Example of a local application: QGIS

Summer School on Digital Humanities

Course material available at

https://github.com/AugustoCiuffoletti/DHSS_2025

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Example of a local application: QGIS

- The user has a GIS application installed on the PC

User

- In this scenario the Web is a tool useful to exchange data
  - but it is not in the picture
- Quantum GIS (QGIS) is an Open Source GIS application
  - software is developed and maintained by volunteers
  - first release in 2002
- Runs on Windows, Linux, MacOS

QGIS operation

- Acquires and aggregates layers from different formats
  - both local data and remote databases
- Lets you create new layers
  - populated with customized features
- In the end you can:
  - produce a graphic file (jpg, png etc.)
  - save in QGIS format
  - publish the map
- ...and much more

Step by step QGIS tutorial - 1

Create a new project

- Open QGIS and select Project-> New

Create a raster background layer

- Ctrl-L -> Browser -> XYZ Tiles
- Double-click on OpenStreetMap
- Use the control pad to focus on a limited region
- Note: Instead of Ctrl-L you can use the *Data source manager* icon in the toolbar

Step by step QGIS tutorial - 2

Define a vector layer

- Layer -> New Vector -> New shapefile
  - or use the *New Shapefile* icon in the toolbar
- Select
  - a filename where to save the layer (e.g., Demo)
  - the features type: *Point*, *Multipoint*, *Line*, *Polygon*
    - in the example that follows we use *Point*
  - a coordinate system (`WGS84 EPSG:4326`)
- Add fieldss for the features in the layer (*New Field* form)
  - when finished hit Ok
- The new layer appears in the *Layers Panel*

Step by step QGIS tutorial - 3

Further configuration of a layer

- Double click on the Demo layer to set layer properties
  - in *Symbol* set the graphic symbol and its properties
  - in *Labels* select *Single label* and next field to use to label the point on the map
  - in *Fields* update feature fields

Step by step QGIS tutorial - 4

Populate a vector layer (with points)

- Select the Demo layer and press the *Pencil* icon in the toolbar
  - a pencil appears in the *Demo* row in the *Layer* panel
- Type `Ctrl+.` to enter new point features
  - the mouse pointer becomes a crosshair
- Move the pointer on the map and click to add a new point feature
  - ...a box appears to set feature attributes
- ... repeat for each point
- To move a point feature Edit -> Move feature or use the *Vertex tool* in the toolbar
- To exit edit mode, right click again on the Demo layer and Toggle Edit (the pencil disappears)
  - or use the *Pencil* icon again

Step by step QGIS tutorial - 5

Update feature attributes

- Right click on the Demo layer and select Open attribute table
  - Bottom right icons to select the view style
- `Ctrl+E` to enable table edit (or click *Pencil* icon)
- Modify one or more attribute values
- `Ctrl+S` to save

Add an attribute ("desc") to the features

- Right click on the Demo layer and select Open attribute table
  - `Ctrl+W` to add a new attribute
  - Set name and type (e.g., "desc" of type String) for the attribute
  - Double click to set the attribute value (or to modify it)

Step by step QGIS tutorial - 6

Compute fields with point coordinates

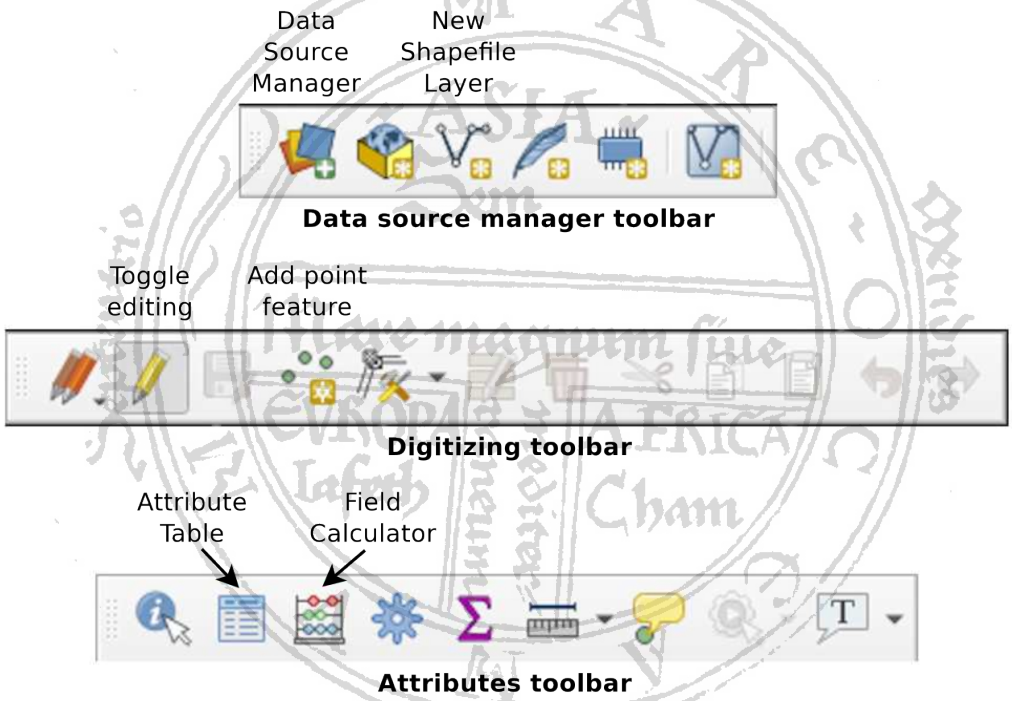
- Select a layer and click the *Open Attribute Table* button in the toolbar
- Select the abacus icon in the attribute table window
- Input a name for the field you want ot add (e.g. *Lat*)
- Select a type for the field (e.g. *Real*)
- Type the formula *y($geometry)* in the *Expression* box
- Create another field for the latitude (e.g. *Lat*, *x($geometry)*)
- See more functions expanding the *Geometry* drop-down list

Step by step QGIS tutorial - 7

Save your work

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

GUI shortcuts shortform



Lab Activity

- (Basic) North of La Spezia there is a region called "Cinque Terre". The name comes from five fisherman villages: Corniglia, Manarola, Vernazza, Monterosso and Riomaggiore. Set a Point for each of them and show on the map a label with their name.
- (Intermediate) Draw a sea route to visit all villages starting from Levanto (another small town on the north). Convert the line to a new layer of vertices using Vector -> Geometry tools -> Exctract Vertices (by the way, you need a permit to do that)
- (Advanced) Compute longitude and latitude of such points, and label each of them with a string "(long, lat)" using the concat function in the calculator
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