

Second Summer School on Digital Tools for Humanists

Instructions for the hands-on tutorial on GIS

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Introduction

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>

Preparation

- install qGis for <http://www.qgis.org> (recommended version 3.4 Madeira, otherwise expect a slightly different interface)
- install "Gaia GPS" on your smartphone (Android or iPhone/iOS)
- create a "Gaia GPS" free account

Suggested progression

- (sect. 1) create a vector layer in qGis containing a single point (e.g. your home)
- (sect. 2) create (without recording) the same point in OpenStreetMap <https://www.openstreetmap.org>
- (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 with "Gaia GPS" and take a picture, export the project as a GPX file and import in uMap.

1 Quantum GIS (qGis)

- Open the qGis application and install "QuickMapServices plugin" and "Georeferencer GDAL plugin" ("Plugins" → "Manage and install plugins")
- 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 $\$y$

2 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

3 qGis: import a GPX 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 gpx 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 (not with GPX files)
 - 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-referenced 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 transparency 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"

Geoparazzi Shortform: 7 steps

