" ("View" → "Toolbars")
  - install "geopaparazzi" on your smartphone

1 Open Street Map

- In your browser, go to https://www.openstreetmap.org
- Login in one of the following ways
  - use another account for one of the "third parties" or
  - follow the "Register" wizard (recommended, to use uMap later)
- To create a layer with a point
  - Click the "Modify" button and use the online editor ID
  - Click on the "Point" button (turns blue)
  - Click on a point on the map
  - Modify point attributes and fill relevant fields
  - Click X to cancel the point
  - Do not save!
- To mark a line or a closed perimeter, one click for each point, a double click to close
- To remove a feature, click on it with right button and select the trash bin
- With "Save" our fake feature is recorded in the OSM public database: don't do that
- OpenStreetMaps depends on accurate volunteer work: in case you want to add a new feature, you are welcome, but double check or ask for a review

2 Quantum GIS (qGis)

- Open the qGis application, and install the "OpenLayers" plugin
  - "Plugins" → "Manage and Install Plugins..."
  - in the "Search" box type "OpenLayers Plugin" and click "Install plugin"
- Create a new project with select "Project" → "New" (not needed if you do not mind losing your work)
- Load a background raster:
  - Web → OpenLayers plugin → OpenStreetMap
  - Select magnifying glass (+)
  - repeatedly click on Pisa on the map
- Create a new layer as a shapefile of points
  - Layer → Create Layer → New shapefile layer
  - In the popup:
    - select "Point"
    - Indicate EPSG:4326 for the encoding (same as the background)
    - Proceed with "OK"
  - Indicate a file (e.g. "Demo")where to record the shapefile. The shapefile appears in "Layer" panel (usually left)
- Add new point(s) in the shapefile
  - Right click on the shapefile in the "Layers" panel, and click "Toggle editing" (an icon in the panel changes, find it...)
  - "Edit" → "Add element"
  - For each point
    - Move the crosshair on the map and click
    - In the popup add the "Id" (the only attribute) and close with "OK"
  - When finished, right click on the shapefile in the "Layers" panel, and click "Toggle editing"
- To modify the icon associated with the points
  - right click on the shapefile in the "Layers" panel and click "Properties"
  - select "Style" and click on the new icon
  - "Ok" to close
- Remove features from a layer
  - Right click on the shapefile in the "Layers" panel, and click "Open Attribute Table"
  - Click (select) the row representing the point to remove: the icon changes color in the map
  - Click on the trash bin icon
- Add lat/long columns
  - Right click on the shapefile in the "Layers" panel, and click "Open Attribute Table"
  - Select "Abacus" (Ctrl-W)
  - Set field name (*longitude*) and type (*decimal*) of attribute
  - In the *Expression* box type *$x* and *OK*
  - Repeat with *latitude* and *$y*

3 qGis: import a glx trace

- Open or create a qGis project (see above)
- Layer → Add layer → Add vector layer
- In the popup select
  - File
  - System
  - Browse and find the glx files
  - Leave the popup with "Open"
- "Select all" select all vector layers, next "OK"
- If the track is not visible: "View" → "Panels" → "Ordine dei layers" and drag the layer in first position
- On each layer you can
  - add attributes (e.g. latitude and longitude)
  - remove spurious points
  - highlight points with define property
- To select points with defined attributes:
  - Right click on the track and select "Open attribute table"
  - Use "Select elements..." and type an expression (e.g.: ele ¿ 100)
  - Selected rows in the table and points on the map are highlighted

4 qGis: geo-referencing a map

Geo-reference a JPEG or PNG map:

- Install "Georeferencer GDAL"
- Raster → Georeferencer → Georeferencer
- + (upper left button) and select the map file (jpg, png...)
- select reference system EPSG:3857 (same as OSM)
- associate (at least) three distant points on the map with corresponding points on the OSM map.
- For each of them:
  - Click on "Add point" on the un-referenrenced map
  - Point and click a relevant point on the map (e.g., road crossing)
  - in the popup windows, click "From map canvas": the focus moves on the OSM map
  - on the OSM map point and click the same point
  - the focus moves back: click OK
  - each time a new point appears in the Ground Control Point (in the GCP box)
- in the georeferencer popup, click the wheel (Settings):
  - Transformation type: Thin Plate Spline
  - Output raster: your destination file
  - Target SRS: EPSG:3857
  - Tick "Load in qGis when done"
  - Click OK when finished
- Click "Start georeferencing" (green triangle)
- the georeferenced map appears in the main window
- Check the result in the main window:
  - Right click on the track and select "Properties"
  - In the popup window, bring the trasparency cursor to 50
  - Verify maps alignment
  - If needed, move points or add new ones (three is the minimum)
- To use the new raster "Layer" → "Add Layer" → "Add raster layer" and browse the "tif" file

5 uMap

- Create a map and add features
  - With your browser go to `http://umap.openstreetmap.fr/en`
  - Login using OpenStreetMaps credentials (or Twitter, Bitbucket, or Github)
    - it is possible to play **without** credentials, with limitations
  - On your left control buttons (more buttons with the "More Controls" button)
  - Click the magnifying lens (left) and digit the name of a town (e.g. "Pisa")
  - If you do not like some french names, "Change map background" and select "OpenStreetMaps"
  - To create a feature, enter edit mode by clicking the "pencil" on the right
  - A column of button appears:
    - the three upper buttons are for the basic features
    - the up-arrow is to import data (use it to import a track!)
    - the "wheel" is for various settings (try "slideshow")
    - the next is to configure the background
    - the "drum" is to manage layers (add/remove/order)
  - Click on a symbol and point on the map to create features
  - To associate external references to the features
    - right-click on the feature, a panel appears on the right
    - alternate way, left click on the feature and click on the pencil in the pop-up
    - in the "Description" box, click on the "?" to obtain instructions on various kind of media
  - When finished click on "Save" and "Disable editing"
- To modify map accessibility, click the "Key" button on the right (very slow, be patient)
- To export or embed the map, click the "Share" button on the left:
  - An iframe ready for cut and paste
  - A short URL
  - Below "Download"
  - Click under "Download" to select the format (geojson, gpx, kml)
  - Download and open the file with a text editor to see how features are represented

6 Geopaparazzi: record and export a track

- Record a track with geopaparazzi:
  - Create a new project (... upper right corner)
  - Give a significant name
  - Upper right button: add project details (optional)
  - Middle left button: start a new track. Works only when GPS is active
  - A project contains several tracks
  - Same button to close the track
- Recording notes and pictures during the walk
  - The middle right button shows a map
  - Center map on the GPS (bottom of screen)
  - Record a *waypoint* with the "Star" button on the left (it will be exported in the GPX file)
  - Record a note with the top button on the left (it is not exported in the GPX, but it is documented in the PDF report)
    - Select type of note
    - Click "Scatta una foto"
    - Take the shot
    - Save the note (diskette symbol, upper bar)
    - Notes marked by colored circle on map
- Export a GPX track (XML)
  - A project is already loaded
  - Lower right button (up arrow)
  - Select format:
    - gpx for qGis
    - kmz for GoogleEarth
- Export a PDF report
  - A project is already loaded
  - Lower right button (up arrow)
  - Click "Schede del progetto a PDF"

Geopaparazzi Shortform: 7 steps