CE-712: Digital Image Processing of Remotely Sensed Data

Tutorial Exercise 1

Aim:

To familiarize with downloading the Landsat 8 satellite data from United States Geological Survey (USGS) and study the image characteristics using MATLAB and QGIS.

Submit a soft copy of the report (GroupWise) showing your results and a one-liner for your observations.

Stick to the naming convention and deadline.

MATLAB

MATLAB (matrix **lab**oratory**)** is a numerical computing environment and programming language developed by MathWorks. Matlab allows matrix manipulations, plotting of data, and image processing along with wide multi-disciplinary applications. It is one of the most widely used software frameworks for various research applications. A screenshot of Matlab Interface is shown in Figure1, it consists of a menu bar, Current Folder window, Command Window and a Workspace.

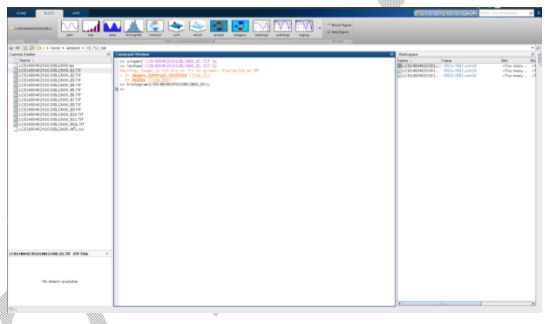

Figure 1:- Matlab Interface

QGIS

QGIS (Quantum Geographic Information System) is an open source GIS package that provides data viewing, editing, and spatial analysis. The software can be downloaded from https://www.qgis.org/en/site/forusers/download.html .QGIS interface is as shown in Figure 2.

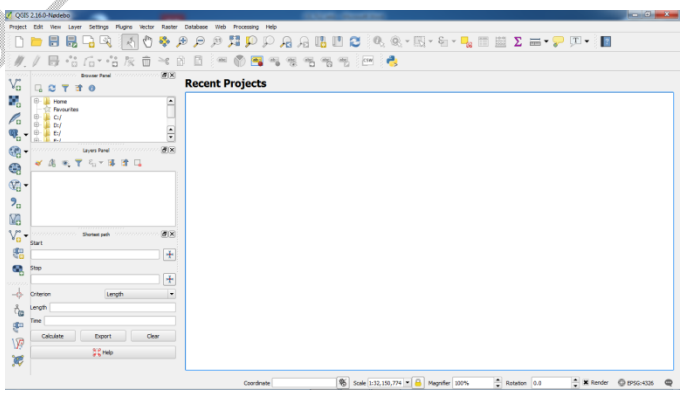

Figure 2:- QGIS Interface

Steps to Obtain Landsat 8 data

1. *Create your individual account* on the USGS website (*earthexplorer.usgs.gov*)
2. *Sign In* to the website using your login credentials.
3. The first step for downloading the data from USGS is to *enter search criteria*, Use Map option to select your hometown region.
4. Then click on the Data Sets tab. Now we get the list of all available datasets. From this list expand the Landsat Archive option, in this select L8 OLI/TIRS (Landsat 8 Operational Land Imager and Thermal Infrared Sensor).
5. Next click on results, where we get all the available L8 images for the selected region. Click on download for the image of any date. From the Download Options select Level 1 GeoTIFF Data Product.

Steps to import the data in Matlab

1. *Open Matlab<Change the current directory path to the directory where Landsat data is stored.*

   For example, if the Image name is *LC81480462016108LGN00_B1* and Image format is *.tiff* use:

   uiopen*('LC81480462016108LGN00_B1.TIF')*

2. Display individual band images using the ***imshow*** **()** command.

   In continuation with step 1, it would be:

   imshow('LC81480462016108LGN00_B1.TIF')

3. Write the number of bands and each of their frequencies represented by LANDSAT. Indicate the
4. Spatial resolution and radiometric resolution of each band. (Preferably in a tabular format)

Steps to visualize data in QGIS

1. Open QGIS, select add layer from the Layer tab in Menu toolbar. Then select import raster layer option, select the Landsat image and click open.
2. Right click the imported image in Layers Panel, and then select Properties.
3. Check the spatial resolution and radiometric resolution of each band.