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 Gabor Filters**
   (Using ROI)

5. **Learn Regions using Artificial Neural Network (ANN)**
   (Run features from Gabor filter through ANN to learn the 4 regions)

Image Classifying

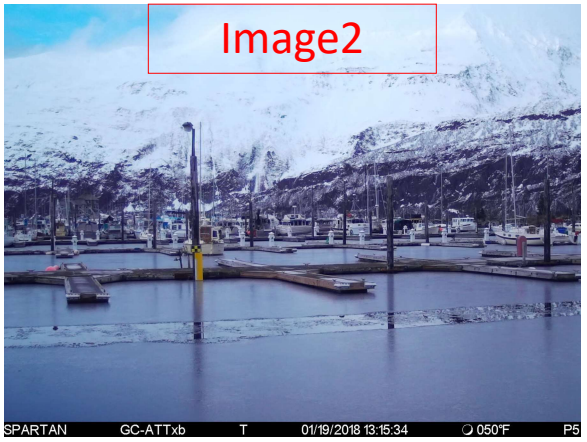
Daily Usage process (After the learning process)

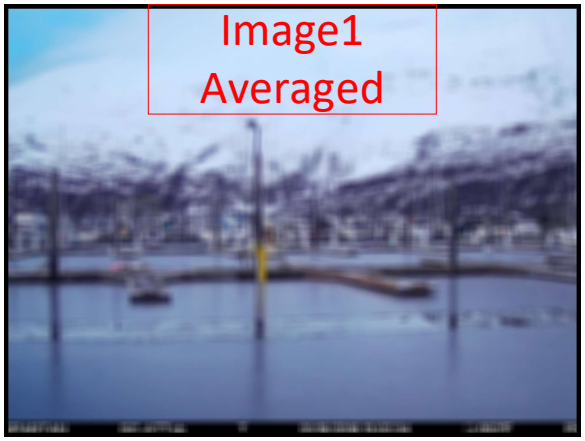
6. **Load Image**
   Run an Image through an ANN
7. **Output Mask**
   Generate image of Water Pixels

1. Averaging and Subtracting

Load Image1

Load Image2





Average Image1

Average Image2

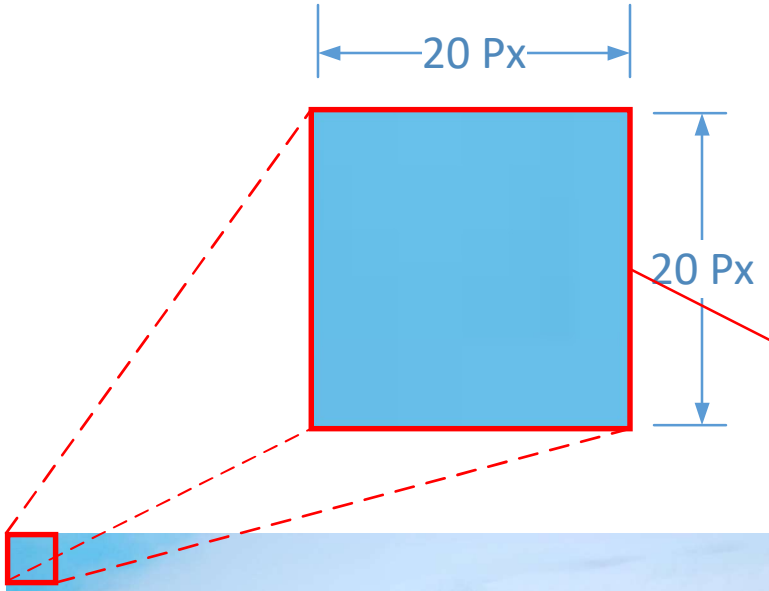
Subtract Averaged Images

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

1. Averaging and Subtracting

(Averaging Details)

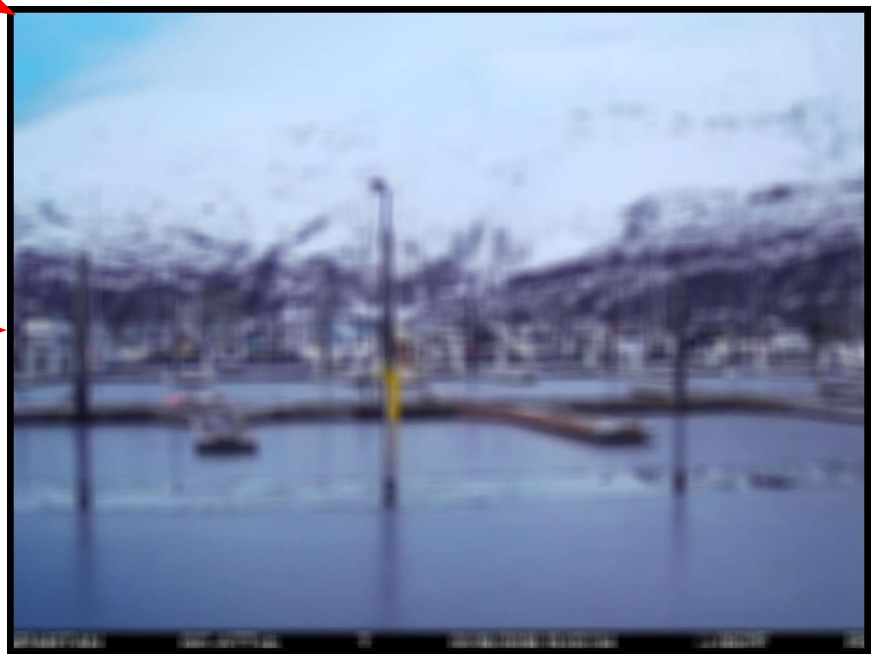
A 20 x 20 block of pixels is averaged to produce a single center pixel for the resulting Averaged image



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

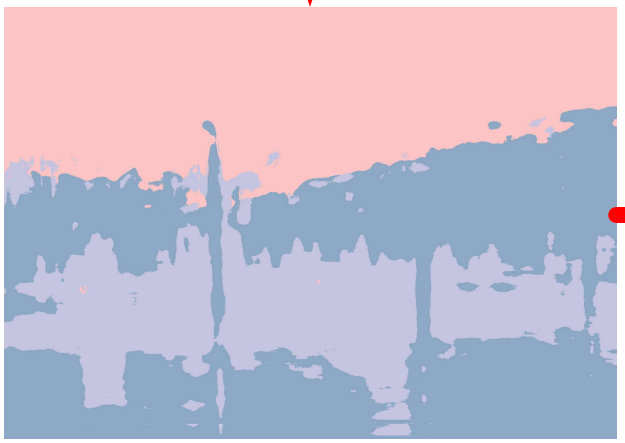
2. Generate Mask

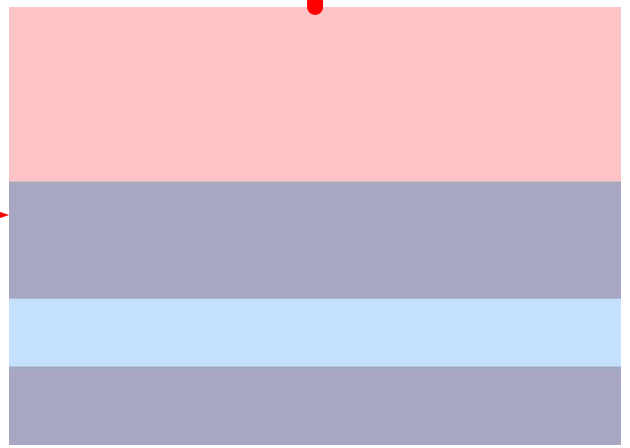
All images averaged and subtracted.

(Exaggerated brightness)

Region mask generation

Mask created using kmeans

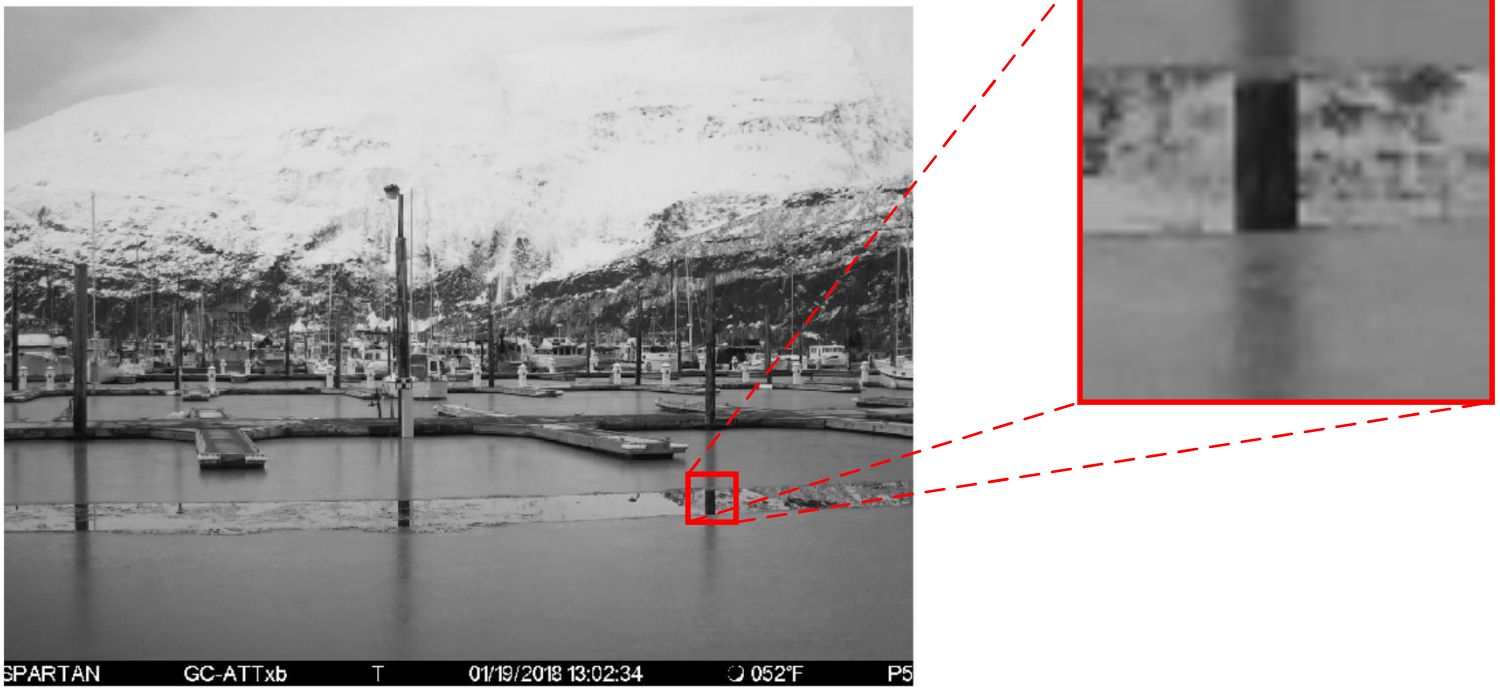




3. Sample ROI

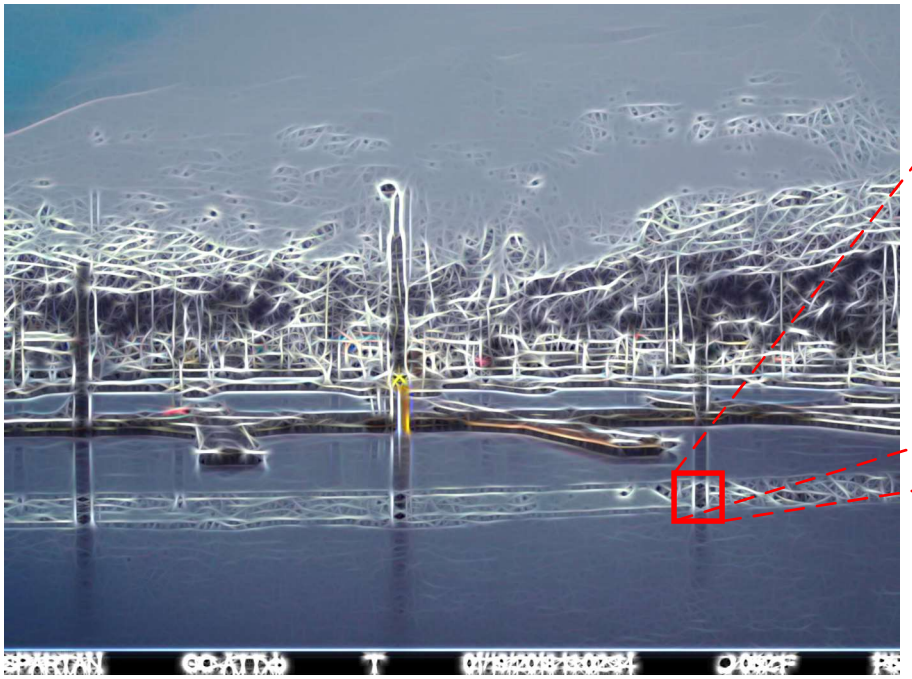
Image converted to greyscale
(This gives us 1 channel so we don't get multiple results per pixel in the next step)

Grab sections within each Mask Region



Extracted ROI

4. Generate Gabor Filter



Resulting Filter

5. Learn regions using ANN

6. Load Image

7 .Water Pixel Classification