
Lab 6

ESRM430

Instructor: Dr. L. Monika Moskal

Lab Objective:

- Image classification - Part 2 (Supervised Image Classification)

Tools:

- SPRING Software -- version 5.2.7
- Olympia WA digital imagery (resampled color near infrared) - 04406110_NIRsmall.TIF
 - Date: August 2008
 - Imagery size is 3660 by 549 and pixel size is 0.3 m
- Lots of patience ☺

What you will hand in:

- A TIFF of a supervised feature based classification of Olympia, submitted in a digital format using the Lab6 drop box on the course website
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Task 1: Set up a directory

- Set up a directory on the C driver to work from. I suggest using creating a folder called ESRM430_Lab6
- Copy Lab6 materials from the ESRM430 website into the folder you've just created
- Do not work from your flash drive, but do back up the lab folder you have been working with to the flash drive at the end of the lab

Task 2: Set up a database, create a data model and import imagery

In this task you will create a database, create a data model, and import near-infrared imagery of Olympia, WA. Note that this is the same image from the previous lab, but the resolution has been reduced to 0.3 meter pixels from 0.1 meter pixels (coarser spatial resolution) to speed up the processing.

- Refer to Lab 4 for steps on creating a database, creating a data model, and importing imagery (Lab 4 can still be found on the ESRM 430 website)

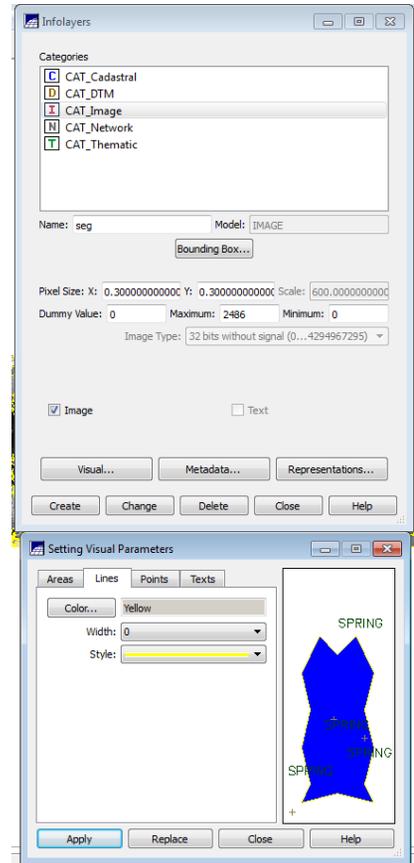
Task 3: Image Segmentation

In this lab you will produce a feature based supervised classification. To do so you will need to segment your imagery similar to the procedures used in Labs 4 and 5.

- In the segmentation use a Similarity of 10 and an Area (pixels) of 1000 and select band #1, the near infra-red band, to run your segmentation. This should take about 2 minutes on the lab computers.
- Draw the segmentation on top of the photo. Do this by selecting the segmentation infolayer and clicking Labeled in the checkbox below, or by loading each of the photo bands first and then loading the segmentation. This will draw the segmentation on top of the imagery.

Since you are working with a near infrared image you might want to change the color of the segmentation lines from red to a color which is more visible on top of near infrared imagery

- Select the segmentation infolayer by clicking on it in the control panel
- On the toolbar Click the infolayer icon: 
- Select the 'Image' check box
- Click the 'Visual...' button in the Infolayers window
- In the Setting Visual Parameters window the default tab will be Areas, click the Lines tab to bring up options for formatting segmentation lines
- Click the Color button and choose a yellow color, then click OK, then Apply
- After this process is complete close the Setting Visual Parameters and Infolayers windows and move on to Task 5



Task 5: Context Creation

In this step we will create a context for our classification similar to previous labs.

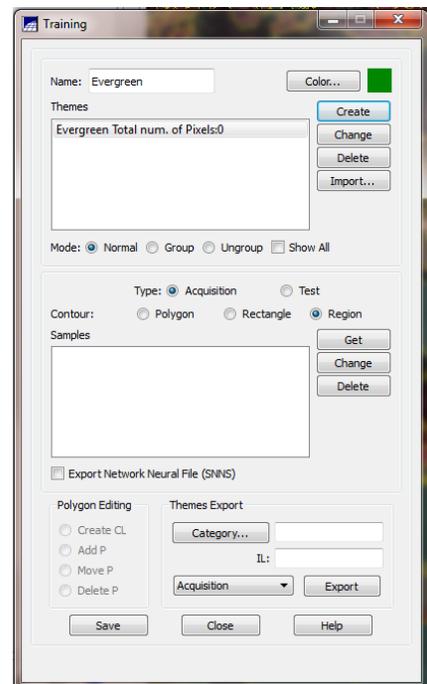
- In the Main Menu select Image>Classification...
- You will need to create a context for your classification. Click the Create button to open the context creation window
- In the name field name your classification 'classification'.
- Click the 'Regions' radio button and select band #1 (the near infrared band) and select your segmentation by clicking on it.
- After you have completed the above steps click Apply and the Context Creation window will close.
- In the Classification window select the classification context and your segmentation by clicking on them. Then click the 'Extraction of attributes of the regions' button. DO NOT close the Classification window when it has completed.

Task 6: Training Data

The next step is to train the computer to recognize regions with specific shape and pixel values as specific classes; we will then tell the computer to perform the supervised classification. Before you move on to the next step make sure the NIR image is displayed.

- In the Classification window click the Training Button to open the training window, if a box comes up that says acquire samples click 'OK'

Do Not Close the Training Window Without Clicking Save, If You Do You Will Lose All of Your Training Data and Will Have to Repeat Everything!



- In the name field name your first class Evergreen and choose a dark green color for it by clicking on the Color button and click **Create**

You have just created a class for Evergreen trees and will see a class appear in the Themes window with zero acquired pixels. The computer needs to know what pixels we would like to be put into this class, so we will need to select pixels in our imagery that correspond to evergreen trees. This will tell the computer to put all similarly colored pixels into this class when we run our classification on the entire image.

- Try selecting pixels evergreen tree pixels with the three different Contour types: Polygon, Rectangle, and Region. (*Hint: evergreen and deciduous trees will be different colors of red and will also have different shapes*). For Polygon, right click to close the area you want. Region will automatically select all the pixels in an image segment.
- After you have selected pixels click the Get button in the Training window. You will see the number of pixels for your Evergreen class change in the Themes box. This means you have placed this many pixels into this class as training data for your Evergreen class.
- Acquire at least 10,000 pixels for this class (~2-5 training sites)
- In the Training window the default option for Type is set to Acquisition, click the Test radio button and now acquire a test site. We will use this training site in an accuracy reporting step later on.

Training and test sites should be acquired throughout the full extent of the image so your training sites do not represent only one area of the imagery.

- Now create the following classes, acquiring ~10,000 pixels of training data and 1 test site for each class

Again, you should be collecting 1- 3 representative examples for each theme in a class (Acquisition), with only 1 validation (Test) example. Not all segmented polygons need to be accounted for as you are training the computer to do this work for you.

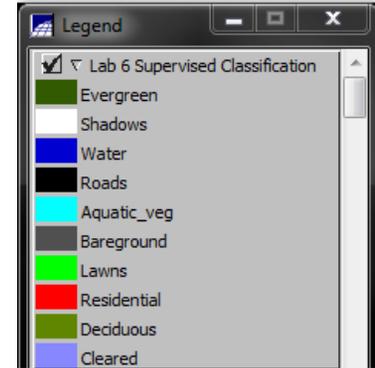
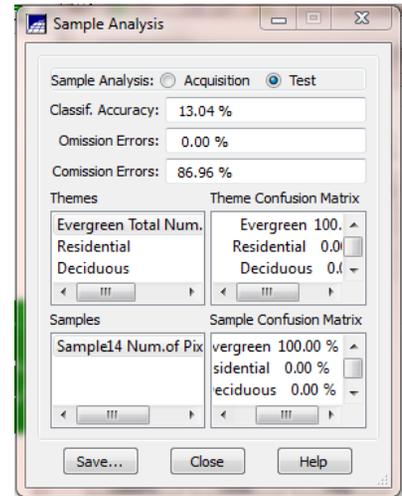
| # | Name | Set Color As |
|----|---|----------------------|
| 1 | Residential (buildings which you interpret to be residential) | R: 255 G: 0 B: 0 |
| 2 | Deciduous | R: 96 G: 134 B: 0 |
| 3 | Evergreen | R:50 G: 90 B: 0 |
| 4 | Cleared (transitional areas) | R: 135 G: 135 B: 255 |
| 5 | Bareground (very low vegetation or no vegetation) | R: 80 G: 80 B: 80 |
| 6 | Lawns | R: 0 G: 255 B: 0 |
| 7 | AquaticVeg | R: 0 G: 255 B: 255 |
| 8 | Water | R: 0 G: 0 B: 209 |
| 9 | Roads | R: 0 G: 0 B: 0 |
| 10 | Shadows | R: 255 G: 255 B: 255 |

- After you are finished, click the Save button, close the Training window, and move on to Task 7

Task 7: Supervised Feature Based Classification and Sample Analysis

In this step you will prepare a feature based supervised classification based on your training data and calculate the attributes (statistics) for your training sites.

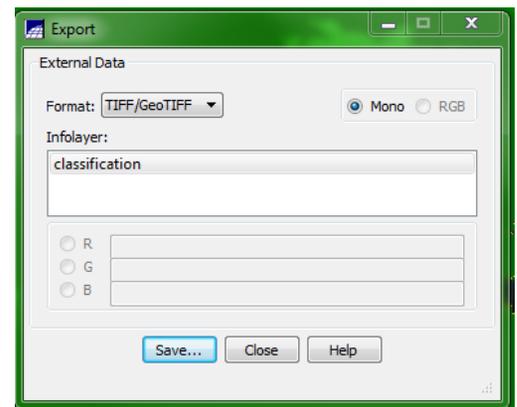
- If the Classification window is not already open in the Main Menu select Image>Classification...
- Be sure the Classification is selected in the Contexts box and that the Olympia_1 band (*the near infrared band*) is selected then click the Classification button to bring up the Image Classification window
- In the Image Classification window click the Type of Classifier drop down box and change the classification algorithm to Bhattacharya and change the Acceptance Threshold to 99.9%
- In the name field, name your classification with your last name and then supervised, example 'Dunne_supervised'
- Now click the sample analysis button. The Sample Analysis window will appear. The sample analysis type will be defaulted to Acquisition, change the to Test by clicking on the Test Radio button
- Make note of the Classification Accuracy and the 2 types of error. What do they mean? This topic will be discussed in later lectures. When you are finished close the Sample Analysis window
- In the Image Classification window click Classify button to run your classification.
- After completing your classification add a legend to it by clicking View > Legend and select your classification from the drop down. The legend will show your class names and the colors associated with those classes.



Note: The colors for your classes should match the colors for classes seen on the legend at the right.

Tsk 8: Exporting Imagery

- To export your classification go to File>Export>Export Vectorial and Matricial Data
- We will export this as a .tiff file. The default format should already be set to TIFF/GeoTIFF, if it is not you can change it by clicking the Format drop down box
- Select your classification in the Infolayer box by clicking on it and then click the Save button
- Navigate to the folder you created for Lab6 materials and click the Save button
- You will now have the classification .tiff file saved. You can send this file to yourself in an email or save it to a thumb drive. You will upload this to the course drop box as part of your lab.



You have just exported your classification you produced as a TIFF, if you haven't already done so give the file a name that includes your last name. This file will be the only submission for Lab 6.