QGIS (full name Quantum GIS) is a free and open source geographic information system (GIS) software that allows users to view, edit and analyze geographic data.

We can use QGIS for map editing, and label the map information required by customers (names of different blocks, soil characteristics, etc.) through QGIS to form a data set.

Pros of QGIS:

Integration: QGIS can be integrated with other software like PostGIS, we can storage information by PostGIS.

Cross-Platform: Runs on various operating systems, including Windows, macOS, and Linux.

Support for Various Data Types: Supports a wide range of vector, raster, and database formats.

Customization: Users can customize the interface, tools, and develop own tools by Python
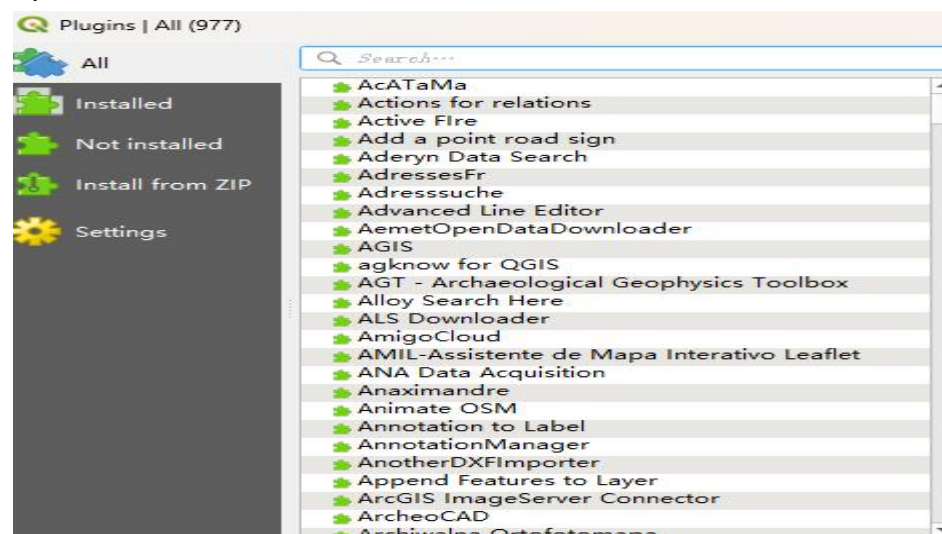
Cons of QGIS:

Performance: For some large datasets or complex operations, QGIS might be slower than some commercial software.

Advanced Features: Some highly advanced or niche GIS functions available in commercial software might not be present or might be less polished in QGIS.

Alternative Solutions to QGIS:

ArcGIS: It offers a comprehensive set of tools for GIS analysis and visualization, but comes at a significant cost.

MapInfo: A commercial desktop GIS software known for its user-friendly interface.

Data Types Supported by QGIS:

Shapefiles (.shp): A popular vector data format developed by Esri.

GeoJSON (.geojson): A format based on JavaScript Object Notation (JSON) used for encoding geographic data structures.

KML & KMZ (.kml, .kmz): Used by Google Earth, these formats are for geographic visualization.

Geopackage (.gpkg): An open standard that can store multiple vector and raster data types.

GeoTIFF (.tif, .tiff): A georeferenced raster image format.

JPEG & PNG: When accompanied by world files, can be georeferenced.

ERDAS IMAGINE (.img): A raster data format.

Digital Elevation Models (DEM): Representing 3D surfaces.

Raster Calculator

A raster dataset, often simply referred to as a raster, is a data structure representing a grid of pixels (or cells) organized into rows and columns, where each pixel has a value.

Raster Calculator is a tool used for performing mathematical operations on raster datasets. It's frequently used in GIS to create new raster datasets derived from existing ones by applying algebraic formulas that use operators and functions on the raster pixel values.

API

QGIS provides a Python API known as PyQGIS. If we want to use the raster calculator functionality programmatically through the QGIS API, we have to be interacting with the *qgis.analysis* module.

As developers, we have to understand PyQGIS API. Also the knowledge about raster data, bands, pixel values and data types are needed.

Features

Raster datasets can be used as single or multi-band datasets in various formats like GeoTIFF, JPEG, PNG, etc.

Mathematical Operations: We can perform various mathematical operations such as addition, subtraction, multiplication, etc.

Logical Operations: Useful for conditional statements, for example, setting specific pixels to certain values based on conditions.

Statistical Functions: Mean, median, standard deviation, etc.

Custom Expressions: We can build and evaluate custom expressions to derive new raster data.