

Overview

Stream Gauge water pixel classification
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Image Processing (Unsupervised Learning)

Generate Mask (One time processing)

1. Average and Subtract

2. Generate Mask
(with 4 color regions)

Pick ROI and Generate HOGs

3. Sample Region Of Interest
(ROI)
(from each region)

4. Generate Histogram of
Oriented Gradients
(HOG)
(Using ROI)

5. Learn Regions using Artificial Neural Network (ANN)
(Run HOG through ANN to learn the 4 regions)

Image Classifying

Daily Usage process (After the learning process)

6. Load Image

Run an Image through an ANN

7. Output Mask

Generate image of Water Pixels

1. Averaging and Subtracting

Image1



Load Image1

Load Image2

Image2

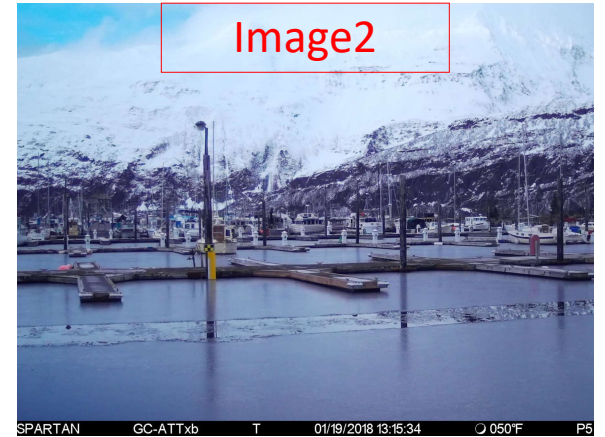
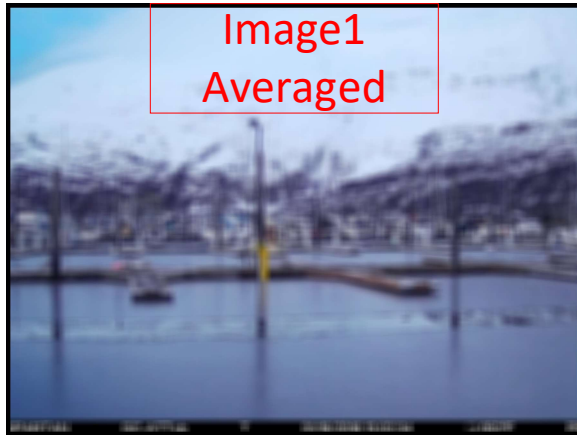


Image1
Averaged



Average Image1

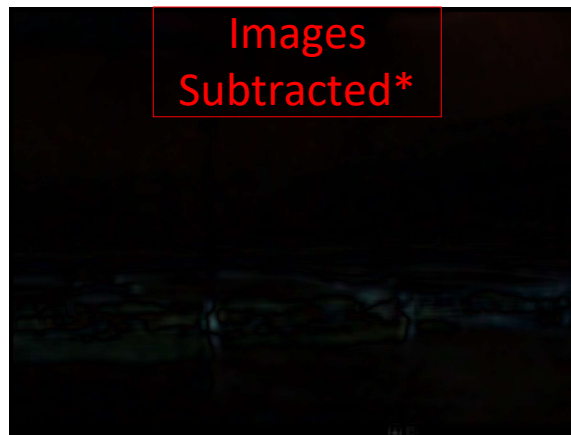
Average Image2

Image2
Averaged



Subtract Averaged
Images

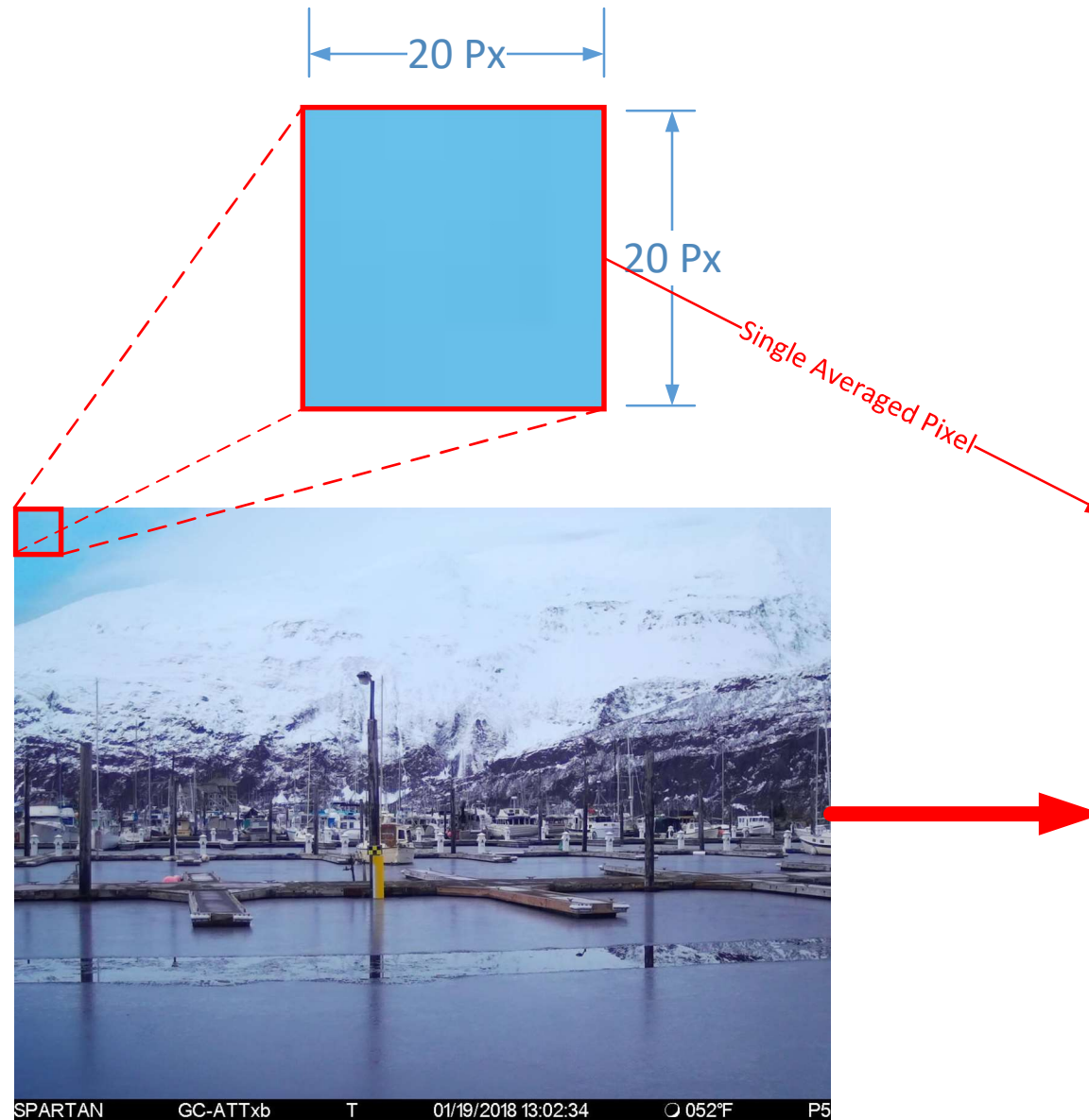
Images
Subtracted*



**Output image will have low RGB values which make it hard to see by the naked eye.*

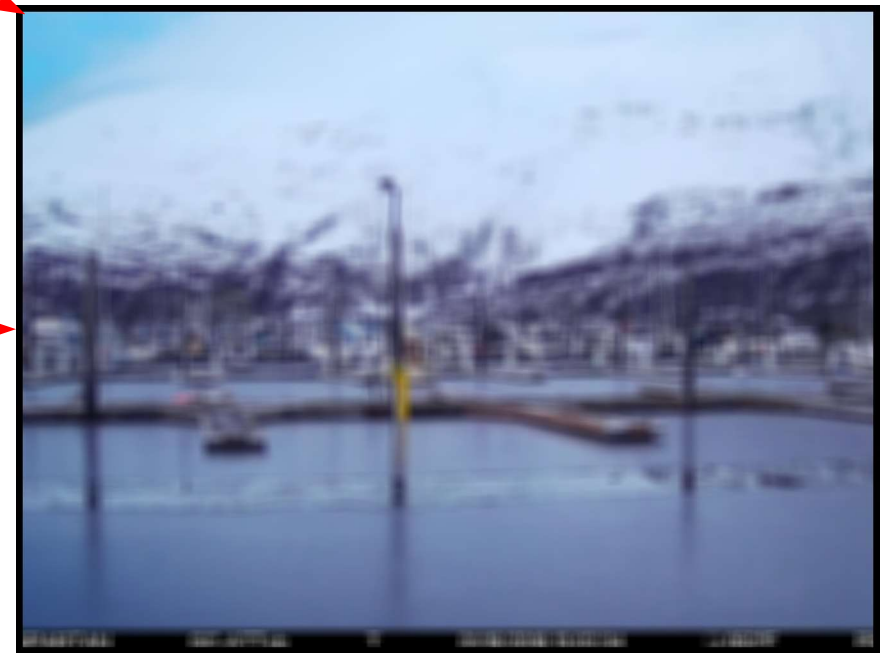
1. Averaging and Subtracting (Averaging Details)

A 20 x 20 block of pixels is averaged to produce a single center pixel for the resulting Averaged image



This produces the below averaged image which reduces artifacts by small differences in the image.

The averaged image ends up with a boarder of 10 pixels we are unable to create an average for



Original Image

Averaged Image

2. Generate Mask

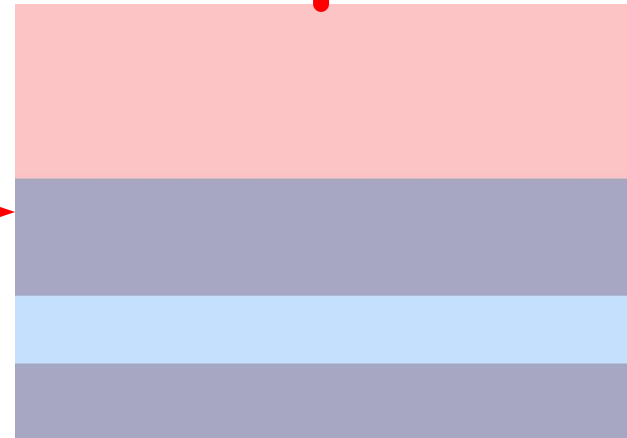
All images averaged and subtracted.

(Exaggerated brightness)



Region mask generation

Mask created using kmeans



3. Sample ROI

Image converted to greyscale
(Current OpenCV method requires greyscale)

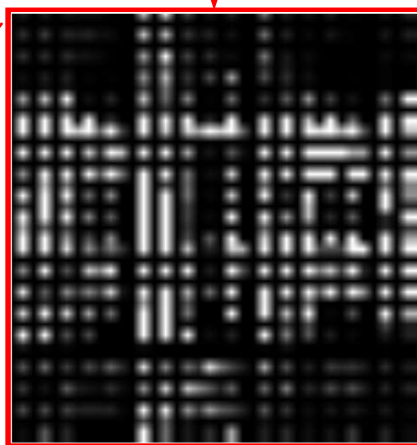
**Grab sections within
each Mask Region**



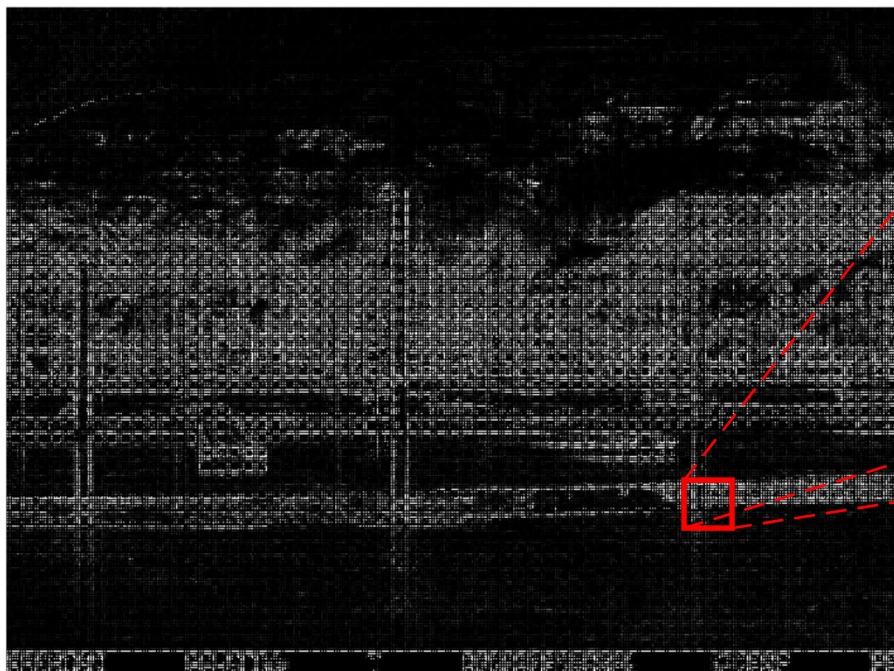


Extracted ROI

4. Generate HOGs



Resulting HOG



5. Learn regions using ANN

6. Load Image

7 .Water Pixel Classification