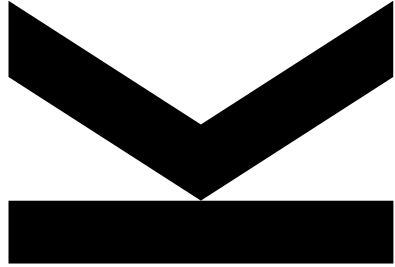


FINAL PROJECT RESULTS



Team B0:

Philipp Eberstaller

Dominik Heindl

Carson Wittwer

CONTENTS

- Implementation Overview
 - Anomaly Detection
 - Post Processing
 - Bounding Boxes
- Results

CONTENTS

■ Implementation Overview

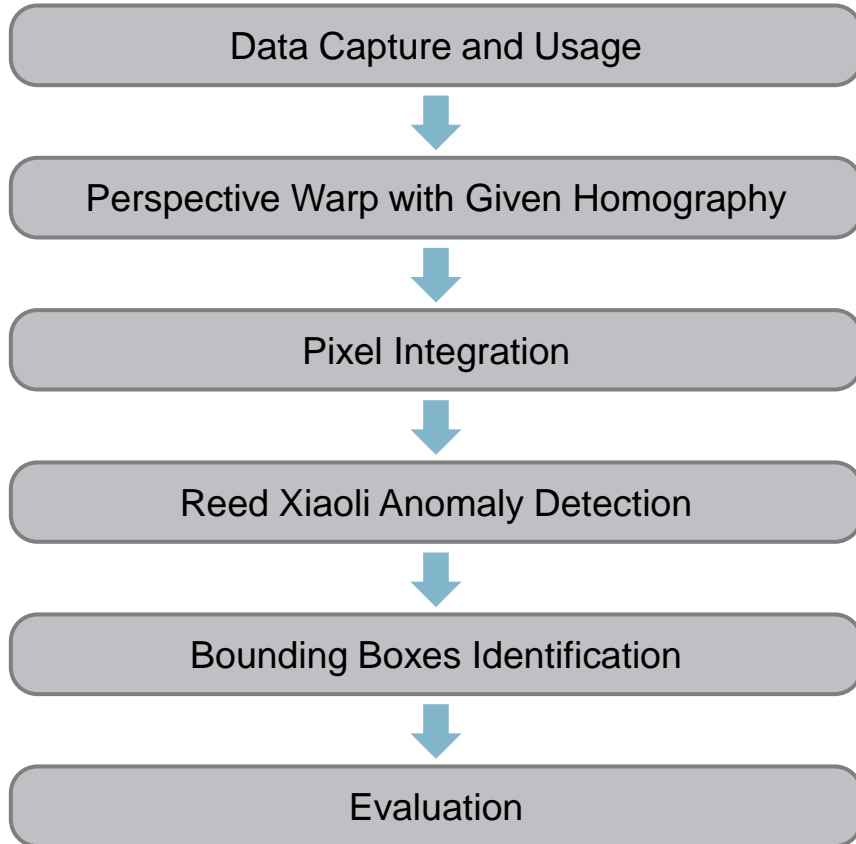
- ☐ Anomaly Detection
- ☐ Post Processing
- ☐ Bounding Boxes

■ Results

IMPLEMENTATION OVERVIEW

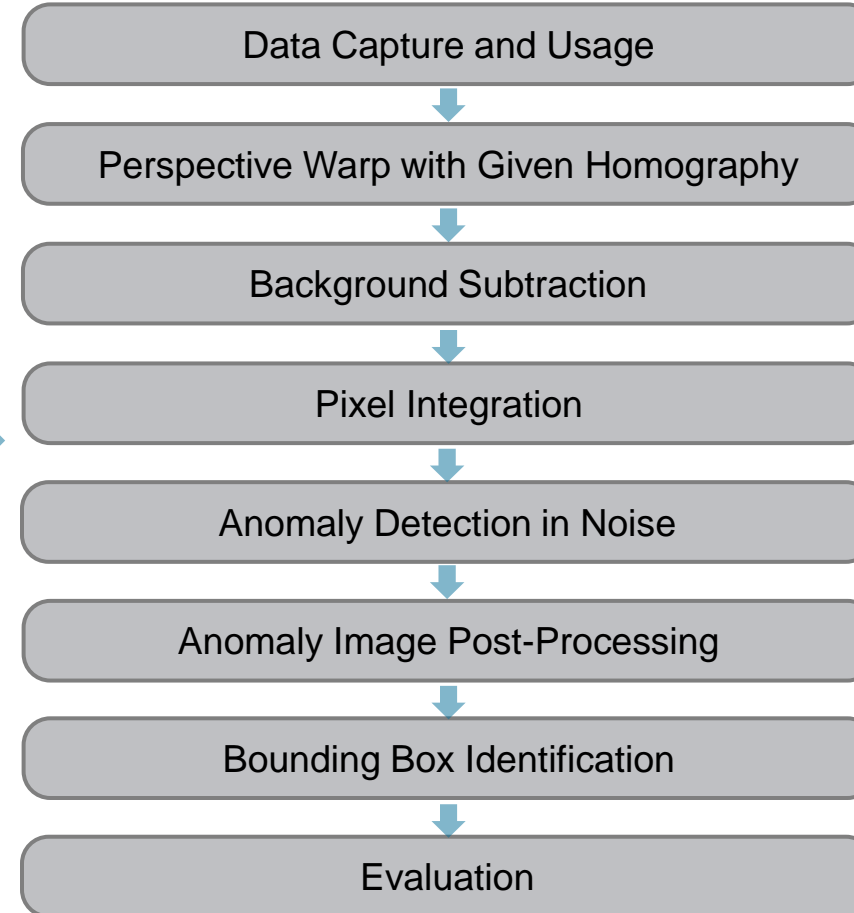
■ Given Solution:

Given Algorithm



■ Our Implementation:

New Algorithm



IMPLEMENTATION OVERVIEW

ANOMALY DETECTION

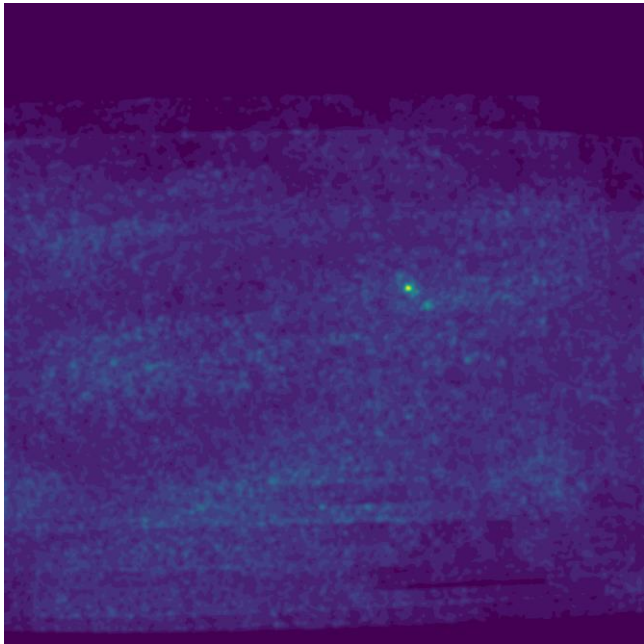
A. Davy, T. Ehret, J. Morel and M. Delbracio, "*Reducing Anomaly Detection in Images to Detection in Noise*" 2018 25th IEEE International Conference on Image Processing (ICIP), 2018, pp. 1058-1062

1. Divide Image into 5x5 patches with stride of 3
2. Train knn-algorithm to find most similar patches
3. Average similar patches to create "self-similar" image
4. Compute residual image
 1. self-similar minus original image
5. Apply Gaussian Blur

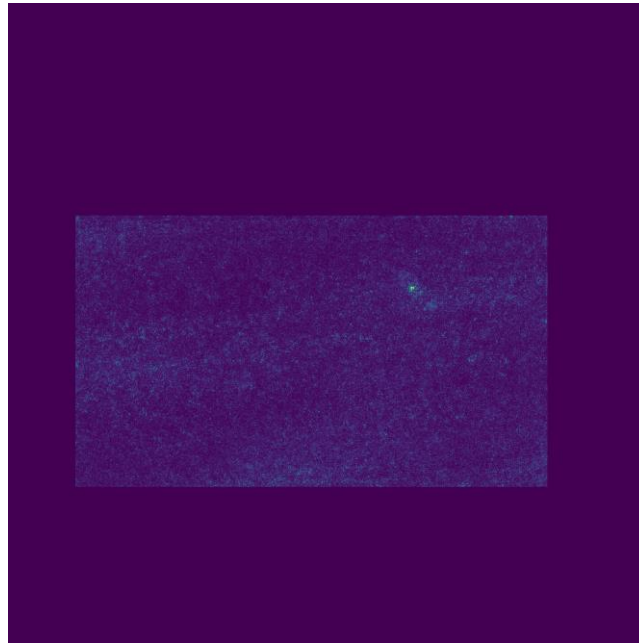
IMPLEMENTATION OVERVIEW

ANOMALY DETECTION

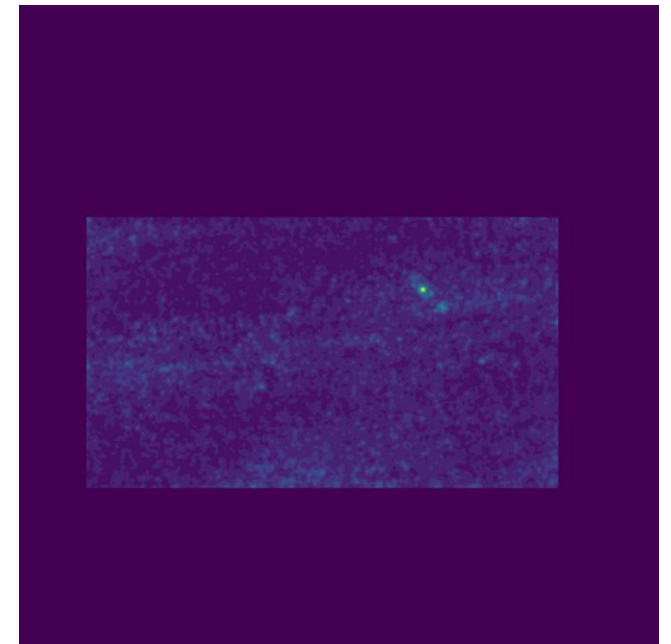
A. Davy, T. Ehret, J. Morel and M. Delbracio, "*Reducing Anomaly Detection in Images to Detection in Noise*" 2018 25th IEEE International Conference on Image Processing (ICIP), 2018, pp. 1058-1062



Original (unoptimized)
Anomaly Mask



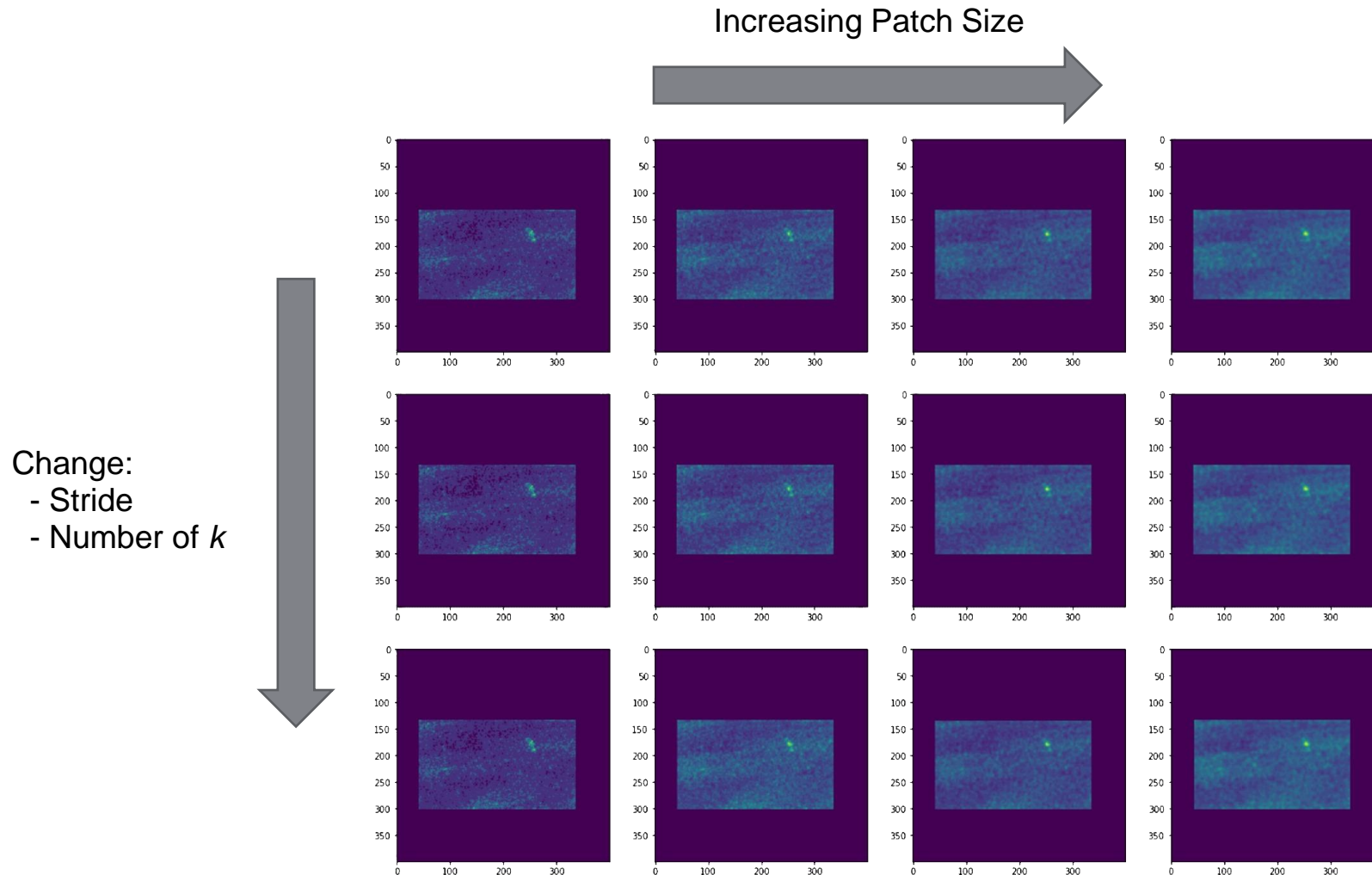
Residual Image
(self-similar - original image)



Cropped Anomaly Mask
(Residual Image + Blur)

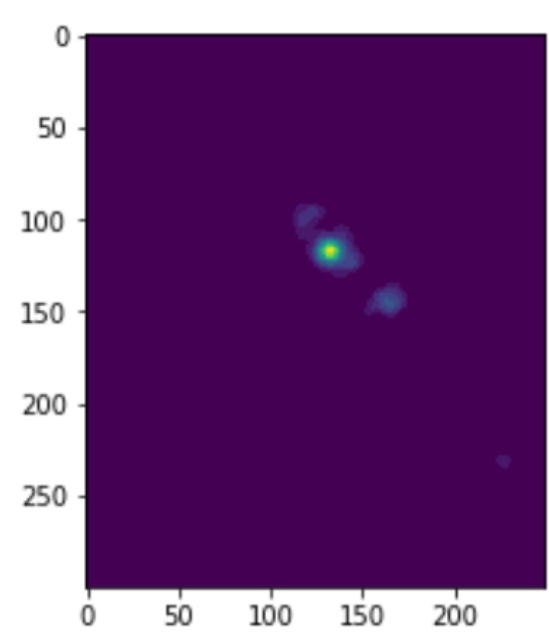
IMPLEMENTATION OVERVIEW

ANOMALY DETECTION - HYPERPARAMETER SEARCH

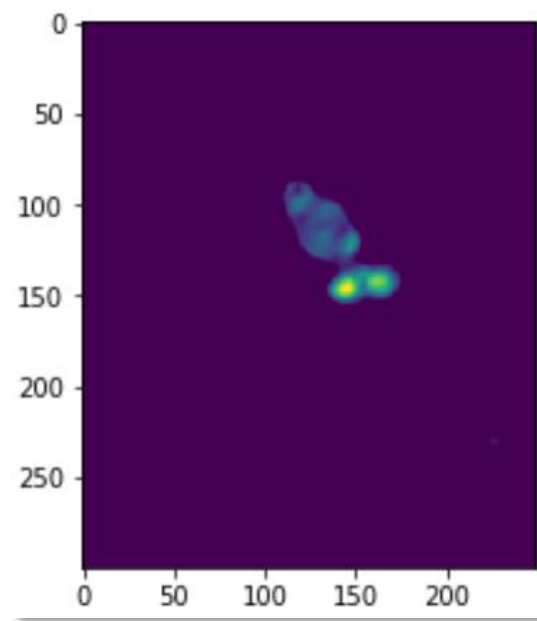


IMPLEMENTATION OVERVIEW

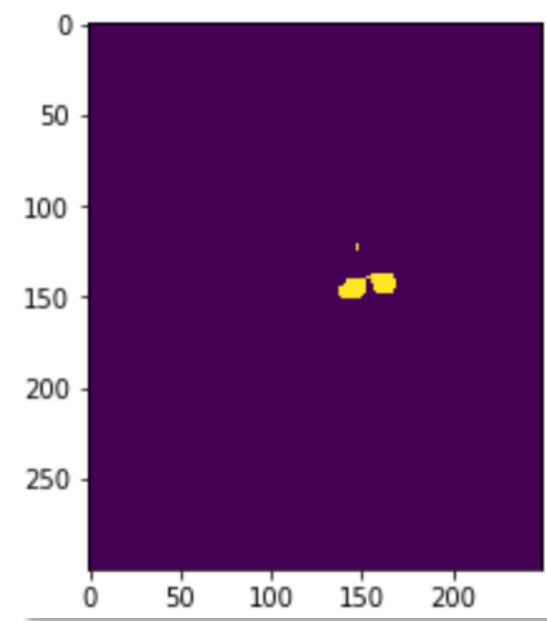
ANOMALY POST-PROCESSING



Blur image and cut off
small values



Take the pairwise
difference between all
time-steps

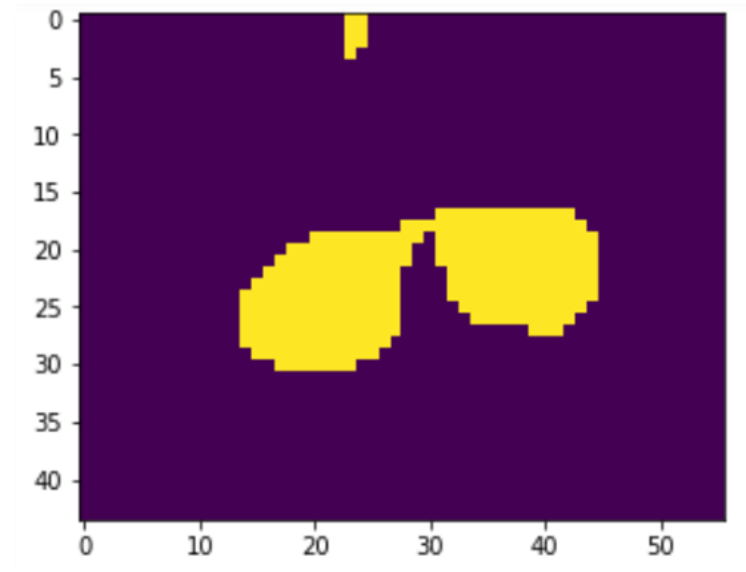
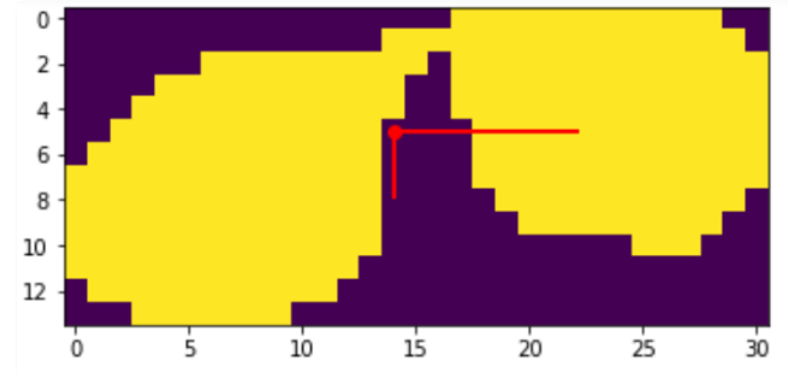


Keep the highest
values

IMPLEMENTATION OVERVIEW

BOUNDING BOXES

- Combine close islands of pixels together
- Check that the anomaly is not just a few pixels / random noise
- Create a rectangle around the island
- Calculate improved center and size of the bounding box



CONTENTS

- Implementation Overview

- ☐ Anomaly Detection
- ☐ Post Processing
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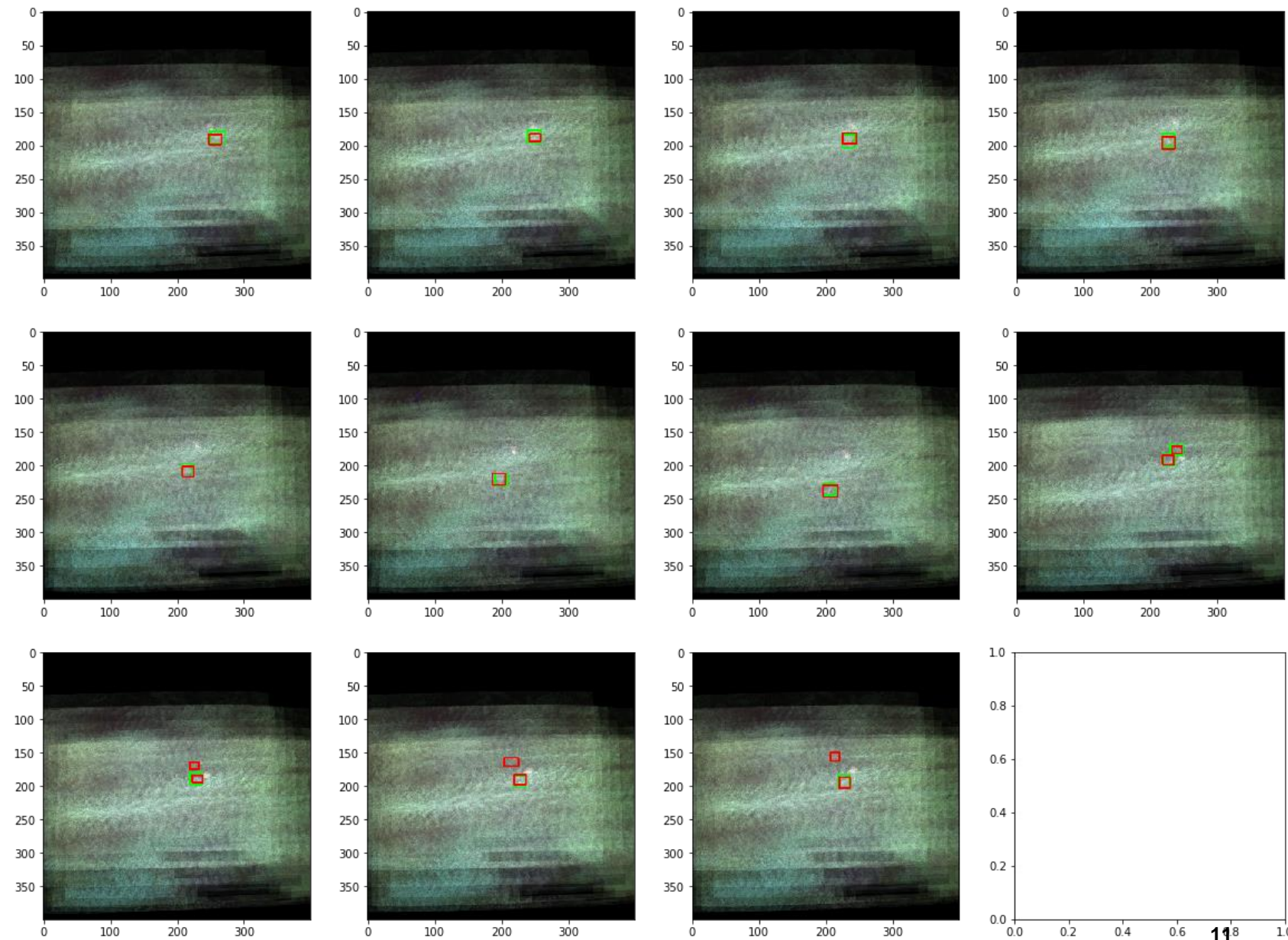
- Results

RESULTS

Evaluation Set:

57.7%

Green: Our bounding boxes
Red: Ground Truth Boxes

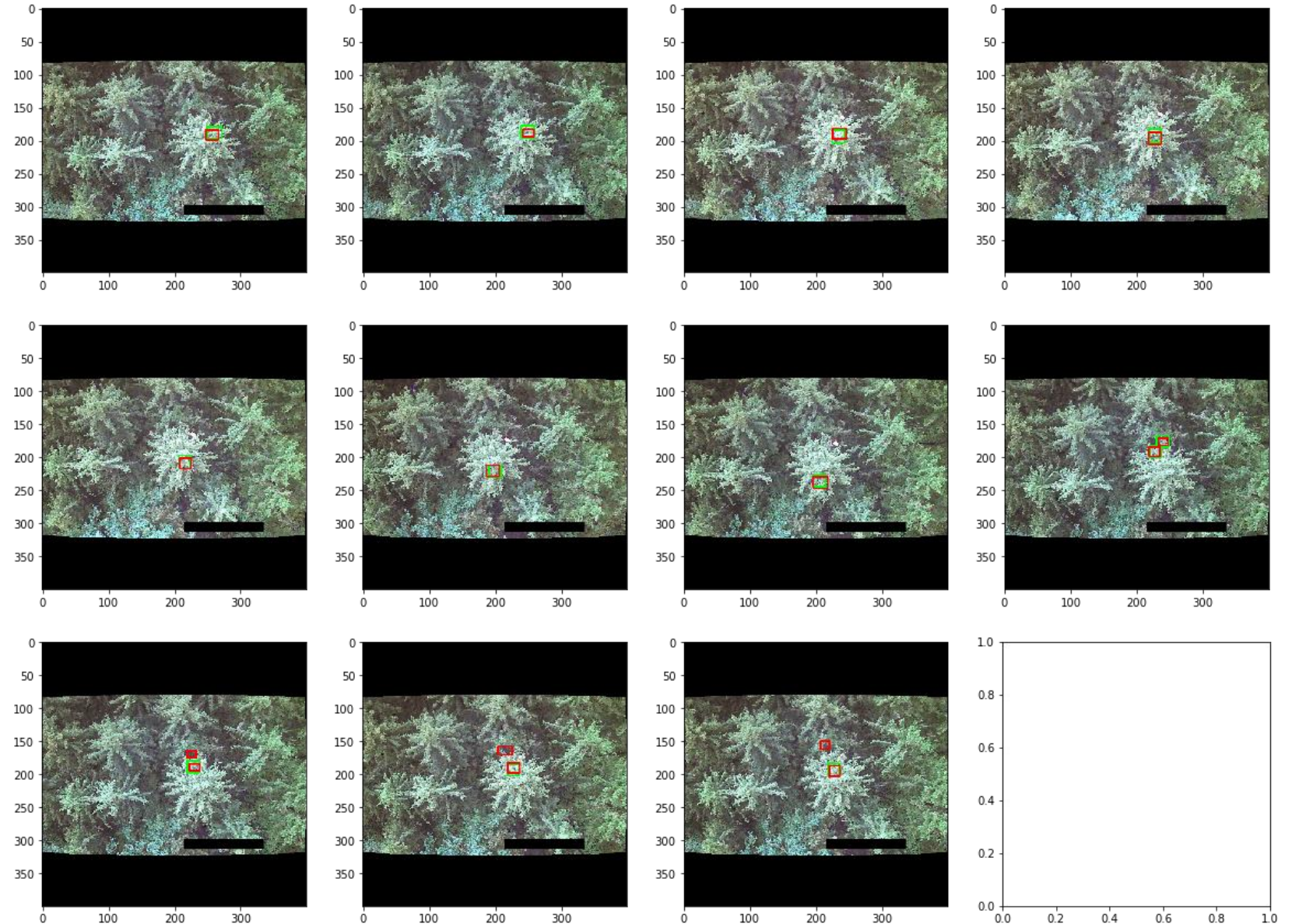


RESULTS

Evaluation Set:

57.7%

Green: Our bounding boxes
Red: Ground Truth Boxes



RESULTS

Pros:

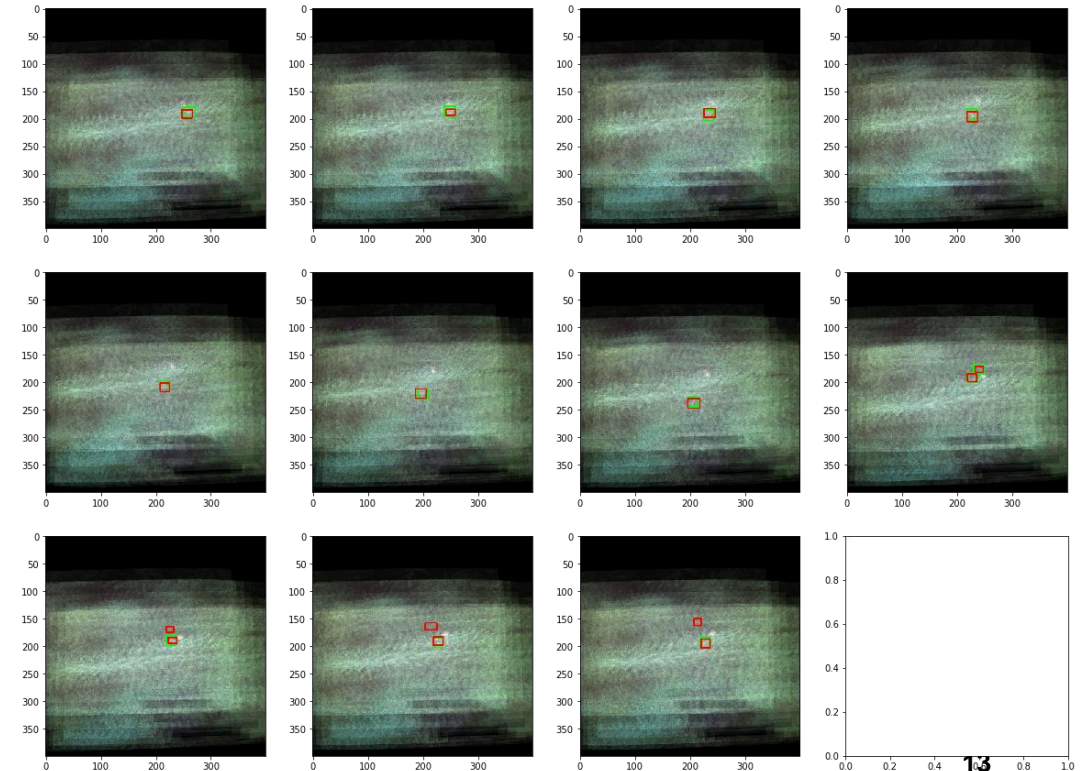
- Fully unsupervised
- Limited input data needed
- Simple concept, yet we believe effective

Cons:

- Runtime complexity scales quickly on image size - $O(n^3)$
- Unsure of generalization of chosen parameters
- Issues with second human detection in some images

Evaluation Set:

57.7%



THANK YOU

QUESTIONS?