

# User Documentation

## Mini-GIS Application

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TSI24 - December 2024

**Version 1.0**

*How to use CuteGIS : Our mini-gis*

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## I Context of the application

The aim of this project was to develop a lightweight Geographic Information System (GIS), entirely coded in C++ with the integration of the OpenGL and QT libraries and following the agile methods with all the class during three weeks.

The application is named CuteGis to reflect both its foundation on the Qt framework and its charming, compact nature as a mini-GIS.



## II Features in 2D mode

Upon launching the application, the main window opens, featuring a layer manager and a display area for your data. Below the view, a 2D/3D toggle button allows you to switch between modes. Additionally, a toolbar with multiple tabs is available, although currently, only the "File" tab is functional, as the other tabs are still under development and serve a purely decorative purpose for now.

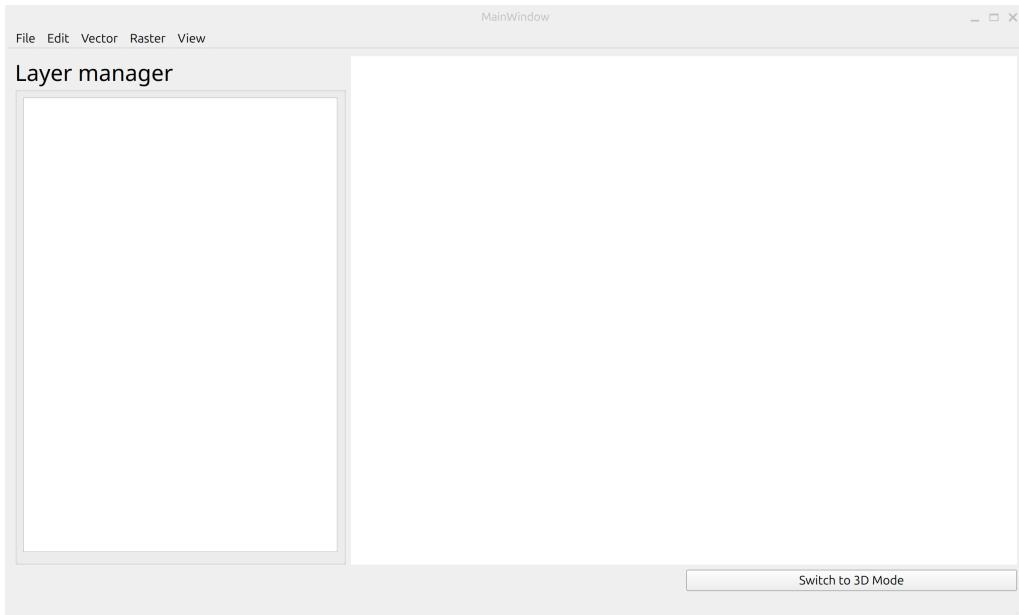


Figure 1: Mainpage of CuteGis upon launching

In 2D mode, here are the features available in CuteGis:

- ❖ Local data loading (shapefile, geojson, geotiff)
- ❖ Load data by stream (WMS and WFS)
- ❖ visualization of image layers (e.g. orthophotos) and vectors (e.g. roads, buildings, etc.)
- ❖ Simple camera control (zoom and pan)
- ❖ Layer management system (reorder, rename, delete, focus on layer)
- ❖ Display of entity information (attribute table) and highlight one element by mouse action
- ❖ Session system to save previously loaded layers in the last application used

## II.1 Loading data

### Local data

When you start the application, it defaults to 2D mode. In this mode, you can only load 2D files (geojson, shapefile, and tiff). In the cute-gis repository, the data directory contains several data files ready for loading into the application. You can choose from the provided files to render them on the view, or you can select your own files.

To access your file explorer, click on the "File" tab in the toolbar, then select "Open File..." and "Local Data"

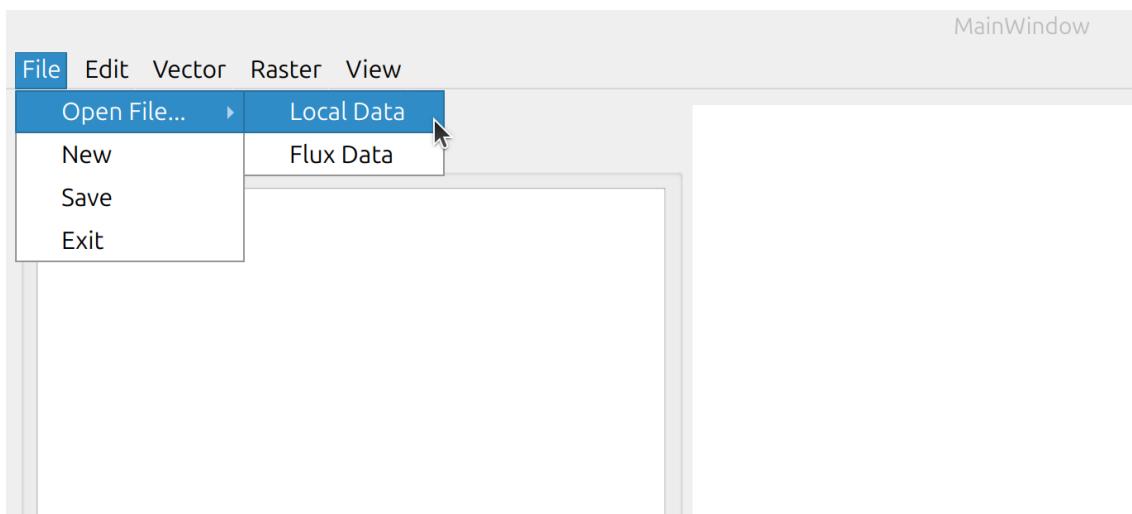


Figure 2: Tool bar menu



In some computers (such as those in room L309, although not all, for unknown reasons), if you click too quickly in your file explorer, the application may lag. Please be patient, and it will eventually respond.

Once you've chosen your file, it will magically display on the view. You can then explore and utilize the limited features available in the application to play with it!

### Flow data

With CuteGis, you can display vector and raster data from different types of flows, including WFS (Web Feature Service) and WMS (Web Map Service).

To access the flow menu, click on the "File" tab in the toolbar as you did previously, and then select "Flux data." From the drop-down list, you can choose to retrieve data from IGN and DataGrandLyon services.

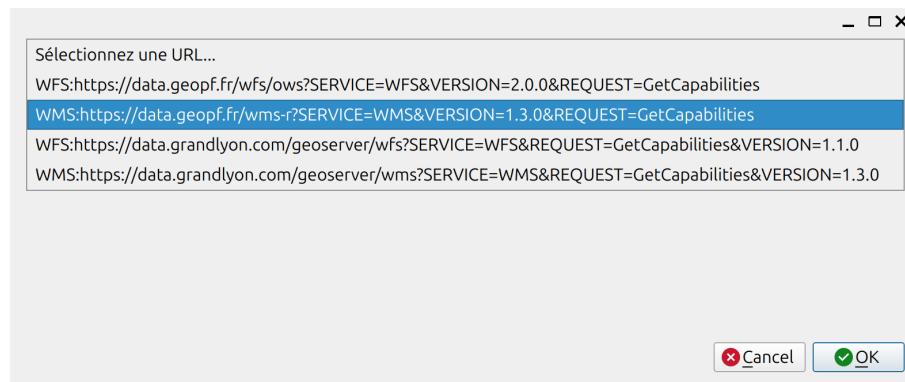


Figure 3: Flow menu

**i** Displaying data from flows can take a significant amount of time, depending on the amount of data to be retrieved and your computer's performance. Regardless, please be patient, and the application will eventually respond.

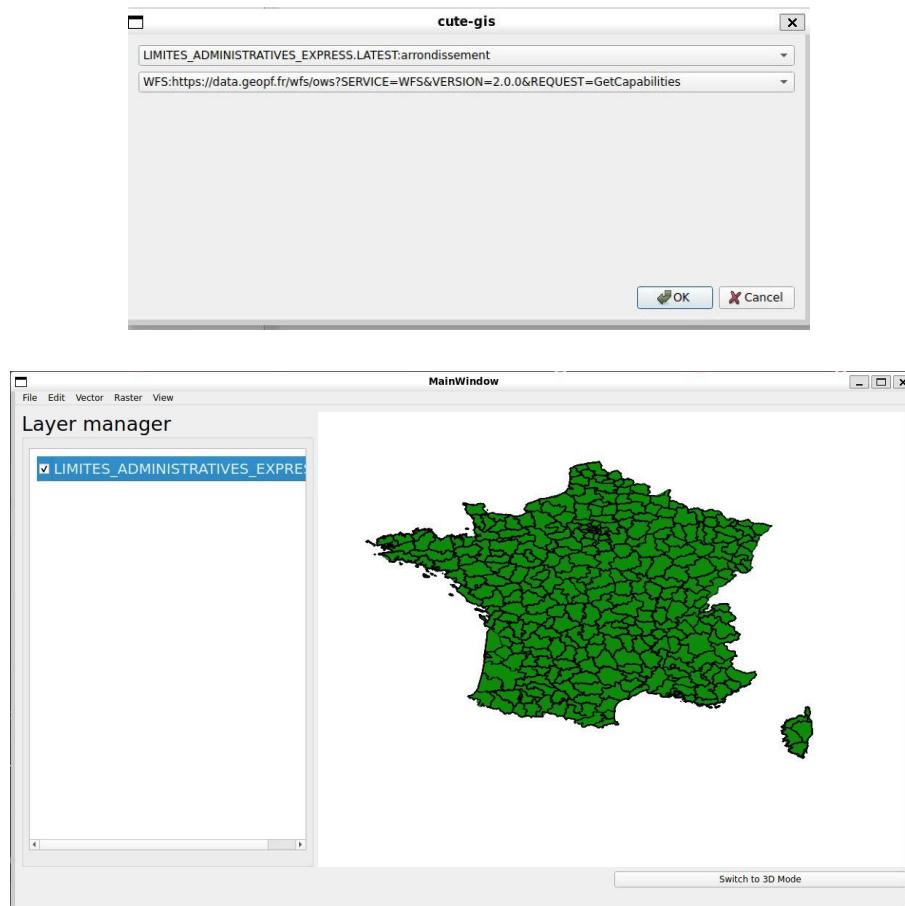


Figure 4: WFS flow data example

## II.2 Interaction in the view area

In the view area, to display the layers, you can zoom using your mouse wheel and pan by right-clicking. You can also navigate with the arrow keys on your keyboard.

### Layer Manager

The Layer Manager in **CuteGis** provides a comprehensive interface for managing and interacting with layers. The functionalities are available only in 2D mode. Any changes made in the Layer Manager are immediately reflected on the view. Below are the instructions on how to use its features:

#### 1 - Reordering Layers

In 2D mode, you can reorder layers by dragging and dropping them with the mouse. Layers at the top of the list will be displayed above others on the map.



**How to Use:** Click and hold a layer, drag it to the desired position, and release it.

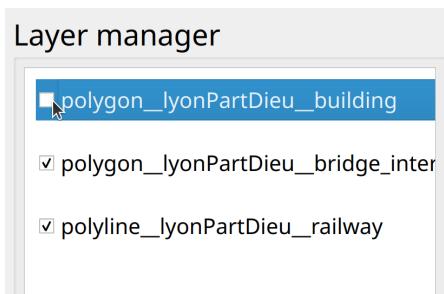
#### 2 - Toggling Layer Visibility

Each layer has a checkbox beside it to toggle its visibility:

- **Checked:** The layer is visible on the map.
- **Unchecked:** The layer is hidden from view.



**How to Use:** Click the checkbox next to the layer name to toggle its visibility.



### 3 - Context Menu Options

Right-clicking on a layer in the Layer Manager opens a context menu with the following options:

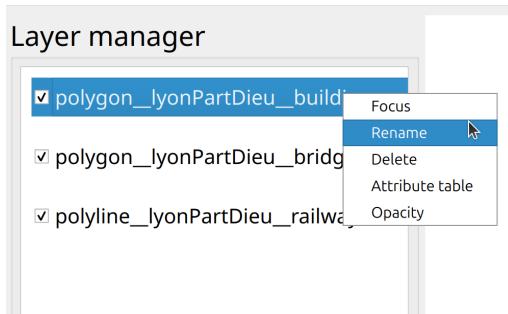


Figure 5: Layer menu options

- ❖ **Focus:** Resets the map view to center the selected layer in the display area.
- ❖ **Rename:** Allows you to rename the selected layer.
- ❖ **Delete:** Removes the selected layer from the Layer Manager and the map view.
- ❖ **Attribute table:** Opens the attribute table for the selected layer, where you can view and interact with its data. Selecting a row in the attribute table will highlight the corresponding geographic feature in yellow on the map.

	Fid	cleabs	nature	type
1	285	BATIMENT0000002244533996	Indifférenciée	Résidentiel
2	402	BATIMENT0000002275540255	Indifférenciée	Indifférenciée
3	512	BATIMENT0000002275866178	Indifférenciée	Commercial
4	18035	BATIMENT0000000240887925	Indifférenciée	Commercial
5	18586	BATIMENT0000000240887794	Industriel, agricole ou commercial	Indifférenciée
6	18600	BATIMENT0000000240887812	Indifférenciée	Indifférenciée
7	18612	BATIMENT0000000240887836	Industriel, agricole ou commercial	Indifférenciée
8	18613	BATIMENT0000000240887837	Industriel, agricole ou commercial	Indifférenciée
9	18614	BATIMENT0000000240887838	Industriel, agricole ou commercial	Indifférenciée
10	18615	BATIMENT0000000240887839	Industriel, agricole ou commercial	Indifférenciée
11	18616	BATIMENT0000000240887840	Industriel, agricole ou commercial	Indifférenciée



Currently, you cannot select multiple features simultaneously, nor can you remove your selection. However, these features may be implemented in the future. Who knows, maybe one day...

- ❖ **Opacity:** Adjusts the transparency of the selected layer, allowing layers below to be partially visible.

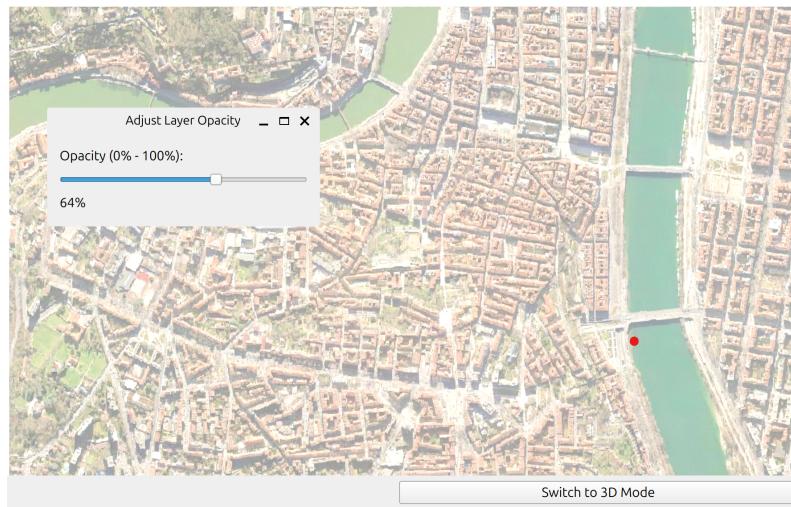


Figure 6: Adjust the slider to set the desired transparency level.

### II.3 Session system

CuteGis includes a session system that saves the layers you've loaded into the application. When you load layers and then close the app, those layers will automatically be reloaded the next time you open the app. Currently, this feature saves all the layers you load. This functionality has not yet been linked to a specific button in the toolbar.



To clear the session layers, you can either delete the layers one by one in the layer manager or delete the generated JSON file directly from the data directory of the application.



If you reopen the application and the layers are displayed automatically, the features of the layer menu may take longer to execute than usual. Please be patient, and the application will eventually respond. Alternatively, if you find the wait too long, you can delete the JSON files in the data directory to clear the session.

## III Features in 3D mode

Unfortunately, CuteGis does not currently support a full 3D mode. In the existing 3D mode, you can only load .obj files, display them in the view area, and navigate through the view.

### III.1 Loading data

To load your file in 3D mode, follow the same steps as you do in 2D mode. Open your file explorer and select your .obj file. Ensure that you are in 3D mode by clicking the button on the main page below the view area.

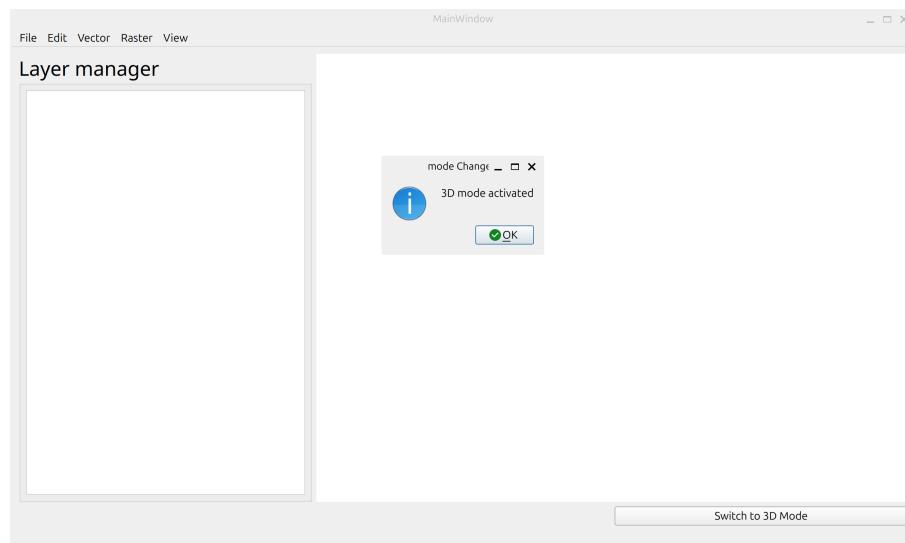


Figure 7: Activate the 3D mode, otherwise, your .obj files will not be visible



If you have loaded 2D layers in the view area and then switch to 3D mode, unfortunately, you will not be able to see your 3D model. The camera cannot focus on the model from the 2D layer. To resolve this, you need to relaunch the application without any layers saved, switch directly to 3D mode, and then load your 3D file.

### III.2 Interaction in the view area

Once you've loaded the .obj file, you can navigate through the view area using these controls:

- ❖ **ZQSD keys:** Move the camera along the local axis, similar to first-person movement.

- ❖ **Arrow keys:** Move the camera based on the global view.
- ❖ **Drag the mouse up and down:** Zoom in and out of the view.
- ❖ **Drag the mouse left and right:** Pan across the view.
- ❖ **Ctrl + Click:** Rotate the camera vertically and horizontally.
- ❖ **Space key:** Move the view upwards.

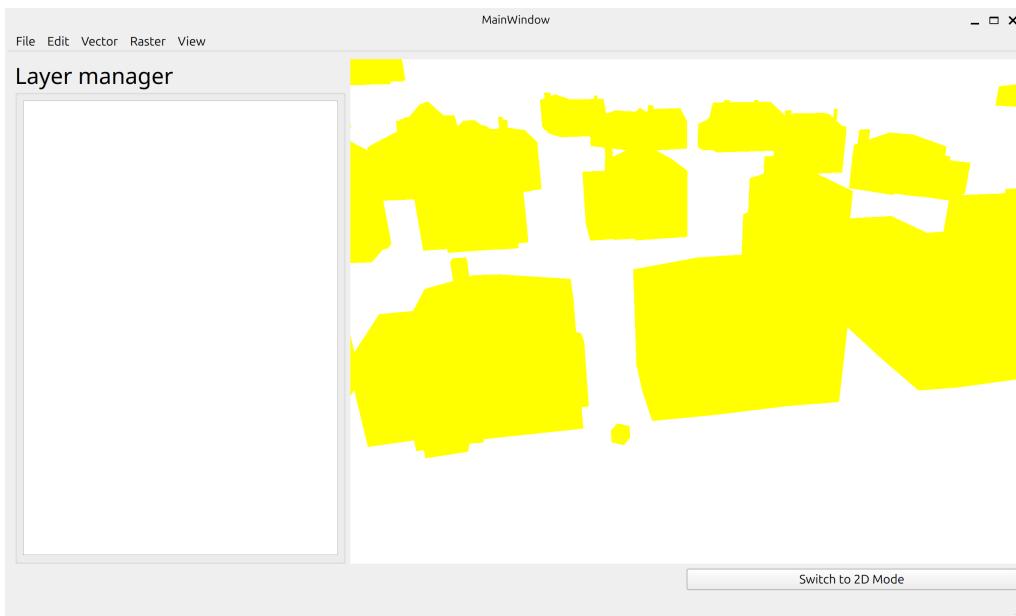


Figure 8: Navigate through the area view



If you switch back to 2D mode, you can seamlessly load your 2D files in the map view without any issues. Pretty cool, right?

## Where our obj file comes from ?

Originally, CuteGis was designed to load and render citygml files. However, our research and development team didn't have time to implement this functionality properly. Initially, we were unsure how to render a citygml directly in our view, so we planned to convert it to a format we could render, which is an .obj file.

The .obj file available in the data directory comes from a [citygml file](#) that was converted into an .obj file format using a [CLI Python parser](#). While waiting for the development of our citygml parser, we continued to work on the 3D view with the .obj file available in the data directory.