
1.6 Application and documentation

Exercise materials and tasks

Congrats! You made it through first part of theory – introduction to GIS!

Now that you have expanded your knowledge, we will do an exercise on that topic.

Download and install QGIS on your computer.

Go on the following page and check instruction provided below and in the documents on the website:

<https://qgis.org/en/site/>

1. QGIS is unique among the major desktop GIS software applications in that it can run on Windows, Mac, and Linux computers. For this reason, it is important to select the QGIS version appropriate for your operating system on the Download page. You will also notice that, even once you have selected your operating system you may still see up to 4 options to choose from: for Windows you can select a 32-bit or 64-bit version of QGIS and for both Windows and Mac you can select the latest release of the software or an older, more stable long-term support release. The 64bit version is recommended for almost all users, unless you are attempting to install the software on an older computer that has a 32-bit processor. It is also recommended that you install the latest release rather than the long-term release so that you have access to the latest QGIS features. If you are working on a Windows PC or Mac, click on the QGIS standalone installer link for the software version that is most appropriate for your computer configuration to download the QGIS installation files. If you hoping to load QGIS on a Linux computer, follow the instructions on the Download page to download and install the software on your computer using the software installation method specific to your Linux distribution.
2. Once you have downloaded the most suitable version of QGIS for your Windows or MacOS computer the next step is to actually install the software on your machine. Once you are ready to run the installer, click on the QGIS installer file you downloaded to bring up a wizard that will walk you through the install process in a few easy steps. For most users the default options offered in each step will be fine, but you should read the contents of each page in the wizard carefully to see if you think any adjustment to the default settings is required for your particular use case. Once you reach the end of the installation wizard, click the Install button to start the installation process which should take just a few minutes to complete on a typical computer.

Now that you have installed QGIS on your computer. Open the attached file (***Data_practices-it contains District_boundaries, province_boundaries, health_facilities, school_locations, Roads_network, powerlines_network, aquatic_land and LULC_2009***) for Rwandan data and follow the below instructions.

Get familiar with QGIS interface and tools:

- First of all, locate the table of content, standard menu, Zoom and other tools, Data sources browser, map area etc.
- Then import shapefile into QGIS environment (browse the file named **data_practices** and add all vector layers located in that file)
- From the table of context try to explore attribute tables for displayed data, **from the attribute table select secondary schools of Eastern province (Hint: use select by attribute tools)**
- Select and Export the Eastern province of Rwanda as polygon from the **province_boundaries.shp**
- Using the **created Eastern province.shp** clip following data **health_facilities.shp, roads_network.shp, aquatic_land.shp and powerlines_netowrk.shp**
- Create **multiple-buffer (of 100, 300 and 500 m)** along the powerlines_network of Eastern province
- With all extracted data of Eastern province, create a map layout (include all key element of map)
- Create another separate map of population distribution by Rwandan districts

Answer the following three questions on the application exercise.

1. How many attributes does secondary schools of Eastern province data layer have?
 - a. 0
 - b. 3**
 - c. 5
2. How many health facilities objects intersects with 100m powerlines network of Eastern province?
 - a. 40
 - b. 13**
 - c. 523
3. What is the total length of roads in Eastern province of Rwanda?
 - a. 453 km
 - b. 513 km
 - c. 494.5km**

Additional resources and material

Before we move to the next module on Remote Sensing, below are a few more resources available to you if you wish to go deeper on GIS.

If you feel like diving into depth on **QGIS for beginners**, these videos provide all the info. Note that they are long to watch and only optional:

- An absolute beginner's guide to QGIS: <https://youtu.be/NHolzMgaqwE>

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- <https://courses.spatialthoughts.com/introduction-to-qgis.html>
 - <https://courses.spatialthoughts.com/advanced-qgis.html>
 - Make a map from areal image in QGIS:
<https://www.youtube.com/watch?v=ttwb4OrRpFE>
 - Complete Tutorial - How to Make a MAP from ZERO:
<https://www.youtube.com/watch?v=9seReuWjZUg>
 - More about map projections:
<https://kartoweb.itc.nl/geometrics/Map%20projections/mappro.html>

Raster terrain analysis: Using DTM we calculate aspect, hill shade, slope, relief:

- Raster analysis —
https://docs.qgis.org/3.22/en/docs/user_manual/processing_algs/qgis/rasteranalysis.html
- Raster terrain analysis —
https://docs.qgis.org/3.22/en/docs/user_manual/processing_algs/qgis/rasterterrainanalysis.html
- Vector analysis —
https://docs.qgis.org/3.22/en/docs/user_manual/processing_algs/qgis/vectoranalysis.html
- Vector geometry —
https://docs.qgis.org/3.22/en/docs/user_manual/processing_algs/qgis/vectorgeometry.html