

# Deep Globe Building Detection Challenge

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Zhao Kang

# Objective & Background

- Automatically detecting buildings from satellite images
- Binary segmentation problem to localize all building polygons in each area
- Use same data and evaluation methods as [SpaceNetChallenge](#), which has been held for 2 rounds.

# Data: Input Files: Overview

City	Area (Sq. Km)	Building Labels (Polygons)	Amount (GB)
Vegas	216	151367	23+7.9
Paris	1030	23816	5.3+1.8
Shanghai	1000	92015	23.4+7.7
Khartoum	765	35503	4.7+1.6

Image size: 200m\*200m

Image format: GeoTiff

Data collection: Digital Globe Worldview-3 Satellite

Data source: SpaceNet Building Dataset

Data downloading: Amazon Online Service:

```
aws s3 ls s3://spacenet-dataset/SpaceNet_Buildings_Dataset_Round2/
```

# Data: Input Files: Satellite Images

4 different types:

- ◆ PAN: panchromatic (single channel, 16-bit grayscale, ~30 cm resolution)
- ◆ MUL: 8-band multi-channel (8\*16-bit, ~1.2m resolution).
- ◆ RGB-PanSharpen: [pan-sharpened](#) version of Red-Green-Blue bands from the multispectral product (3 channels, 3\*16-bit, ~30 cm resolution).
- ◆ MUL-PanSharpen: pan-sharpened version of MUL (8 channels, 8\*16 bit, ~30 cm resolution)

# Data: Input Files: Ground Truth Files

- CSV files Format:

```
img1,1,"POLYGON ((103.7 205.4 0,107.8 201.9 0,
100.5 203.2 0,94.4 208.0 0,93.0 215.7 0,92.1 226.1 0,89.6 228.8 0,
95.0 233.9 0,92.4 236.6 0,95.4 239.8 0,116.7 221.0 0,116.7 216.1 0,
103.7 205.4 0))", "POLYGON ((-43.681699199999969 -22.981289 0, ...
[truncated for brevity]...))"
```

**ImageId:** a string that uniquely identifies the image.

**BuildingId:** an integer that identifies a building in the image (1 or -1)

**PolygonWKT\_Pix:** specifies the points of the shape that represents the building in Well Known Text format. The coordinate values represent pixels.

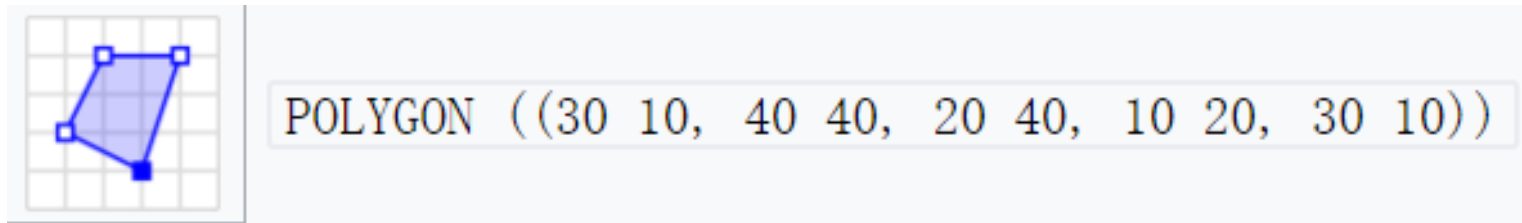
**PolygonWKT\_Geo:** specifies the points of the same shape in geographical coordinates in {latitude, longitude, 0} triplets.

# Output Files (Detection Result)

- CSV files:

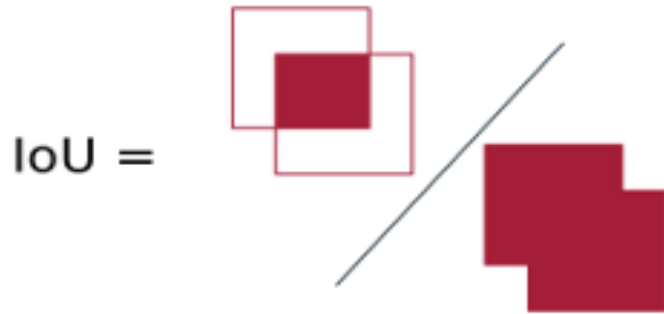
ImageId, BuildingId, PolygonWKT\_Pix, Confidence

Confidence is a positive real number, higher numbers mean you are more confident that this building is indeed present. See the details of scoring for how this value is used.



# Evaluation Metric

- IOU (Intersection over union)



true positive if  $\text{IOU} > 0.5$

false positive otherwise

- F1 Score

$$\text{F1 score} = 2 * \text{Precision} * \text{Recall} / (\text{Precision} + \text{Recall})$$

# Important Dates

- Date open: March 16<sup>th</sup>
- Submission Deadline: April 30<sup>th</sup>, 6 pm (results and paper of 4 pages)
- Competition ends: May 15<sup>th</sup>
- Paper Notification: May 20<sup>th</sup>
- Challenge Notification: May 25<sup>th</sup>
- Deep Globe Workshop at CVPR: June 18<sup>th</sup>



# Reference

1. <http://deepglobe.org/challenge.html>
2. <https://github.com/SpaceNetChallenge>
3. <https://wwwtc.wpengine.com/spacenet>
4. <https://community.topcoder.com/longcontest/?module=ViewProblemStatement&rd=16892&pm=14551>