**Lab 10: Supervised Classification**

**(questions at bottom of document)**

You explored unsupervised classifications in the last lab. Unlike unsupervised classifications, in supervised classifications you define informational classes *a priori* (first) and uses statistics to characterize these “training classes.” Then pixels are assigned to each informational class based on how similar they are to that class. Similarity is measured in different ways depending on the algorithm.

Today you will explore supervised classification. The most important part of a supervised classification is **careful choice and delineation of your training sites**. Be as meticulous as you can during this part of the exercise – even a single pixel included where it shouldn’t can screw things up. Zoom is your friend!

As you are working along today, SAVE, SAVE, SAVE. This includes not only your final supervised classification, but also your signature editor. You’ll need these for an upcoming lab. If you forget, you will have to redo this lab before you can move into the new stuff.

We’ll be working with the Central WA image in the lab8 subdirectory (like the last lab). Copy it onto your flash drive. Make sure you have plenty of space. You’re familiar with this file and the area, so off we go!

You’ll be running a supervised classification.

Use the following classes (unless you can - and do - justify different ones):

* Water
* Agriculture - hay
* Agriculture - fallow
* range 1
* range 2
* roads (asphalt)
* roads/buildings (concrete/aluminum)
* forest 1
* forest 2
* forest 3
* exposed basalt
* Riparian Vegetation.
* Snow/ice
* Clouds
* Burn scars

Open up the kitco image. Use your favorite band combination. Note, it’s probably wise at this point to print out the lab – your screen will be cluttered enough.

Choose the **Raster Tab**, then choose **Supervised/Signature Editor**. The **Signature Editor window** will pop up. For this exercise you will use it to collect and characterize your training polygons.

On the **main Erdas ribbon** choose the **Drawing tab**. You will use the drawing tools to create training polygons. The most useful tool will be the polygon in the Insert Geometry area (top row, left side, to the left of the “A”).

In the image, **look for representative examples of the cover types** **and their variants** that you listed in your classification scheme. You will use the **Drawing Tools** to draw **polygons** around these example areas. The polygons are your “training sites” or “training data.” Remember to be very careful drawing these polygons – you do NOT want to include extraneous cover types in a polygon (see step 5 below). Zoom in close to draw your polygons. Remember that training areas should be relatively homogeneous examples of each of the cover classes from your classification scheme. You should include SEPARATE training sites that capture the variability within types (*e.g.*, water with different spectral reflectance). You can merge the results ***after*** ***classification*** to a single type (*e.g.* water). To start a polygon, left click the mouse at a starting point. Then move the mouse cursor to drag out a boundary line and click again to produce a vertex when you need to change direction. Keep doing this until the training area is enclosed and double click to finish the polygon. Note that if you make a mistake, you can delete the polygon by selecting it and hitting the delete button on your keyboard. Once you have drawn one polygon, goto the next step, do that, repeat.

Now go to the **Signature Editor** window. Select a training polygon on your image (click on it) and hit the button for **Edit/Add** (  ). **Edit the name** to reflect the cover type (*e.g*., water) that goes with the polygon and **select a recognizable color** in the color column for the class. Note that you should have at least four polygons for every landuse type. You can name them, *e.g*., water1, water2, *etc*., and choose the same color for all polygons of the same basic type (*e.g.*, color all water blue).

6. Repeat this procedure until you have several examples of each cover type in your classification scheme.



Enter polygon button Merge button

As you have several polygons for every class, you can merge them using the merge button on the signature editor. **BUT**, before you do this, I recommend 1) saving the signature editor file. I also recommend double checking all your polygons to make sure they represent what you intend.

OK. Now you can merge your training site data. To merge training data, first select the data you want to merge by clicking on each row to be used while holding down the shift key. Then hit the merge button (be sure to delete the original rows in the Signature Editor Window afterwards by selecting the appropriate rows and right clicking the mouse and choosing **Delete)**.

Now, before you carry on, make sure that your “Value” column numbers match your Class # numbers. Make sure both go from 1 to n (where n is your total number of classes). **This is important** because ERDAS does both the classification and the accuracy assessment based on the “Value.” Remember this for your project as well.

Examine the spectral signatures of your training classes by selecting them and using the  **button** on the Signature Editor. Remember, blue reflection is always high because of Raleigh scatter (we haven’t corrected for this.

Once you’ve finished merging signatures, save your signature editor file – but give it a new file name! This way you have both what you think is good, and the original signatures. Just in case….

Also, save the aoi file you made digitizing (right click on it in the contents part of the main window and “save layer as.” You will need all these in the future!

When you are done adding, editing, and merging your training classes, from the **Signature Editor Window Menu Bar** choose **Classify/ Supervised**. Browse to your directory and **type in a name for the output file**. Use the defaults for other choices (**Nonparametric rule: none**; **Parametric rule: Maximum likelihood**). After you have created the classification open another Viewer window and look at the result. Make sure you are saving it as an erdas .img file, not, say, a .tif file.

Odd note… the system was happiest if I selected every class in the signature editor before running the classification. I got goofy results once when I had only one class selected.

If your classification has problems, it is usually because your training polygons did not capture the range of variability in each class or were too variable (too much variability in one polygon). Sometimes you might have training polygons that are NOT good indicators of the spectral properties of the training class. You can delete these polygons and reclassify. **THE MOST IMPORTANT PART OF SUPERVISED CLASSIFICATION IS CHOOSING YOUR TRAINING POLYGONS, and this is often an iterative process**.

9. Continue editing and modifying your training data and re-classifying until you have a good product. Compare this classification to your unsupervised classification from the last lab.

10. Now, using the same final signatures in your signature editor that you used previously, **reclassify the image** the same way but for the **Parametric rule** choose **Minimum Distance**. Save this image, too!

At this point, you should have at least two signature editor files, at least two supervised classifications (images), and your aoi file saved. DO NOT delete these, as you will need them for the next lab – when we do an accuracy assessment.

Note, this lab swiped from <http://www.uwyo.edu/rs4111/> and heavily modified. Thanks Ken!

**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Worksheet**

**Lab 10: Supervised Classification**

**(note, I want to see some detailed answers here)**

1. Insert one image of a representative part of your study area max likelihood classification (one where pretty much every class is located – think about a quarter to third of the total area). Be sure to include the contents pane so I can see what each class actually is.
2. How does your original supervised classification look?? Did the classification do a good job of mapping land cover? Are there obvious areas of confusion? If so, which types are confused? Why? This will take time zooming in and out on different areas and comparing your classification (max likelihood) with the original image.
3. How do the supervised and the unsupervised (from last week) classifications compare? Call up last week’s images and take a peek! Is it better in some areas than others (forest, ag, shrub steppe, etc)? Why or why not?
4. How does the Minimum Distance classification compare to the Maximum Likelihood Classification you did? Which do you think is more accurate? Or are they similar. Discuss any obvious differences based on your knowledge of how these algorithms work.