Extracting Basic Landcover Classes From Metro's High Resolution Terrestrial Air Photos

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Todays Presentation

- Project Goals - Automation
- Data - High Resolution Color Infrared Orthophotos
- Methods - Object Oriented Extraction
- Results of Pilot Project
- Lessons Learned

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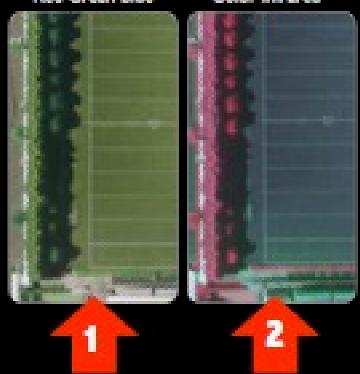
Data - High Resolution CIR Orthos

Artificial Turf Field

Red Green Blue   Color Infrared



- ADH40 Digital Camera
- Aircraft Platform
- Orthorecification using gps data and dtm
- 6 in per pixel native resolution
- RGB and NIR bands

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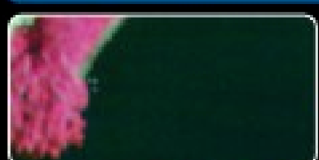
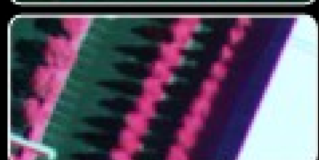
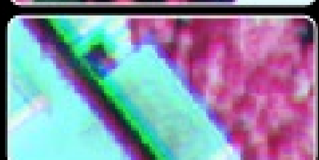
Data Challenges



Scan lines in dark areas



Significant Shadows



NIR band not registered

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Methods - Feature Analyst

- Visual Learning Systems - Feature Analyst
  - Object based classification
  - Uses inductive learning algorithms to model feature recognition process
    - User gives a sample of the features to be extracted
  - Genetic Ensemble Feature Selection

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Methods - 2 Processes

- Decision Tree
  - Used Multiple operation to maximize differences in the desired classes
  - Good for one image
- Multi Input Feature Extraction
  - One operation that makes use of a 4 class training layers
  - Can be batched to many images

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Step 1- Image Fusion to NDVI

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Step 2- Extract Vegetation

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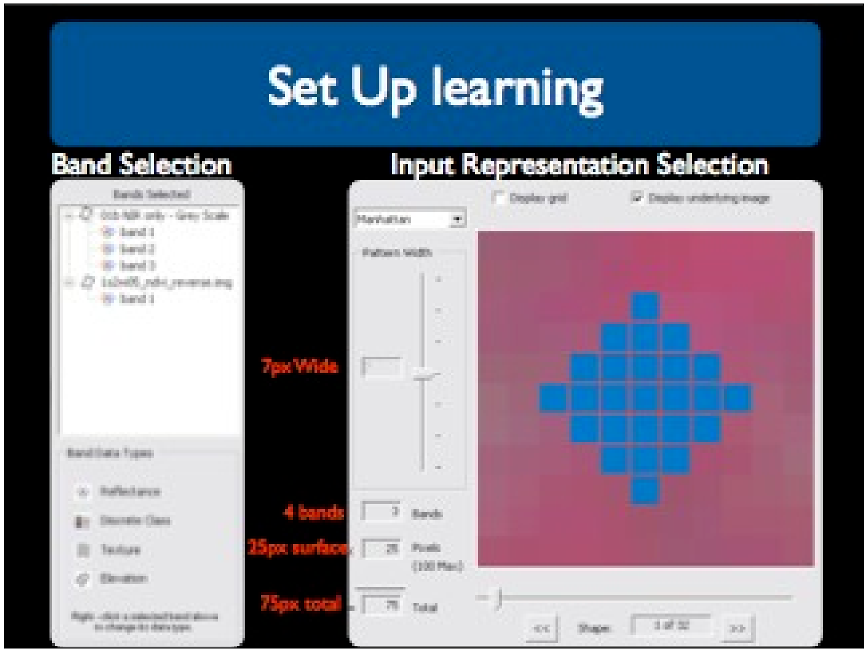

Set Up learning
Band Selection
Input Representation Selection
7px Wide
4 bands
25px surface
75px total

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Step 2- Vegetation Result

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Step 2- Extract Trees & Other Veg

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Step 2 - Tree & Other Veg Results

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Step 3 - Grass & Shrub Extraction

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Decision Tree Results

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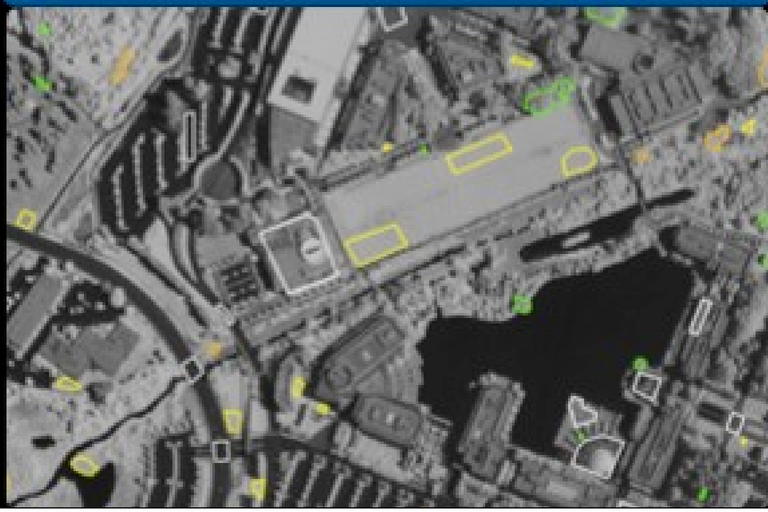
Multi-Input Training



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Multi-Input Results

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Decision Tree Accuracy

Classification Data	background	Grass	Shrub	Tree	Total	Users Accuracy %	K^
	Reference Data						
background	93	0	0	0	93	-	1.00
Grass	0	19	0	1	20	95	.94
Shrub	0	2	20	3	25	80	.77
Tree	0	2	3	57	62	92	.88
Total	93	23	23	61	200		
Producers Accuracy %	-	83	87	94			

Overall Accuracy = 94.50%   Overall Kappa = .9171

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Multi-Input Accuracy

Classification Data	background	Grass	Shrub	Tree	Total	Users Accuracy %	K^
	Reference Data						
background	92	0	1	1	93	-	.96
Grass	0	15	0	2	20	88	.86
Shrub	0	7	18	5	25	60	.55
Tree	1	1	3	54	62	91	.87
Total	93	23	22	62	200		
Producers Accuracy %	-	65	82	87			

Overall Accuracy = 89.50%   Overall Kappa = .8418

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Lessons Learned

- Need more reference points to asses accuracy
- Need reference points based on field data
- The analysis would benefit from lidar to resolve vegetation in shadows and shrub area.
- At some point a method is needed to extract water and turn the "background" class into a credible impervious class.

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Thank You

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