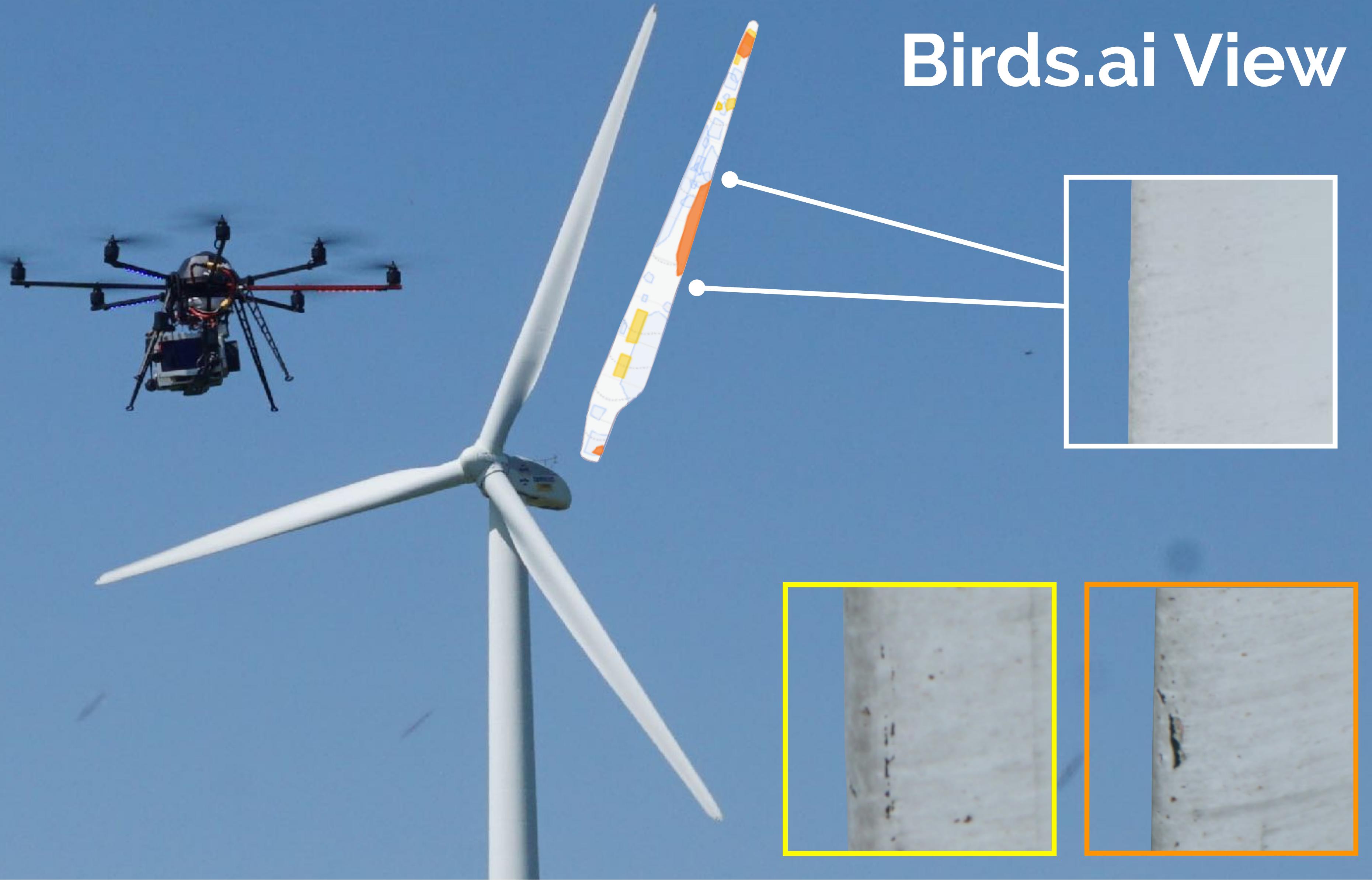






Birds.ai View



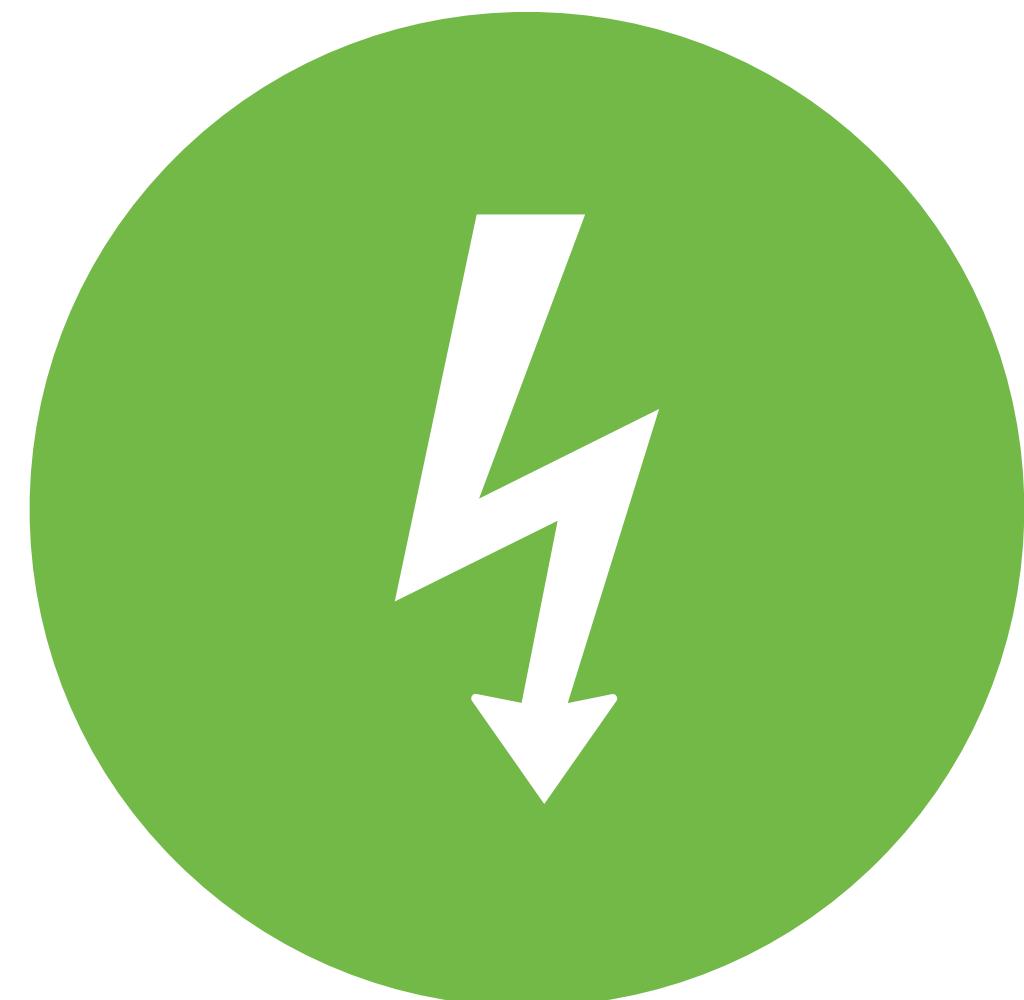


Birds.ai

Benefits



**Control
Assets**



**Expand
Network**



**Grow
Business**



Birds.ai

Market

Europe



USA



World





Birds.ai

Traction



65



Birds.ai

Team



Camiel Verschoor
CEO



Anouk Visser
CTO



Kitso Epema
CPO

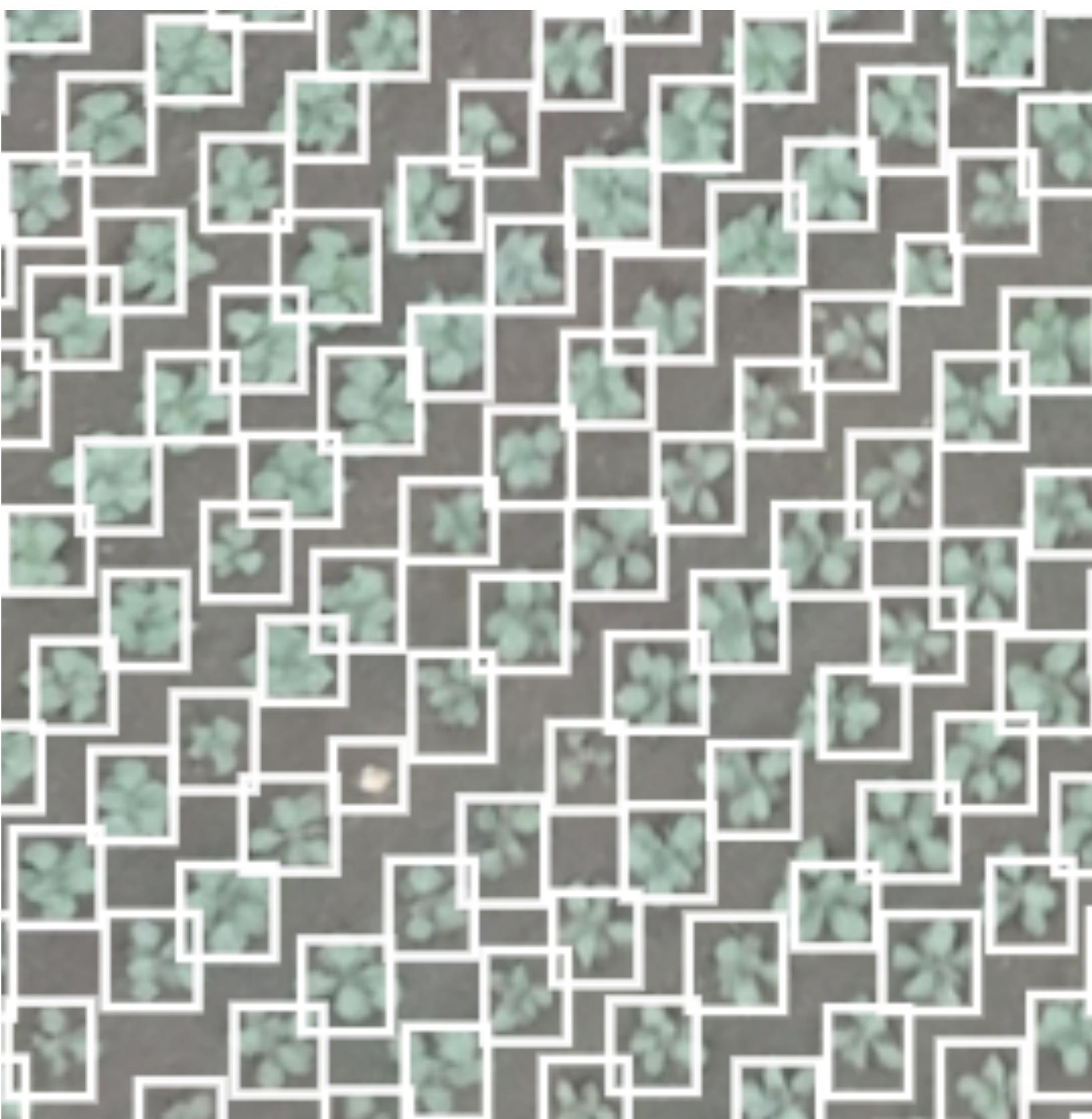


Birds.ai



Birds.ai

Agriculture





Birds.ai

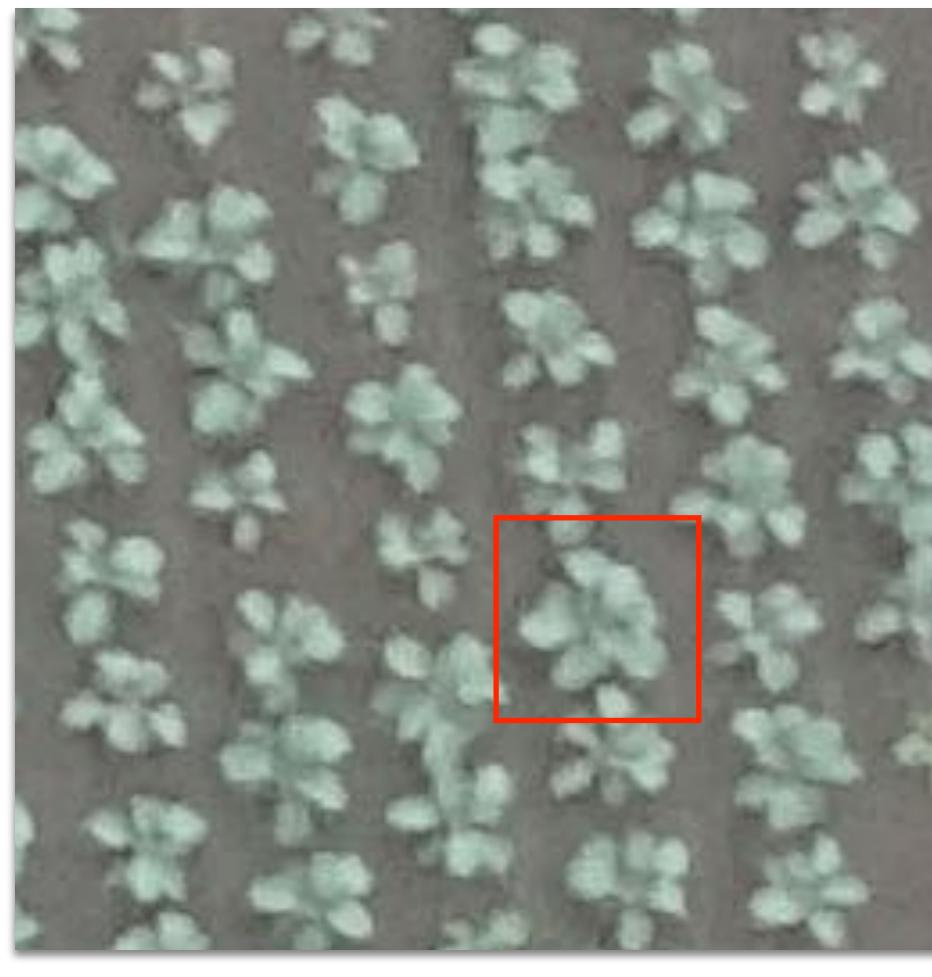


Image with Rols

Convolution
and pooling

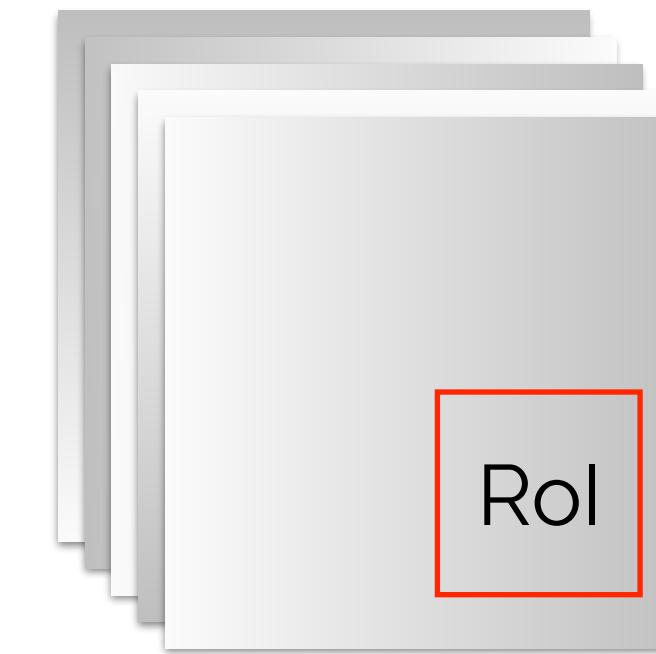
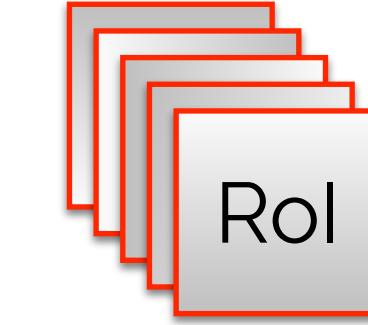


Image
conv features



Rol conv
Features



Fully-connected
layers

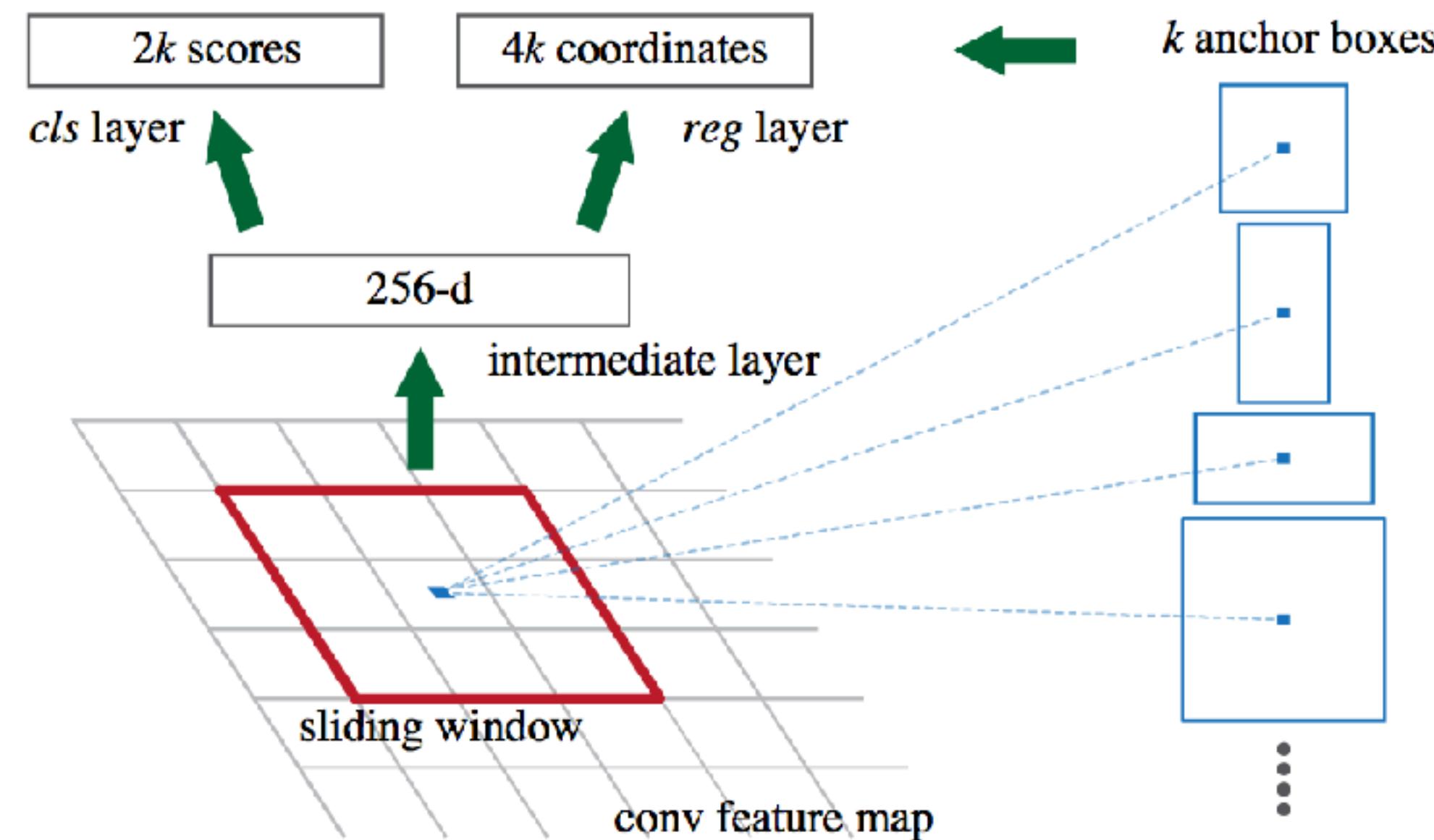


Fast R-CNN [1]



Birds.ai

Faster R-CNN [2]



[2] Ren, S., He, K., Girshick, R., Sun, J.: Faster r-cnn: Towards real-time object detection with region proposal networks. In: IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI). (2016)



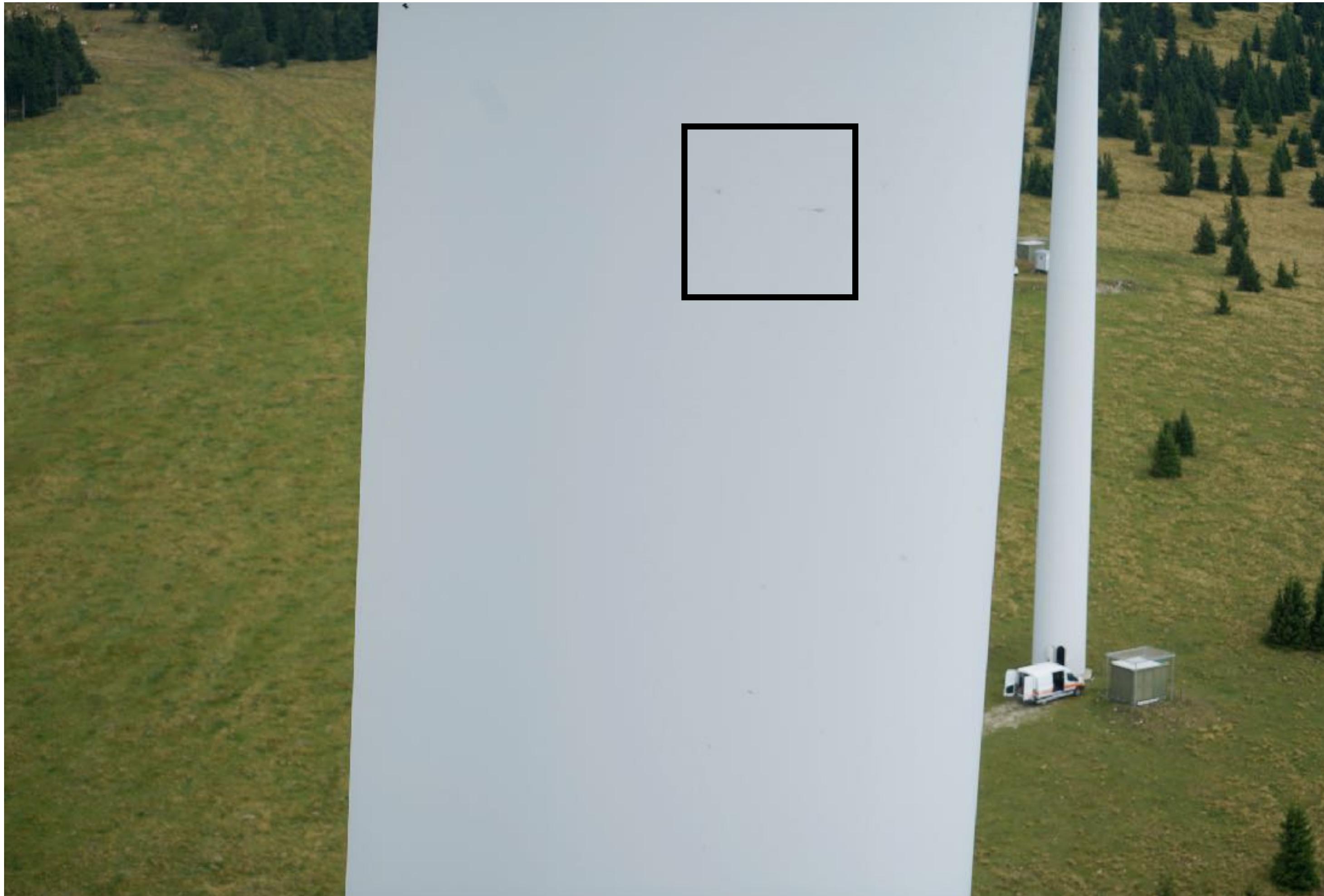
Birds.ai

Wind Turbines





Birds.ai



Wind Turbines





Birds.ai

Missing Components





Birds.ai

Local Damage (level 1)



← →

250px



← →

100px



Birds.ai

Local Damage (level 1)



500px



250px



Main Challenges

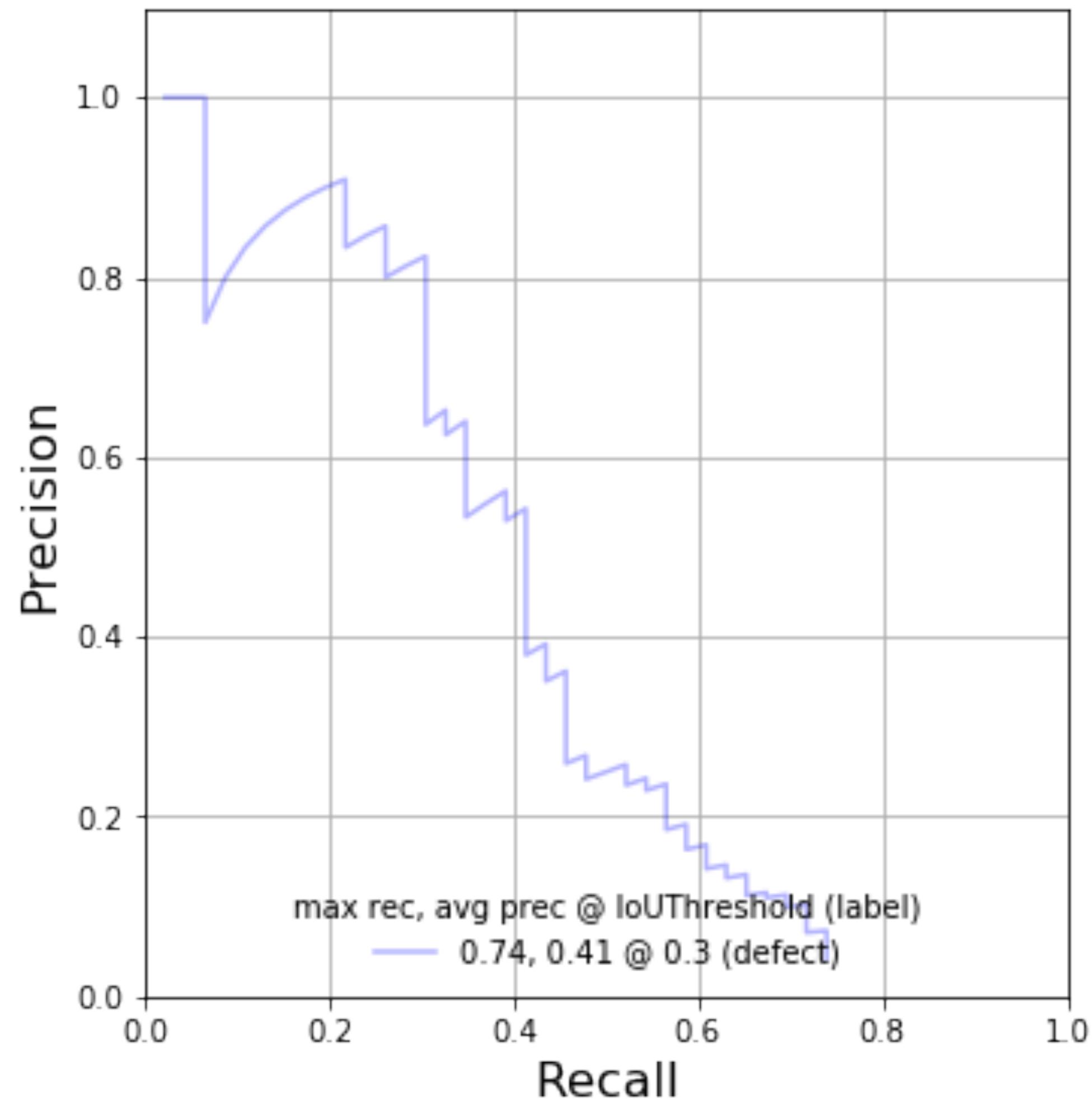
- No 'typical' defect
- Massive variety in shapes / ratios
- No clear boundary
- Missing components are also defects



Birds.ai

- Train
 - 2 wind turbines
 - 75 images
 - 125 defects
- Test
 - 2 wind turbines
 - 34 images
 - 46 detections

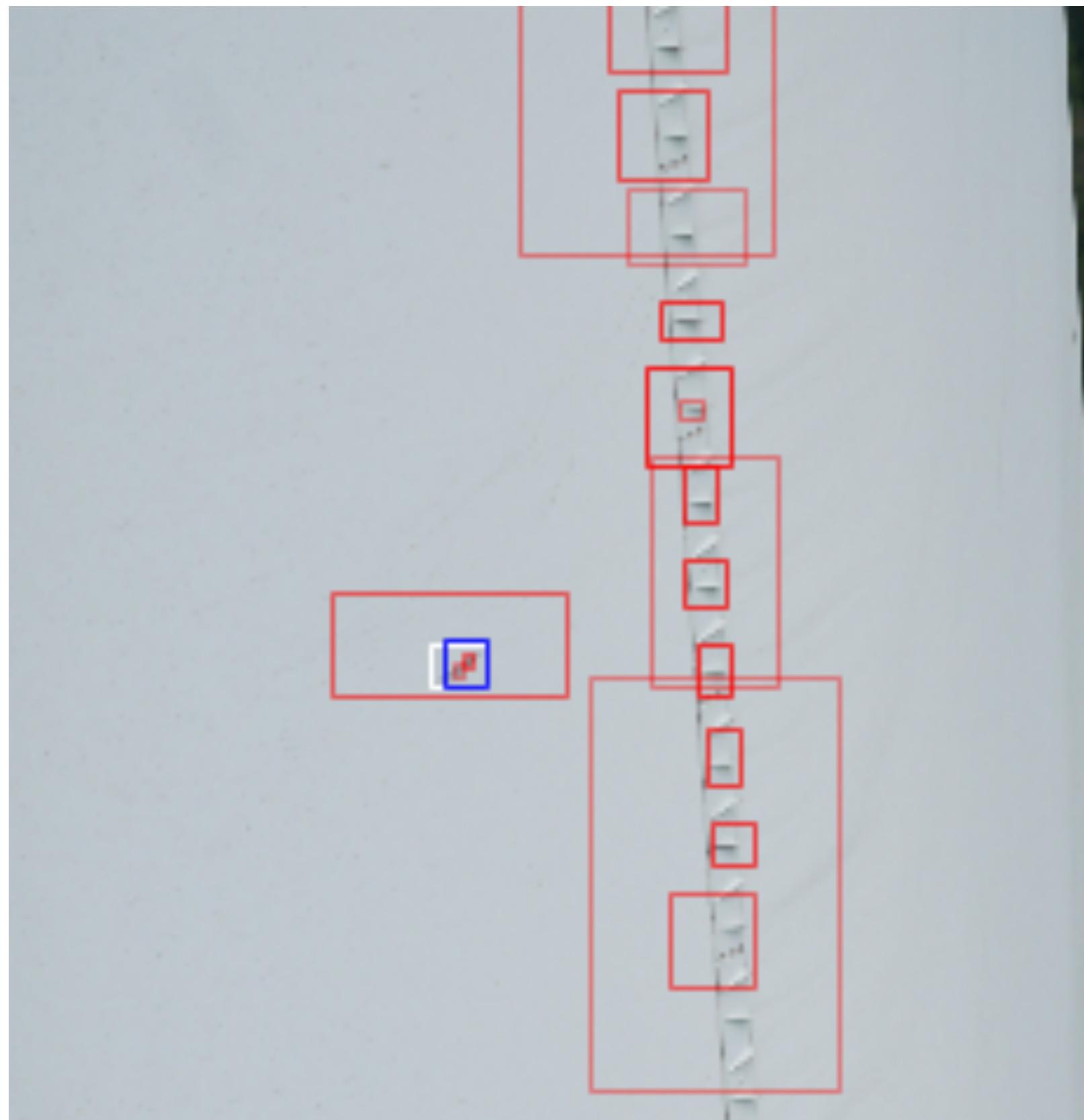
Object Detection





Birds.ai

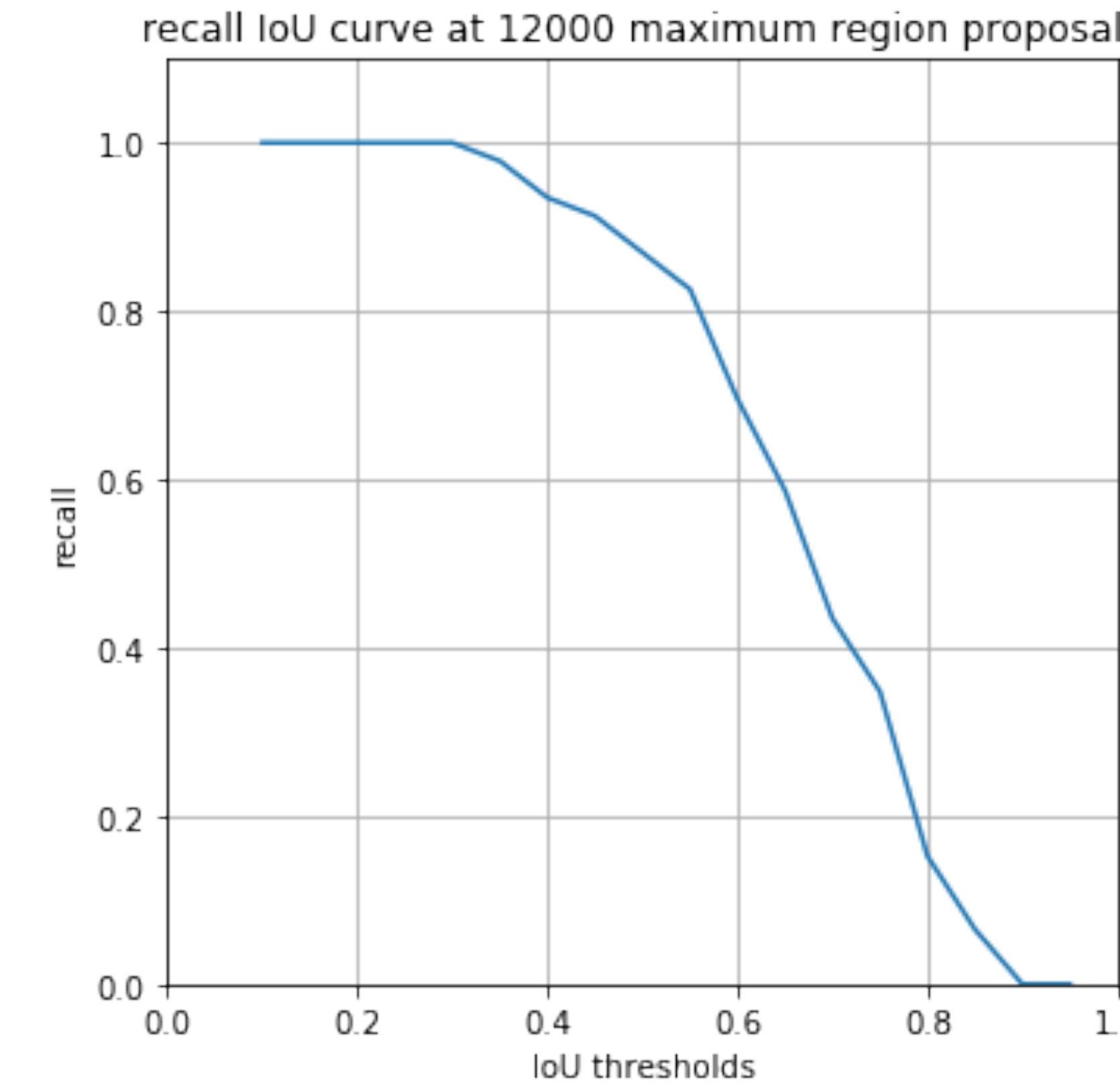
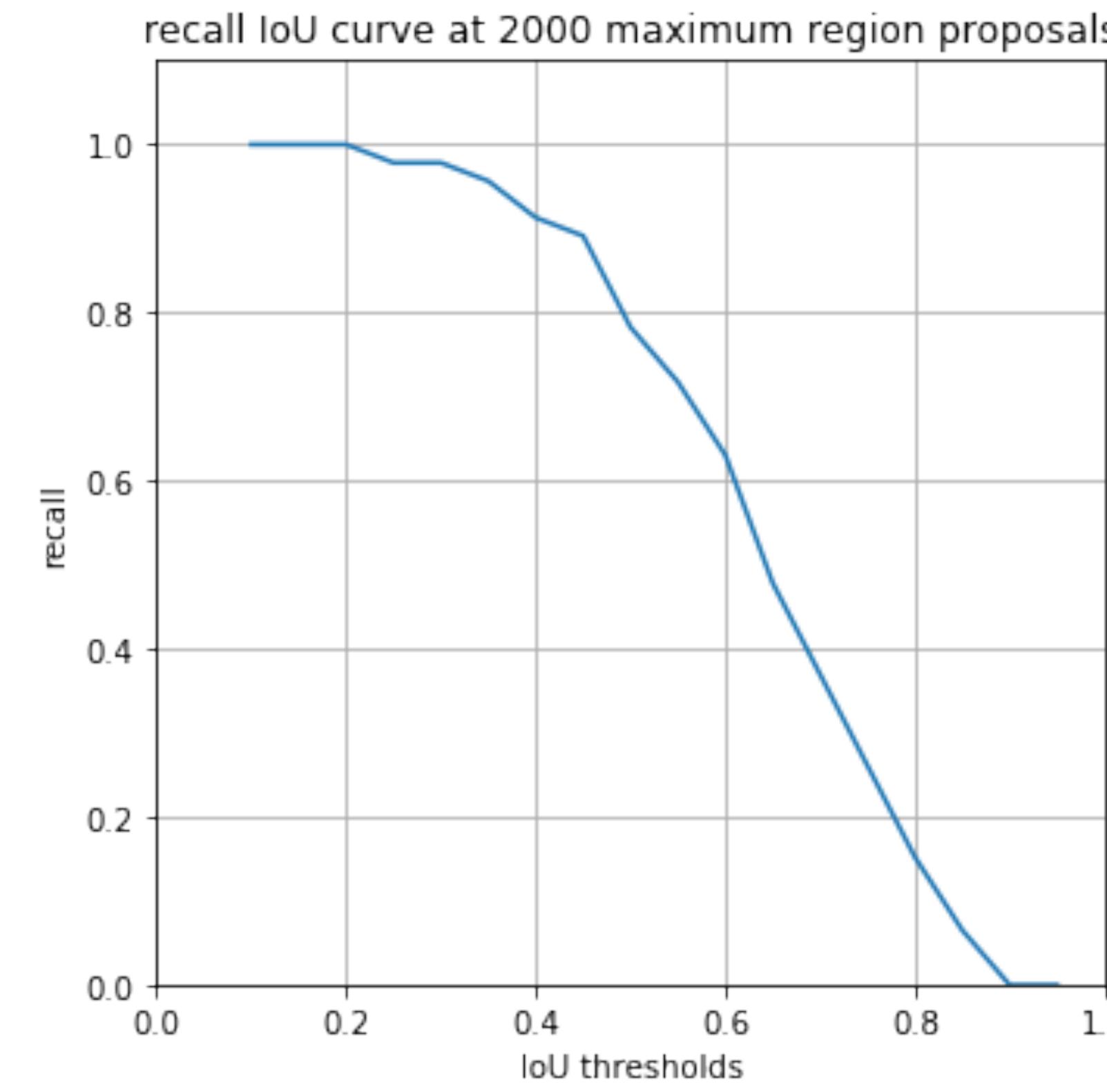
Object Detection





Birds.ai

Object Detection



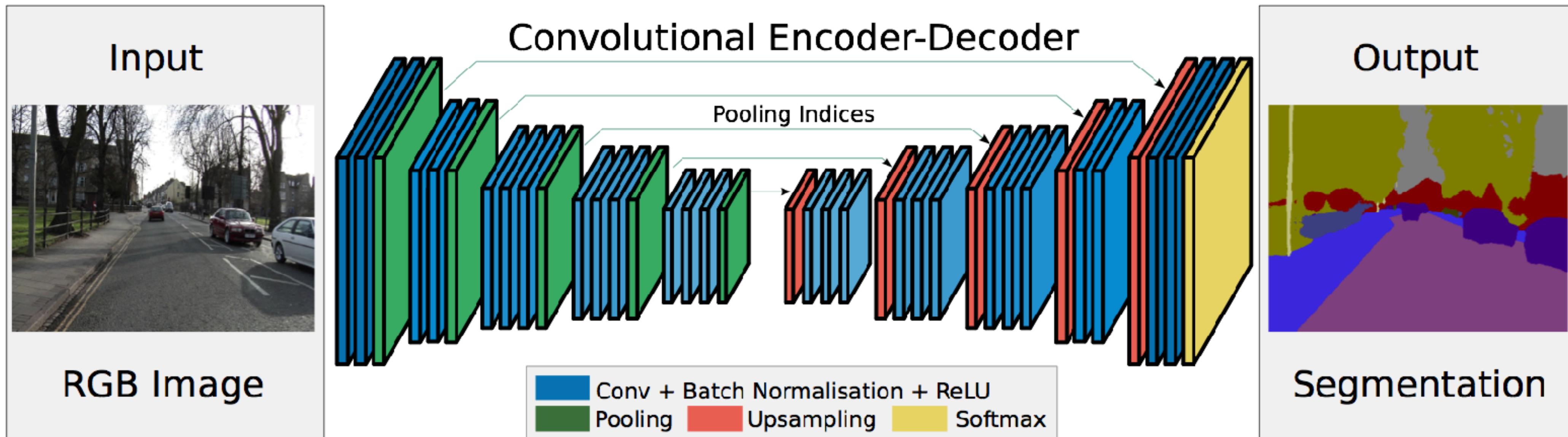




Birds.ai

Semantic Segmentation

SegNet [3]



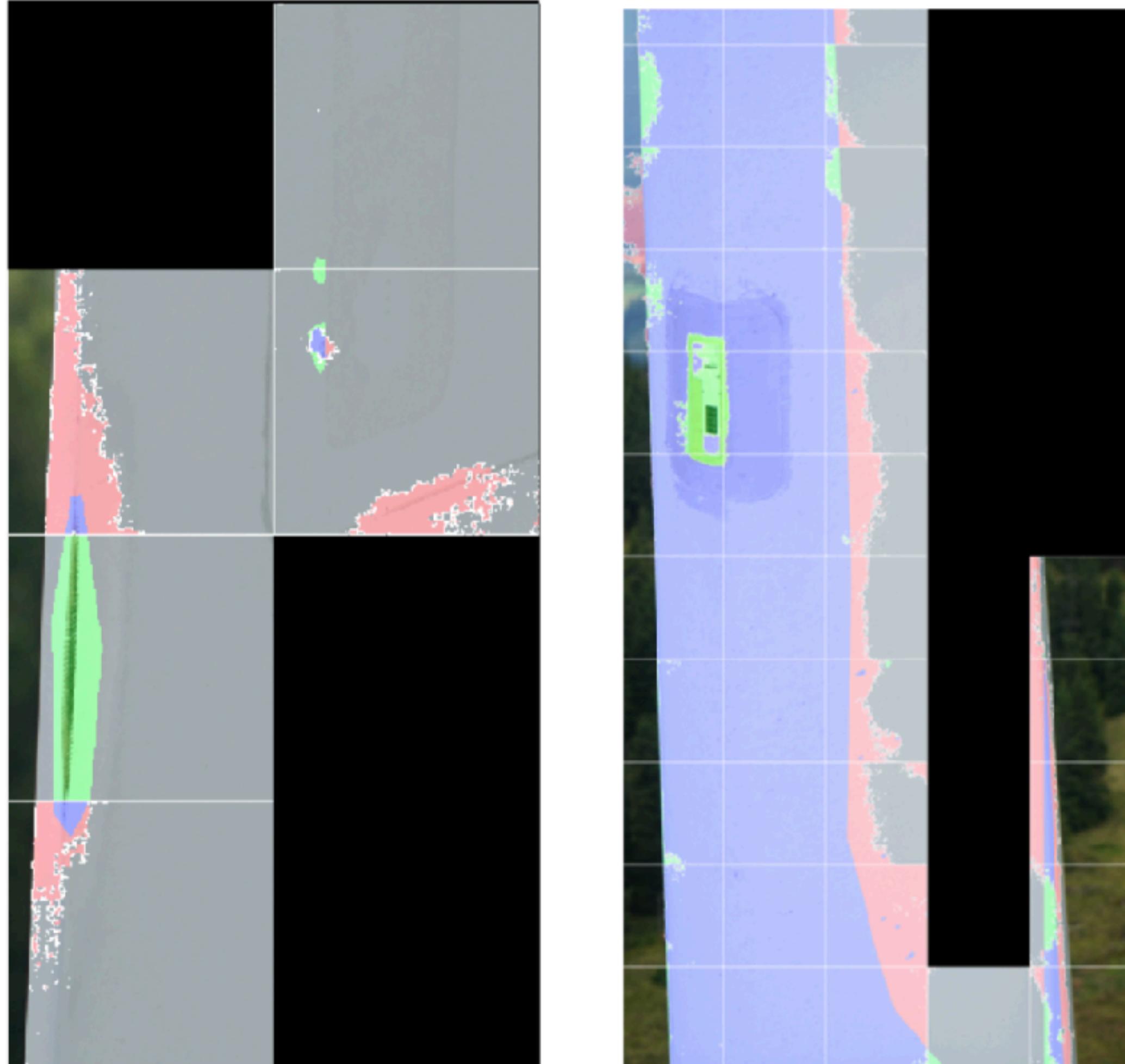
[3] Badrinarayanan, Vijay, Alex Kendall, and Roberto Cipolla. "Segnet: A deep convolutional encoder-decoder architecture for image segmentation." IEEE transactions on pattern analysis and machine intelligence 39.12 (2017): 2481-2495.



Birds.ai

- Train
 - 2 wind turbines
 - 75 images
 - 125 defects
- Test
 - 2 wind turbines
 - 34 images
 - 46 detections

Semantic Segmentation

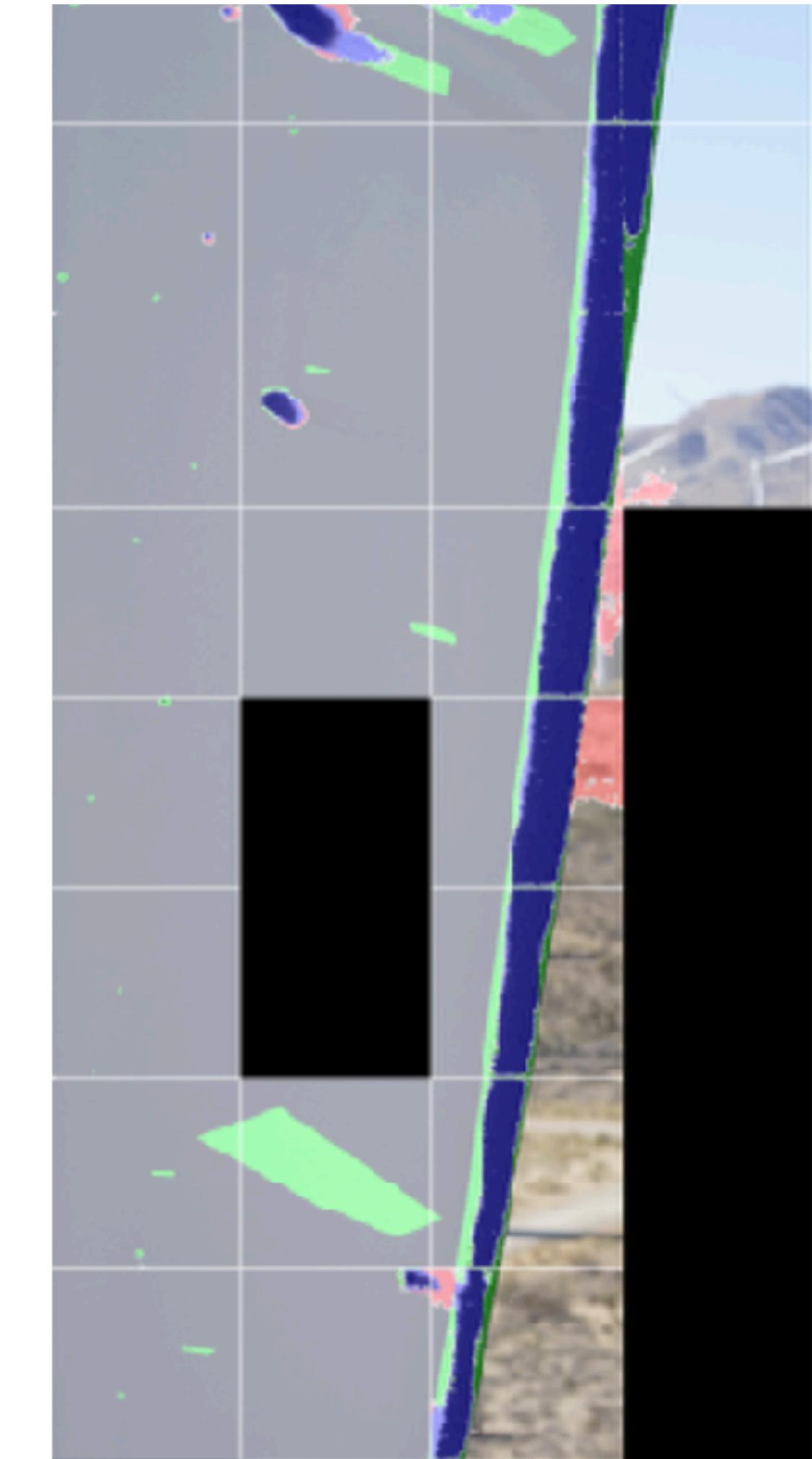




Birds.ai

- Train
 - 8 wind turbines
 - 600 images
- Test
 - 8 wind turbines
 - 200 images
 - 1584 detections

Semantic Segmentation





Birds.ai

- Train
 - 8 wind turbines
 - 600 images
- Test
 - 8 wind turbines
 - 200 images
 - 1584 detections

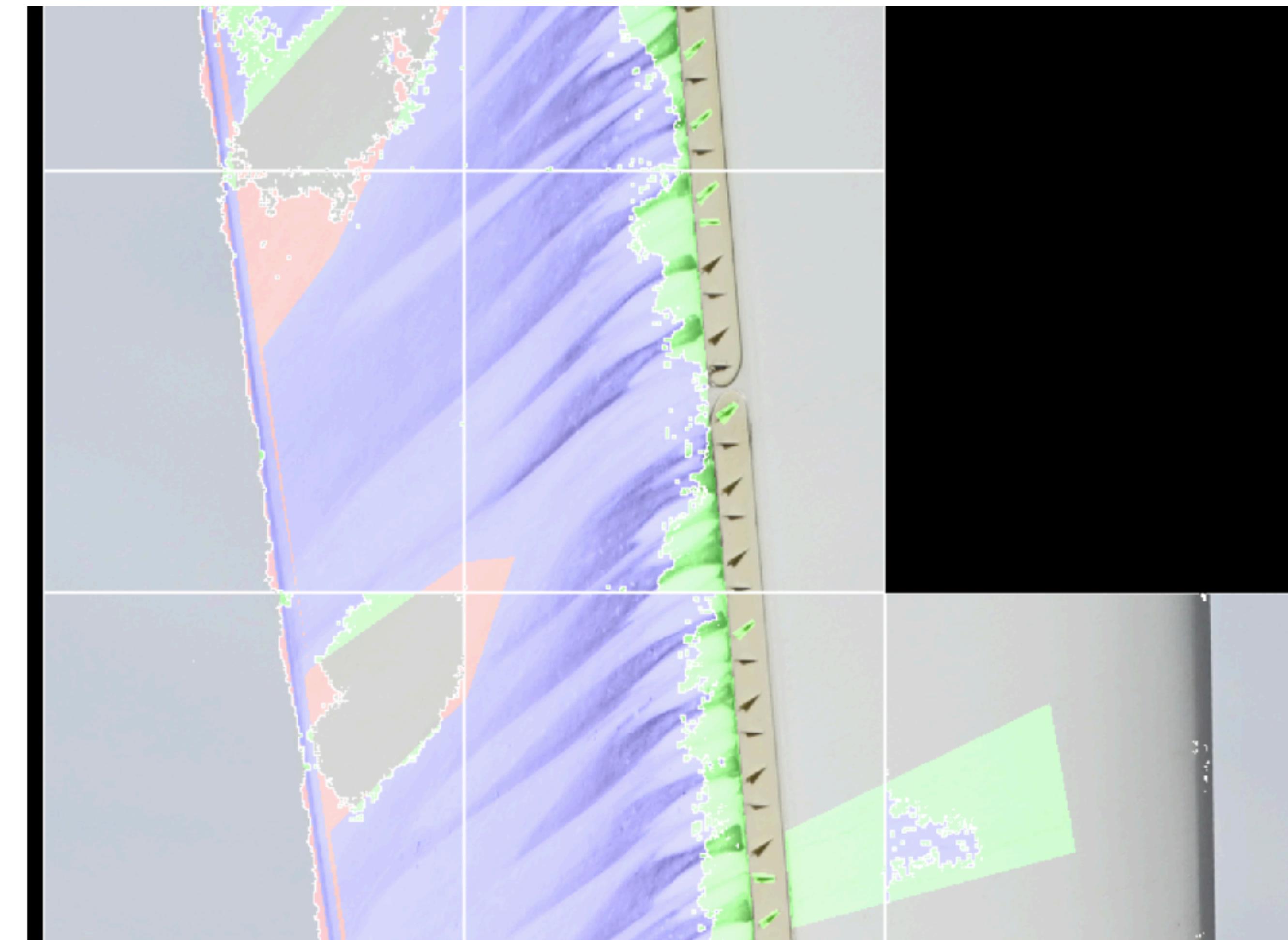
Semantic Segmentation

	recall
Erosion / Dirt	0.61
Local Damage / Dirt	0.54
Oil	0.74
Erosion	0.89
Local Damage (2)	0.60
Missing Component	0.09
Local Damage (3)	0.60



Birds.ai

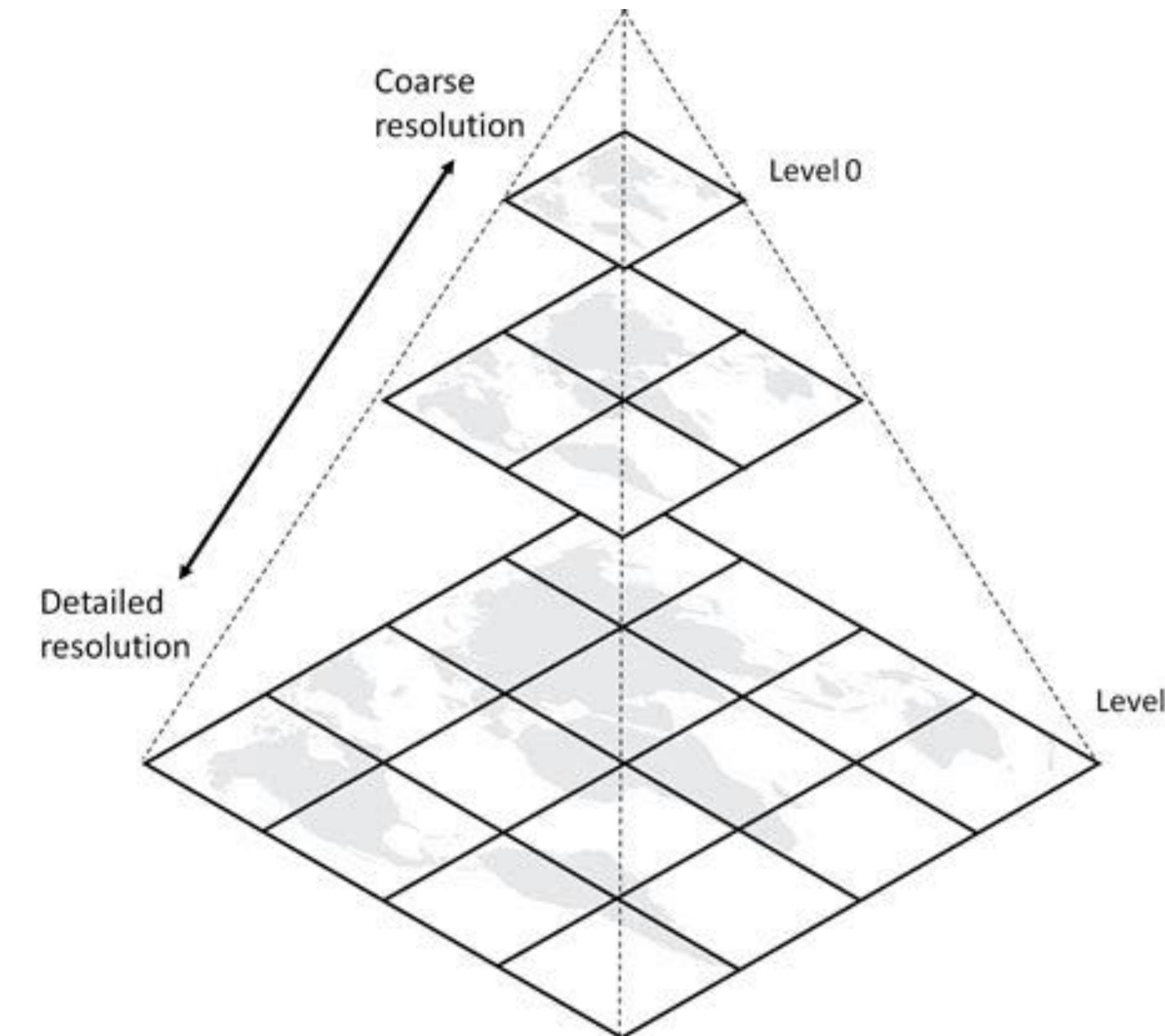
Tile Classification





Birds.ai

Tile Classification





Birds.ai

Tile Classification

gt/pred	Level 1	Level 2	Level 3	background
Level 1	51.22	33.8	6.92	8.06
Level 2	30.09	56.27	2.35	11.29
Level 3	33.82	8.82	57.35	0
background	13.03	14.97	4.28	67.72



Birds.ai

Next steps

- Defect vs. non-defect
 - Severity labels
 - Defect types
-
- [4] U-Net
 - [5] Mask R-CNN

[4] Ronneberger, Olaf, Philipp Fischer, and Thomas Brox. "U-net: Convolutional networks for biomedical image segmentation." International Conference on Medical image computing and computer-assisted intervention. Springer, Cham, 2015.

[5] He, Kaiming, et al. "Mask r-cnn." Computer Vision (ICCV), 2017 IEEE International Conference on. IEEE, 2017.





Birds.ai

Solar Panels

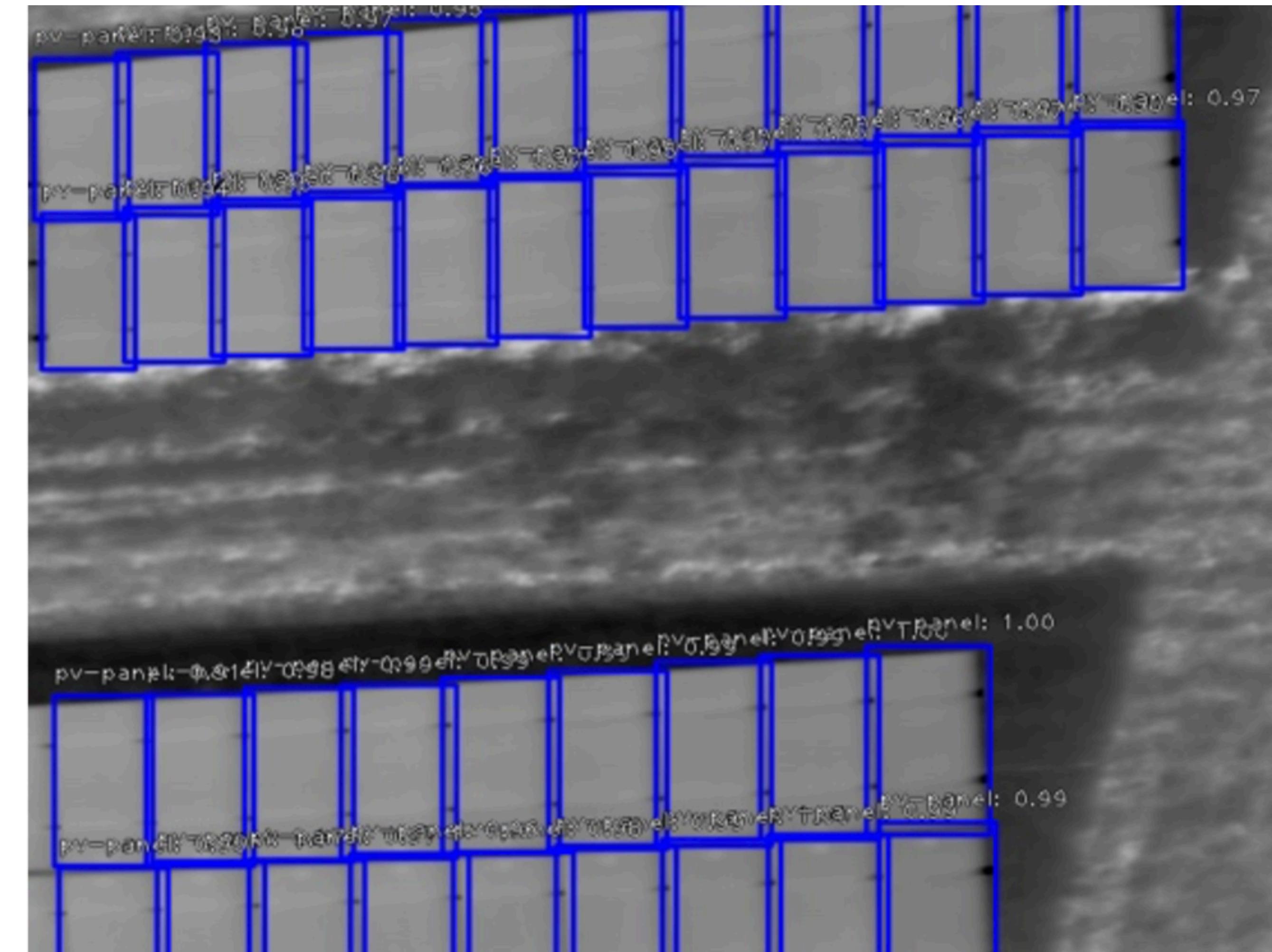




Birds.ai

Panel Detector

- Train
 - 30 images
 - 1846 panels
- Test
 - 6 images
 - 200 panels

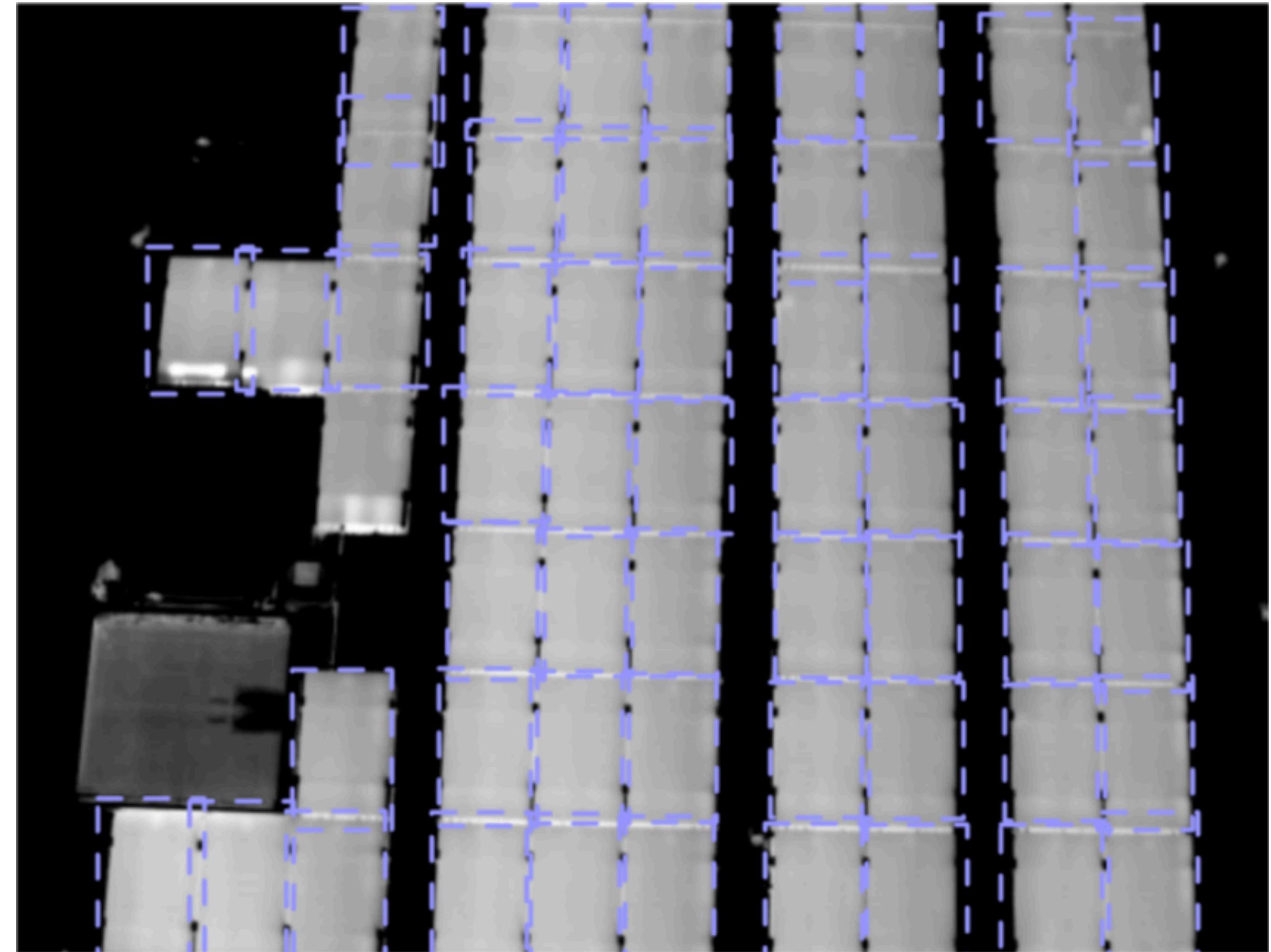




Birds.ai

Panel Detector

- Train
 - 30 images
 - 1846 panels
- Test
 - 6 images
 - 200 panels



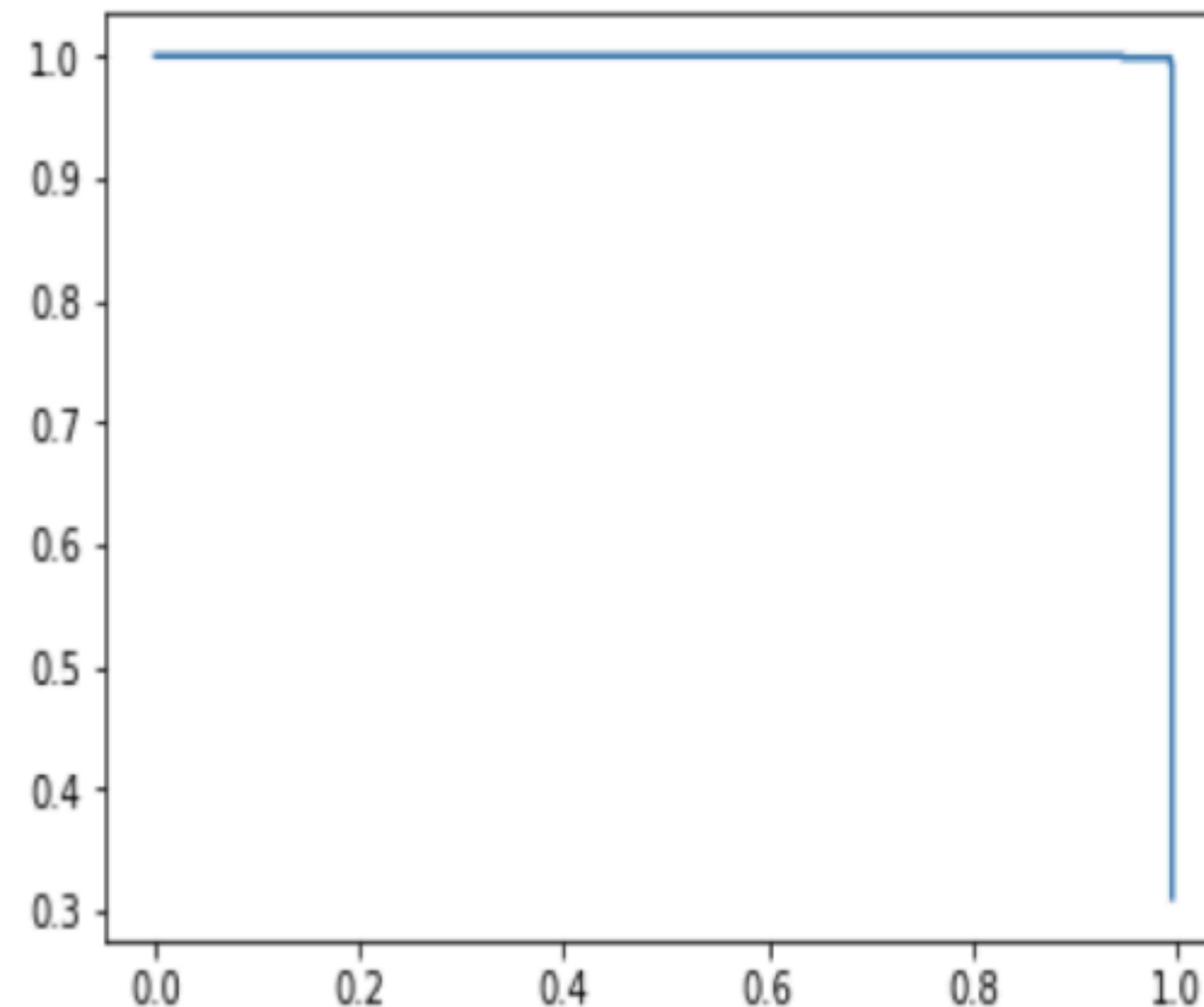


Birds.ai

Panel Detector

- Train
 - 30 images
 - 1846 panels
- Test
 - 6 images
 - 200 panels

IoU = 0.8

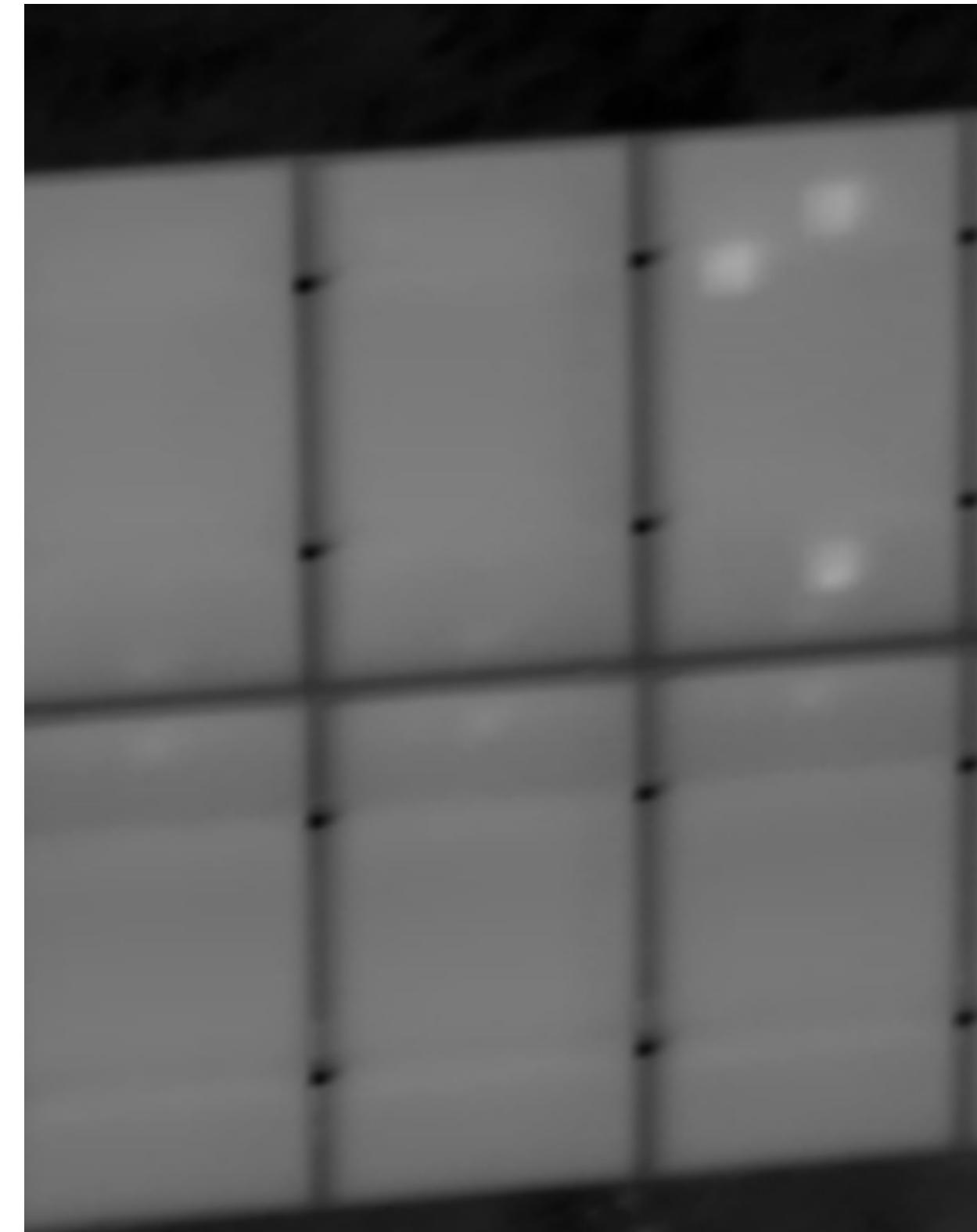




Birds.ai

Classification

- Train
 - 268 defect panels
 - 680 ok panels
- Test
 - 100 defect panels
 - 100 ok panels





Birds.ai

Classification

- Train
 - 268 defect panels
 - 680 ok panels
- Test
 - 100 defect panels
 - 100 ok panels

gt/pred	Defect panel	OK panel
Defect panel	66	34
OK panel	23	77



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Contact

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