

Lab Report:
Week 6 – ERDAS Tutorial
SURE 339 – Prof. R. Burtch
Lincoln Stuart
Due: 2/20/07

Purpose:

The purpose of this lab exercise was to be familiarized with the ERDAS Vector Querying and Editing module and the Classification module. In the Vector Querying and Editing module, the tutorial taught the student to display vector layers, edit vector attributes, create queries to display attributes based on definable criteria, edit vector layers, create new vector layers, export and create attributes and create and edit shapefiles and their attributes. In the classification module, the student learned how to use the unsupervised ISODATA classification process to classify a Landsat TM scene.

Procedure:

In the Vector Querying and Editing module, the first task was to open a vector layer – zone88. To change the display settings for the vector layer, the points, nodes, colors etc, the Properties and Line Style Chooser dialog boxes were opened. Next, the attributes for the zone88 vector layer were displayed in tabular form in the Attribute viewer. Such information as area, perimeter and zoning is displayed for each lot in the vector layer in the attribute viewer. Selecting different areas within the vector layer can be done several ways – one by dragging a selection box over the layer, and all entities inside, or crossed by the box, is selected. Once an entity is selected in the vector layer viewer, the corresponding entity's properties are highlighted in the attribute table. Another method for selecting entities is by querying. Using the criteria function, entities can be searched for based on their characteristics, for example parcel size. Another task in this module was editing the vectors. Using tools in the vector tool palette, arcs can be split, manipulated, joined, etc. Further, a new vector layer was created. One feature of the vector tool is the ability to export attributes of one vector layer to another. Thus, the new vector layer created in the tutorial was given the same data set as the original one. A shapefile was also created in this module, and saved. In creating it, different areas were specified using the polygon tool, and different options for selecting areas were utilized. Each area possessed a set of attributes available in the Vector Attribute table.

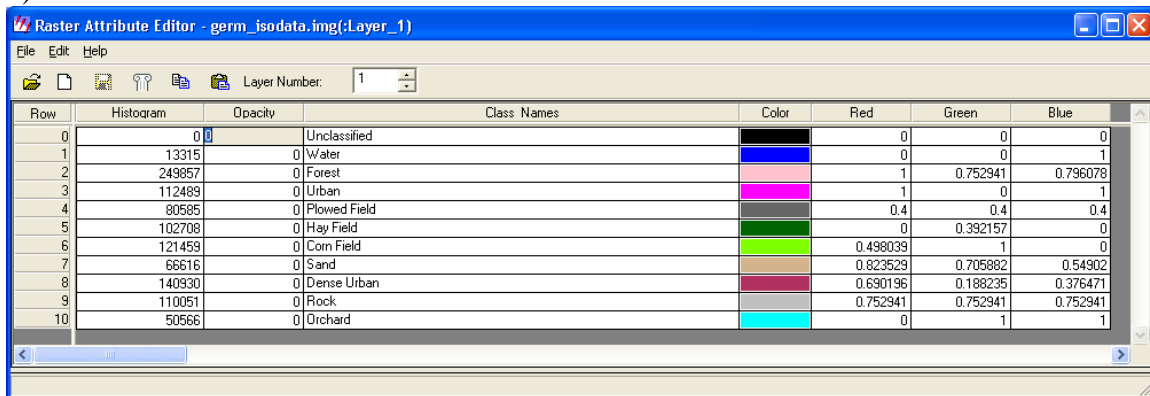
In the Classification module, a Landsat TM scene was classified using the ISODATA unsupervised iteration method. To begin, the TM image was selected from the Unsupervised classification tool under Data Prep function in ERDAS. Initial cluster options and processing parameters were then chosen, including the number of maximum iterations and convergence threshold (when the function can stop). With these parameters set, the classification could take place. Once the classification was performed, the new file was opened and overlaid on the original. Then, in the Raster Attribute Editor, the classes can be edited, with their representing colors chosen. After attributing colors to classes, the image was placed into the Map Composer, a legend of the different classes created, and printed. The map is included with this report.

Questions:

1) Classification is the process of sorting pixels into a number of classes or categories based on their data file values. Pixels are sorted, or put into classification categories, if a pixel's value satisfies a set of criteria.

2) ERDAS Imagine uses the ISODATA algorithm to perform classification. In short, clusters are formed by using the minimum spectral distance formula. The tool begins with either arbitrary cluster means or means of an existing signature set. Each time the clustering repeats, the means of these clusters are shifted. The ISODATA utility performs iterations, sorting pixels into clusters, and once a certain number of iterations are performed, or a threshold percentage of pixels remain inside clusters, then the iteration stops.

3) See attached sheet. Raster Attribute Editor shown below:



The screenshot shows the Raster Attribute Editor window for a layer named 'germ_isodata.img(Layer_1)'. The window contains a table with the following data:

Row	Histogram	Opacity	Class Names	Color	Red	Green	Blue
0	0	0	Unclassified		0	0	0
1	13315	0	Water		0	0	1
2	249857	0	Forest		1	0.752941	0.796078
3	112489	0	Urban		1	0	1
4	80585	0	Plowed Field		0.4	0.4	0.4
5	102708	0	Hay Field		0	0.392157	0
6	121459	0	Corn Field		0.498039	1	0
7	66616	0	Sand		0.823529	0.705882	0.54902
8	140930	0	Dense Urban		0.690196	0.188235	0.376471
9	110051	0	Rock		0.752941	0.752941	0.752941
10	50566	0	Orchard		0	1	1

4) The difference between supervised classification and unsupervised is that in supervised classification, the interpreter recognizes features, assigns values and tells the computer to classify similar pixels into the same clusters. Thus, supervised classification is under the direct control of the interpreter. In unsupervised, the computer is allowed to create clusters and classify the pixels according to patterns it finds in the pixel data. Unsupervised is a more automated approach to classification.

5) Isodata is an Iterative Self-Organizing Data Analysis Technique, which is used in unsupervised classification. The Isodata algorithm uses the minimum spectral distance formula to form clusters. By sorting the pixel data, pixels can be classified into these clusters through iteration. The maximum number of iterations should be specified (to prevent an endless cycle) as well as a convergence threshold, which tells the computer to stop running iterations after a certain percentage of pixels remain inside the same clusters.

6) See attached sheet.

9) Criteria function, attributes, and vector layer.

The screenshot shows a GIS application interface. On the left, a map displays a vector layer with yellow and cyan colored regions. On the right, an attribute table is open, showing columns for Record, AREA, PERIMETER, ZONE88#, ZONE88-ID, and ZONING. The table contains 22 records, with several rows highlighted in yellow. Below the map, a 'Selection Criteria' dialog box is open, displaying a criteria string: `$(AREA) > 5000000 and $(ZONING) == 4`. The dialog includes fields for Columns, Functions, and Compares, along with a calculator interface. The Windows taskbar at the bottom shows the Start button and several open applications, including ERDAS IMAGINE 9.1 and the GIS viewer.

Record	AREA	PERIMETER	ZONE88#	ZONE88-ID	ZONING
8	12369503.000	20993.100	8	7	4
9	4282449.500	10005.494	9	8	8
10	9044407.000	24284.061	10	9	7
11	70444104.000	106172.047	11	10	4
12	72101.367	1212.358	12	11	21
13	2407814.250	6937.226	13	12	22
14	567419.125	3078.611	14	13	13
15	625020.875	3926.702	15	14	16
16	3734484.750	11976.501	16	15	11
17	8296132.500	13483.364	17	16	7
18	2320556.500	6106.532	18	17	13
19	1676031.250	5324.090	19	18	4
20	314430.500	2383.777	20	19	22
21	15531826.000	34730.367	21	20	4
22	460725.125	2760.074	22	21	13

10) Shapefile attributes.

The screenshot shows a shapefile attribute table window. The table has four columns: Record, AREA, PERIMETER, and ID. It contains three records. The first record has an ID of 1, the second has an ID of 1, and the third has an ID of 5. The PERIMETER values are 5820.394, 4165.673, and 19370.170 respectively.

Record	AREA	PERIMETER	ID
1	1389501.234	5820.394	1
2	1002084.832	4165.673	1
3	17797790.062	19370.170	5

10) - Shapefile

