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Remote Sensing:-Remote sensing is the acquisition of information about an object or phenomenon without making physical contact with the object and thus is in contrast to on-site observation. The term is applied especially to acquiring information about the Earth. Remote sensing is used in numerous fields, including geography, land surveying and most Earth science disciplines (for example, hydrology, ecology, meteorology, oceanography, glaciology, geology); it also has military, intelligence, commercial, economic, planning, and humanitarian applications, among others.

Unsupervised Classification :-

It is a form of pixel-based classification and is essentially computer automated classification. The user specifies the number of classes and the spectral classes is created solely based on the numerical information in the data (i.e., the pixel values for each of the bands or indices). Clustering algorithms are used to determine the nature, statistical grouping of the data. The pixels are grouped together into based on their spectral similarity. The computer uses feature space to analyze and group the data into classes. Roll over the below image to see how the computer might use feature space to group the data into ten classes.

1. Firstly we go to the Earth Explorer usgs by using the link given in the slides and login.

2. Now our first step is to search the study area so go to the ‘Select a Geocoding Method’ and click on the address/place and search the location where we want to study and give the boundary of the area. I select Yamuna Surrounding as my study area.

3. After setting the study area we choose the date range in which we need the data and set the cloud cover less than 10% which means we need data having cloud cover of less than 10%.

4. Now we go to the Data Set and click on Landsat and select the Landsat level 8 image and click on the result. Here we see that there are 35 results and then we click on the footprint to see where this data is located and select the result which covers our study area.

5. We further filter our results by checking the pattern and we give this pattern in the Additional Criteria so that it shows the result in that criteria.

6. Now we select our result which has less cloud cover and is appropriate for our study and analysis and download that image by clicking on the download icon and then select the product option than download.

B. Unsupervised classification

1. Now we go to QGIS, open a new project and install the Semi-Automatic Classification Plugin by clicking on plugin and then select Manage and Add plugin.

2. Our first step is pre processing so to do this we open the plugin by clicking on SCP and select show plugin and there is a option of preprocessing so click on this open and then select the LANDSAT, here click on the Directory where we save the LANDSAT image and select the folder in which we save LANDSAT images.Then we select the MTL file from the folder in which we save earlier. Now to search for dark objects in images such as water bodies etc and objects having any surface reflectance we click on the option DOS1 atmospheric correction. Then to increase the resolution of red, green and blue bands we select the option Perform Pansharpening. After that we run this and select a folder where we want to do this.Now our processing has been completed.

3. All the bands that have been processed are shown in the layers panel automatically. The band having suffix PAN are PAN sharpened images and bands with suffix RT can show surface reflectance.

4. Our next step is to clip these raster as we do not study the complete raster and get our required study area. So to do this go to the SMC plugin and set the BANDSET because we create the bandset for these bands. After clicking on the refresh button on the right it shows all the bandset in the layers panel. We select all the banda from band no. 2 to 7 and click on the add button and we created the BANDSET1.

5. Now go to the preprocessing and go to the clip multiple rasters. Now we have three options to clip it. The first one is by giving the coordinates. We will give upper left latitude, longitude and lower right latitude and longitude. This can be done by clicking on the '+' button and left click for upper left and right click for the lower right corner. But here we use a vector for clipping with the help of a polygon shape file.

6. Now we remove the initial band as there is no use of this

7. Our next step is to stack these images(band2 to band7). To do this we go to the Preprocessing and click on the bandset. We remove the bandset as we created earlier and after removing the bandset click on refresh we see a new set of bands. Select all the bands and click on add(make sure that band numbers are correct and set the wavelength as LANDSAT 8 and click on create raster of bandsat and then run it. After that I selected the natural bands from symbology in layers properties.

8. Then we can see the histogram images in which mine case pink colour band is awayas band 4. So I selected band 4 for the red band in symbology and then applied it.

9. Now we can start from the beginning when I clipped these then I have to go to SCP, select Band processing and click on clustering and then select ISODATA and all other values and run it

10. After the run is complete it will look this on screen and now we identify the various bands of which area according to classification required as forests, agriculture, Built up, open area and water. 11. We need to go to post processing and then selecting Reclassification and then selecting unsupervised layer and then clicking on calculate unique value and after giving their new band accordingly required.

12. Now we see the reclassified map and we go to properties of the reclassified layer and select symbology and give the required colors and names to the things.

13. Now we can print it using print layout and then adjusting it here giving CRS to be ESPG 4326-WGS84

15. Then we can apply the grids to horizontal and vertical direction and selecting the CRS and then selecting grid gap and then Select frame and thereafter the data coordinates in degree minute seconds.

16. Now we add the various features to the map like legend, scale, margin etc. and export the map as an image .