HACETTEPE UNIVERSITY
DEPARTMENT OF
GEOMATICS ENGINEERING

GMT345

REMOTE SENSING AND IMAGE PROCESSING

HOMEWORK -3

CONTENTS

- Which algorithm is more successful in your opinion based on the visual interpretation of these two classification results? Why?

- What are the factors affecting the classification results of these two methods?

- Basic Explanations For Unsupervised Classification

- Basic Explanations For Supervised Classification

ABDULSAMET TOPTAŞ – 21905024

Which algorithm is more successful in your opinion based on the visual interpretation of these two classification results? Why?

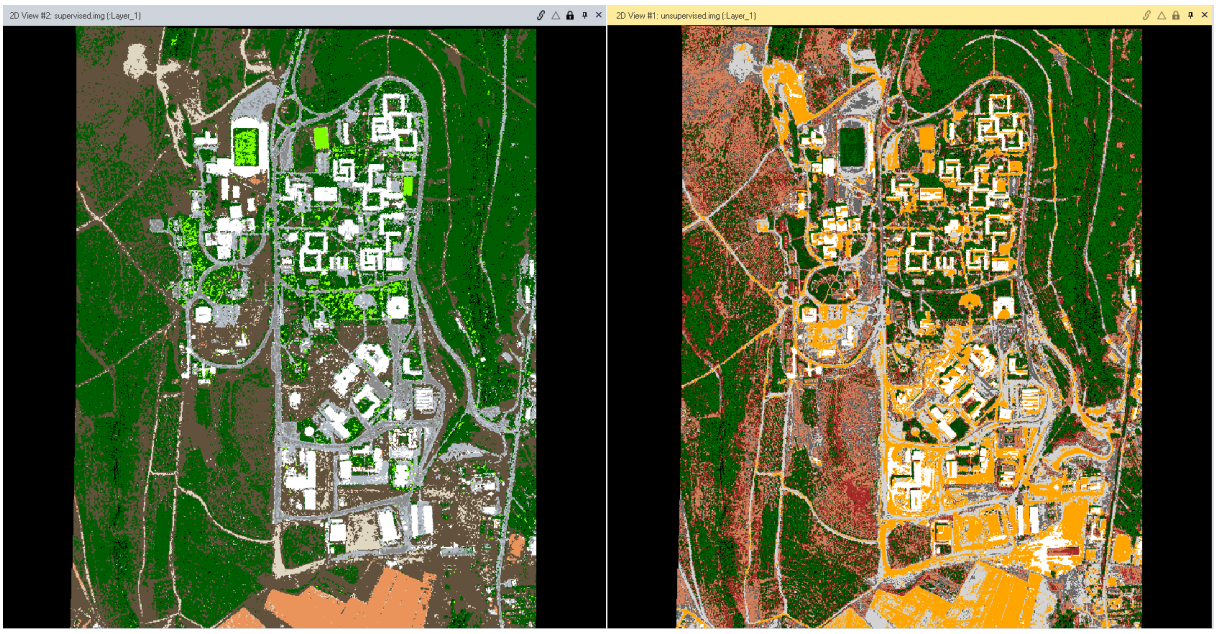

Figure 1 : Supervised Classification (on the left) *Unsupervised Classification (on the right)*

As can be seen in Figure 1, supervised classification (Maximum Likelihood) gave more successful results. The main reason for this is that it is user-input (manual). In other words, we can choose the area we will classify ourselves. Looking at the image, a specific color is given to the "Agricultural Area" class in supervised, but when color is given, it cannot be given a color specifically for "Agricultural Area" because it is automatically classified in the unsupervised classification (K Means). In other words, while the Agricultural Area should be in a specific color and should not overflow to other areas, Unsupervised can be the same color in other places.

To give another example, the business named "Pyramid" located in Beytepe falls under a building class. However, since this building was automatically classified in the Unsupervised Classification, it was included in the "Dirt Road" and "Road" classes. Thus, there may be a loss of structure or space in the Unsupervised Classification.

In the Supervised Classification, the business named "Pyramid" belongs to the building class as it should be. Because manually that area is surrounded by polygon and manually assigned to a certain class.

What are the factors affecting the classification results of these two methods?

Number of Classes : If there are too few classes, common areas may be lost, or too many classes will increase the workload.

Data quality : Classification results may not be accurate if the quality of the data is poor or if the dataset contains noise data.

Algorithm Used : An algorithm suitable for the dataset makes the results meaningful.

Incorrect Classification: In Supervised If labeled data is missing or incorrectly labeled, classification results may not be correct.

Number of iterations : Iteration slows down operations on large amounts of data, so it can decrease accuracy, but increase accuracy with less data.

Basic Explanations For Unsupervised Classification ;

First, the original image was imported in erdas. Then, (Raster → Unsupervised Classification) steps are applied. In the window that opens, "original image" and "output file" are selected as input. In this part, the “K Means” algorithm was used and 8 classes were selected as desired in the assiginment.

Since this classification is done automatically, colors were given in accordance with the places where the number and density were higher in the coloring process. At the same time, class names were assigned accordingly.

K Means algorithm working steps ;

- A set number of cluster centers are positioned randomly,
- Pixels are assigned to their nearest cluster,
- The mean location is re-calculated for each cluster,
- Repeat 2 and 3 until movement of cluster centres is below threshold.

Unsupervised Classification is a type of classification that makes the classification process automatically. In this method, no labels are given to the data beforehand. The algorithm discovers the similarities and differences between the data and tries to classify the data on its own. This method does not require the data to be labeled, but more accurate results can be obtained if labeled data is used.

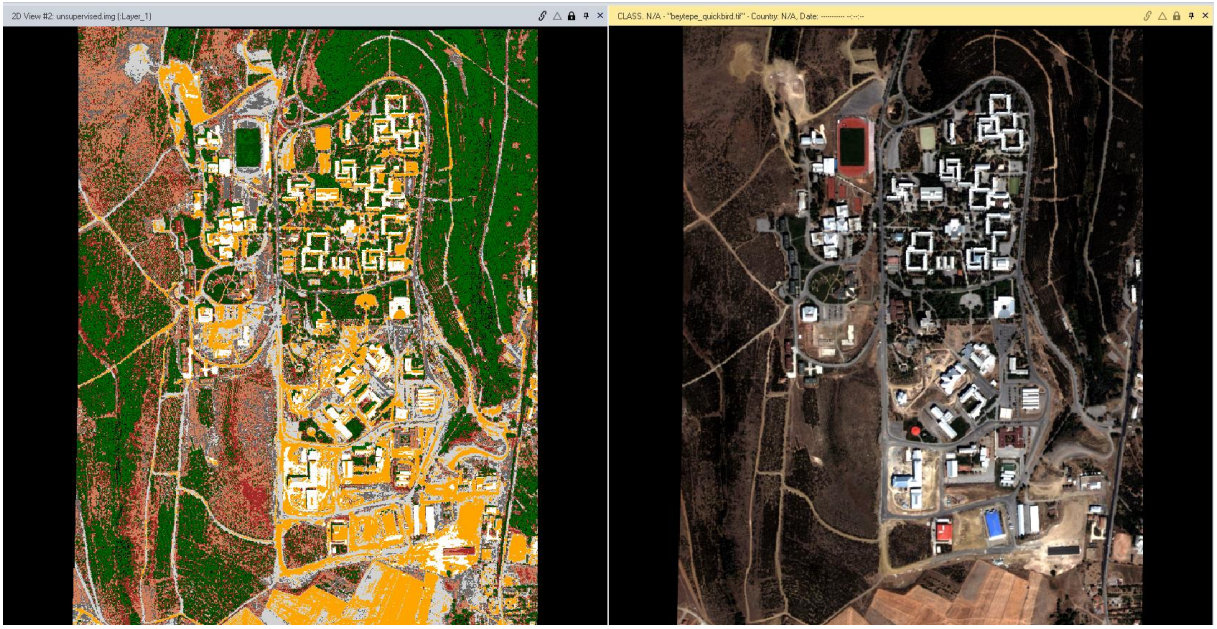

Figure 2 : Unsupervised Classification (on the left) *Original Image (on the right)*

Basic Explanations For Supervised Classification ;

First, the original image was imported in Erdas software for supervised classification. Then, the relevant steps were performed in order (Raster → Supervised -→ Signature Editor → Supervised Classification).

In the signature editor, the area that is desired to be classified from the draw plugin in the software was selected by turning it with a polygon and transferred to the editor. For example, if this process is done for the Road, it is divided into subclasses such as "Main Road", "Secondary Road", “Byroad” and all of these road classes are selected and combined with the "Merge" command, so that "Road" is obtained as a single class.

Then, the same procedures were applied to all 8 classes and the file was saved with the extension ".sig". In the "Supervised Classification" process, the "original image", file with ".sig" extension and "output file" were selected and the "Maximum Likelihood" algorithm was used as the algorithm.

Maximum Likelihood uses "probability" rather than distance in the feature space. Assigns the pixel to the most probable class.

It decides that a pixel value of X is in class C, if and only if,

Pc ≥ Pi **i : 1,2,3,…,m possible classes**

Pc : probability for class c

This algorithm is the most accurate among the supervised algorithms and takes into account the variability of classes. However, it requires a lot of computation and the computation time increases as the number of bands or classes increases.

Supervised Classification is a type of classification with user input. In this method, data is used in which the classification process is known beforehand. These data are images that have been classified before and these images are taught to the classification algorithm.

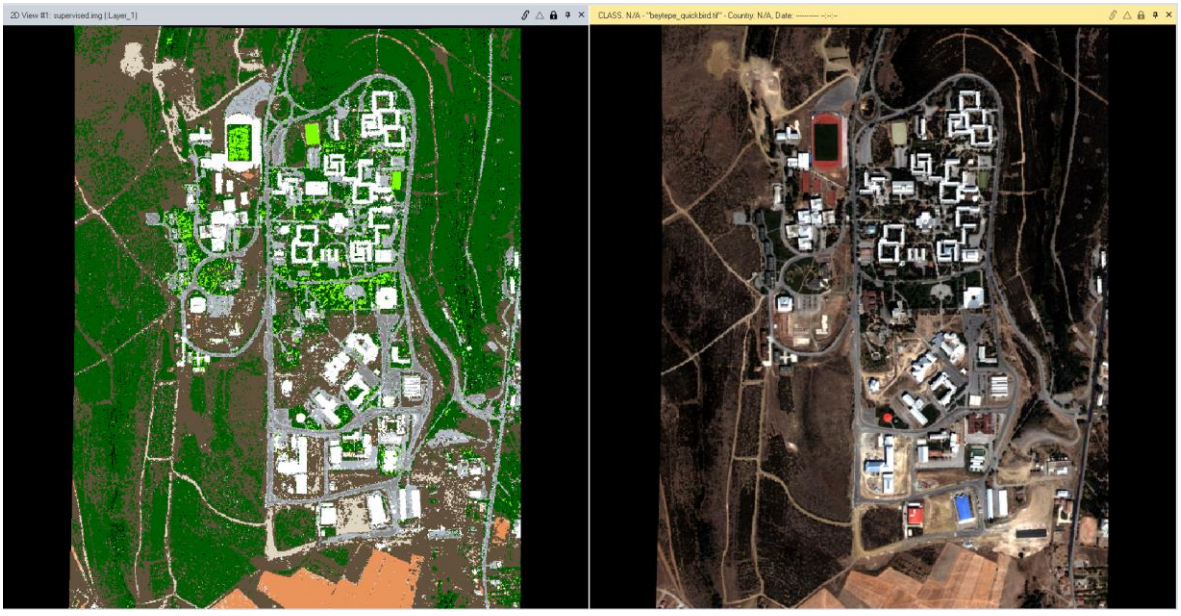

Figure 2 : Supervised Classification (on the left) *Original Image (on the right)*