QGIS: a local application

Summer School on Digital Humanities
Web site: https://bit.ly/dt4h-gis

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QGIS: a local application

The user installs a GIS application on the PC



User

- In this scenario, the Web is a tool for exchanging data
 - but it is not directly involved
- Quantum GIS (QGIS) is an open-source GIS application
 - Developed and maintained by volunteers
 - First released in 2002
 - Here we use version 3.34 (Prizren)
- Runs on Windows, Linux, and macOS

QGIS Operation

- Acquires and aggregates layers from various formats
 - Includes both local data and remote databases
- Enables creation of new layers
 - Populated with customized features
- Among final output options:
 - Produce a graphic file (JPG, PNG, etc.)
 - Save in QGIS format
 - Publish on the QGIS Cloud (plugin needed)

Hands-on QGIS - Load a raster

Create a New Project

Open QGIS and select Project -> New

Add a Raster Background Layer

- Layer -> Data Source Manager -> XYZ Tiles
 - You can also use the Ctrl-L instead of using the menu
- Double-click on OpenStreetMap
- Use the control pad to zoom in on a specific region

Understanding the Raster Layer

- The map is now displayed as a raster layer
 - · Composed of multiple tiles, similar to an image
 - Cannot be modified within QGIS
- Various providers offer raster layers
 - OpenStreetMap is a free, open-source provider

Hands-on QGIS - Add a Vector Layer

Define a Vector Layer

- Layer -> Create Layer -> New Shapefile Layer
 - Or use the *New Shapefile* icon in the toolbar (third icon in the second row)
- Choose:
 - A filename to save the layer (e.g., Demo)
 - The feature type: Point, Multipoint, Line, Polygon
 - In this example, use Point
 - A coordinate system (EPSG: 4326 WGS84)
- Add new fields for the features in the layer
 - e.g. Last visit with type Date and click Add to Fields List
 - When finished, click Ok
- The new layer appears in the Layers Panel
 - To view the layers panel, View -> Panels and tick Layers
- Two layers shown, Demo and OpenStreetMap
- We can edit the Demo vector layer

Hands-on QGIS - Refine the layer definition

Further Configuration of a Layer

- Double-click on the Demo layer to set its properties
 - In Symbology, choose the graphic symbol and adjust its properties
 - In Fields, update feature attributes
 - you may want to add a new las t visit field
 - for this enable editing with the pencil and add (or delete) a field
 - In Labels, select Single label and choose the field for labeling the points (e.g., select the name field)



Hands-on QGIS - Working with points

Populate a Vector Layer (with Points)

- Select the Demo layer and Layer -> Toggle editing
 - Or the pencil in the second toolbar
- Then select Edit -> Add Point feature
 - or the ctrl+, shortcut
 - The mouse pointer changes to a crosshair
- Click on the map to add a new point
 - A box appears to set feature fields
- Repeat as you like
- To move a point feature,
 - menu Edit -> Edit geometry -> Move Feature
 - right click on the point to move
 - drag to the new position
 - left click to displace the selected point
- To exit edit mode, right-click on the Demo layer and select Layer -> Toggle Editing

Hands-on QGIS - Edit fields

Update Feature Attributes

- Right-click on the Demo layer and select Open Attribute Table
 - Use the bottom-right icons to adjust the view style
- Press ctrl+E to enable table editing (or click the Pencil icon)
- Modify attribute values as needed
- Press ctrl+s to save

Add an Attribute ("desc") to the Features

- Right-click on the Demo layer and select Open Attribute Table
 - Enable editing
 - Press ctrl+w to add a new field (or find the "New Field" button in the toolbar)
 - Set the name and type (e.g., "desc" of type Text)
 - Click OK

Hands-on QGIS - Process fields

For each point compute a new field with distance from Rome in degrees

- Select a layer and click the Open Attribute Table button in the toolbar
- Click ctrl+i or the abacus icon in the attribute table window
- Input a name for the new field (e.g., Lat)
- Choose a type for the field (e.g., Decimal Number)
- Enter the following formula in the Expression box

distance(@geometry, make_point(12.5, 41.9))

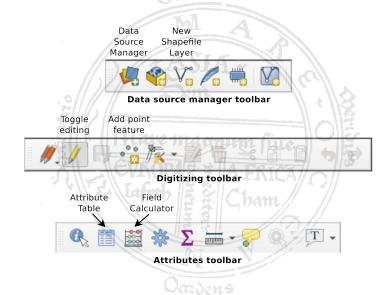
- The distance function takes two points
 - @geometry is the one corresponding to the row in the table
 - make_point(12.5, 41.9) corresponds to Rome (long,lat)
- Note: to see meters conversion is needed, from EPSG:4326 to EPSG:3857, using the transform function

Hands-on QGIS - Save or export

Save Your Work

- Save the project in QGIS native format (Ctrl+S or Project -> Save)
- Export as an image (Project -> Import/Export -> Export Map to Image)
- Export in a portable vector format (Project -> Export DXF)

GUI Toolbar Icons (Quick Reference)



Lab Activity

- (Basic) North of La Spezia, there is a region called "Cinque Terre". The name comes from five fishing villages: Corniglia, Manarola, Vernazza, Monterosso, and Riomaggiore. Set a Point for each village and display a label with its name on the map.
- (Intermediate) Draw a sea route visiting all the villages, starting from Levanto (another small town to the north).
 For this create a new LineString vector, enable editing, select Add Linear Element and mark waypoints with the left button. Right button to close the LineString.
- (Intermediate) Convert the line to a new layer of vertices using Vector -> Geometry Tools -> Extract Vertices
- (Advanced) Compute the longitude and latitude of these points, and label each one with a string "(long, lat)" using the concat function in the calculator.