

BUILDING A WORLD OF DIFFERENCE

AUTOMATED FEATURE EXTRACTION FROM IMAGERY IN GIS

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AGENDA

Why do this?

Budgeting

Getting imagery and selecting tiles

Extracting features (at night, when you're sleeping)

Clean up

Discussion/Questions

WHY DO THIS?

- Leverage information in public domain imagery
- Need to rapidly assess large area / # features
- Not enough time and/or budget to digitize manually
- Ok with ~ 80% accuracy
- Change detection
- Sanity of GIS professionals

CASE STUDY: ORANGE COUNTY



ASSESS PV POTENTIAL ON A PARCEL BY PARCEL BASIS

- Rooftops
- Parking Lots
- Vegetation
- Swimming Pools
- Bare ground

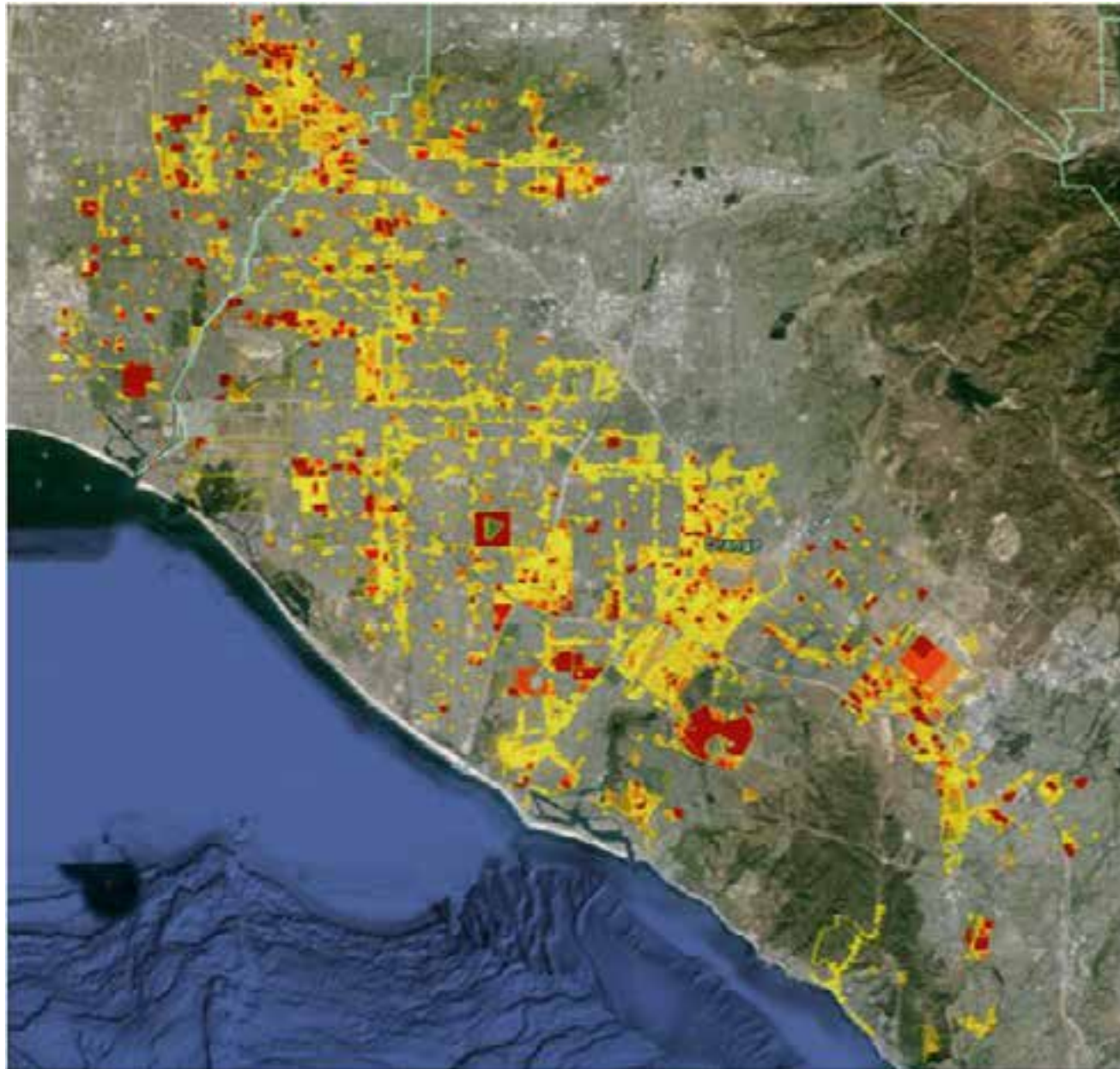
IMAGE PROCESSING TO IDENTIFY ROOFS AND LARGE PARKING LOTS



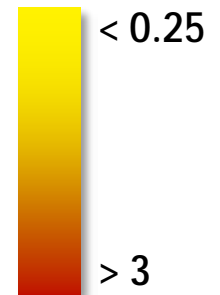
IMAGE PROCESSING TO IDENTIFY ROOFS AND LARGE PARKING LOTS



IDENTIFIED LARGE ROOFS AND PARKING LOTS



Technical Potential
Capacity, MWdc



WHAT YOU NEED FOR THIS RECIPE

- Imagery
- ArcGIS for Desktop
- Feature Analyst extension by Overwatch Geospatial
- Zippy workstation or other heavy duty processing capability
- Some ancillary GIS datasets are very helpful: parcels, land use, zoning, general plans, etc.

BUDGETING

- Software
- 12 hours of Feature Analyst setup
- 15 minutes per square mile
 - Image download
 - Extraction
 - Clean up
- “Break even” point ~ 10 square miles vs. digitizing

ACQUIRING IMAGERY





1m NAIP





0.3m High-Res Orthophoto

USGS EARTHEXPLORER: HIGH-RES ORTHOS

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EarthExplorer

Home | 1 New System Message | Profile | Save Criteria | Load Favorite

Search Criteria | **Data Sets** | Additional Criteria | Results

2. Select Your Data Set(s)

Check the boxes for the data set(s) you want to search. When done selecting data set(s), click the *Additional Criteria* or *Results* buttons below. Click the plus sign next to the category name to show a list of data sets.

Use Data Set Prefilter [\(What's This?\)](#)

Data Set Search:

Aerial Imagery

- Aerial Photo Mosaics
- Aerial Photo Single Frames
- Aircraft Scanners
- Antarctic Flight Line Maps
- Antarctic Single Frames
- ASAS
- DOQ
- High Resolution Orthoimagery
- NADP JPG2000
- NAPP
- NHAP
- SLAR
- Space Acquired Photography

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EarthExplorer

Home | 1 New System Message | Profile | Save Criteria | Load Favorite

Search Criteria | **Data Sets** | Additional Criteria | Results

1. Enter Search Criteria

To narrow your search area: type in an address or place name, enter coordinates or click the map to define your search area (for advanced map tools, view the [help documentation](#)), and/or choose a date range.

Address/Place | Path/Row | Feature | Circle

Show Clear

Coordinates | Predefined Area | Shapefile | KML

Degree/Minute/Second | Decimal

No coordinates selected.

Use Map Add Coordinate Clear Coordinates

Date Range Result Options

Standard Search

Number of records to return: 2,000

Data Sets Additional Criteria Results

























Full Display of 1627004_11SMT125290

Standard Browse

Data Set Attribute	Attribute Value
Entity ID	1627004_11SMT125290
Beginning Date	2010/03/28
Ending Date	2010/03/29
EPSG	26911
Map Projection Description	NAD83 / UTM zone 11N
State/Province/Country	CA
Datum	NAD83
Dataset	201003_orange_county_ca_0x3000m_utm_clr
Projection Zone	11
Sensor	UNKNOWN
Sensor Type	Color
Number of Bands	3
Vendor	WOOLPERT_INC
Resolution	.3
Units of Resolution	METER
Image Name	11smt125290
Agency	USGS
Dataset Size	55750
Center Latitude	33°42'15.04"N
Center Longitude	117°56'10.09"W
NW Corner Lat	33°42'39.17"N
NW Corner Long	117°56'39.48"W

Open New Window Close

USGS EARTHEXPLORER: BULK DOWNLOAD

5		<p>Entity ID: 1627490_11SMT110290 Acquisition Date: 28-MAR-10 State: CA</p> <p>      </p>
6		<p>Entity ID: 1627084_11SMT125290 Acquisition Date: 28-MAR-10 State: CA</p> <p>      </p> <p><u>Add to Bulk Download</u></p>
7		<p>Entity ID: 1627102_11SMT140290 Acquisition Date: 28-MAR-10 State: CA</p> <p>      </p>



EarthExplorer

[Home](#) [1 New System Message](#) [Profile](#) [Save Criteria](#) [Load Favorite](#) ▾

[Search Criteria](#)

[Data Sets](#)

[Additional Criteria](#)

[Results](#)

4. Search Results

If you selected more than one data set to search, use the dropdown to see the search results for each specific data set.

Hide Result Controls ▴

- Show All Footprints From Current Page
- Show All Browse From Current Page
- Add All Results From Current Page to Bulk Download

Compare Browse: ▾ ▾

Browse Opacity: 100%



Data Set

[Click here to export your results](#) >

High Resolution Orthoimagery ▾

EXTRACTING FEATURES

SEVERAL TYPES OF EXTRACTIONS IN FEATURE ANALYST EXTENSION

- Unsupervised (input is # of classes) – useful for determining classes
- Supervised, single class
- Supervised, multi-class
- Wall-to-wall on or off (Supervised)

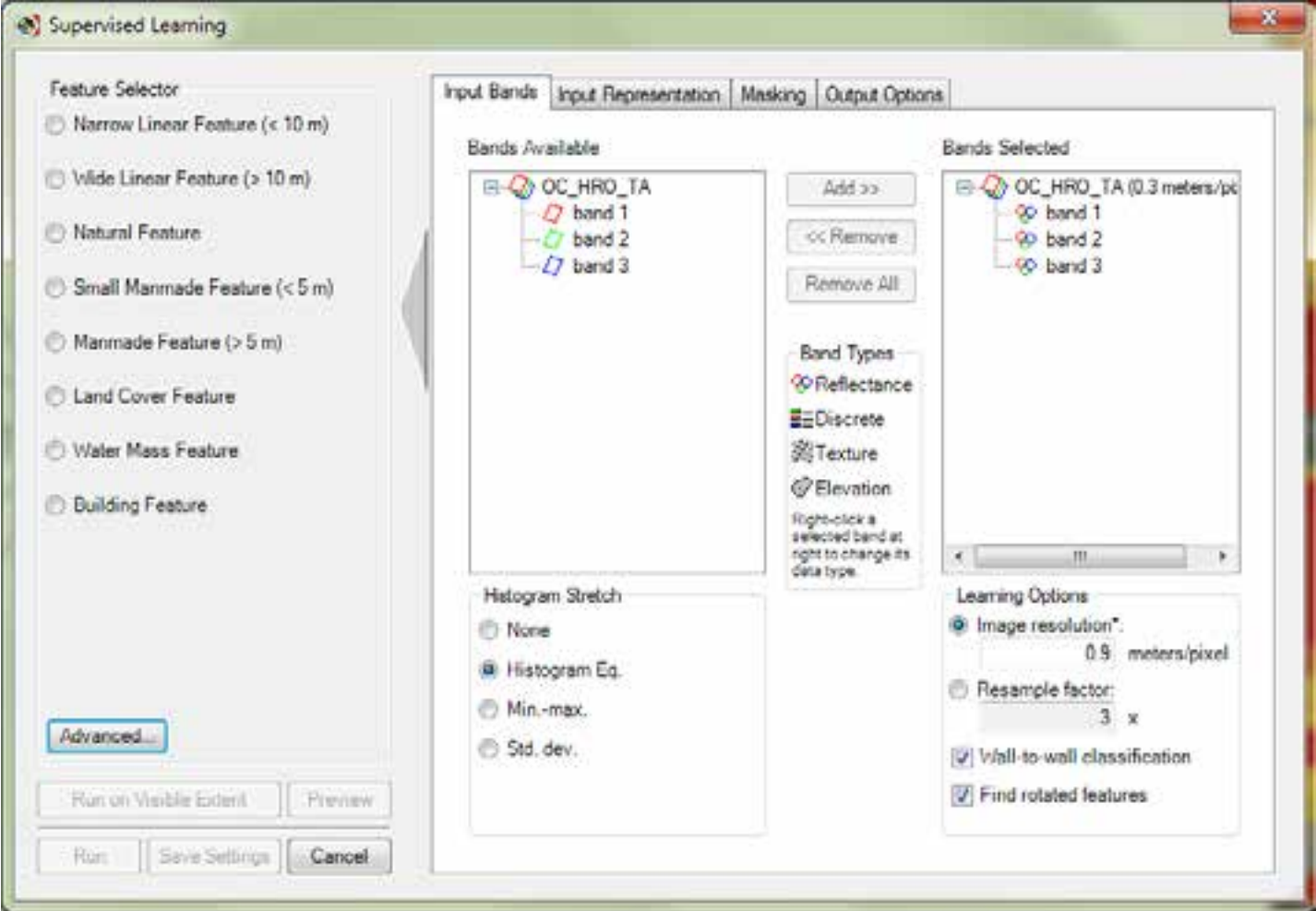
MULTI-CLASS, SUPERVISED, WALL-TO-WALL



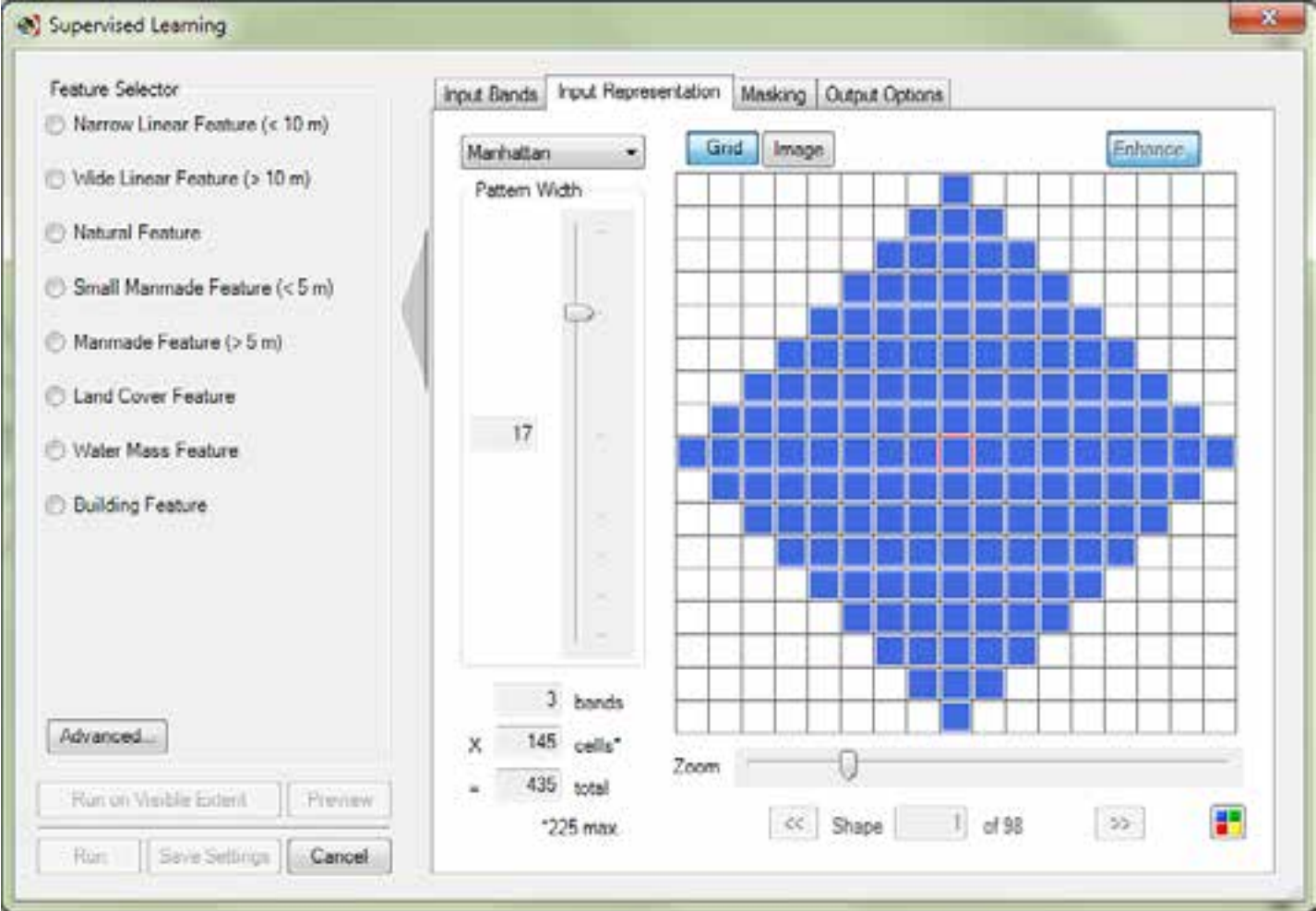
TRAINING SETS



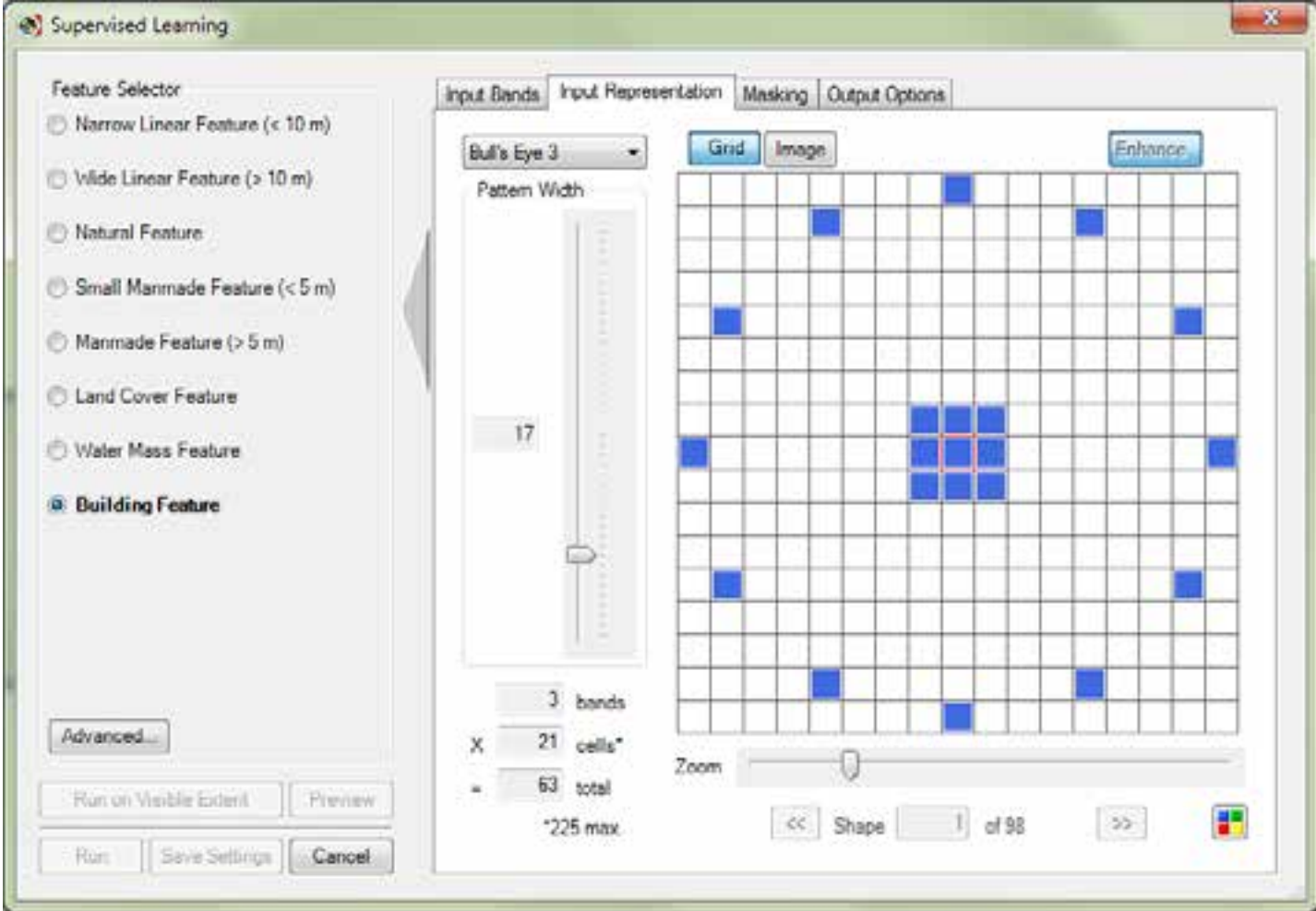
SUPERVISED EXTRACTION SETTINGS



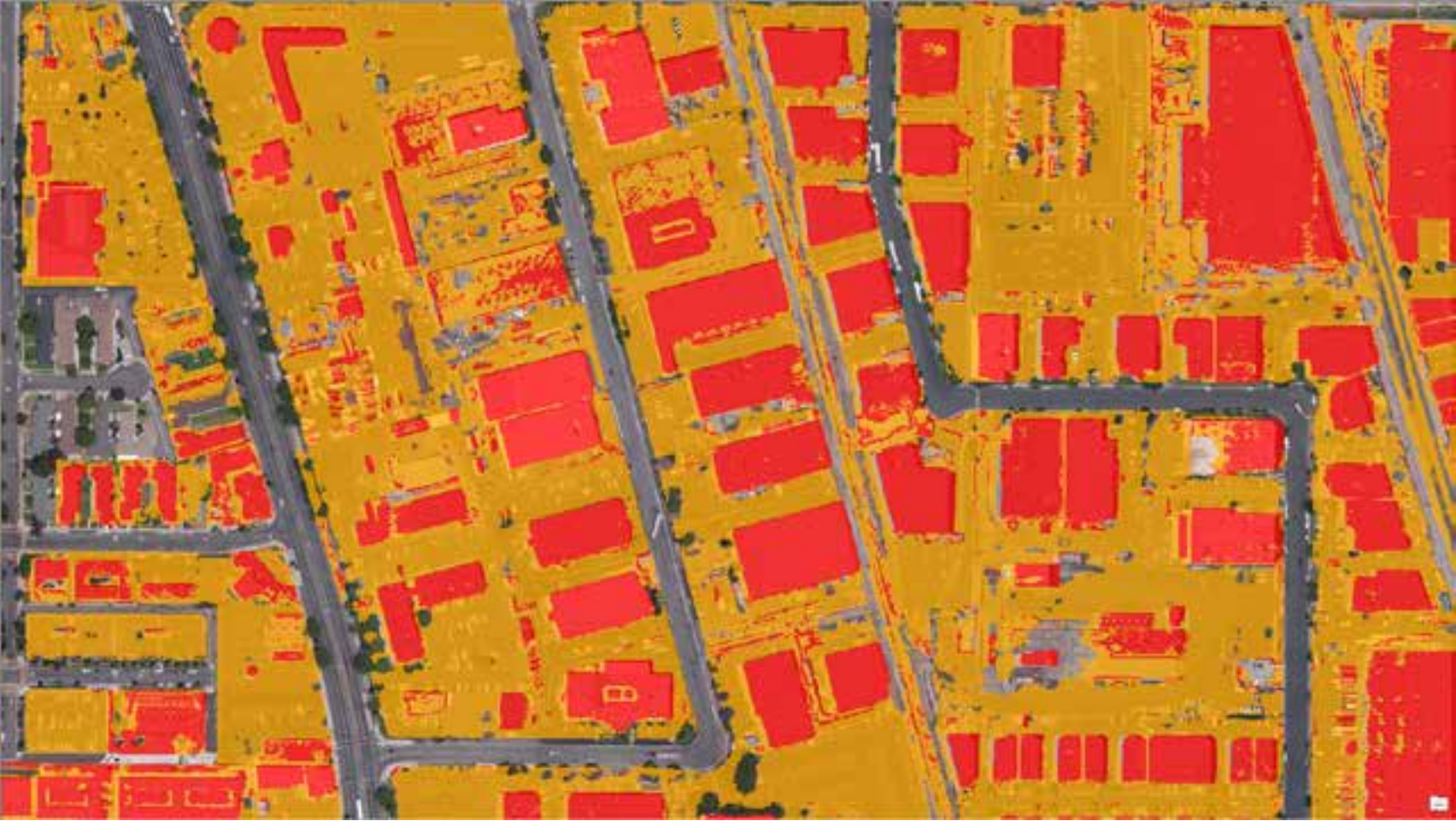
SUPERVISED EXTRACTION SETTINGS



SUPERVISED EXTRACTION SETTINGS



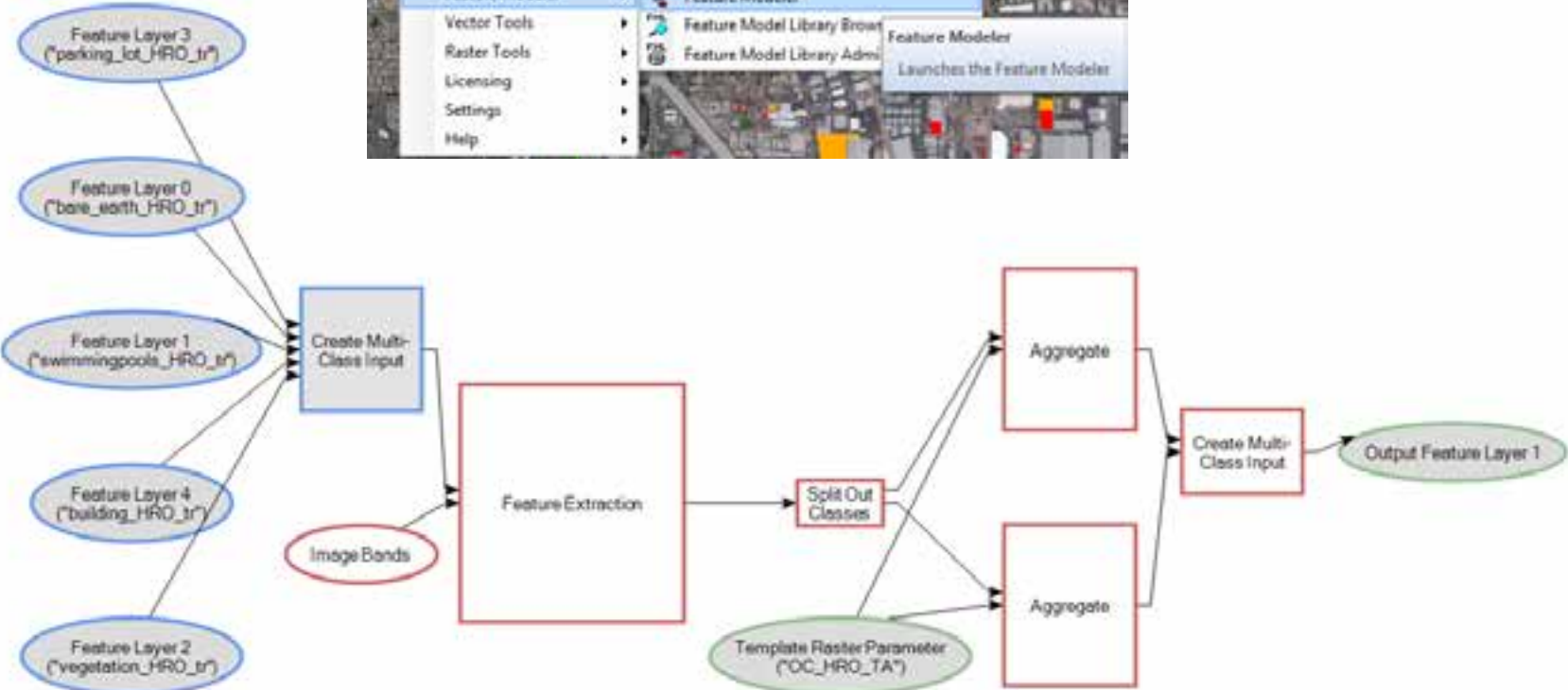
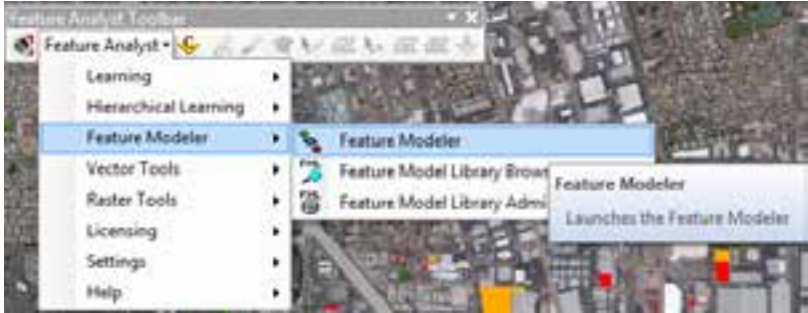
RAW RESULTS, SPLIT BY CLASS



AGGREGATED, 300M



FEATURE MODELER, BATCH PROCESSING



CLEAN UP



INSIDE FEATURE ANALYST

- Hierarchical learning
- Feature simplification
- Smoothing
- Aggregating
- Squaring features
- Converting polygons to points
- Converting polygons to lines

MANUAL CLEAN UP

- Clip to selected parcels, if needed
- Visual QC
- Removal of egregious errors
- Etc

RESOURCES

- Feature Analyst Demo free trial version:
<http://www.vls-inc.com/login/software.htm>
- Includes tutorial MXD and 158 page tutorial guide
- Feature Analyst Resource Guide
- LiDAR Analyst 5.1 for ArcGIS by Overwatch Geospatial (v5.2 if on ArcGIS 10.2)



QUESTIONS



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Together



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