

# Summer School on Digital Tools for Humanists

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## Instructions for hands-on activities

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### Introduction

This document contains a series of exercises for the students of the Summer School on Digital Humanities.

The materials for carrying out the exercises is found at the following address: [https://github.com/AugustoCiuffoletti/dhss\\_2021](https://github.com/AugustoCiuffoletti/dhss_2021)

### Preparation

- install qGis for <http://www.qgis.org> (recommended version QGIS 3.18.3 'Zürich', 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 GPX traces (in GPX directory) in a qGis map
- (sect. 4) geo-reference one of the maps (in Maps directory)
- select a nearby point of interest (e.g. a bridge, a pub, or a tower), locate it on Gaia GPS map, reach the point recording a track, then take a picture. Once at home export the project as a GPX file and import in uMap.

# 1 Quantum GIS (qGis)

- Open the qGis application "QuickMapServices plugin" and enable the "Georeferencer GDAL plugin" ("Plugins" → "Manage and install plugins")
- Create a new project with select "Project" → "New" (not needed if you do not mind losing your work)
- Load a background raster:
  - Layer → DataSourceManager → Browser → XYZ Tiles → OpenStreetMap
  - use the trackpad to center Pisa and magnify
- Create a new layer as a shapefile of points
  - Layer → Create Layer → New shapefile layer
  - In the popup:
    - \* define the "File name"
    - \* select "Point" geometry type
    - \* indicate "EPSG:4326 - WGS 84" for the coordinate system
    - \* add attributes for the features ("New Field")
    - \* Proceed with "OK"
  - The shapefile appears in "Layer" panel
- 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 Point Feature"
  - 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 "Symbolology" 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-I)
  - 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 point feature
  - Zoom in with the mouse wheel until the "Edit" button is unshaded
  - Click the "Edit" 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, select the appropriate tool and then one click for each point, a double click to close
- To edit a feature, right click on it: many options available
- 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 an image

Geo-reference a JPEG or PNG image representing a map:

- Enable plugin "Georeferencer GDAL"
- Raster → Georeferencer
- Open a raster (e.g. OSM) of the region represented in the map you want to geo-reference
- Open the georeferencer with Raster → Georeferencer
- With e (File → Open raster) select the graphic file (jpg, png...) containing the map
- (Preferences → Open raster) 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