Classification Techniques on Eastern Oregon Landsat Data

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Geog 482

Introduction

- This study looks at supervised and unsupervised classification techniques to classify a region of Eastern Oregon/ Washington and Western Idaho
- Mainly forest and agricultural areas exists in it

Purpose

- Test out how well different classification methods work on rural and forested lands
- Gain a better understanding of how Idrisi classifies images

Data

- Landsat 7 data
- Path 42 and Row 28
- 2000 fly over of the area
- Resolution 30 meter
- Bands
  - 1 Blue
  - 2 Green
  - 3 Red
  - 4 NIR
  - 5 FIR

Methods

- Convert Landsat images to Idrisi image format
- Combine bands 1,2 and 3 together
  - Use this image for signature training
- Process signature file on bands:
  - Visible Color (1,2,3)
  - Near IR (2,3,4)
  - Fear IR (3,4,5)

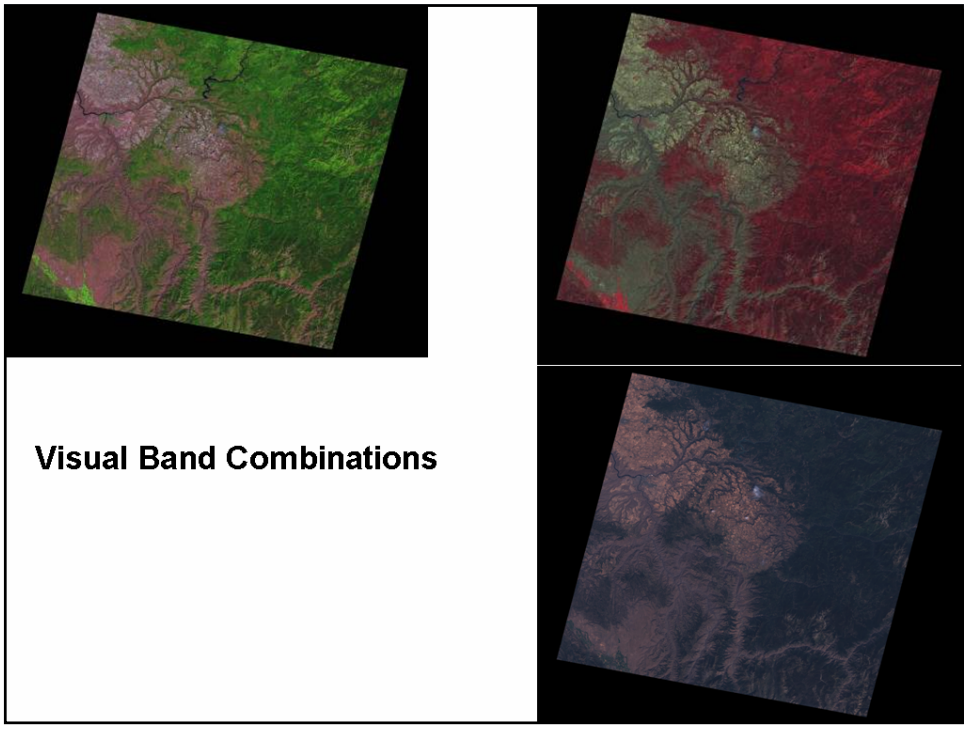
Test Preformed

<u>Supervised</u>

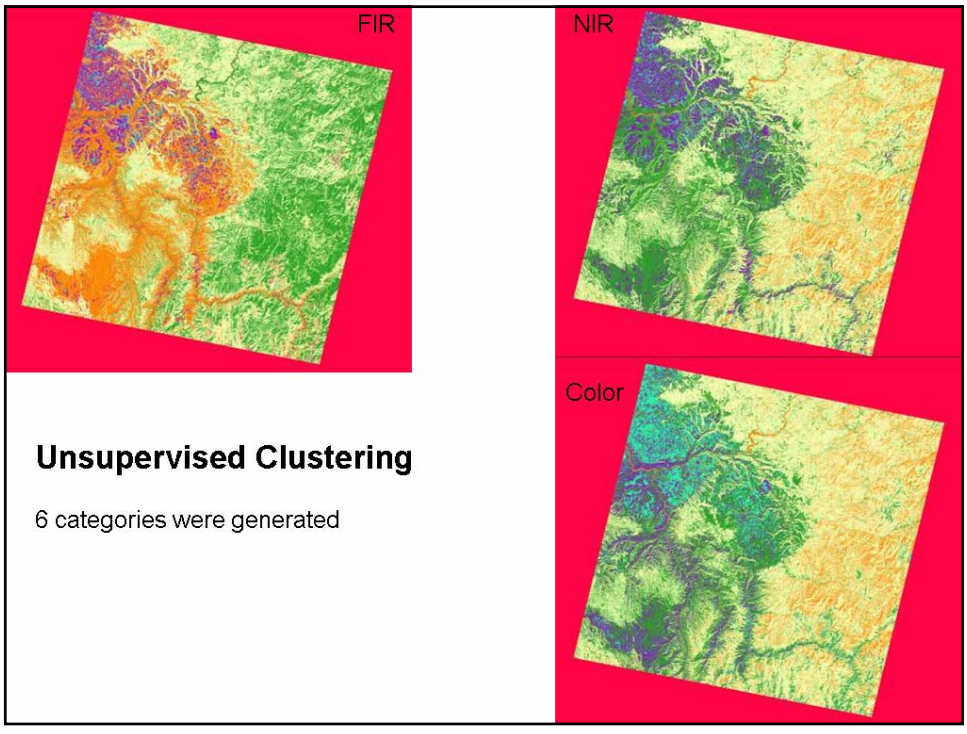
Soft
-Maximum Likelihood
-Fisher

Hard
-Bayesian

<u>Unsupervised</u>
-Clustering
-Isoclustering

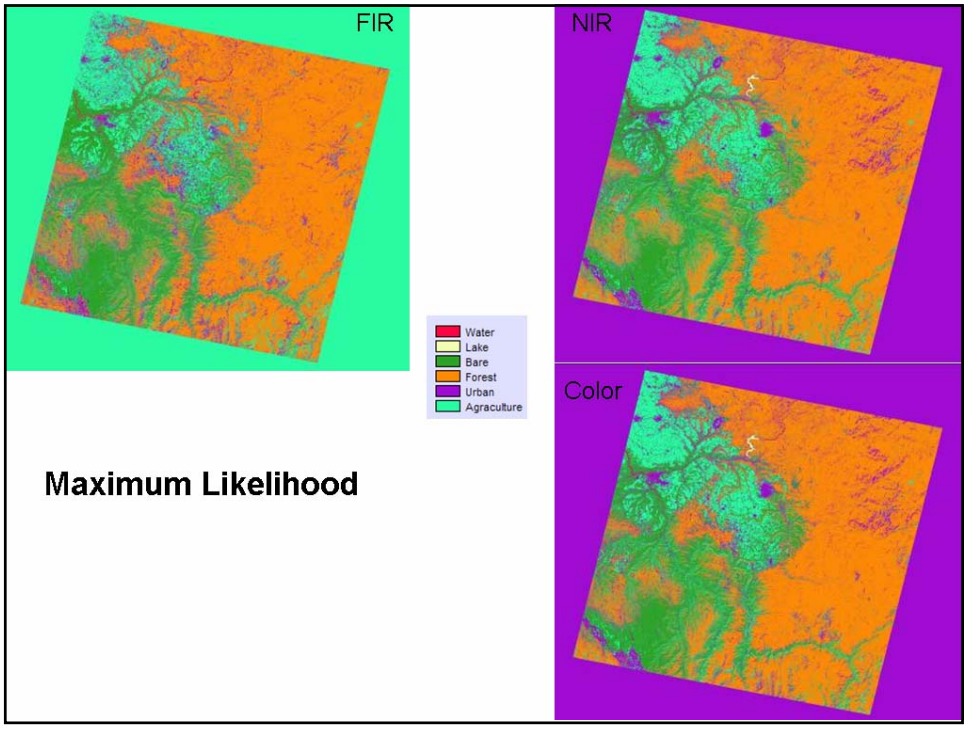


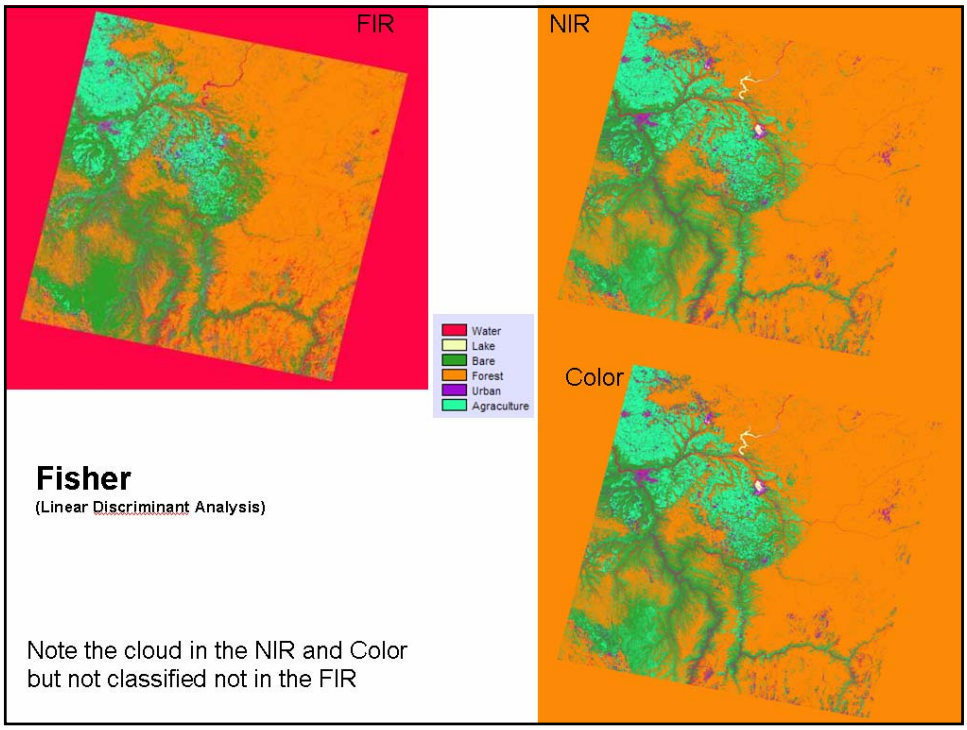
Visual Band Combinations

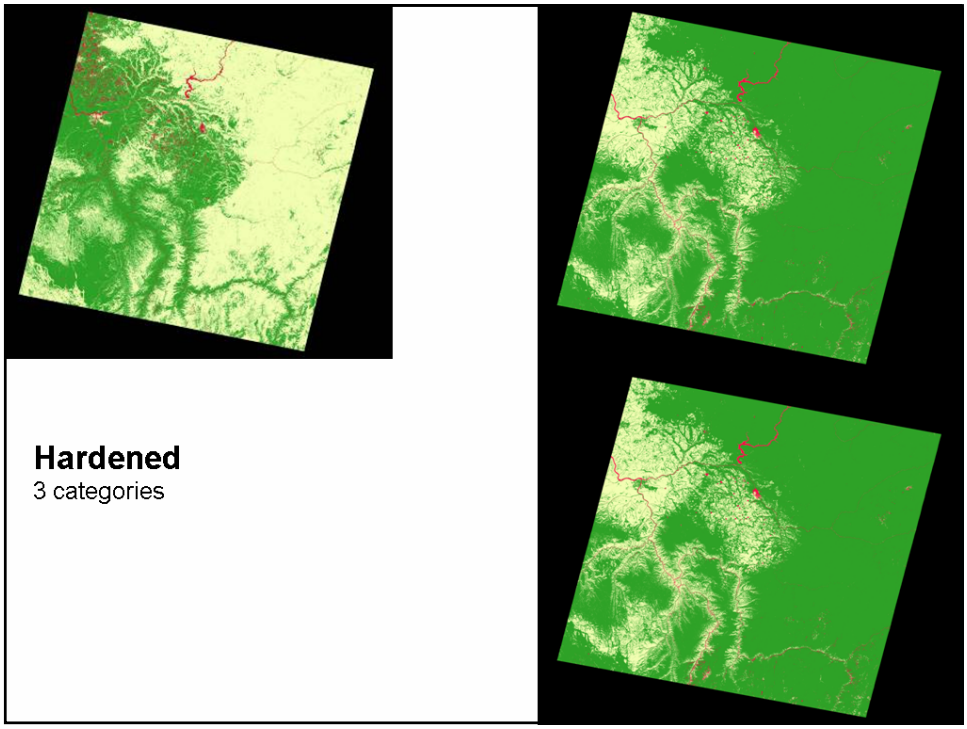


Unsupervised Clustering

6 categories were generated


FIR
NIR
Color
Water
Lake
Bare
Forest
Urban
Agraculture
Maximum Likelihood


FIR
NIR
Color
Water
Lake
Bare
Forest
Urban
Agraculture
Fisher
(Linear Discriminant Analysis)
Note the cloud in the NIR and Color
but not classified not in the FIR



Hardened
3 categories

Results

- Accuracy assessments
  Error matrixes for the different test against each other
- The FIR image classified the forest/bare earth distinction the best for the supervised tests.
- The river was classified well in all the supervised methods
- The cloud messed up everything in the area classified some times as a lake, a river or even urban.

Error Matrix Analysis of STUDYAREAMAXLIKE (columns : truth) against STUDYAREAFIR-MAXLIKE (rows : mapped)

	1	2	3	4	5	6	Total	ErrorC
1	62078	22585	0	5707	80	68	90518	0.3142
2	5789	12637	0	4529	15301	6006	44262	0.7145
3	0	0	6751018	0	173688	777583	7702289	0.1235
4	4752	649	0	20213031	1256954	162777	21638164	0.0659
5	0	399	3242	1186937	2898632	710357	4799567	0.3961
6	0	4	1015196	405981	26927225	5335059	33683464	0.8416
Total	72619	36274	7769456	21816184	31271880	6991850	67958264	
ErrorO	0.1452	0.6516	0.1311	0.0735	0.9073	0.2370		0.4810

Error Matrix Analysis of STUDYAREANIR-MAXLINE (columns : truth) against STUDYAREAFIR-MAXLIKE (rows : mapped)

	1	2	3	4	5	6	Total	ErrorC
1	62092	22586	0	5728	81	31	90518	0.3140
2	5835	12584	0	4242	16246	5355	44262	0.7157
3	0	0	6823234	0	212827	666228	7702289	0.1141
4	5032	645	0	20171363	1257790	203333	21638164	0.0678
5	0	374	6253	1112986	2485966	1193988	4799567	0.4820
6	0	4	818112	326134	26798636	5740579	33683464	0.8296
Total	72959	36193	7647599	21620452	30771546	7809514	67958264	
ErrorO	0.1489	0.6523	0.1078	0.0670	0.9192	0.2649		0.4806

Error Matrix Analysis of STUDYAREANIR-MAXLINE (columns : truth) against STUDYAREAMAXLIKE (rows : mapped)

	1	2	3	4	5	6	Total	ErrorC
1	72590	0	0	0	24	5	72619	0.0004
2	0	36152	0	0	116	6	36274	0.0034
3	0	0	7505211	0	3745	260500	7769456	0.0340
4	0	0	0	21608601	72210	135374	21816184	0.0095
5	34	40	1503	9948	30585088	675267	31271880	0.0220
6	335	1	140885	1904	110363	6738362	6991850	0.0363
Total	72959	36193	7647599	21620452	30771548	7809514	67958264	
ErrorO	0.0051	0.0011	0.0186	0.0005	0.0061	0.1372		0.0208

Conclusion

- The lakes were hard to classify correctly in both methods
- The agriculture lands were often misclassified as forest or bare earth
- Urban environments are very difficult to classify. Maximum Likelihood test found urban the best.
- Unsupervised clustering works well for non-human touched lands (forests/bare)