

IMAGE/OBJECT BASED CLASSIFICATION TOOL

Developed by NASA DEVELOP at BLM at ISU GIS TReC, Pocatello, Idaho

1. Introduction

This image/object based classification tool was developed by NASA DEVELOP participants in 2016. The objective of this tool is to improve the fire community's access to information regarding Juniper land cover, tree density, and frequency. This tool uses multiband Imagery and point data to classify different vegetation types. It is designed to calculate the resulting classification's density of juniper (class value 5). These results are then interpreted to identify juniper management phase. Phase categories are:

- Phase 1 = >1 and <= 15% juniper cover
- Phase 2 = >15 and <= 45% juniper cover
- Phase 3 = > 45% juniper cover

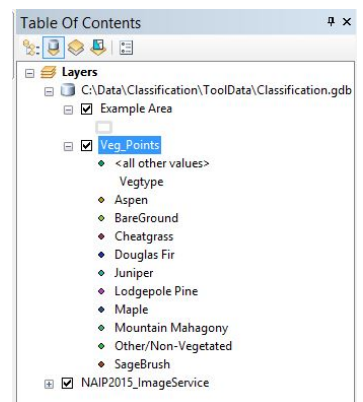
To use this tool, you will need ArcGIS 10.3.1 and the Geostatistical Analyst Extension.

2. Download and Extract Image/Object Classifier tool

1. Download software from;
<http://giscenter.isu.edu/software/objclass.htm>
2. Unzip the file to your computer. For this exercise we will be using the C:\Data folder

3. Open the Image/Object Classifier tool in ArcMap

1. From Windows Explorer
 - Navigate to C:/Data → Classification → Tool_Documents
 - Double-click the Classification.mxd
 - This ArcMap document will contain the vegetation points layer you can use in classification, a link to Idaho NAIP imagery, and an Example Area polygon



4. Define the Area of Interest (AOI)

1. In this example the area of interest has been created for you (Example Area)
 - This represents a sample AOI that you will use in your vegetation classification.

5. The Vegetation Point Feature Class

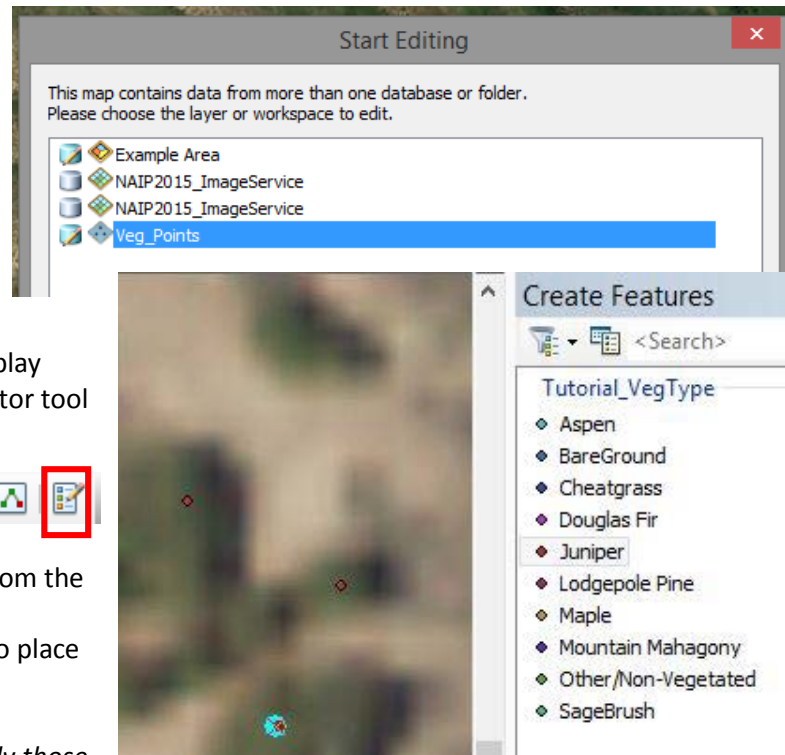
1. The Veg_Points feature class, which (found in the table of contents (TOC)), will be used to identify known vegetation sites.
2. Pre-defined vegetation types have been created for you.



6. Edit Vegetation Classification Points

1. Start adding points that will be used to classify the imagery.

- From the editor tool bar, click Start Editing
- Select the Veg_Points feature class
- In the Create Features Pane, select a specific vegetation type to map. In this step, you are showing ArcGIS points where you know this specific cover type exists.
 - If the Create features pane does not display automatically, locate this icon in you editor tool bar.



- Select the Veg_Point type you want to digitize from the Create Feature pane
- Zoom in, out, and around your area of interest to place as many known points as you can.
- Periodically save your edits

Note: you do not need points for each VegType category. Only those of interest to your current project.

2. When done adding points;

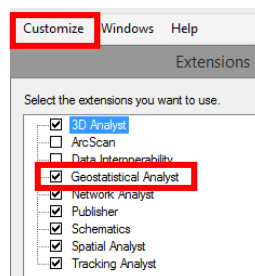
- Save edits → Stop editing


TIPS: To accelerate re-draw performance, right click the image service and select properties. Click the extent tab, and set the extent to your AOI polygon feature class.
During digitizing, if you wish to pan the map, hold down 'c' on your keyboard and you will be able to pan across the imagery without having to first select the pan tool.

7. Run the Tool

1. Enable the Geostatistical Processing Extension

- Click Customize → Extensions
- Check Geostatistical Analyst

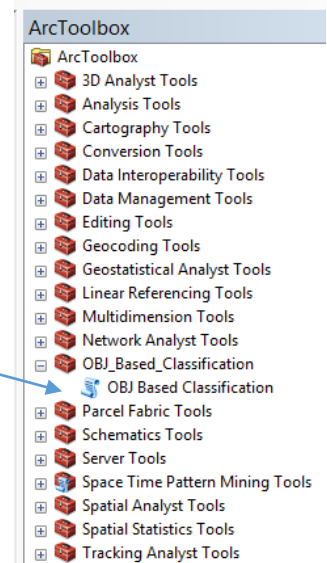


2. Open the tool from ArcTool Box ;

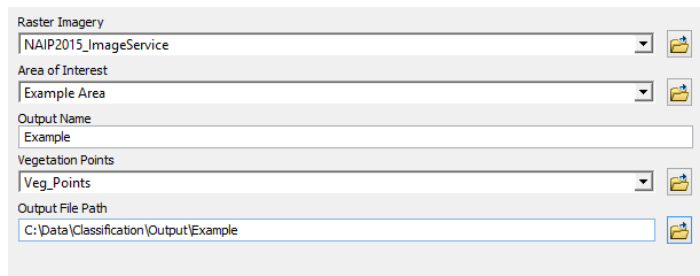
- From the OBJ_Based_Classification tool box
 - Double click the OBJ Based Classification tool

Set the following parameters

- Area of Interest = AOI polygon feature class (Example Area)
- Output Name = users choice (used as a prefix for all output names)
- Vegetation Points = Veg_Points point feature class



- Output File Path = Create a new folder inside the output folder



3. Click OK

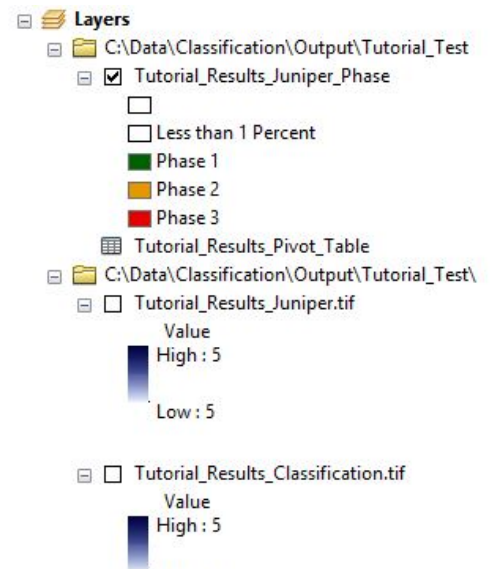
Processing will take some time and is a function of the size of your AOI, the number of bands of imagery used in the classification, and the number of vegetation types being classified.

Results

All the resulting feature classes, tiffs, or tables will be added to the Table of contents (TOC) and the Output folder you selected as the output file path.

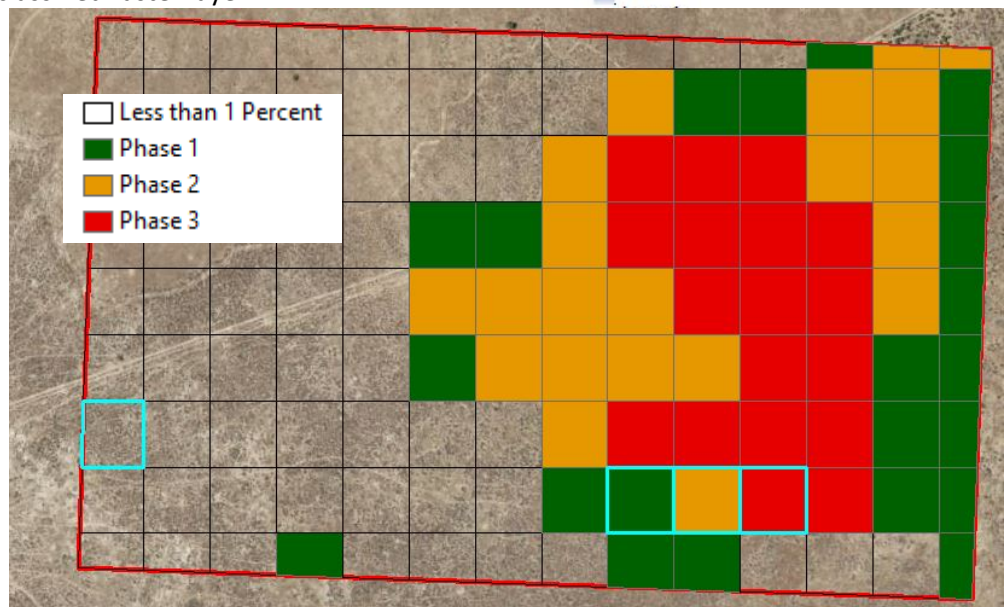
Four layers will be added to the TOC

- _Juniper_Phase
 - Divides the study area into 1 acre blocks to calculate percent juniper cover (*this is based on top-most canopy and does not take into account understory vegetation*)
 - Phase categories are calculated as:
 - Phase 1 = >1 and <= 15% juniper cover
 - Phase 2 = >15 and <= 45% juniper cover
 - Phase 3 = > 45% juniper cover
- _Pivot_Table
 - This table will show you how your points were classified and can be used to identify misclassifications.
- _Juniper.tif
 - Displays only those pixels classified as juniper
- _Classification.tif
 - Displays the fully classified raster layer



Reading the Results

1. The Juniper_Phase layer;
 - Open the Phase attribute table
 - The two columns to pay close attention to are the Percentage and Phase columns
 - The percentage column tells you the percent cover in a given acre
 - The Phase column labels each acre depending on its phase category
 - To view the polygon corresponding to a given record, simply select that record



| Tutorial_Results_Juniper_Phase | | | | | | |
|--------------------------------|---------|----|-------|---------|------------|---------------------|
| FID | Shape | Id | COUNT | COUNT_1 | Percentage | Phase |
| 21 | Polygon | 0 | 3969 | 140 | 4 | Phase 1 |
| 22 | Polygon | 0 | 4032 | 569 | 14 | Phase 1 |
| 23 | Polygon | 0 | 4032 | 1501 | 37 | Phase 2 |
| 24 | Polygon | 0 | 3969 | 2311 | 58 | Phase 3 |
| 25 | Polygon | 0 | 4032 | 1847 | 46 | Phase 3 |
| 26 | Polygon | 0 | 3969 | 66 | 2 | Phase 1 |
| 27 | Polygon | 0 | 2256 | 42 | 2 | Phase 1 |
| 28 | Polygon | 0 | 3806 | 1 | 0 | Less than 1 Percent |
| 29 | Polygon | 0 | 4032 | 29 | 1 | |
| 30 | Polygon | 0 | 4096 | 19 | 0 | Less than 1 Percent |
| 31 | Polygon | 0 | 4096 | 0 | 0 | Less than 1 Percent |
| 32 | Polygon | 0 | 4032 | 3 | 0 | Less than 1 Percent |
| 33 | Polygon | 0 | 4096 | 17 | 0 | Less than 1 Percent |

1 (4 out of 126 Selected)

2. The Pivot Table;

- The pivot table is actually a matrix. To interpret this table you will need to know what the coded values are for each Veg type. See the table below

| Coded Value | Vegetation Type | Red | Green | Blue |
|-------------|---------------------|-----|-------|------|
| 1 | Sagebrush | 251 | 197 | 214 |
| 2 | Bare Ground | 120 | 72 | 0 |
| 3 | Cheatgrass | 255 | 255 | 153 |
| 4 | Other/Non-Vegetated | 234 | 234 | 234 |
| 5 | Juniper | 108 | 177 | 177 |
| 6 | Aspen | 196 | 251 | 192 |
| 7 | Douglas Fir | 225 | 75 | 75 |
| 8 | Maple | 124 | 252 | 153 |
| 9 | Lodge pole Pine | 209 | 197 | 252 |
| 10 | Mountain Mahogany | 163 | 234 | 234 |

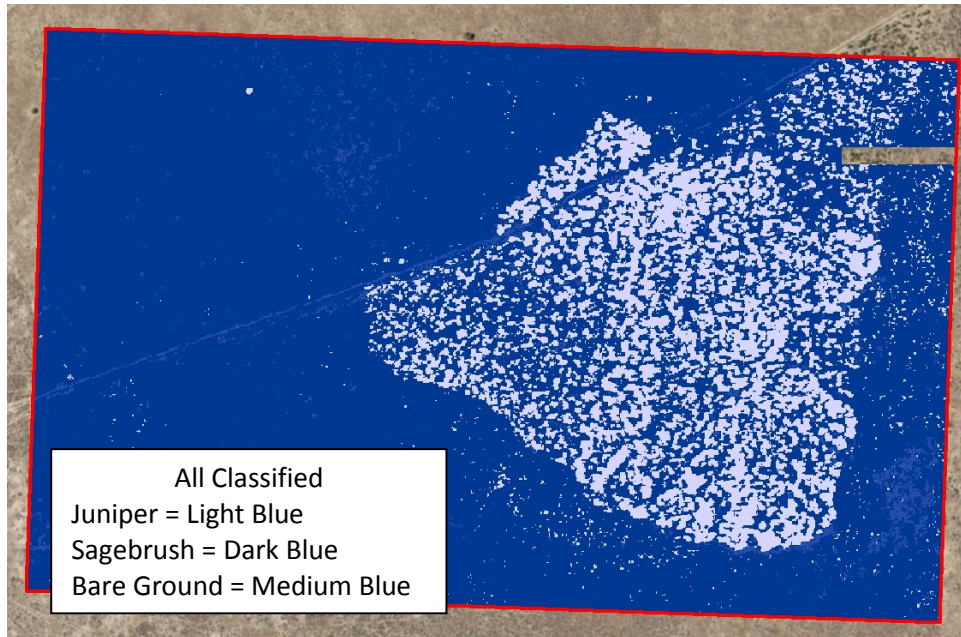
| Tutorial_Results_Pivot_Table | | | | | |
|------------------------------|-----|------------|----------|----------|----------|
| | OID | RASTERVALU | VegType1 | VegType2 | VegType5 |
| ▶ | 0 | 1 | 14 | 3 | 0 |
| | 1 | 2 | 0 | 3 | 0 |
| | 2 | 5 | 0 | 0 | 12 |

- Reading the example table (above):
 - RASTERVALU 1 and VegType1 (sagebrush) have an agreement between 14 points. Meaning 14 points were correctly classified as sagebrush. However, three sagebrush points were misclassified as VegType2 (bare ground).

2. The_Juniper.tif



3. The_Classification.tif

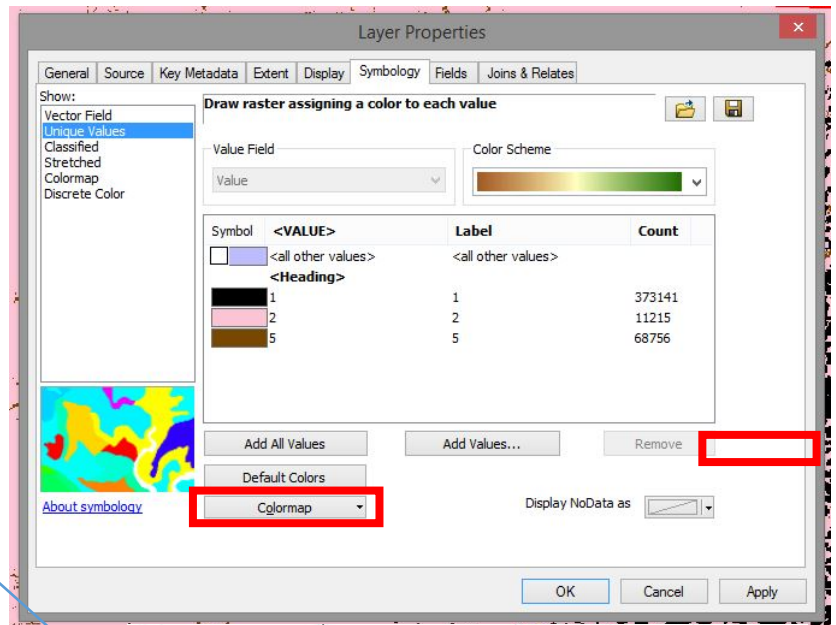


Apply a Colormap

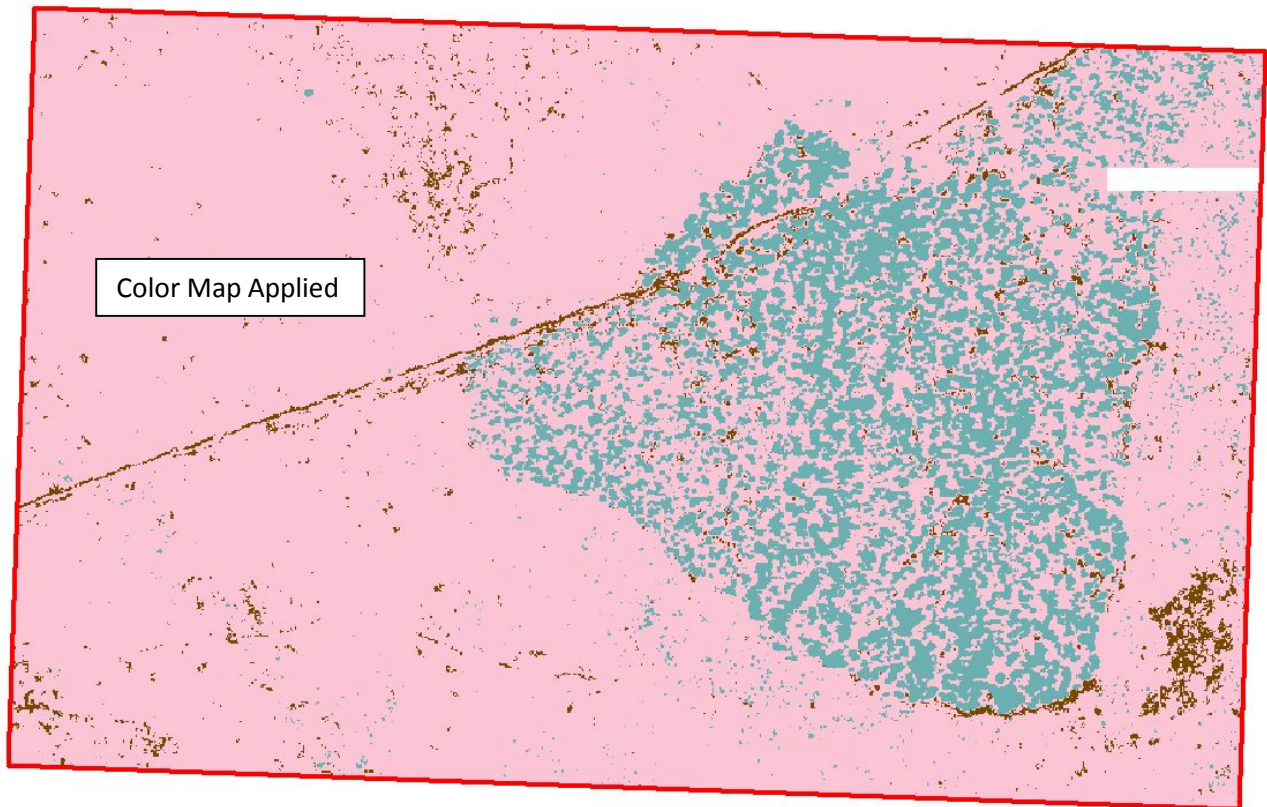
1. To add a colormap to the _Classification.tif or _Juniper.tif;

- Open the layer's Properties
- Click Symbology
- Select Unique Values
- Click the Colormap dropdown
- Select Import Colormap
- Navigate to the .clr file in the ToolData folder
- Click Apply

2. Repeat for _Juniper.tif



| Name | Date modified | Type |
|---------------------------|-------------------|-------------|
| Classification.gdb | 4/13/2016 9:47 AM | File folder |
| Classification_Colors.clr | 4/11/2016 4:52 PM | CLR File |



- 1 Sagebrush
- 2 Bare Ground
- 5 Juniper

Title:

OBJ Based Classification

Description:

Object Based Classification using Multiband Imagery and Point class to classify vegetation type. This tool also also calculates the classifications Cell density of value "5"(Juniper) This density is then visualized using a fishnet to identify the Juniper phase.

Limitations:

Points feature Class has to be located in the Classification Geodatabase located in "..\Classification\ToolData\Classification.gdb". This allows the "Class" Domain to be applied to the VegType field. This domain controls the Coded Values.

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Created:

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