

Understanding Color Mixing and Image Enhancement

a lab exercise for GEOG 460 Remote Sensing of the Environment

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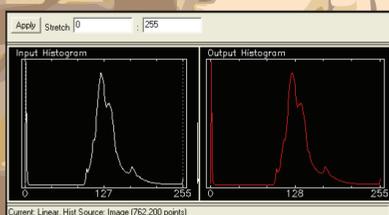
The objectives of this lab are:

- (1) To be familiar with reflectance spectra of vegetation especially in infrared region and understand color mixing;
- (2) To experience different image enhancement technique (contrast stretching, band indexing/ratioing, and spatial filtering).

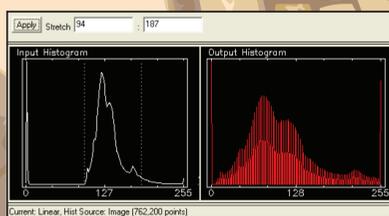
Some background of ADAR image: The Airborne Data Acquisition and Registration (ADAR) System is an airborne multispectral digital camera system. The ADAR wavebands are band 1: blue (450-540 nm), band 2: green (520-600 nm), band 3: red (610-690 nm), and band 4: near-infrared (780-1000 nm). Note 1 μm = 1,000 nm. The spatial resolution is 1 m (3.28084 ft). The ADAR image used in this exercise is taken over a golf course.

1. Experiment with different contrast stretching

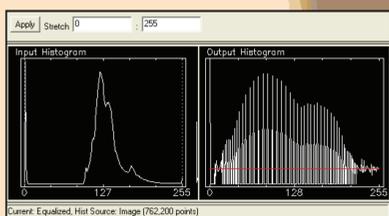
No stretch



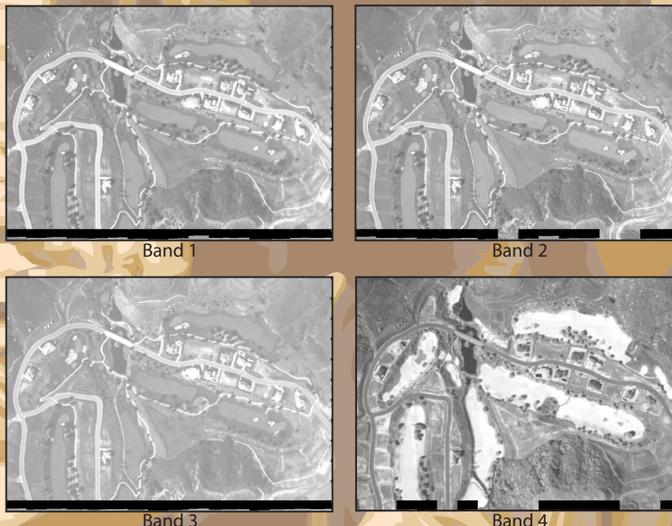
Linear stretch 94-187



Equalization

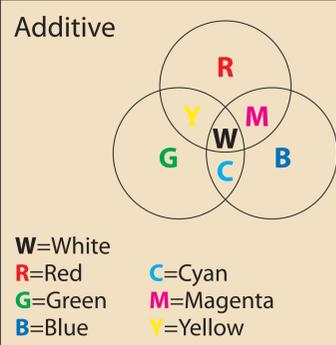


2. Understand color mixing



Band	Road appear in single band as (bright/dark)	Grass appear in single band as (bright/dark)
1	Bright	Dark
2	Bright	Dark
3	Bright	Dark
4	Dark	Bright

Table 1



Color Assignment			Road is predict to appear as	Grass is predict to appear as	Road actually appear as	Grass actually appear as
Blue	Green	Red				
1	2	4	C	R	C	R
4	2	1	Y	B	Y	B
2	4	1	M	G	M	G

Table 2



Band 1 = B
Band 2 = G
Band 4 = R



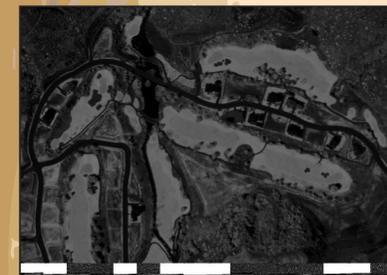
Band 4 = B
Band 2 = G
Band 1 = R

Band 2 = B
Band 4 = G
Band 1 = R



3. Understand NDVI image

$$NDVI = \frac{DN_{NIR} - DN_R}{DN_{NIR} + DN_R}$$

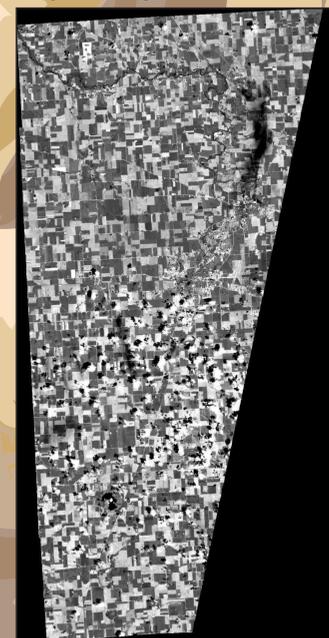


Col	Row	Displayed NDVI	Near Infrared DN	Visible Red DN	My calculated NDVI
211	214	0.291291	215	118	0.291291
357	276	-0.213483	70	108	-0.21348

Table 3

4. Explore different spatial filtering

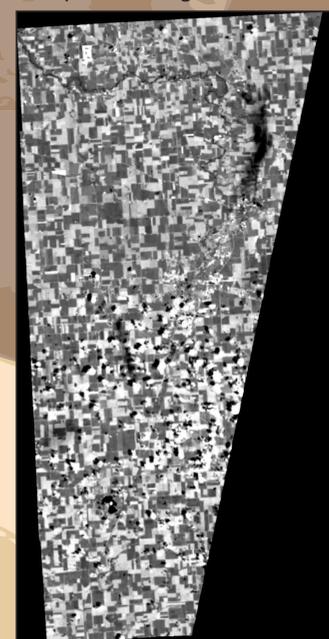
Original image



High pass filtering



Low pass filtering



Directional filtering

