CE-712: Digital Image Processing of Remotely Sensed Data

Laboratory Exercise #

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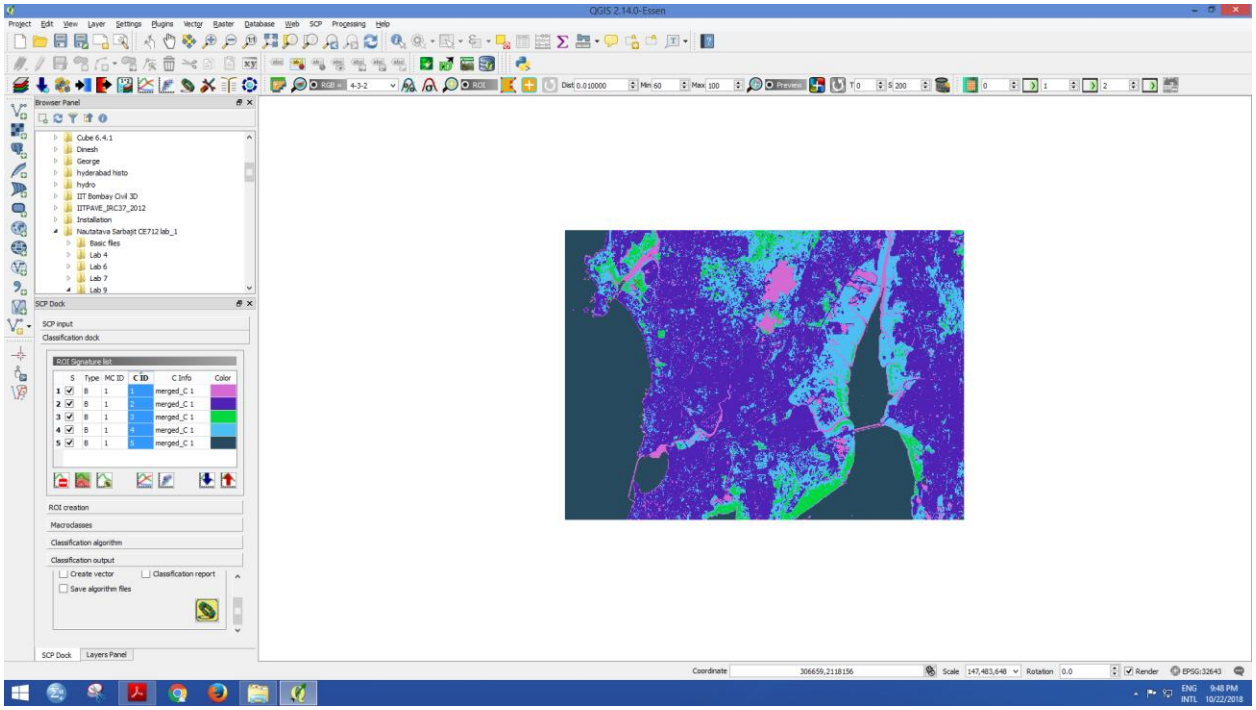
1.

Statistics (Mean, Standard deviation, Min and Max) for each training set

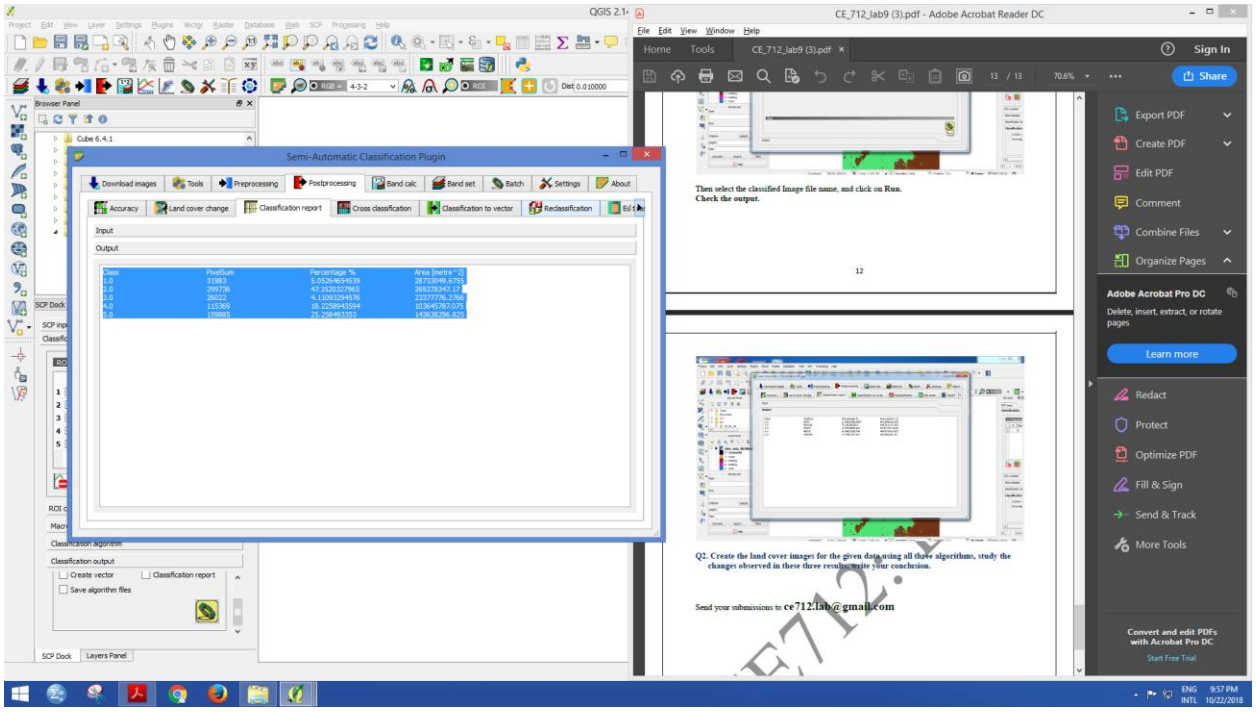
	Bands	Water	Vegetation	Built-up	Mangroove	Sea
Mean	2	8482.9202	8768.2793	9267.6013	9657.7778	8500.6646
	3	7460.4858	7961.1245	8526.2165	8912.5425	7758.5475
	4	6722.0727	7178.5585	7606.99	8915.4575	6932.3354
	5	6061.2123	12595.366	5940.1109	10155.941	13159.446
	6	5336.1268	7919.134	5264.676	10639.248	7731.0854
Standard Deviation	2	89.11547	24.7549	24.21514	275.71969	47.46166
	3	160.28157	40.12141	42.07587	349.20556	69.09291
	4	156.16131	26.59049	142.50802	470.13341	84.41051
	5	150.33359	377.4453	36.09531	834.26339	549.05287
	6	45.45819	65.28234	11.50903	1147.4742	364.51418
Minimum	2	8327	7260	6515	5868	5139
	3	8684	7621	7197	7006	6076
	4	8371	7526	6718	10897	5632
	5	8702	7877	7117	11769	6089
	6	9141	8352	7291	5838	5116
Maximum	2	8760	7882	7122	7272	5781
	3	10282	7621	10266	11753	13558
	4	8619	7526	7224	14348	8273
	5	8844	7877	7270	13991	8098
	6	9323	8352	7983	6065	5299

2.

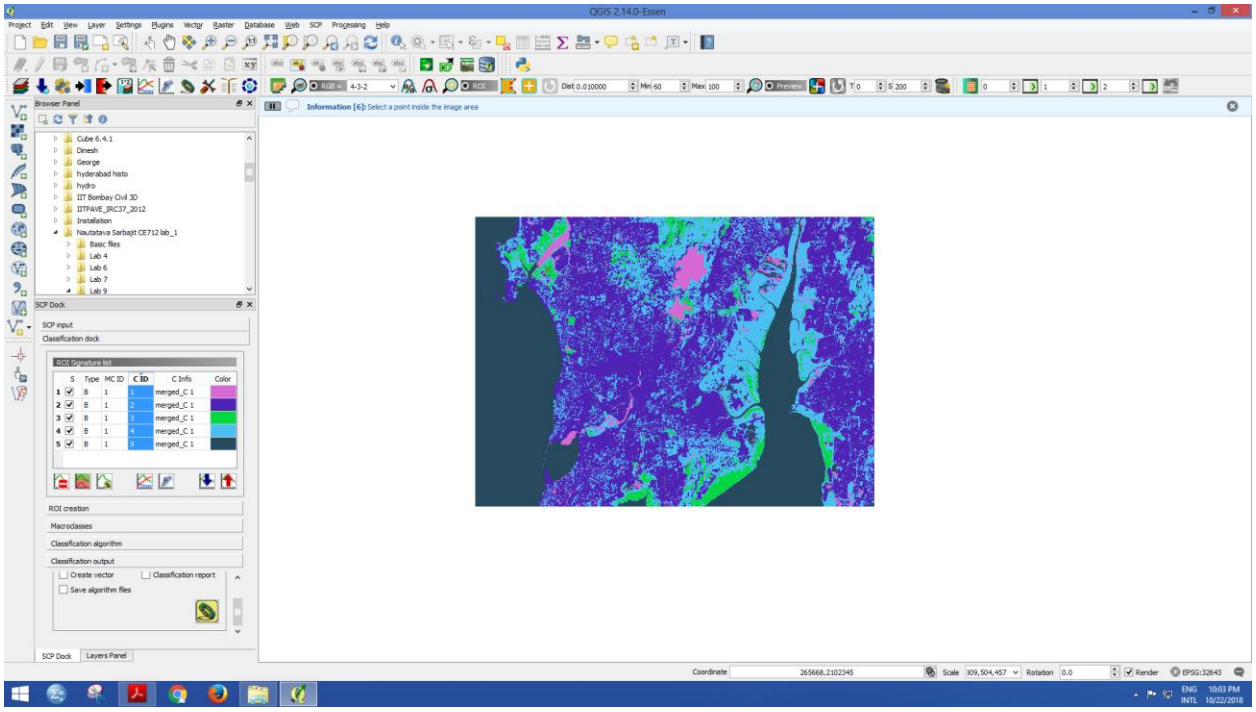
Spectral Angle Mapping



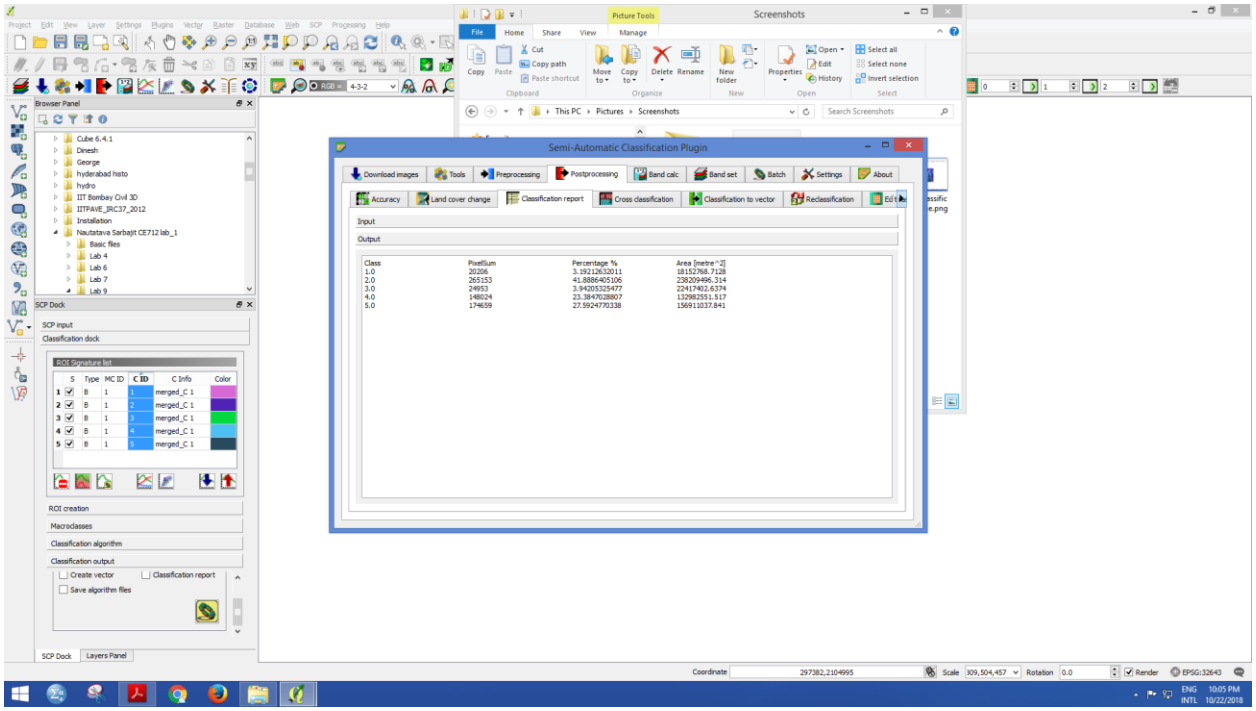
Number of pixels, total area, and percentage of a particular class in the Image



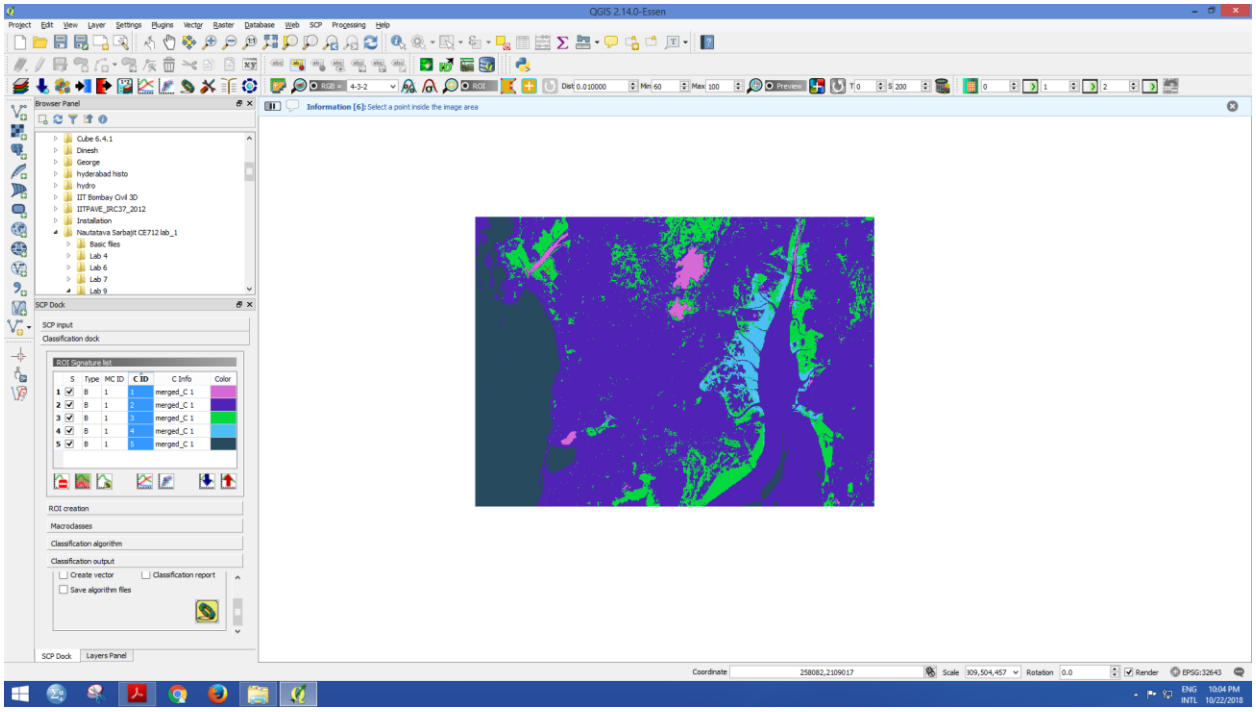
Minimum Distance Method



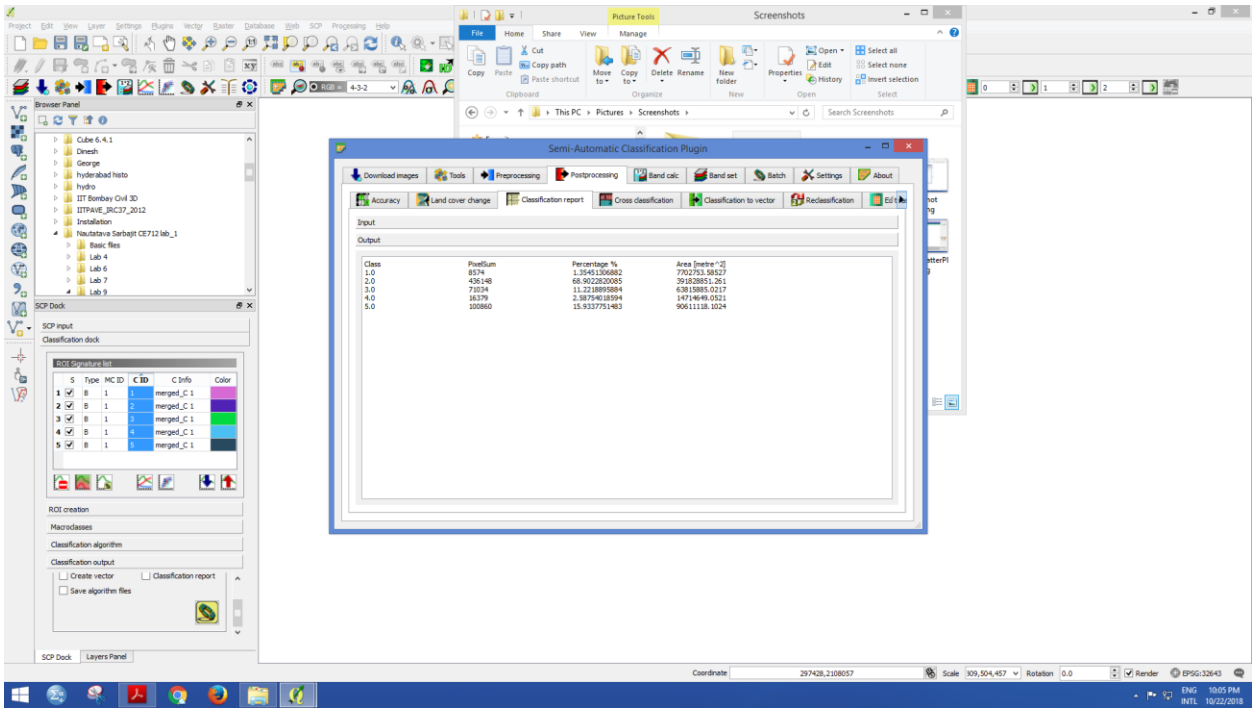
Number of pixels, total area, and percentage of a particular class in the Image



Maximum Likelihood



Number of pixels, total area, and percentage of a particular class in the Image



The Classified Image obtained through Spectral Angle Mapping Algorithm and that of Minimum Distance Algorithm are more similar to each other(percentage distribution of each class is similar) whereas classified image of Maximum Likelihood algorithm is quite different. The accuracy of the

Maximum likelihood algorithm can be identified to be lowest(most of the pixels are assigned to class of Built-up). Minimum distance algorithm and Spectral angle mapping has good accuracy. The functioning of each algortithms are briefly explained in conclusion.

CONCLUSION

Image classification can be considered as a form of pattern recognition which involves identifying the pattern associated with each pixel position in an image in terms of the characteristics of the objects that are present at the corresponding point on the Earth's surface.

Image classification essentially consists of two stages:

1. Recognition of real world objects[For DIP, it can be woodlands, water bodies, grasslands, built up area, etc depending upon thegeographical scale and nature of study]
2. Labelling of the pixels

It refers to the task of extracting information classes from a multiband raster image. The resulting raster from image classification can be used to create thematic maps.

In the Tutorial we got to learn about how to do **land cover classification using the Semi-Automatic Classification (SCP)in QGIS.** The SCP plugin has three algorithms; they are **minimum distance method**, **maximum likelihood method** and **Spectral Angle Mapping Algorithm.**

Training Data for each Class involves assembling statistics which closely describe the spectral response pattern of each land class type can be collected using Training polygons

Spectral Angle Mapping

The algorithm determines the spectral similarity between two spectra by calculating the angle between the spectra and treating them as vectors in a space with dimensionality equal to the number of bands.

Minimum Distance Classifier Algorithm

From the training data, the mean vector is calculated.To perform a minimum distance classification, a program must calculate the distance to each mean vector fromeach unknown pixel.

Many minimum-distance algorithms let the analyst specify a distance or threshold from the class mean beyond which a pixel will not be assigned to a category even though it is nearest to the mean of that category

It is insensitive to different degrees of variance in the spectral response data.

Maximum Likelihood classifier Algorithm

The maximum likelihood classifier evaluates both the variance and covariance while classifying. The probability density function is calculated for each class. It is assumed that the distribution of the cloud of points (i.e., DN numbers) forming the training data is Gaussian (normally distributed).

The probability of a pixel value belonging to each class is then calculated. The probability density functions are used to classify an unidentified pixel.