**Practical 0:**

Quantum GIS interfaces change from one project to another depending on the required interface of the project. Below are the basic menus that you will encounter in Quantum GIS during the practicals.

**Title of the Project** - Shows the title of project that you are going to view.

**Menu Bar** – This provides access to various Quantum GIS features using a standard hierarchical menu.

**Toolbars** – These provide access to most of the same functions as the menus, plus additional tools for interacting with the map. It shows the command for zoom in, zoom out, pan, back to original view, go back to previous extent, go to next extent, object-information, coordinate read-out, measure, print and help.

**Table of Contents/Map Legend (TOC)** - Shows the layers that can be turned on or off and the legend, attributes symbols and query symbols available for the corresponding project.

Display Window - Shows the feature/s that you have turn on from the TOC.

**Status Bar** - Shows you your current position in map coordinates (e.g. meters or decimal degrees) as the mouse pointer is moved across the map view. To the left of the coordinate display in the status bar is a small button that will toggle between showing coordinate position or the view extents of the map view as you pan and zoom in and out.

**Data sources browser** – In previous versions, QGIS browser was only provided as an external application which enables us to explore our spatial data sets. In QGIS 2.0.1-Dufour this application is also integrated in the QGIS framework as an additional panel just below the Table of Contents.

**Practical 1:**

**Aim:** Creating and Managing Vector Data: Adding vector layers, setting properties, and formatting

**Steps:**

1. Open GIS Software, go to menu toolbar and click on new project and create a new ‘.gis’ project.
2. Adding vector layer:
   1. Select layer from toolbar and then select create layer and select new shapefile layer.
   2. A new dialog box appears, give the desired geometry type i.e point, line or polygon.
   3. Enter the name of the attributes that are required.
   4. Click on add to field list after entering the name and type of attributes and click Ok.
   5. Then click on toggle editing button and click on add polygon/line/point and place the cursor at the location where you want to place the polygon/line/point.
   6. Add the values of the attribute and click Ok.

**Practical 2A**

**Aim:** Exploring and Managing Raster data.

**Steps:**

1. From the layer option, select add create layer.
2. Select the folder containing the data and select the .asc file and click on add and Ok, close.
3. Check whether CRS is WG584 FPGS 4326 from the properties tab of project.
4. Go to the layer 90age60 and right click on and select the properties tab.
5. In the symbology tab change the render type to singleband pseudocolor and select desired color and apply.
6. Go to raster and select raster calculation.
7. Select the desired output layer file.
8. In the raster calculation expression give the desired expression, eg: “glda00ag60@1”-”glda90ag60@1” and click Ok.
9. Remove the other two layers
10. Change the color of the output file. Select the interpolation as discrete and continuous.

**Practical 2**

**Aim:** Raster mosaicking and clipping

**Steps:**

1. Go to layer add layer and add raster layer.
2. Select the following .tif images from India folder.
3. Select open.
4. Click on data source manager click on raster window click add.
5. Click on raster, miscellaneous and click on merge.
6. Click on 3 dots select folder to save the file and select all files and click run and close.
7. Uncheck all other layers.
8. Go to layer and add layer and add vector layer.
9. Click on 3 dots and select .shp file and add close.
10. Click on layer right click and click on properties and change boundary color.
11. Select the extraction and click clip raster mask.

**Practical 3B:**

**Aim:** Importing spreadsheets or .csv files.

**Steps:**

1. Go to layer and click on add layer and click on add delimited text layer.
2. A new window opens.
3. Select the .csv file from the data folder.
4. In the custom delimiter tab select all the options.
5. In geometric definition tab select the geometry CRS i.e EPSG:4326 CGS-84.
6. Click on add and click close.

**Practical 4a**

**Aim:** Working with attributes.

**Steps:**

1. Start a new project
2. Go to layer, add layer and add vector layer.
3. Select the zip file by clicking on 3 dots and click on add.
4. Right click on layer in the layer panel and click on open attribute table.
5. To find the place with maximum population click on “pop-max” file.
6. On clicking the select feature using separation on button new window opens.
7. Enter the expression such as pop-max>100 and pop-max<1000 and click on select feature option.
8. This will show all the area with population between 100 and 1000.
9. The place matching the criteria will appear in a different color.
10. Different queries can be performed using the dataset.
11. Use the dataset button to deselect the feature to be rendered in original color.

**Practical 4b**

**Aim:** Terrain Data

**Definition:** A terrain database is a multiresolution, TIN-based surface built from measurements stored as features in a geodata.

**Steps:**

1. Go to layer, add raster layer, select gmted-300, apply, close.
2. Enter 86.92.27.98 in the coordinate field scale 900000 and magnifier 100% at the bottom of QGIS.
3. Press enter the viewport will be centered on Himalaya Region.
4. Crop the raster layer only for the region under study by, go to raster, extraction, clip raster by extent.
5. Select the raster layer as input layer.
6. In the clipping extent, select use canvas extent [if visible part of map is to be selected] or select extent on canvas [manually select an area on canvas]
7. Select the location and give a file name to store the clipped raster layer.
8. Click RUN.
9. Deselect the original layer.
10. Counter lines are the lines on a map joining points of equal height above or below sea level.

To derive counter lines from given raster, go to raster, extraction, contour.

1. In the input layer, select clipped file, interval between contour lines, 100000, attribute name, elev.
2. In the advanced parameters, in the contours field, select a location and give a file name.

Tick the open output file after running algorithm check box.

1. Click RUN.
2. Right click on contour file, properties, labels, single labels, label with, ELEV, Apply, Ok
3. Next, Symbology, single symbol, width-0.20000, apply, Ok
4. In layer panel right click on contour raster layer and select “open attribute table”.
5. Arrange the table in descending order based on the value of ‘ELEV’ column.
6. Compare the above counter line raster layer with the previous Google map image or visit

<https://www.google.com/maps/@27.9857765,86.9285378,14.75z/data=!5m1!1e4?hl=en-US>. To verify the above contour files using Google Map, Make a copy of Contour Layer, Go to Layer, Save As. Select file format as “Keyhole Markup Language”, set file name, location and Layer Name. Also set CRS to WGS 84 EPSG:4326

1. Go to the stored location on Hard Disk and open the “Himalayan\_Google\_Map\_File.kml” with Google Map.
2. For Hill Shade surface analysis, Go to Plugin, Install Georeferencer GADL.
3. After successful installation of plugin Go to Raster, Analysis, Hill Shade.
4. Select the input raster layer, select file name and location for storing Hill Shade output file. Scale - 1.0000, Azimuth of the light - 315.0000, Altitude of light - 45.00000.
5. Click run and close.

**Practical 5**

**Aim:** Working with Projections and WMS Data.

**Definition:**

A Web Map Service (WMS) is a standard protocol developed by the Open Geospatial Consortium in 1999 for serving georeferenced map images over the Internet. These images are typically produced by a map server from data provided by a GIS database.

**Steps:**

1. Layer, Add Layer, Vector Layer. Select “ne\_10m\_admin\_0\_countries.zip” Layer from data folder.
2. Go to Layer, Save As. Select format as ESRI Shape File. Select folder location and file name. Set CRS North\_America\_Albers\_Equal\_Area\_Conic EPSG: 102008.
3. Deselect the original Image and keep the projected layer visible.
4. Select Layer, Add Layer, Add Raster Layer, Select MiniScale\_(standard)\_R17.tif from, Location “GIS\_Workshop \ Practicals \ Practical\_05 \ DATA \ minisc\_gb \ minisc\_gb \ data \ RGB\_TIF\_compressed \ MiniScale\_(standard)\_R17.tif”.
5. The Layer appears on a different location than the location where Great Britain is shown on Map.
6. Open Layer Properties, CRS, Search bri, select British National Grid EPSG 27700.
7. Locate United Kingdom on Layer; the vector layer exactly coincides by the raster layer covering United Kingdom.

**Practical 6a:**

**Aim:** Georeferencing Topo Sheets and Scanned Maps

**Steps:**

1. Go to Layers, Add Layer, Add vector Layer.
2. Select GIS\_Workshop\Manual\Prac06\IND\_adm0.shp.
3. Zoom in to the Mumbai region in the layer.
4. Go to Plugins, Manage and Install Plugins. Ensure that Georeferencer GDAL is checked, if not install Georeferencer GDAL plugin.
5. Go to Raster, Georeferencer. A new Georeferencer window will open.
6. File, Open Raster.
7. Select file “1870\_southern-india\_3975\_3071\_600.jpg” from project data folder.
8. Go to Settings, Transformation Settings.
9. Select Transformation type - Thin Plate Spline ,Re-sampling Method - Nearest Neighbour, Target TRS - Everest 1830 datum: EPSG 4044.
10. Select Output Raster Name and Location. Check the Load in QGIS When Done Option
11. Press “OK”.
12. In the Georeferencer window Go to Edit Add Points.
13. Select the set of control points. Go to, Setting, transformation settings.
14. In the Georeferencing window go to, File, Start Georeferencing.
15. The canvas area will now have the scanned map of Mumbai referenced with control points.

**Practical 6b:**

**Aim:** Georeferencing Aerial Imagery

**Steps:**

1. Install plugin OpenStreetMap
2. Go to Web Menu, OpenLayerPlugin, OpenStreetMap, OpenStreetMap
3. Go to Project, Properties, Set CRS to EPSG 3857
4. Go to View, Panels, select OSM Place search
5. The Gateway of India, Mumbai is located at 18.92°N 72.83°E. Search Gateway of India in OSM Search Panel Zoom in to the appropriate level.
6. Go to Raster - Georeferencer. A new Georeferencer window will open. Click on File, Open Raster Select file “Gateway\_Imagery.tif” from project data folder.
7. Go to Edit, Add Point. Select control points from map.
8. Go to File → Start Georeferencing.
9. Observe that the aerial image of the Gateway of India is georeferenced on OSM in the map canvas.

**Practical 6c:**

**Aim:** Digitizing Map Data

**Definition:**

Spatialite is an open database format similar to ESRI's geodatabase format. Spatialite database is contained within a single file on your hard drive and can contain different types of spatial (point, line, polygon) as well as non-spatial layers. This makes it much easier to move it around instead of a bunch of shapefiles.

**Steps:**

1. Go to Layer, Add Raster, Select “Christchurch Topo50 map.tif” from project Folder.
2. Right-click the Christchurch Topo50 map.tif layer and select Properties.
3. Choose the Pyramids tab. Hold the Ctrl key and select all the resolutions offered in the Resolutions panel.
4. Click Build pyramids. Then click OK.
5. Go to Settings, Options.... Select the Digitizing tab in the Options dialog.
6. Set the Default snap mode to vertex and segment.
7. Press OK. Go to Layer, Add Layer, Add Spatialite Layer.
8. Name the Layer as “Digitized\_Road”, Set Geometry type as “Line”, Set CRS EPSG:4167 – NZGD2000.
9. Add “Name” and “Class” fields using “Add to Fields List”. Once the layer is loaded, click the Toggle Editing button to put the layer in editing mode.
10. Click the Add feature button. Click on the map canvas to add a new vertex. Add new vertices along the road feature. Once you have digitized a road segment, right-click to end the feature.
11. On Layer Panel Right Click on Digitze\_Road, Select the Style tab in the Layer Properties dialog.
12. After creating a new Spatialite layer.
13. Using the above procedure a point feature can also be digitized. The digitizing task is now complete. You can play with the styling and labeling options in layer properties to create a nice looking map from the data you created.