Course Code : URP 2244
Course Title : GIS and Remote Sensing Studio

Image Classification and Accuracy Test

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Date of Submission: 10 March, 2020

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Image Classification

Image classification refers to the task of extracting information classes from a multiband raster image. It is a process of grouping pixels into several classes of land use. It has multiple uses . It can be used to identify different areas by the type of land use. Land use data are used extensively for Urban planning.

We classified a landsat05 image. And using ENVI we made a composite file of that image. Using the composite file we did the classification. We used two type of classification method.

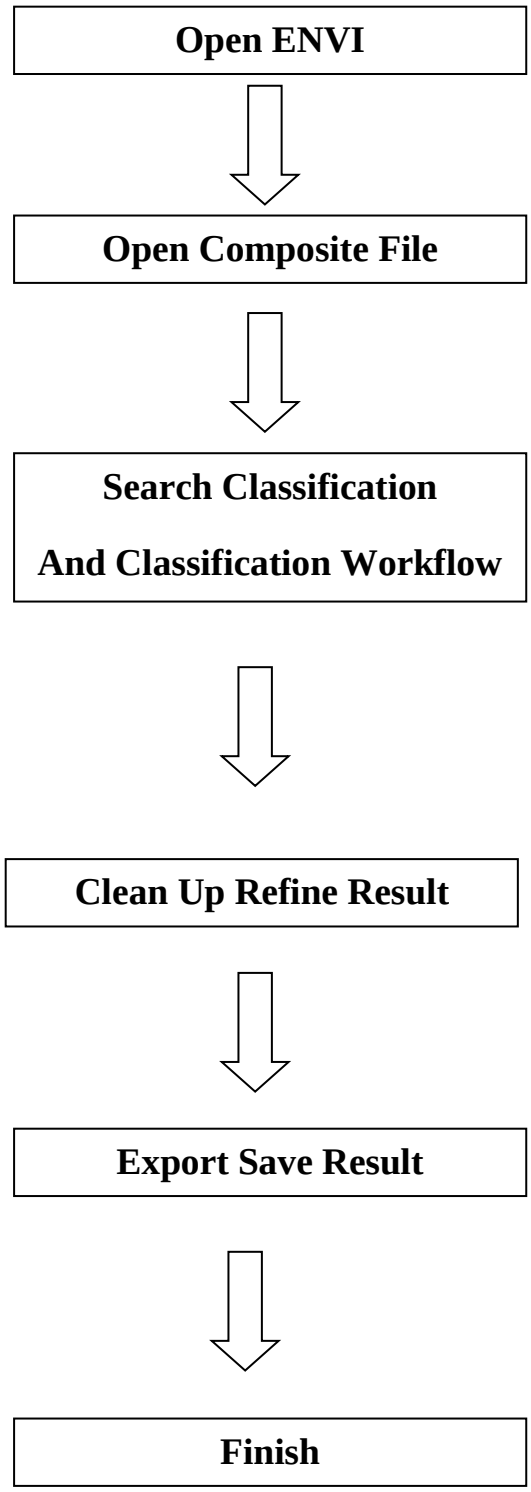
1. Supervised classification method.
2. Unsupervised classification method.

Supervised classification is based on the idea that a user can select sample pixels in an image that are representative of specific classes and then direct the image processing software to use these training sites as references for the classification of all other pixels in the image.
Unsupervised classification is where the outcomes (groupings of pixels with common characteristics) are based on the software analysis of an image without the user providing sample classes. The computer uses techniques to determine which pixels are related and groups them into classes.In ENVI unsupervised Classification is provided by way of two modules named IsoData and K-means.

For classification we used ENVI, ArcGis, MS Excel and MS Word softwares. For image classification we used ENVI software . We classified the image by four classes and those are Vegetation, Buildup Area, Open Space and Water body. We used different colors for each classes . And we find different output file for different classification method.

At last, we wanted to check the accuracy of our classification. We use ArcGis and MS Excel for testing the accuracy.

Process of Unsupervised Classification



Open ENVI:

First, we have opened Envi Software to complete unsupervised classification.

Open Composite file

Now we have opened the composite file . Here composite file named ‘com_prac01.img’ has opened. We can see that in Figure 01.

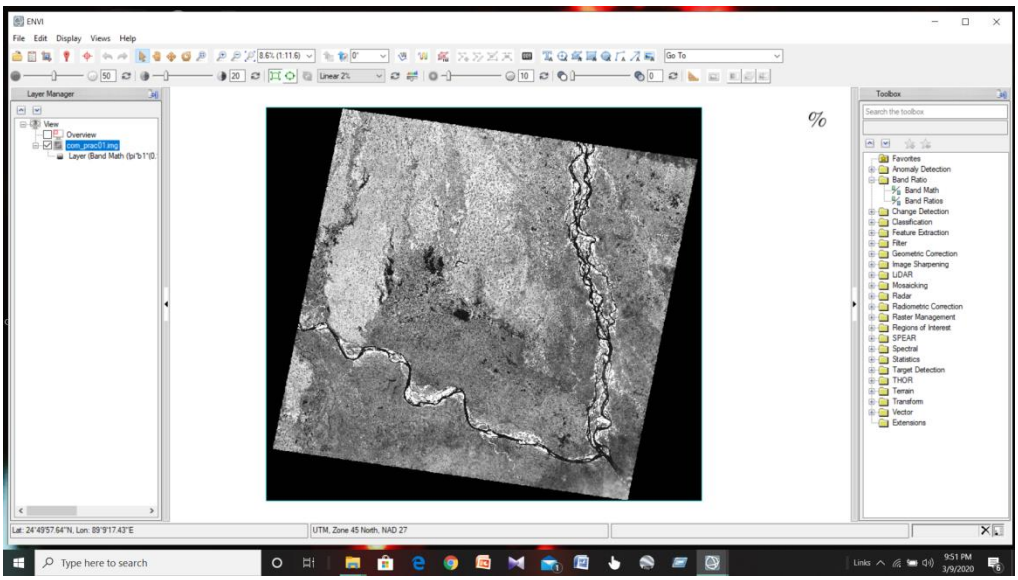


Figure 01: Opening Composite file.

Search Classification

Search ‘Classification’ tool in the search box and search classification workflow. Then new window named ‘Unsupervised Classification’ will open. And we have to input 4 in the empty box named ‘Requested Number of Classes’ and click ‘next’. Like this window:

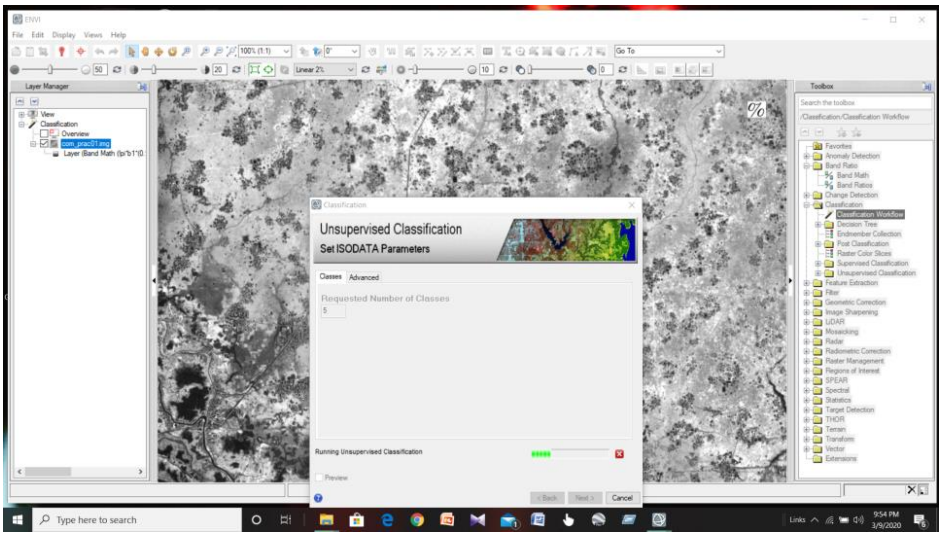


Figure 02: Unsupervised classification

Clean Up Refine Result

Then a window named ‘Clean Up Refine Result’ will open and we should click next.

Export Save Result

Then a window named ‘Export Save Result’ will open. Like Figure 03, we have to input the output filename in the desired folder. And then we have to click ‘Finish’.

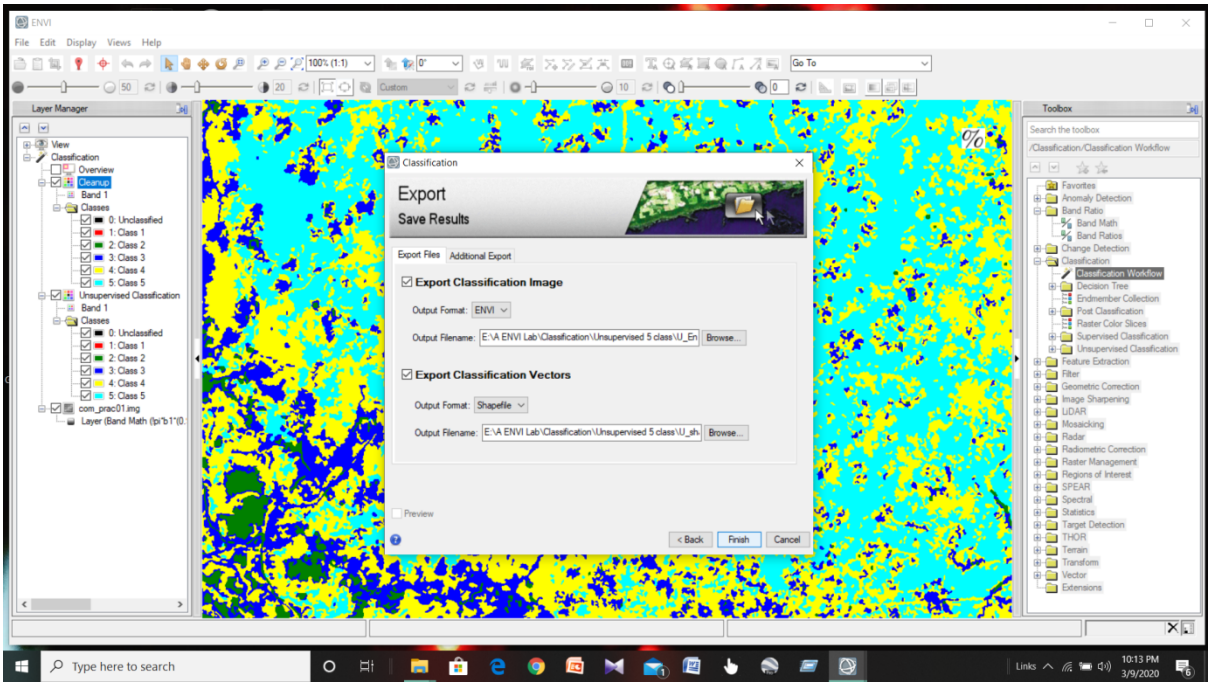


Figure 03: Export Save Result

Unsupervised classification complete

After clicking ‘Finish’ the unsupervised classification will finished. And we will find a figure like following:

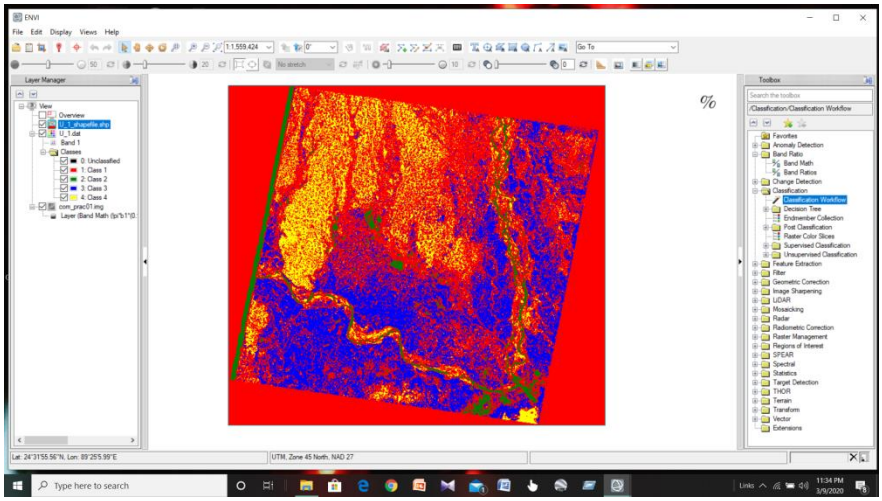


Figure 04: Final Unsupervised Classified File.

Process of Supervised Classification

Open ENVI

Open Composite file

Open ROI (Region Of Interest)

New ROI for each class

Search Maximum Likelihood Classification

Classification Input File

Maximum Likelihood Parameters

Enter Output Class Filename And Click OK

Supervised Classification Finished

Open Envi

First we have to open Envi Software to complete supervised classification.

Open Composite file

Now we have to open the composite file . Here composite file named ‘com_prac01.img’will open. We can see that in Figure 05.

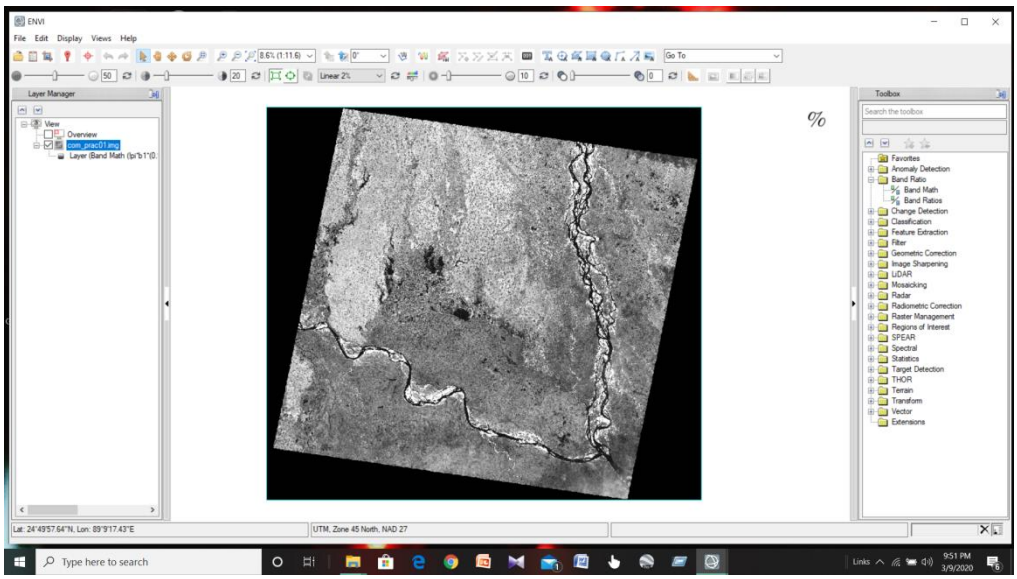


Figure 05 Composite file.

Open ROI (Region Of Interest)

We used the ‘ROI’ tool and we have seen a window like following.

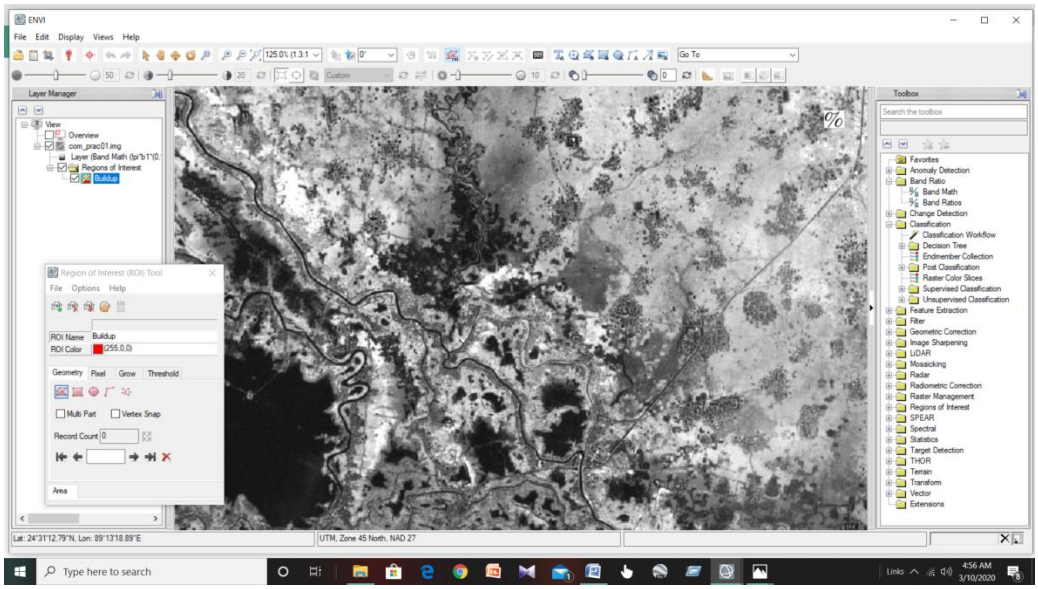


Figure 06 : Region of Interest.

New ROI for each class

For each class, new ROI file has created and specific place denoted for each class . Like Figure 07.

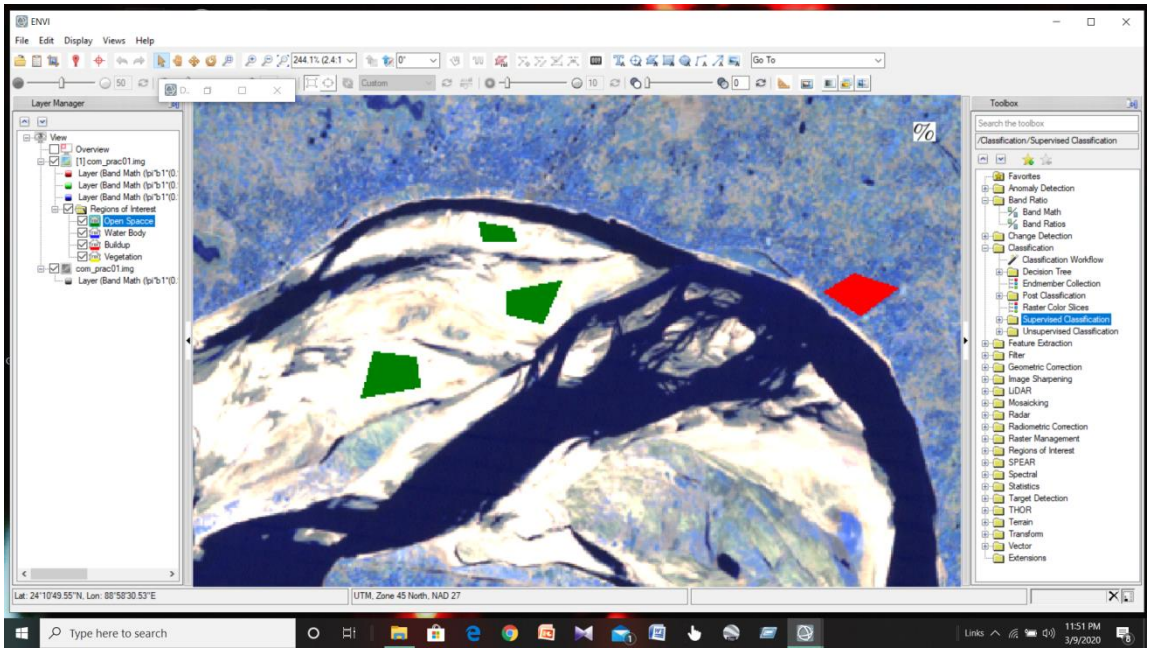


Figure 07: New ROI for each class.

Search Maximum Likelihood Classification

Maximum likelihood classification tool is used for supervised classification. Classification input tool and Maximum likelihood parameter , these two windows will visible in the screen. After select all items an output class filename should enter. And then the output should be like figure 08.

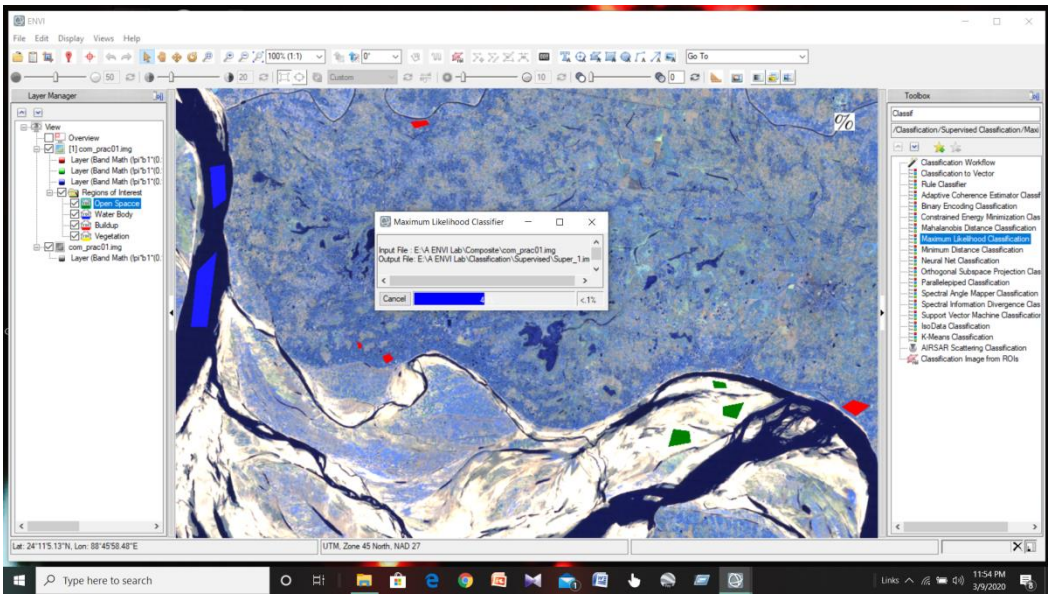


Figure 08: Maximum Likelihood Classification.

Complete Supervised Classification

The complete supervised file is look like the following Figure.

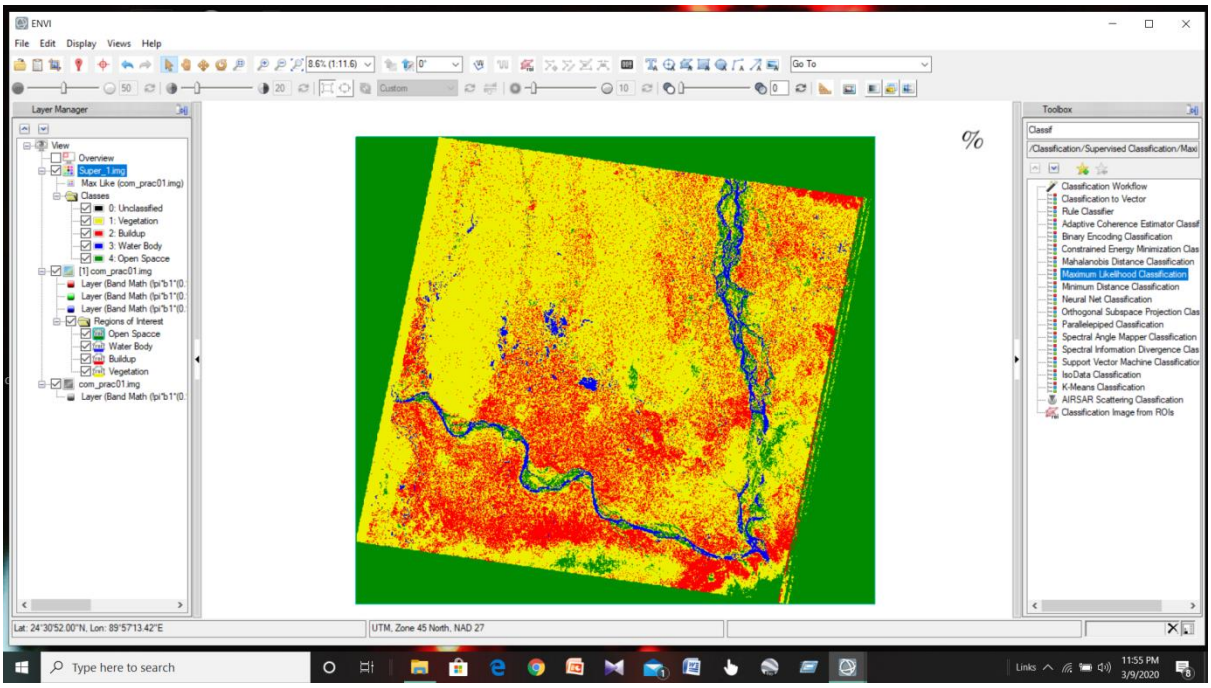


Figure 09: Supervised Classification

Accuracy Test

We can calculate the accuracy by using GIS software and MS Excel. Then we used the ‘Add Data’ tool to open the composite file and supervised file in the ArcGIS. Then we created a shapefile named ‘GCP’ and then open ‘Attribute Table’. After that we added field and named that as ‘Type’ and save that. Then we started editing and add them to attribute table . For each class the the type and id will different (like figure 10). We use field calculator to define each classes. Then we find an attribute table like figure 11. And then we started editing. Then we used the ‘Arc Toolbox’ tool and then ‘Spatial Analysis Tools’ and then ‘Extraction’ and lastly we selected ‘Extract Values to Point’(like figure 12). And then we input the shapefile named ‘GCP’ in the selected input space and connected folder for output named the file as ‘Supervised_training_sample’ (like figure 12) After this we opened an excel file and input the attribute table data to excel and make a pivot table (Figure 13). Then we calculated the Kapa Coefficient and overall accuracy for supervised classification. We calculated the Kapa Coefficient and overall accuracy for unsupervised classification by using same process.

Figure 10, Figure 11, Figure 12.

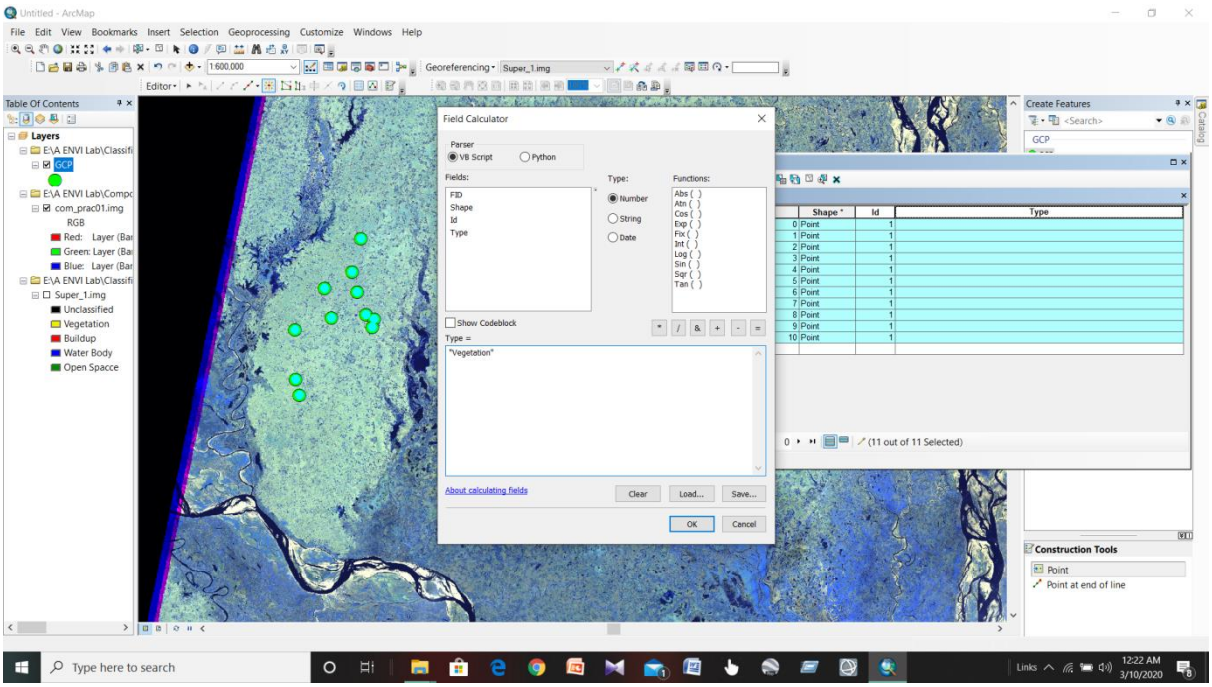


Figure 10: Add field to attribute table.

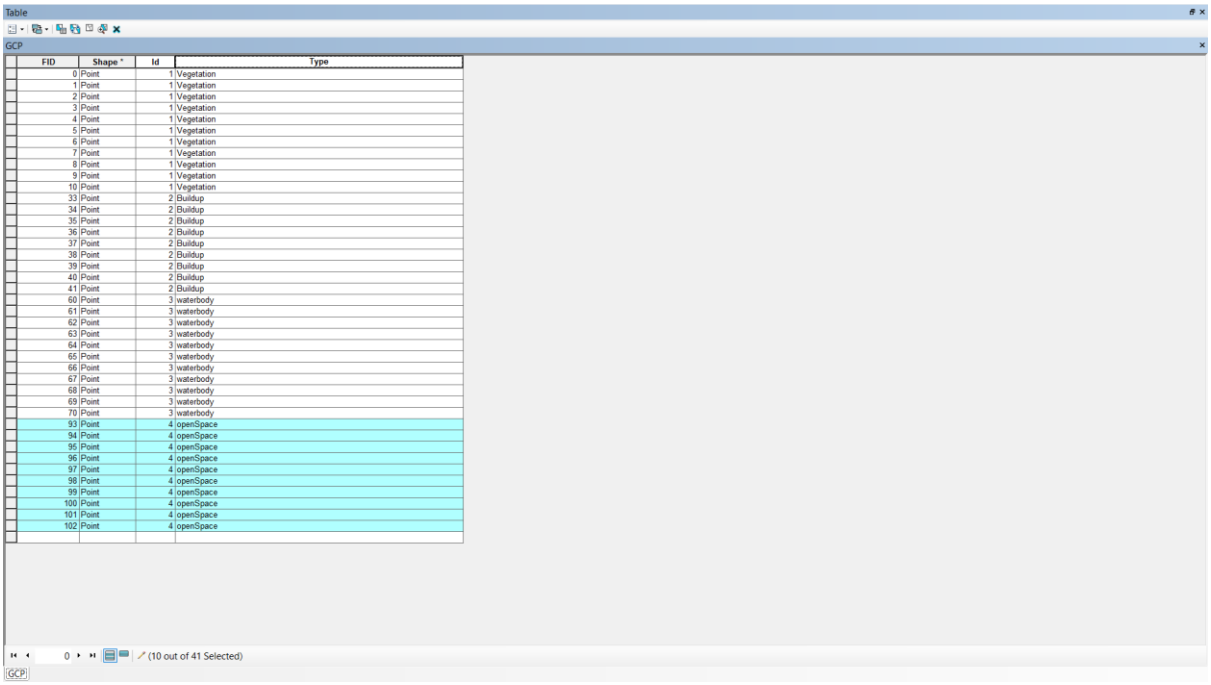


Figure 11: Attribute table for supervised classification accuracy test.

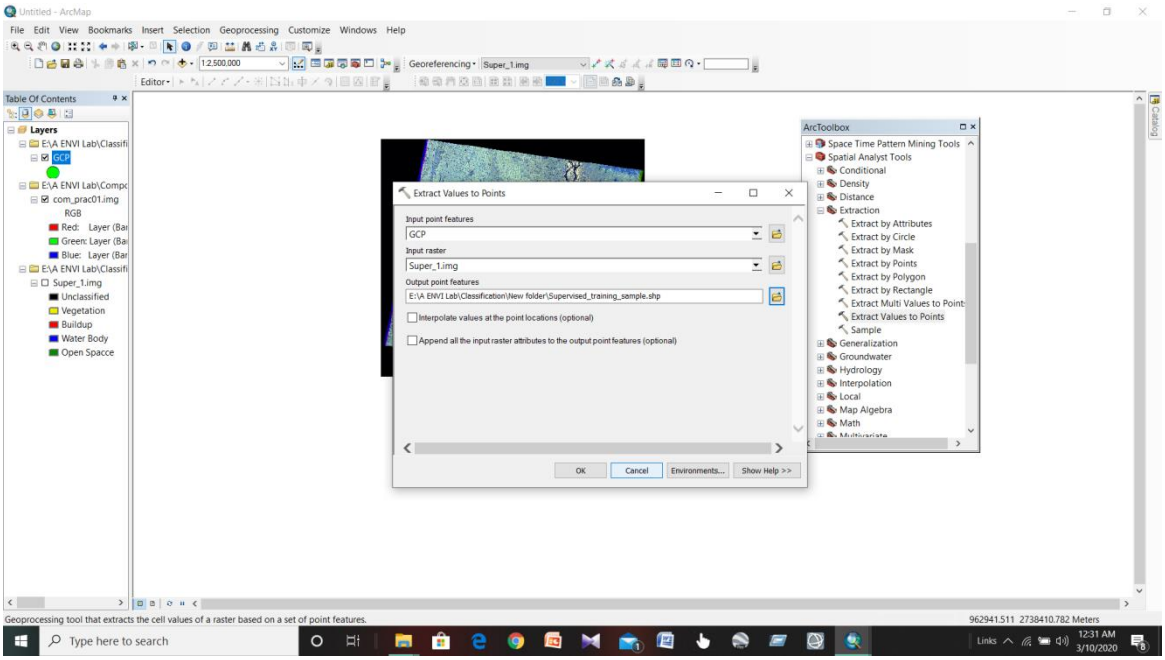


Figure 12: Extract values to Points.

Testing Supervised Classification.

The pivot table for testing supervised classification.

Supervised accuracy					
Count of Type	**Column Labels**				
Row Labels	**1**	**2**	**3**	**4**	**Grand Total**
1	11	3			14
2		6			6
3			11		11
4				10	10
Grand Total	**11**	**9**	**11**	**10**	**41**

Figure 13: Pivot table for supervised classification Accuracy .

Here kapa coefficient, K= {(x*y)-z}/T-Z

Where , x=Grand total

y=Total Accurate

z= Overall sum

T=x*x

Here for our supervised classification,

x= 41,

y=38,

z=429,

T=1681

We find, K=0.90

And Overall accuracy = 38/41 *100%

=92%

Accuracy for supervised classification is 92%.

Testing Unsupervised Classification

The pivot table for testing supervised classification.(Figure 14)

Count of Type	Column Labels				
Row Labels	1	2	3	4	Grand Total
1	8			2	10
2		10	2		12
3		1	7		8
4	2			9	11
Grand Total	**10**	**11**	**9**	**11**	**41**

Figure 14: Pivot table for unsupervised classification accuracy.

Here kapa coefficient, K= {(x*y)-z}/T-Z

Where , x=Grand total

y=Total Accurate

z= Overall sum

T=x*x

Here for our unsupervised classification,

x= 41,

y=34,

z=425,

T=1681

We find, K=0.77

And Overall accuracy = 36/41 *100%

=87%

Accuracy for unsupervised classification is 87%.

Conclusion

Here the selected image is classified by supervised classification method and unsupervised classification method. The accuracy has tested and it is find that the accuracy for supervised classification is 92% and the accuracy for unsupervised classification is 87%. So we can say that the image is well classified.