

# DIGITAL IMAGE KRITSANA NETPUGDEE

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# PROCESSING

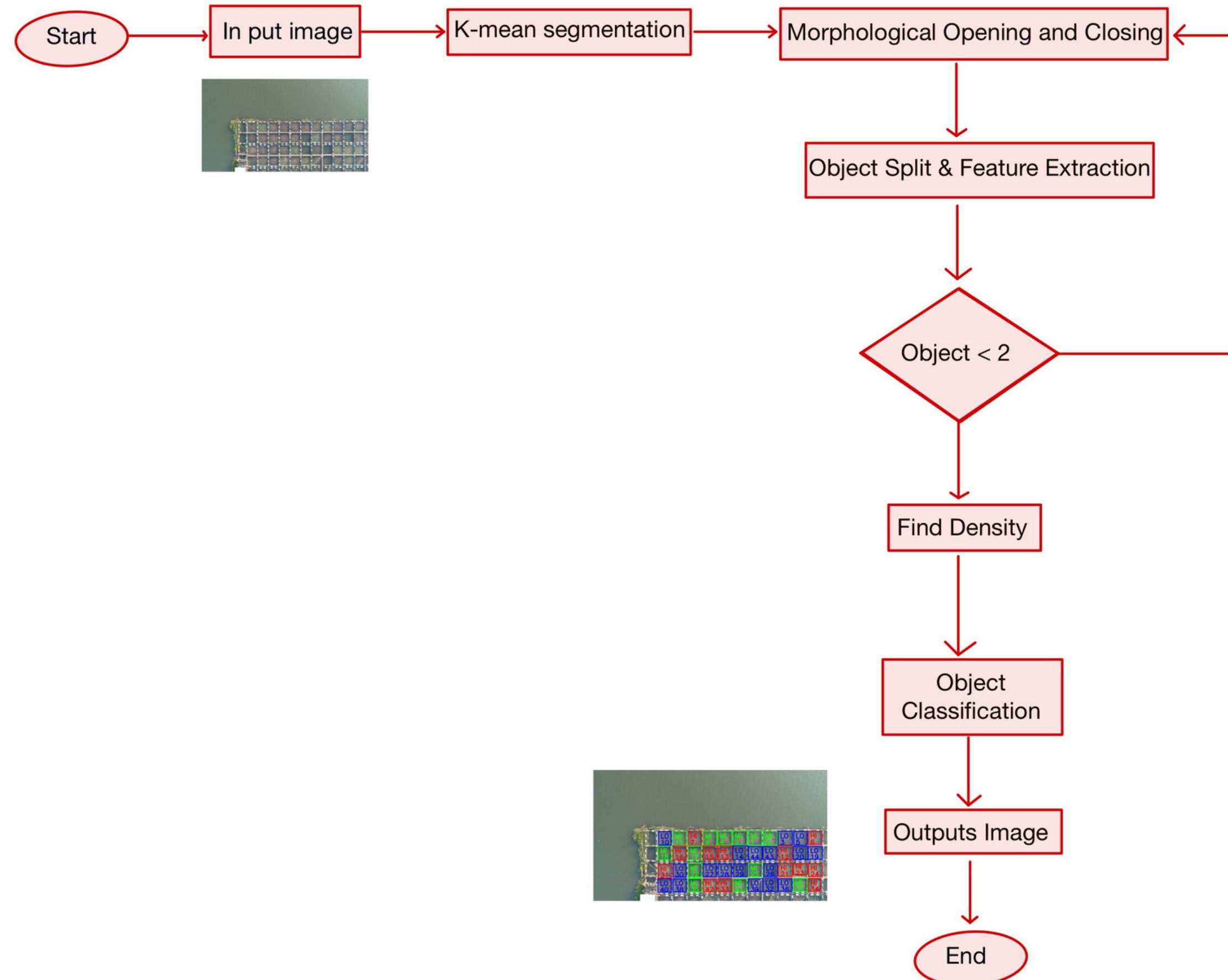


# Stew Detection and Fish Density Classification with a Fixed High Height

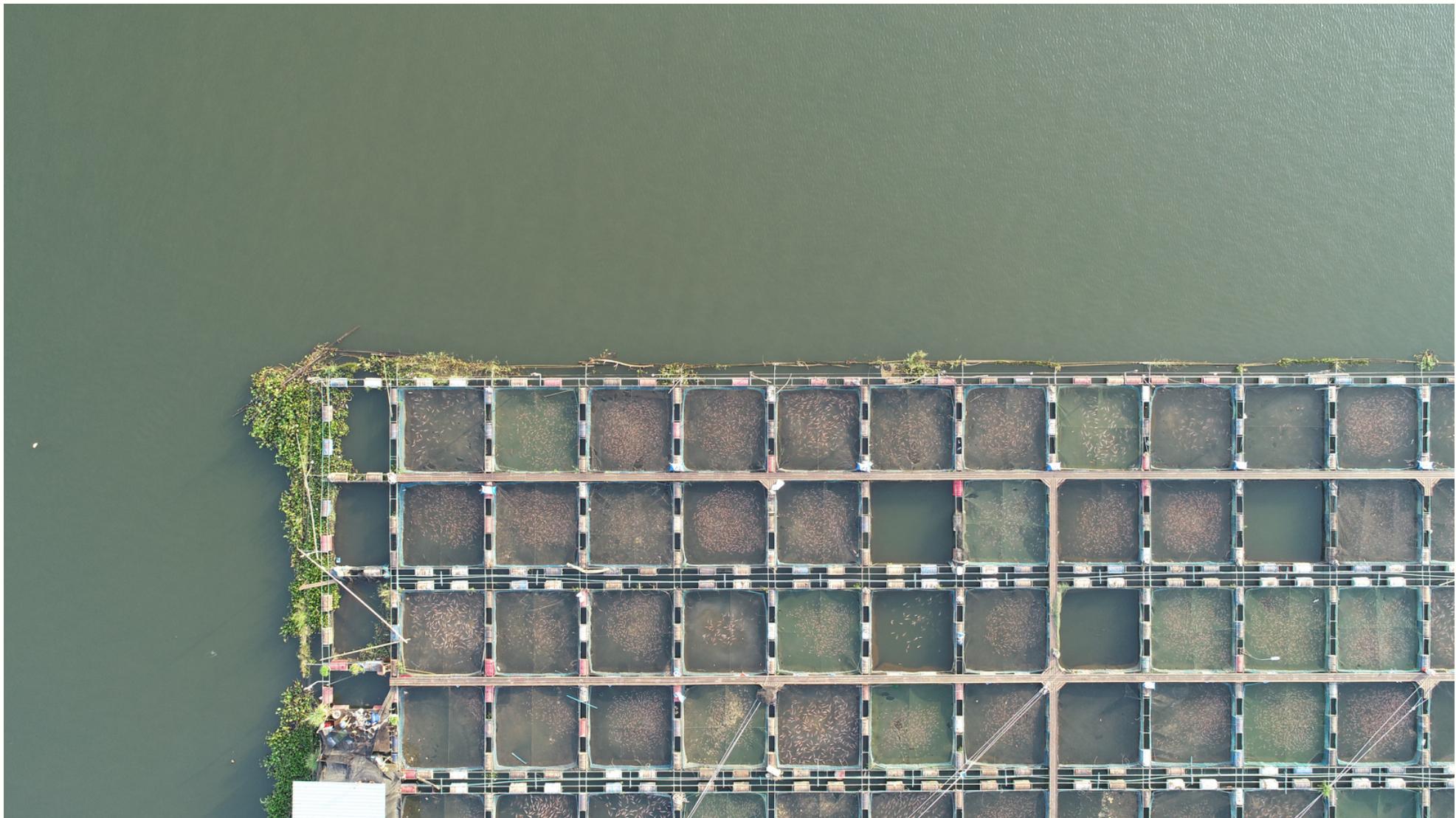


ประโยชน์ของโครงงาน สามารถจำแนกความหนาแน่นของปลาข้างในกระชังเพื่อ นำไปประเมินว่าจะจับปลาหรือจะเพิ่มจำนวนปลา ยิ่งความหนาแน่นมากอาจ ตีความได้ว่าปลาโตเต็มที่แล้ว

# flowchart



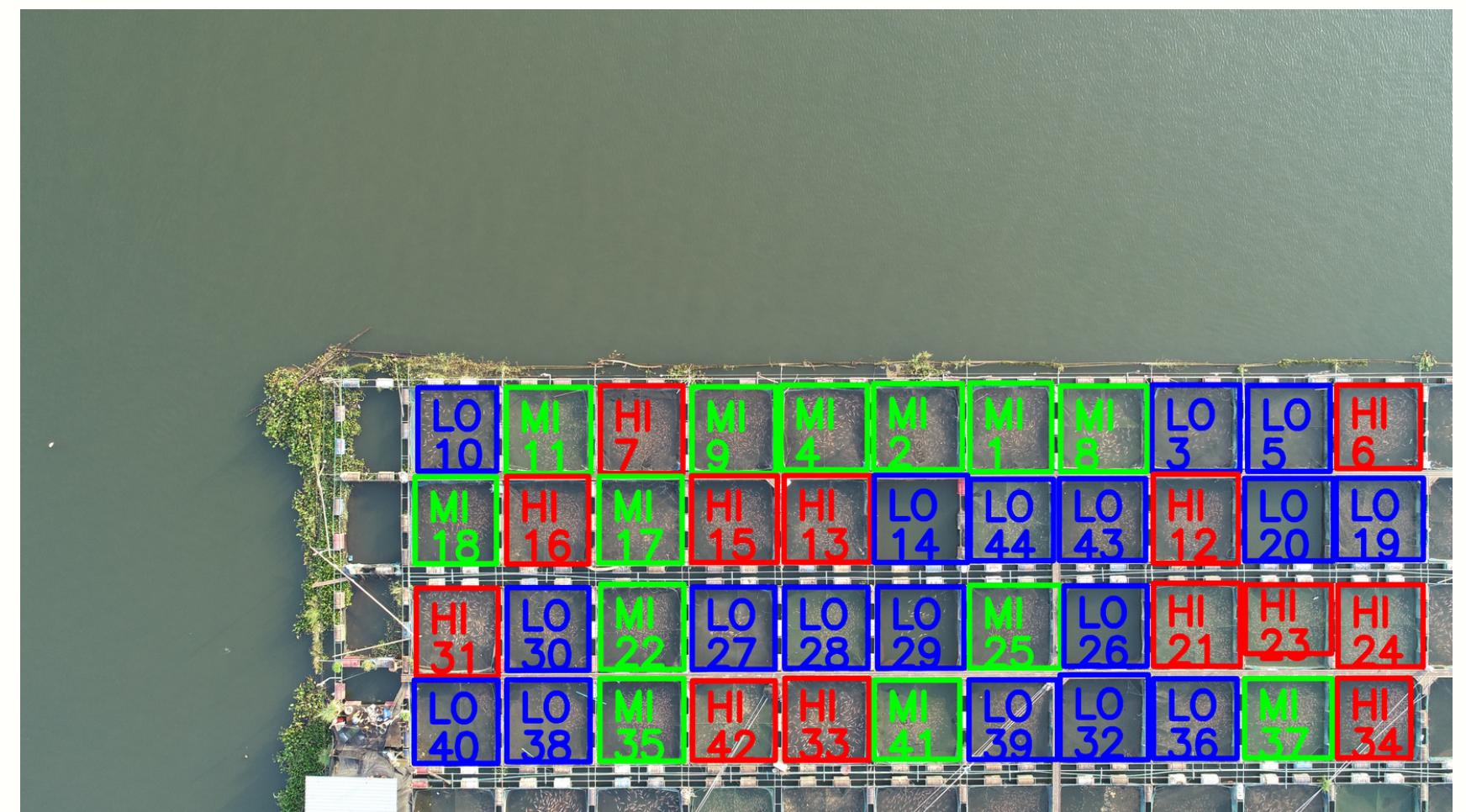
# Original Image



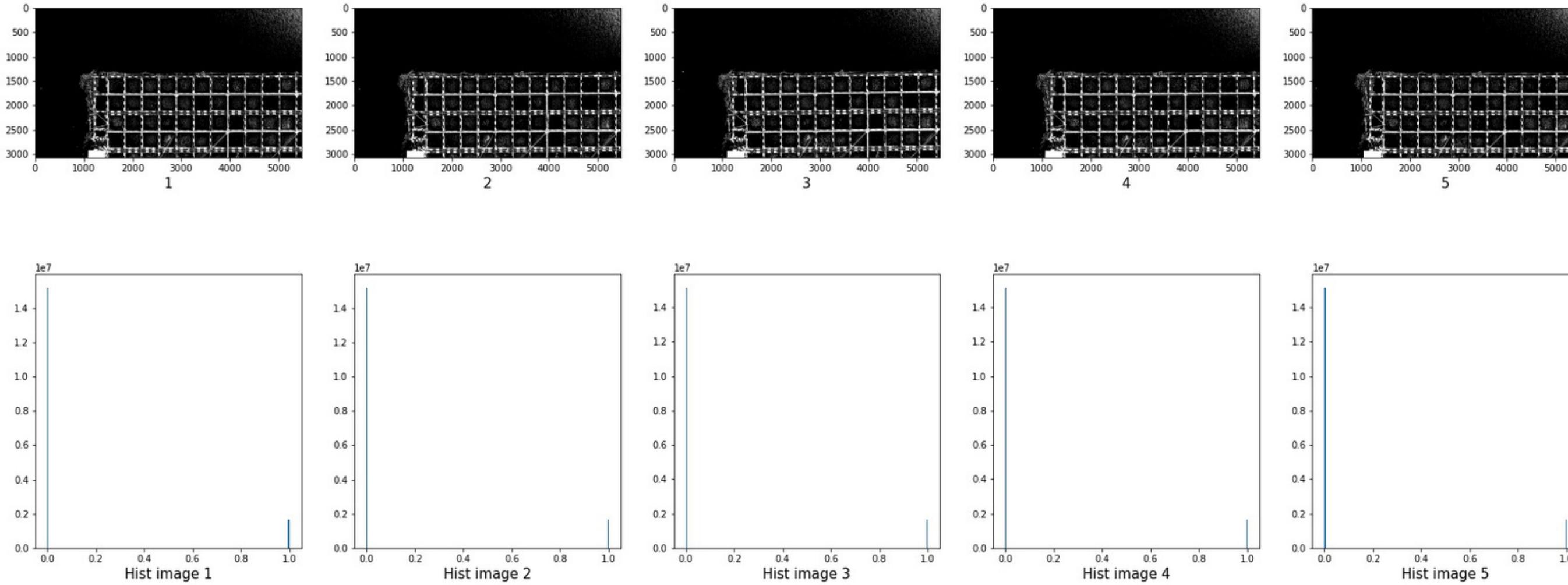
In put pixels size is 5472 x 3078

# Step

- Image segmentation K mean
- Morphological
- Image segmentation Individual Channel Range



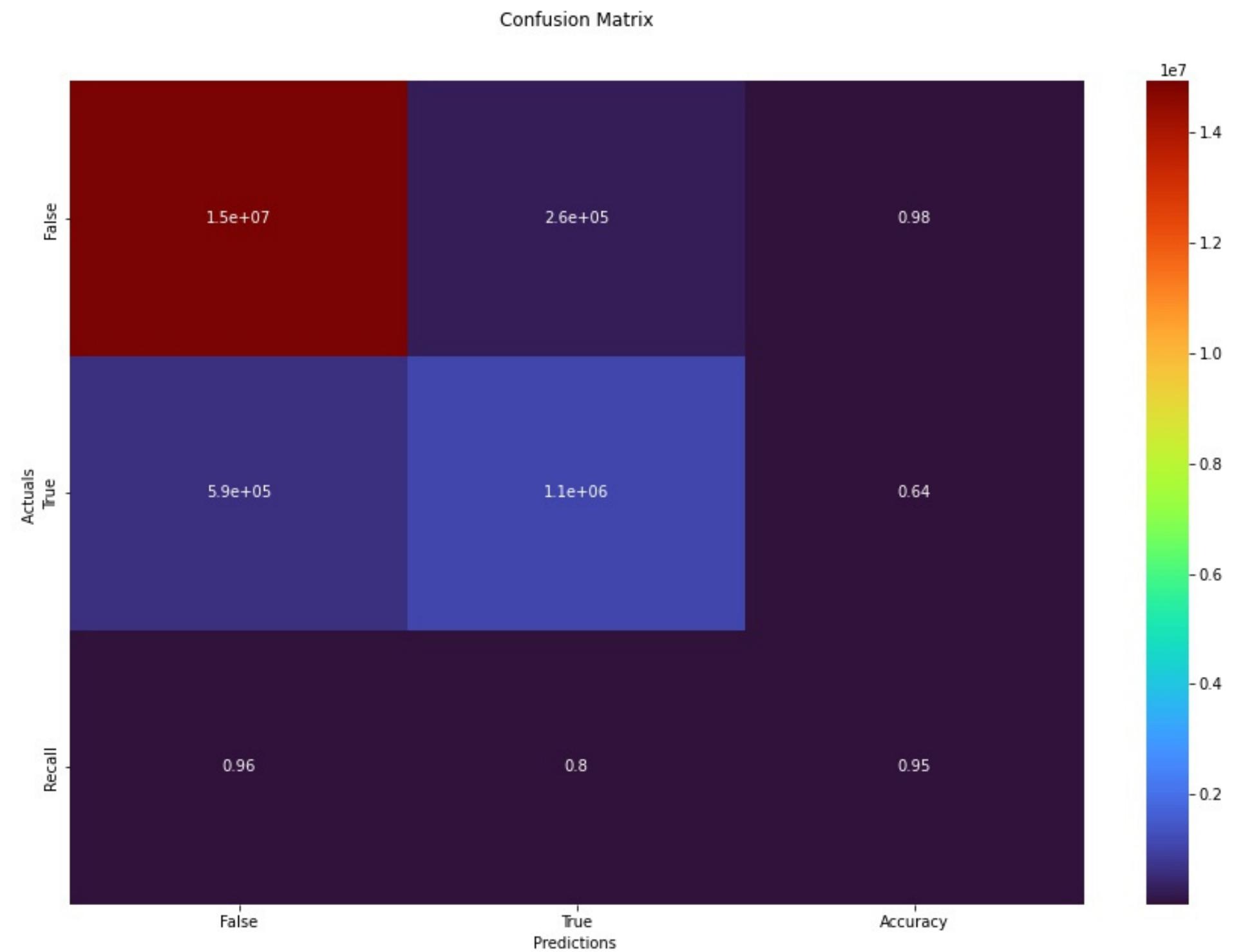
K mean



# K-mean Segmentation

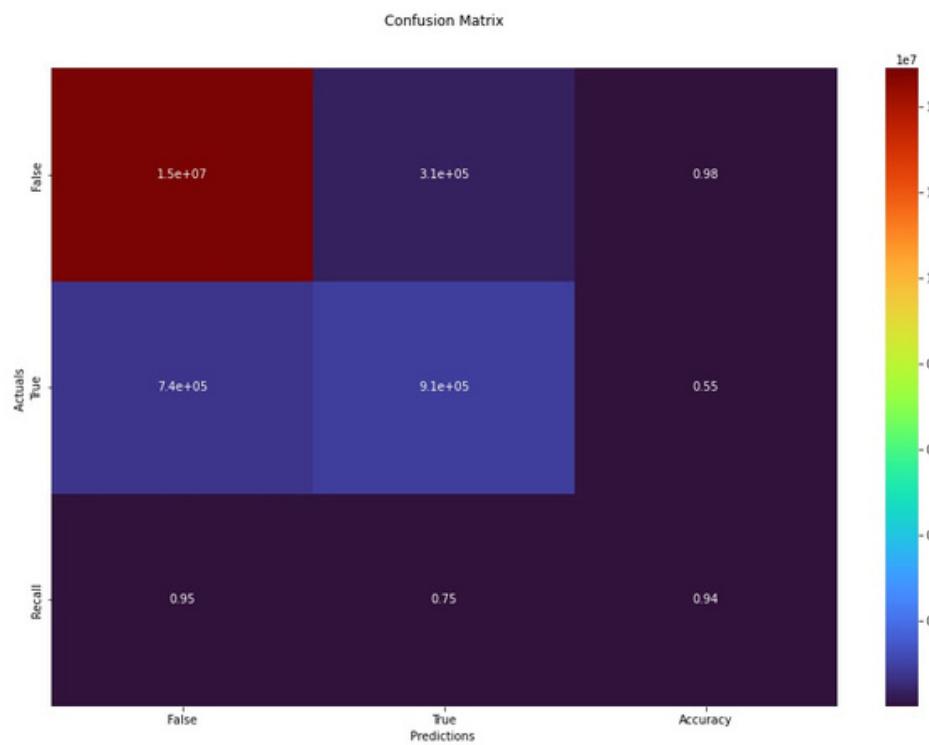
This K-mean find Euclidean Distance

$$\arg \min_{\mathbf{S}} \sum_{i=1}^k \sum_{\mathbf{x} \in S_i} \|\mathbf{x} - \boldsymbol{\mu}_i\|^2$$



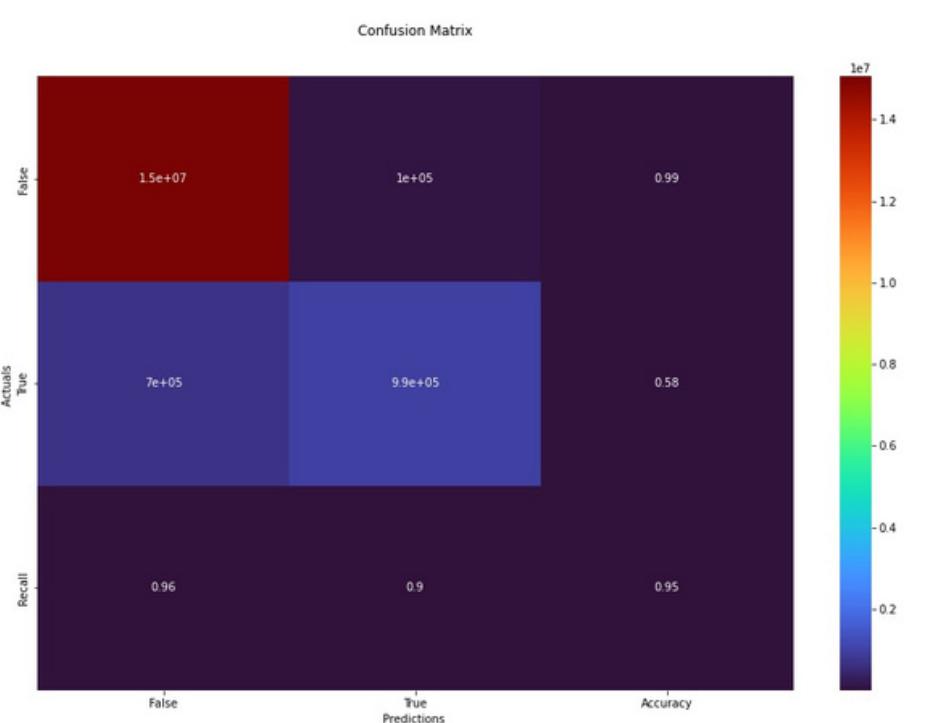
**Image 1**

Intersection over Union 0.55



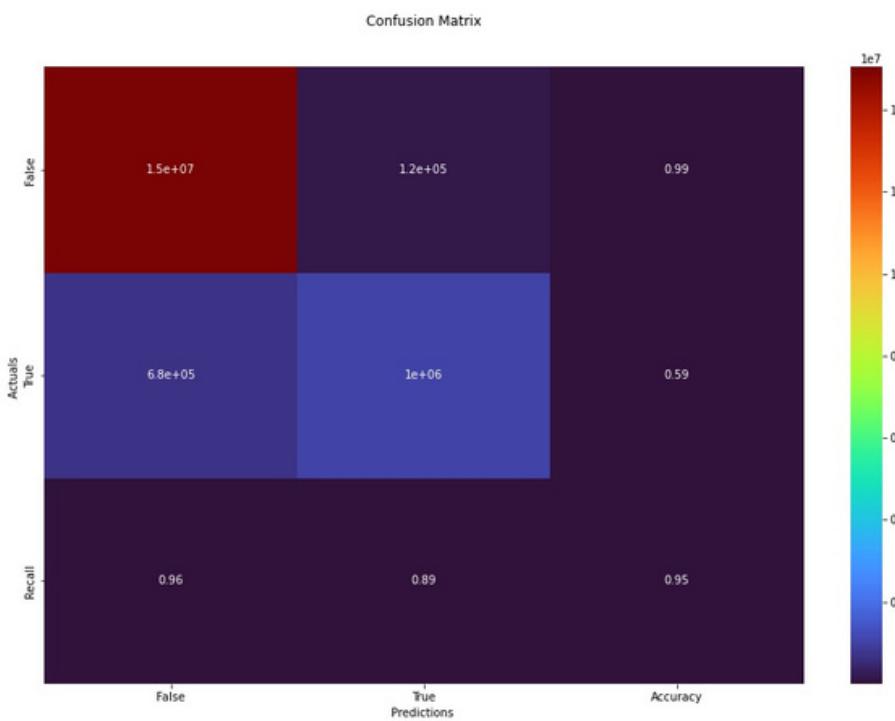
**Image 2**

Intersection over Union 0.46



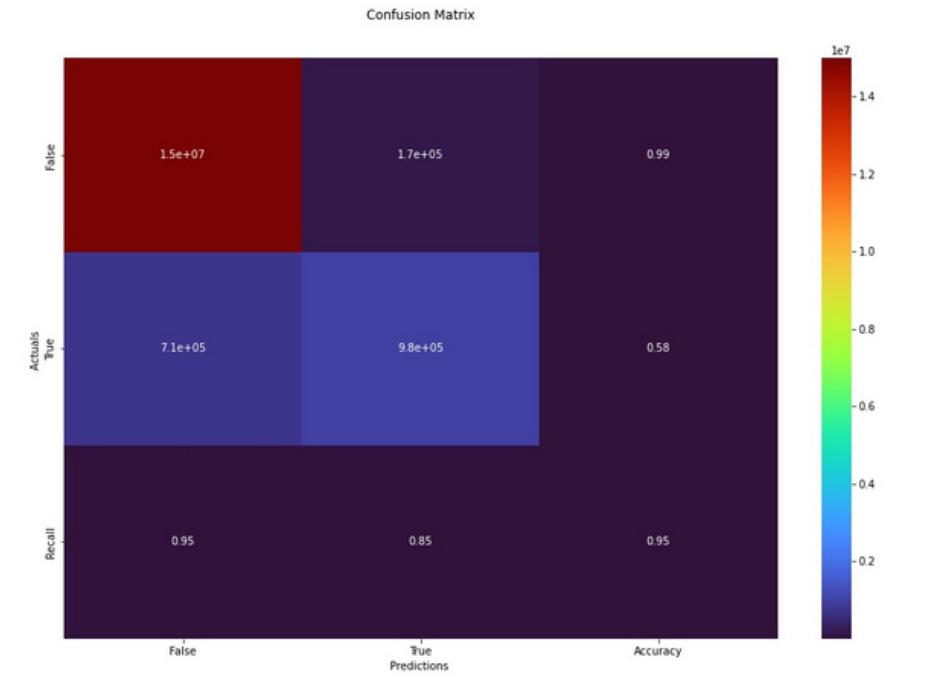
**Image 4**

Intersection over Union 0.55



**Image 3**

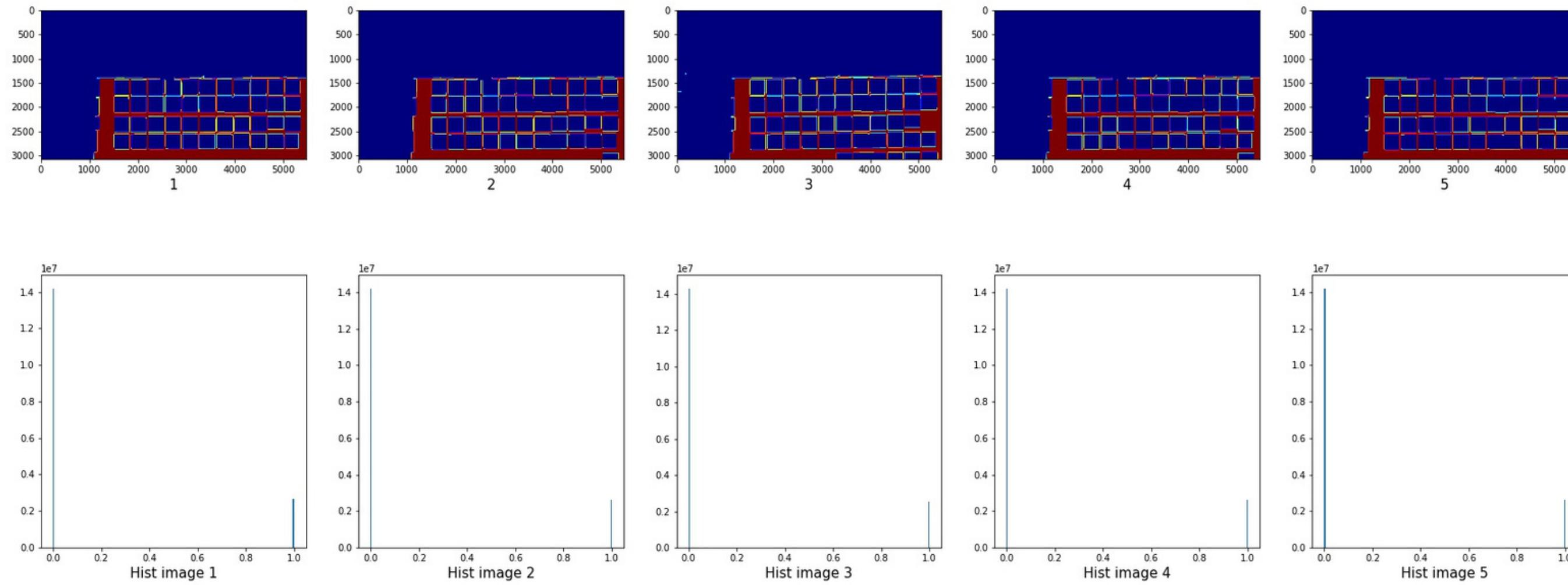
Intersection over Union 0.55



**Image 5**

Intersection over Union 0.53

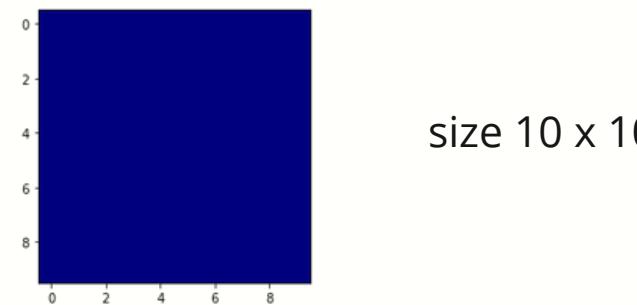
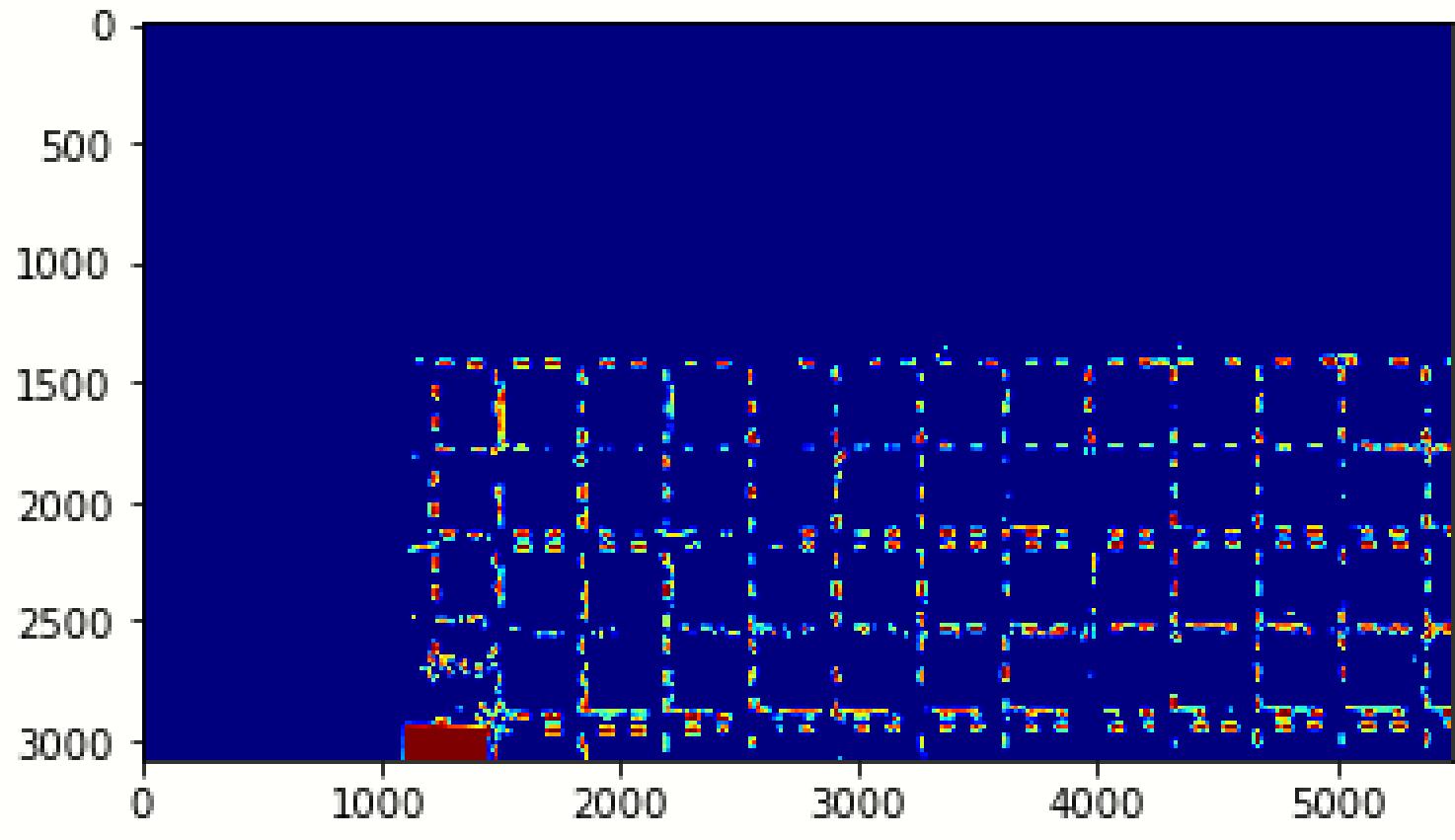
## morphologyEx



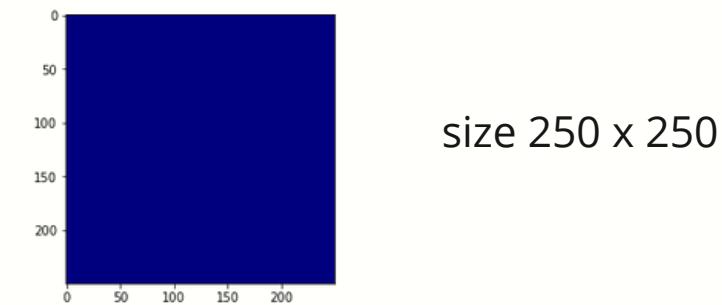
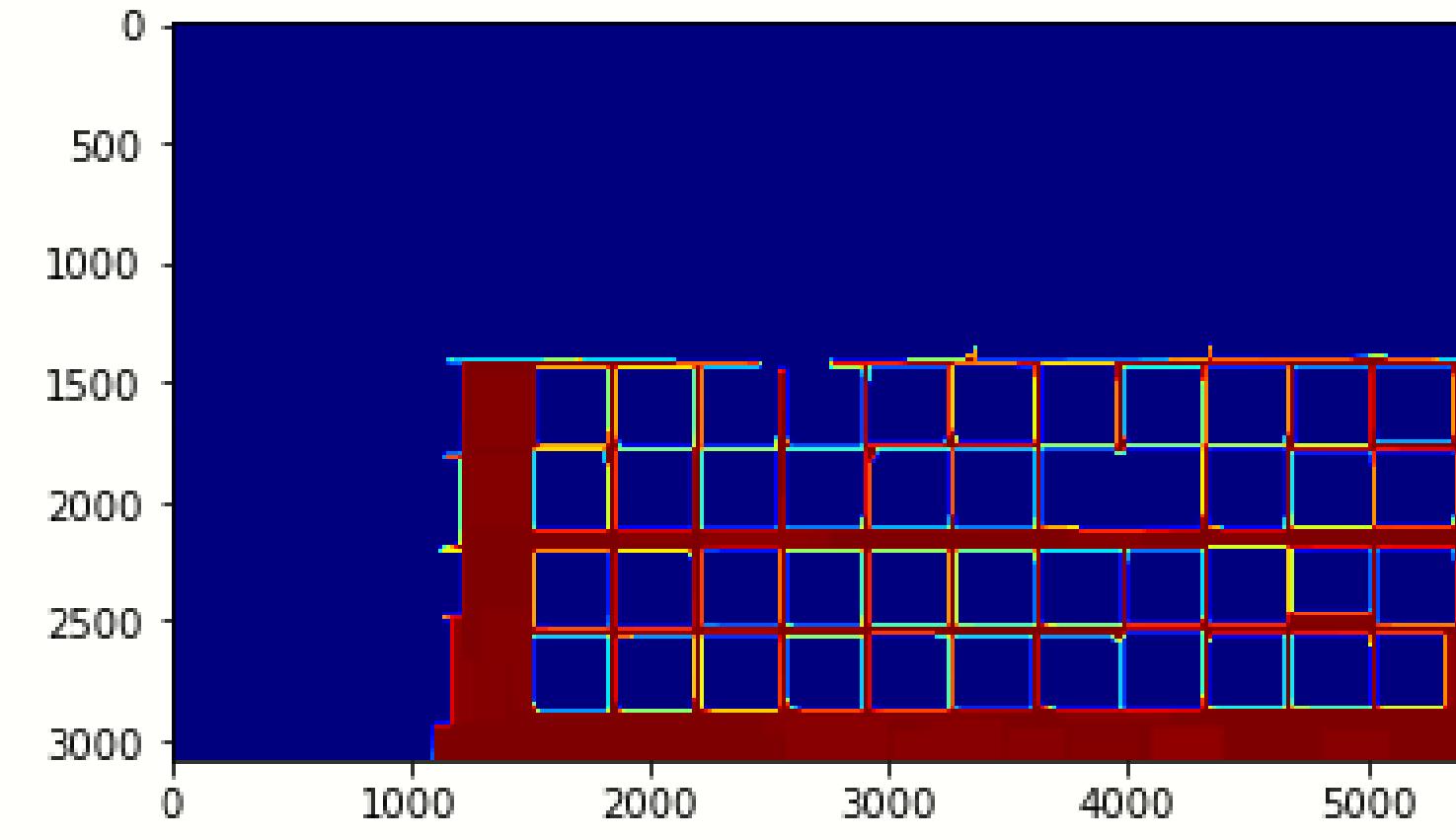
# Morphological

Morphological Opening removes object  
Morphological Closing fills holes smaller than structuring

# Morphological

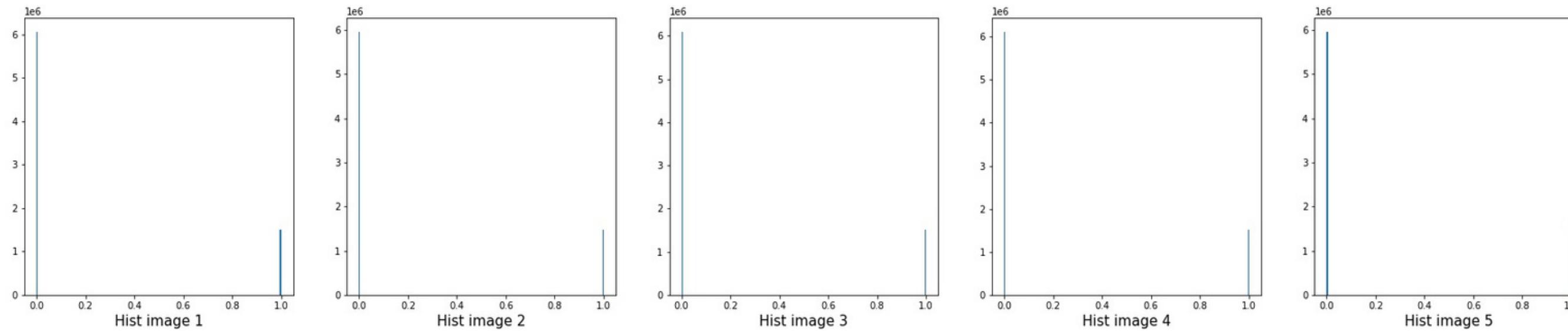
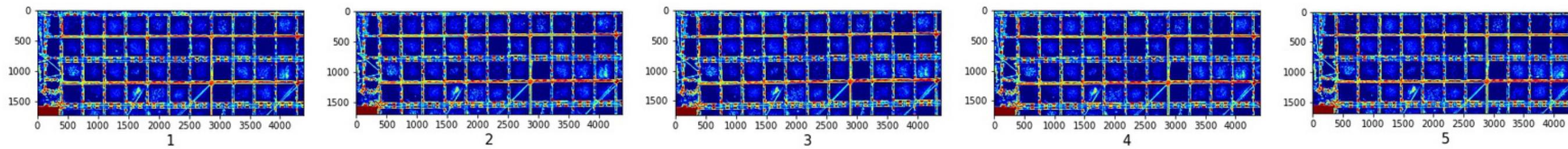


**Opening**



**Closing**

## Object split



# Object split & Feature Extraction

split fish cage from image.

Use connected component analysis function return label image  
next use object split & region feature return sub-image and position

# Object split & Feature Extraction

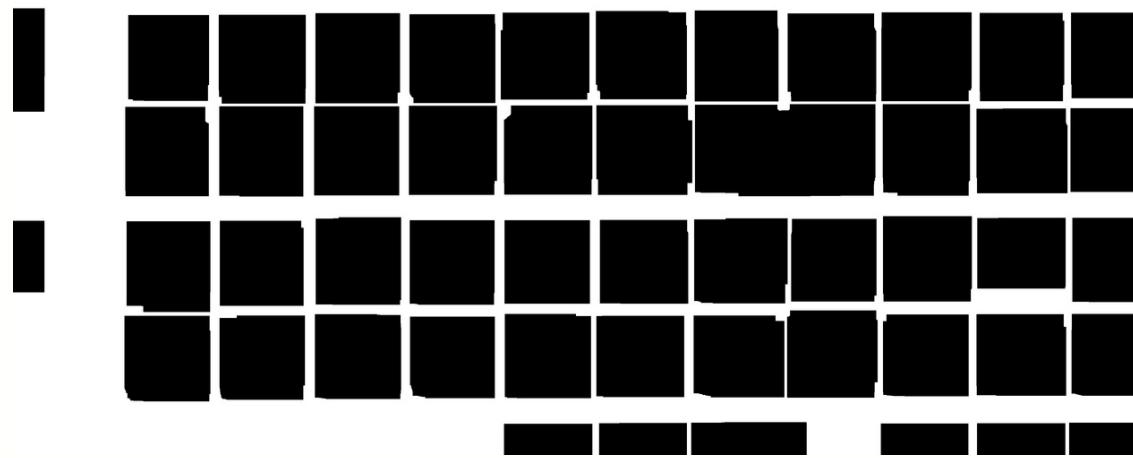


Image 1

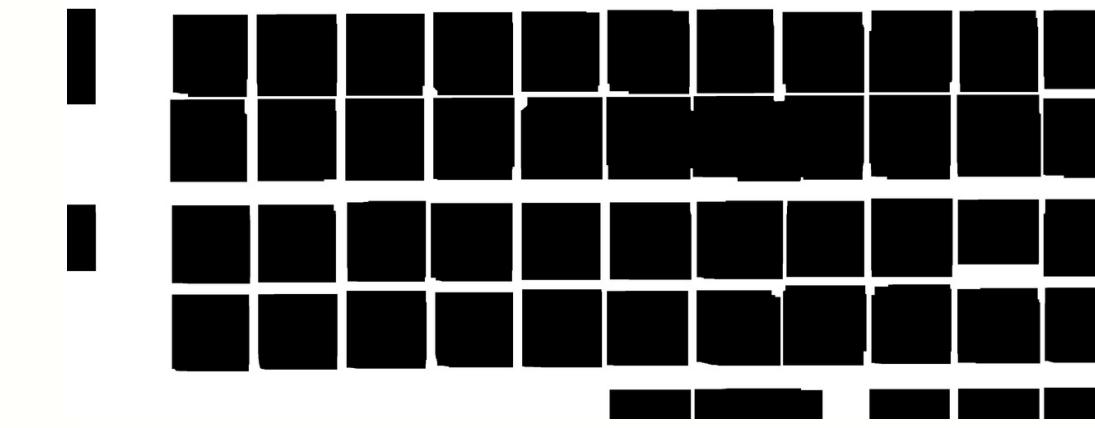


Image 4

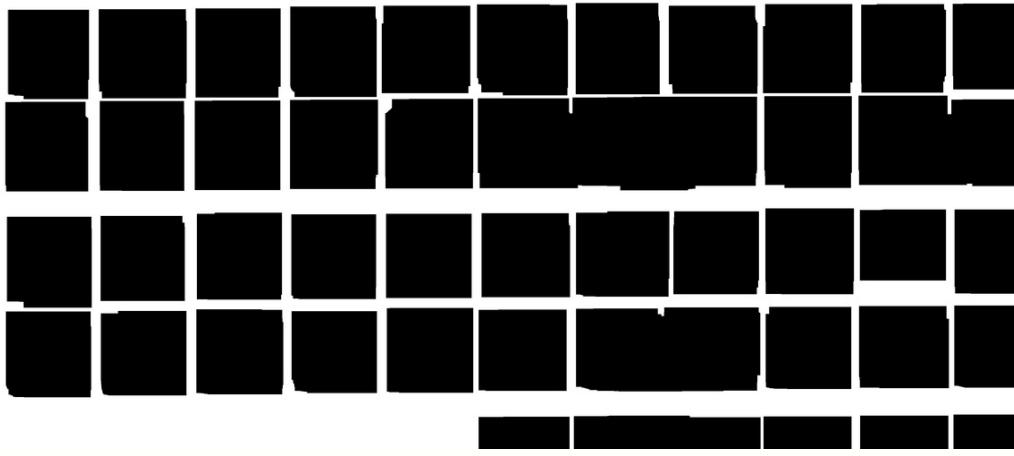


Image 2

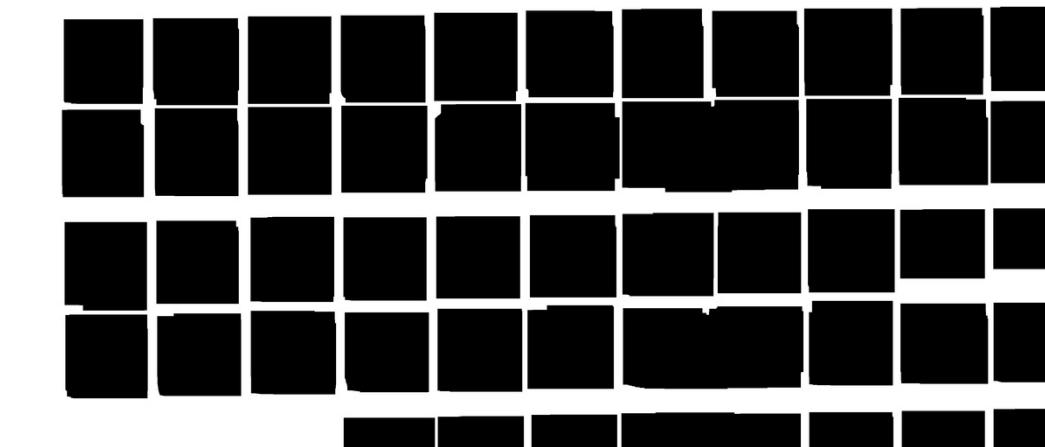
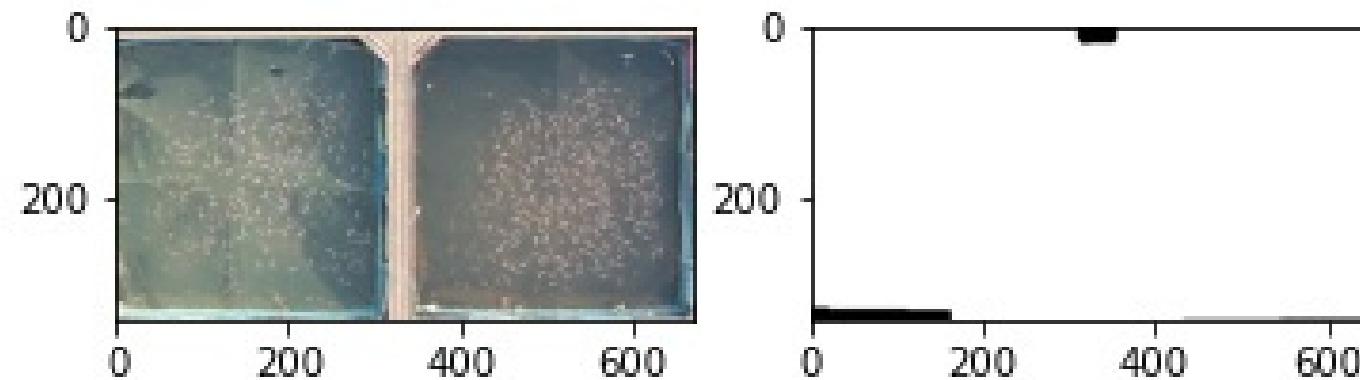
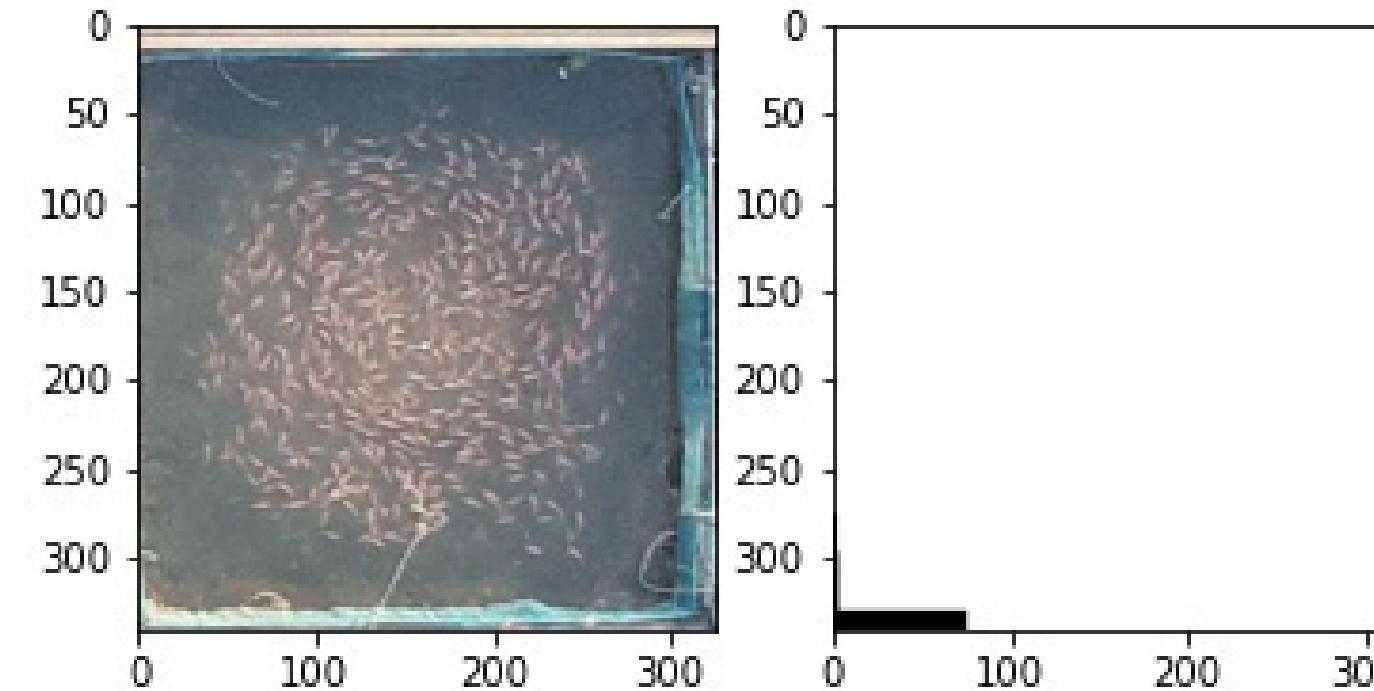
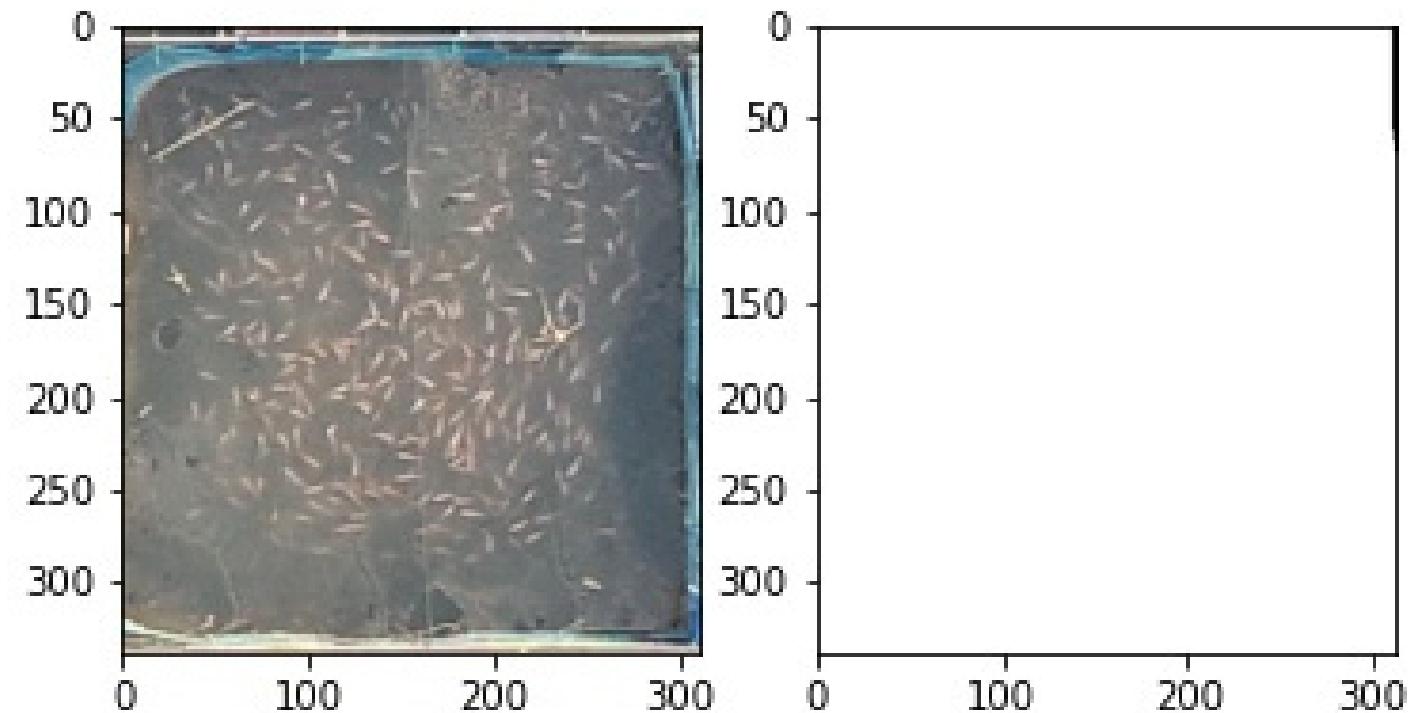
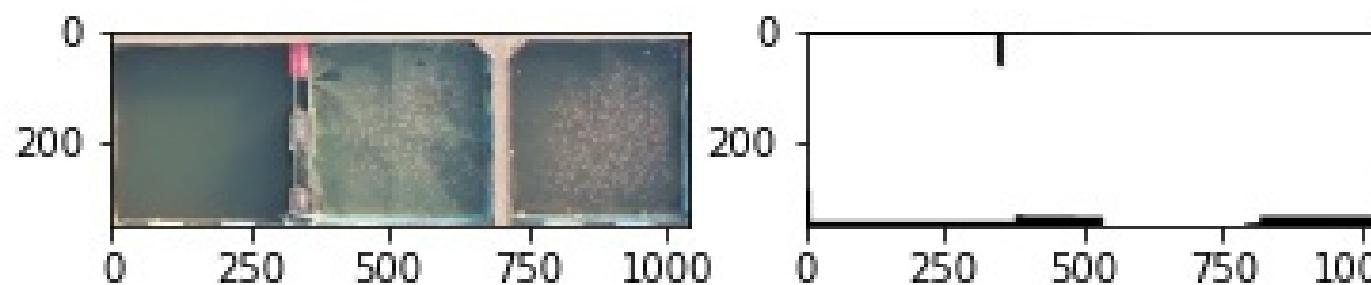


Image 3

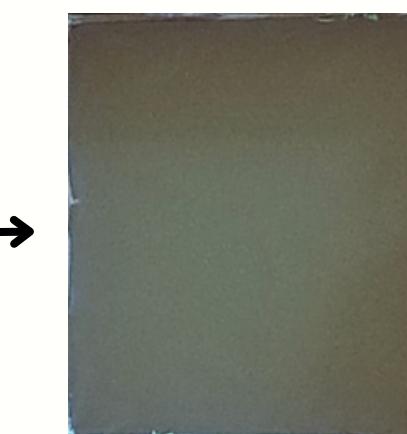
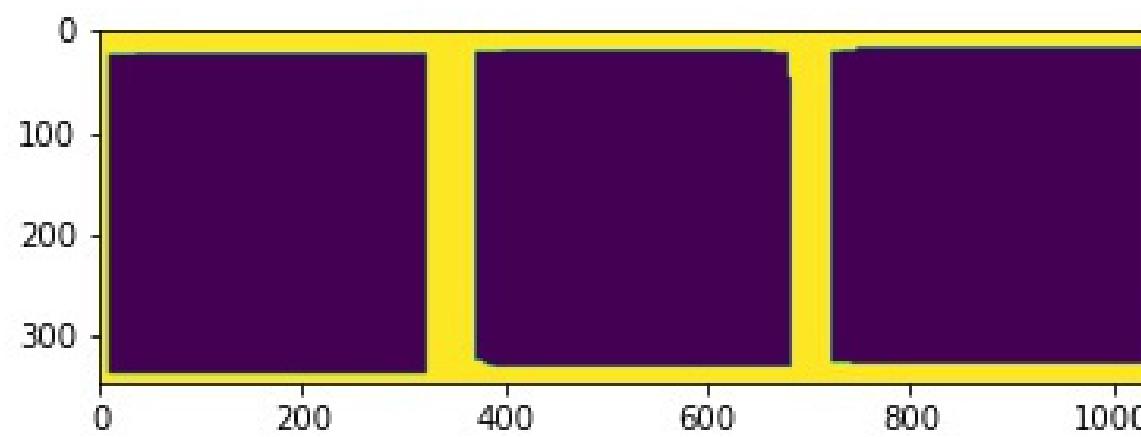
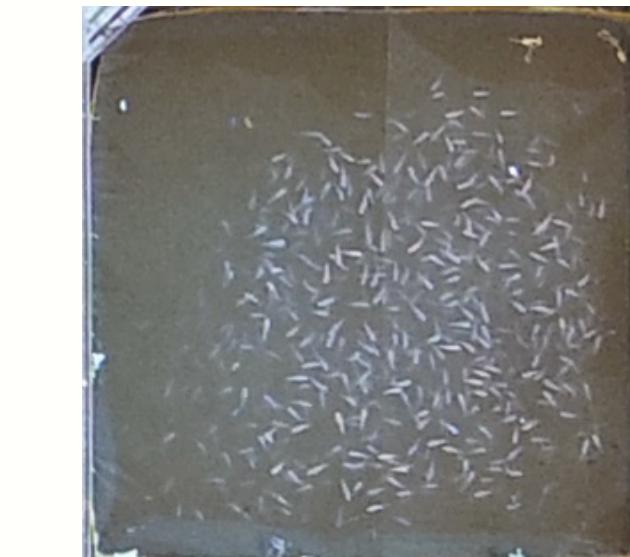
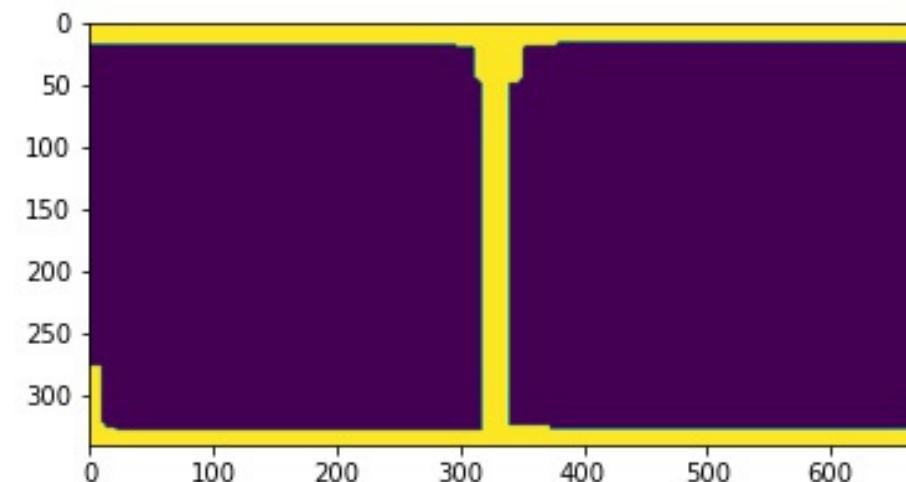
# split fish cage



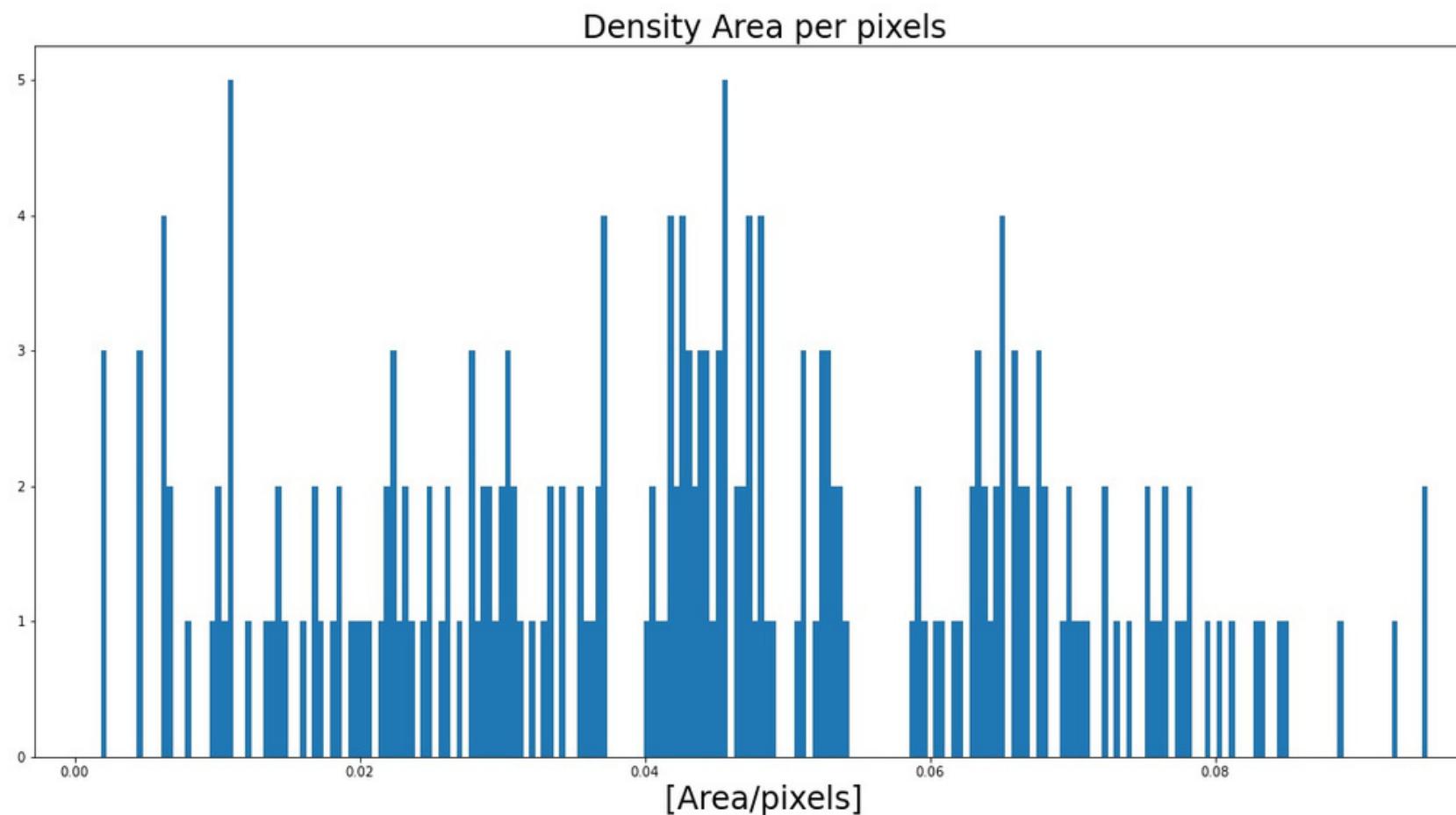
**This problem !!**  
**solve the problem using Morphological Closing  
and Openning**



# Morphological Closing and Openning

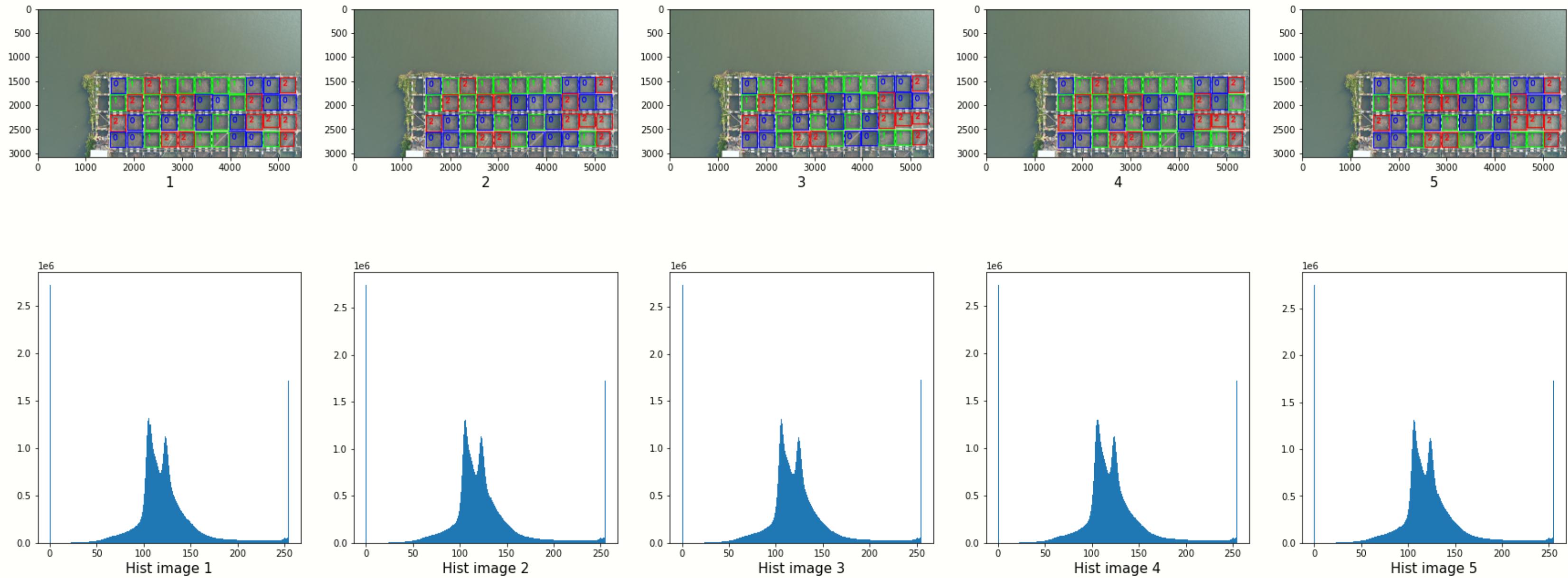


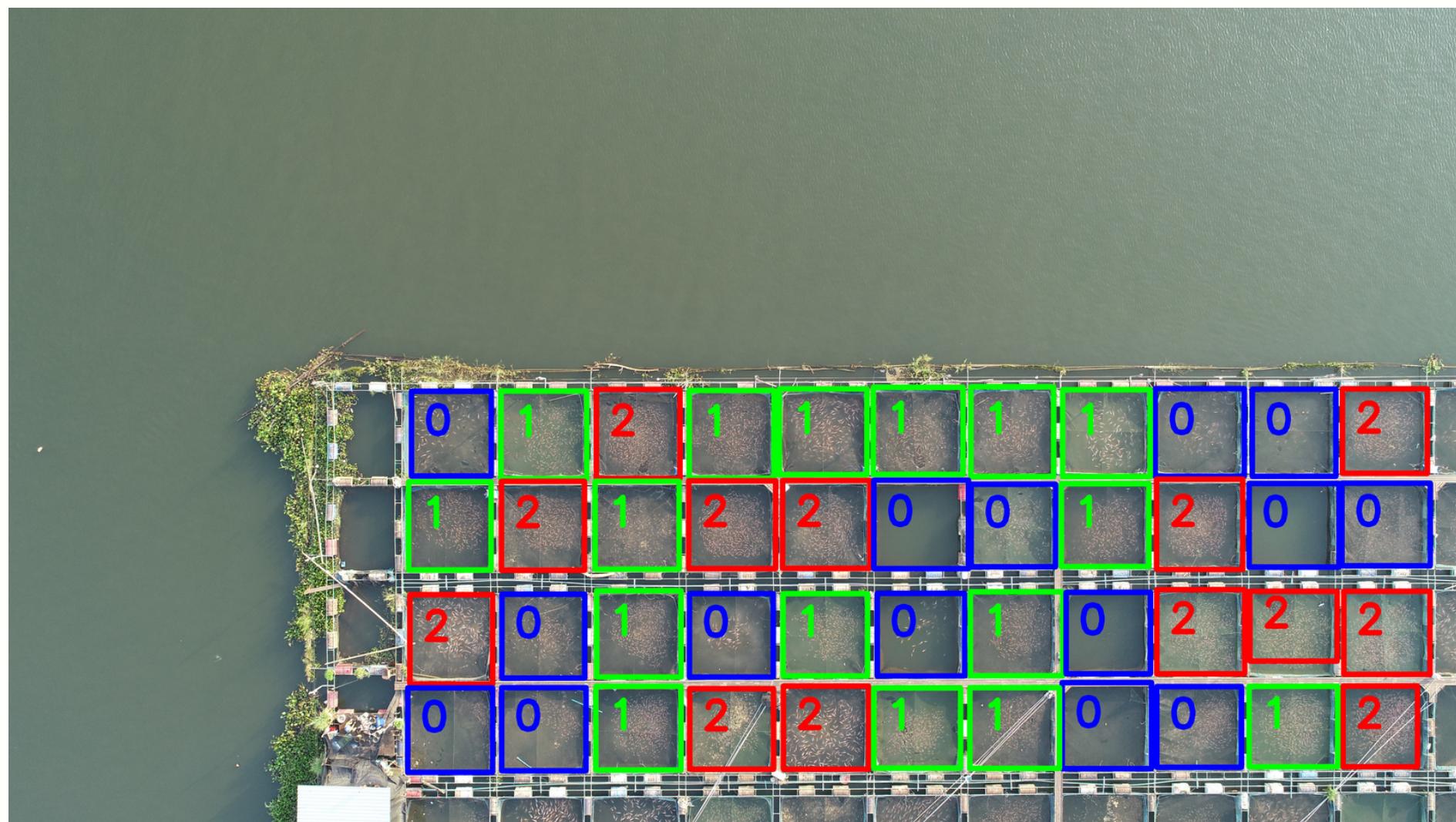
# density



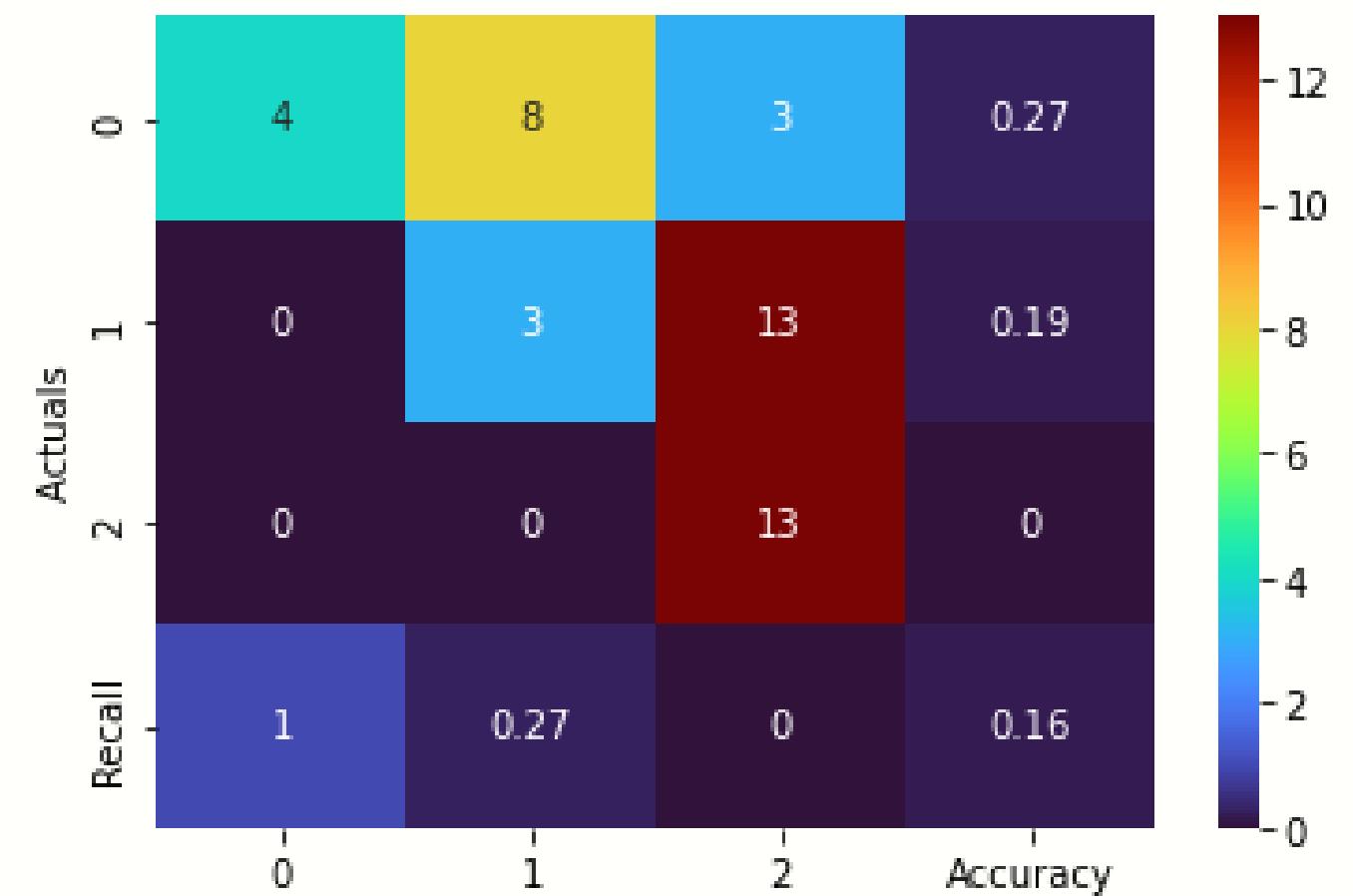
```
if( density >= 0 and density < 0.033): #--> Blue  
    lebel = (0, 0, 255)  
    temp = "0"  
elif(density >= 0.033 and density < 0.056): #-->Green  
    lebel = (0, 255, 0)  
    temp = "1"  
elif(density >= 0.056 and density <= 0.1): #-->Red  
    lebel = (255, 0, 0)  
    temp = "2"
```

## object morphologyEx Invert

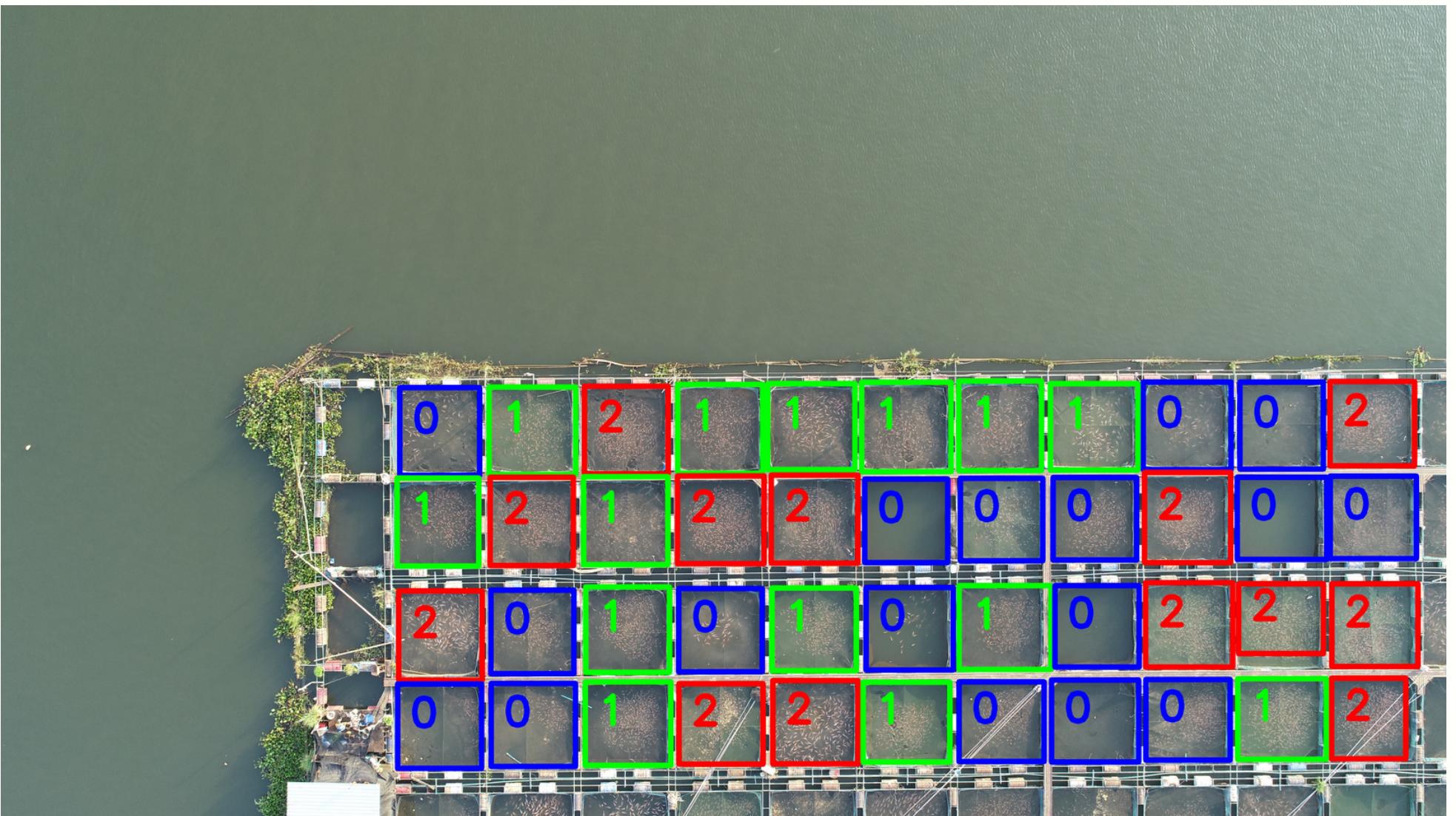




Confusion Matrix

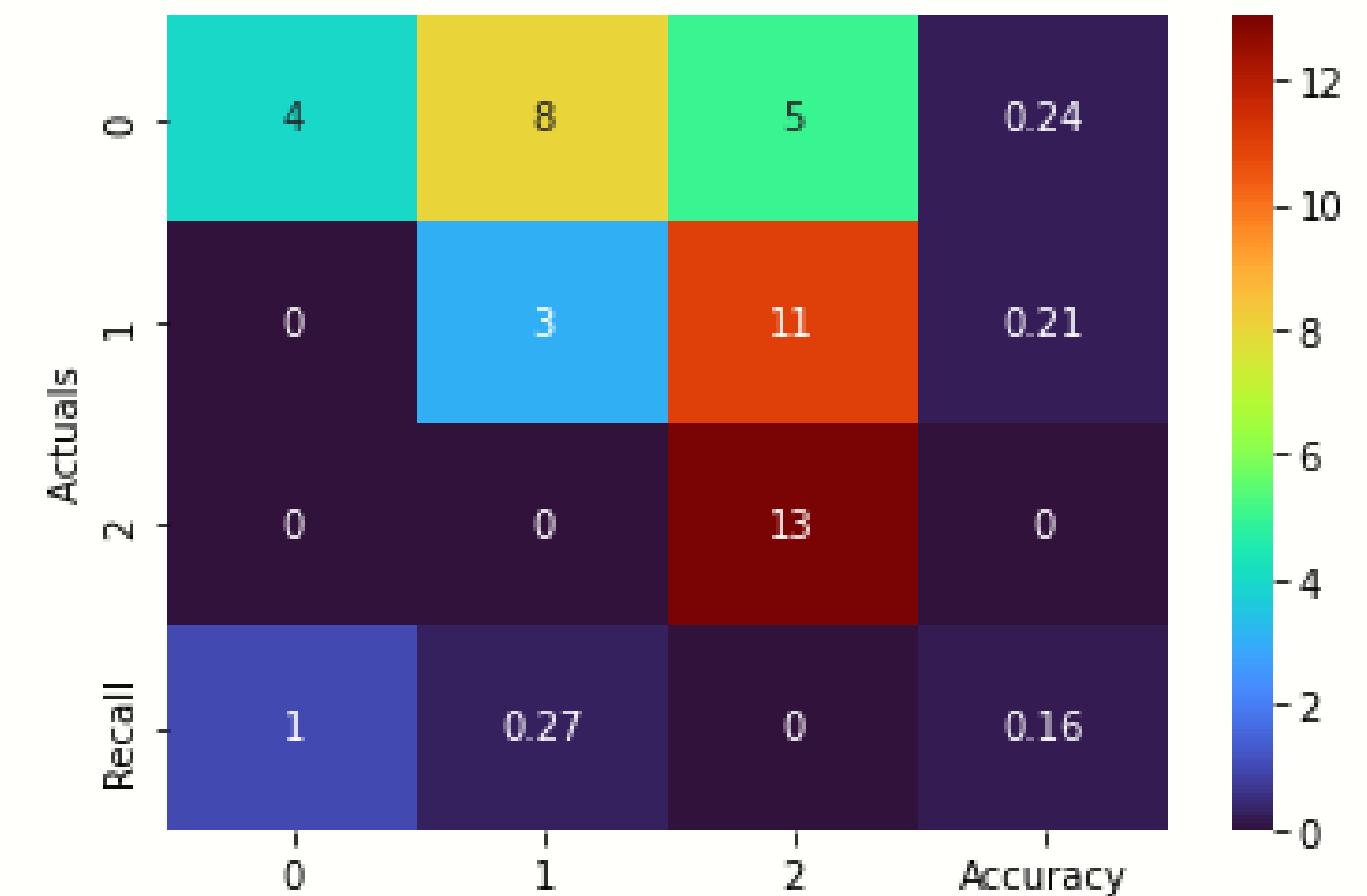


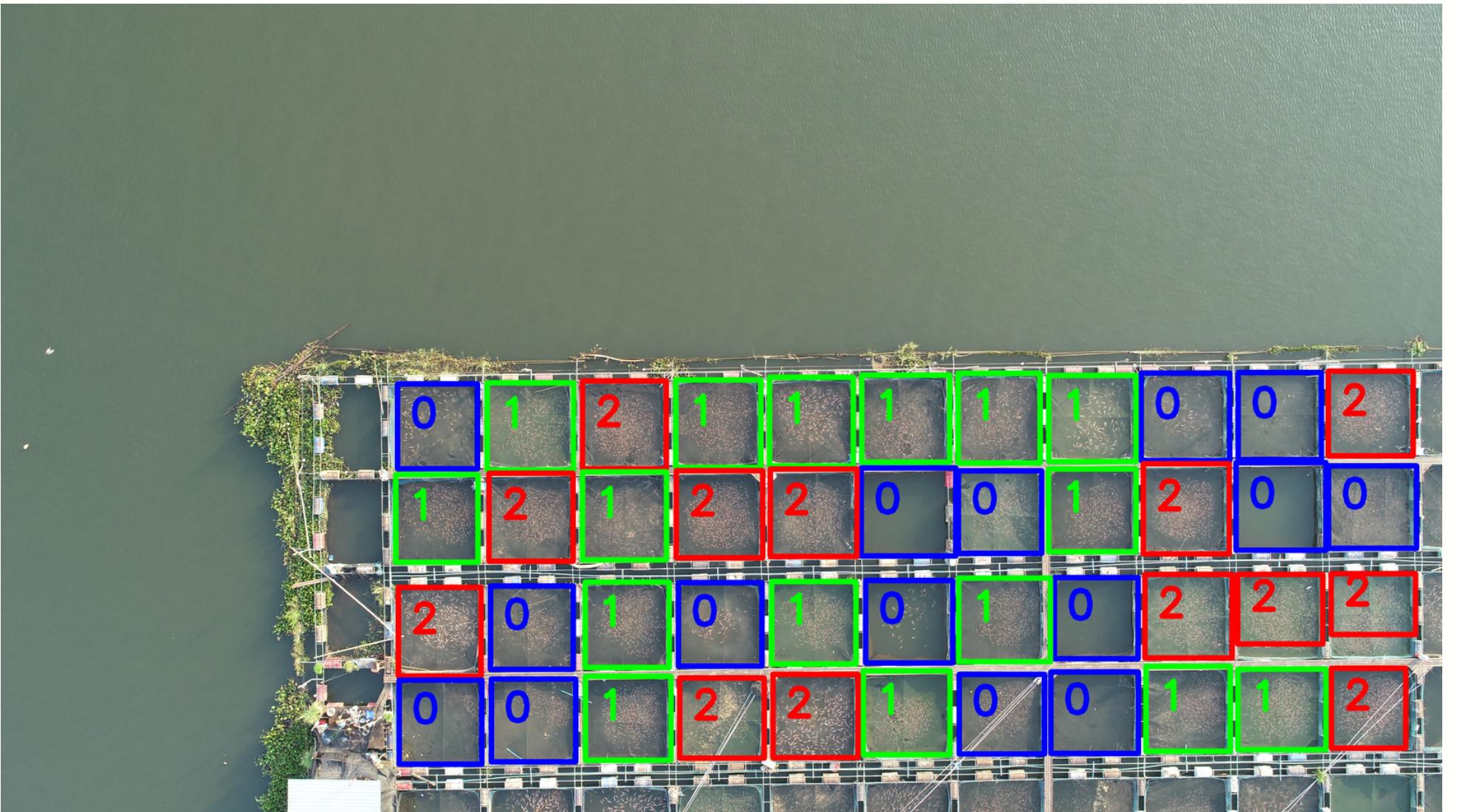
IoU = 0.725



IoU = 0.675

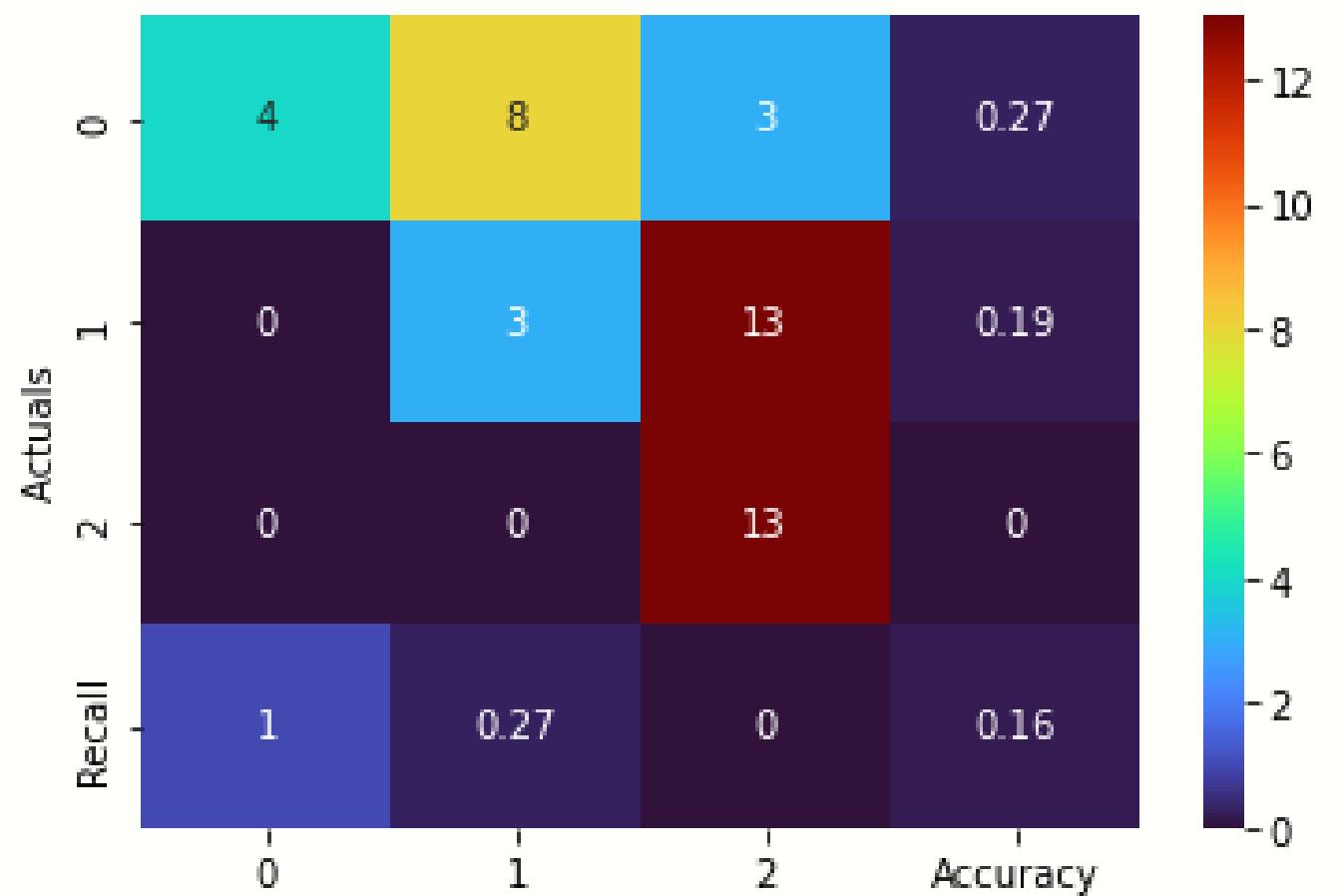
Confusion Matrix

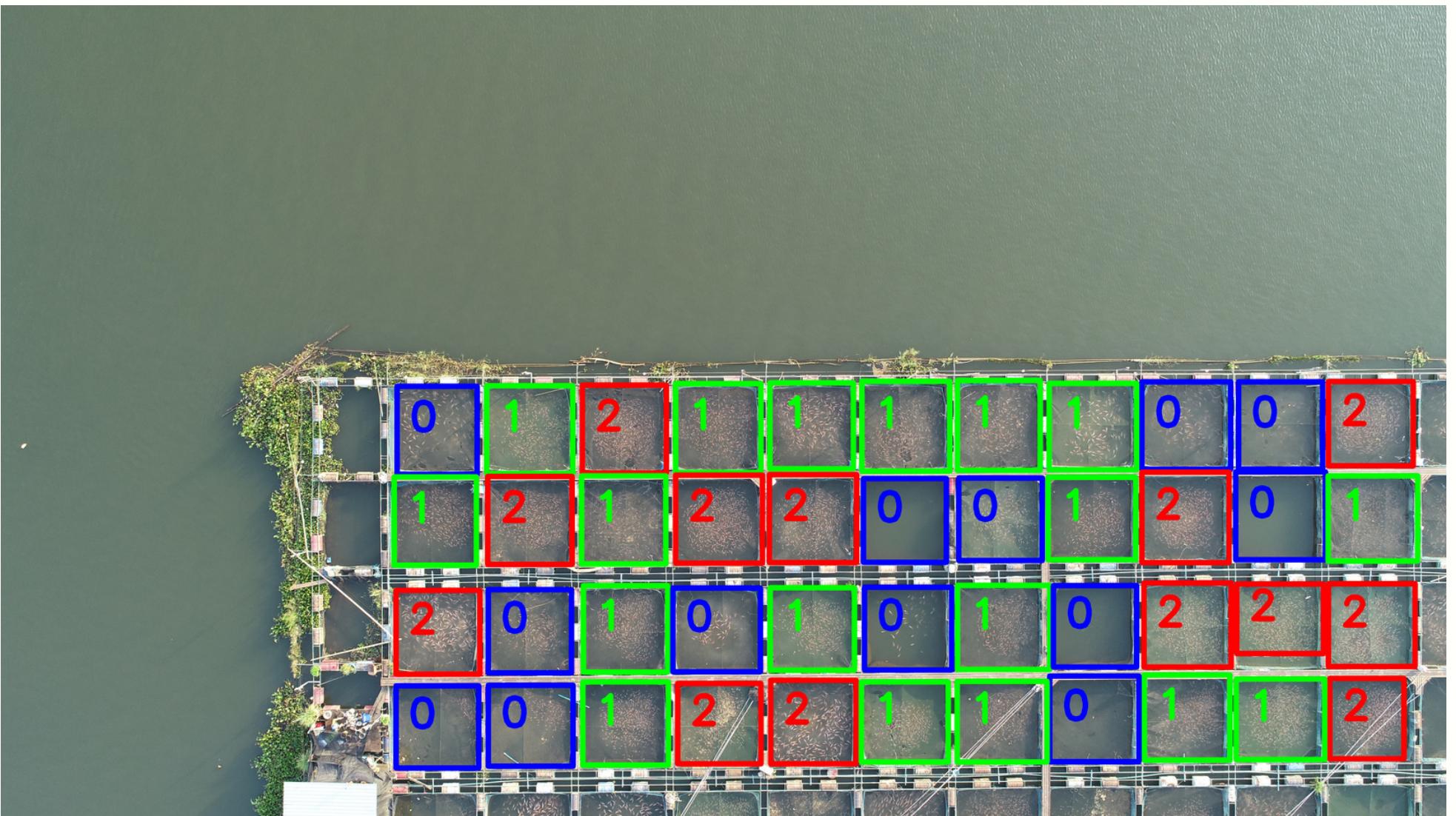




IoU = 0.725

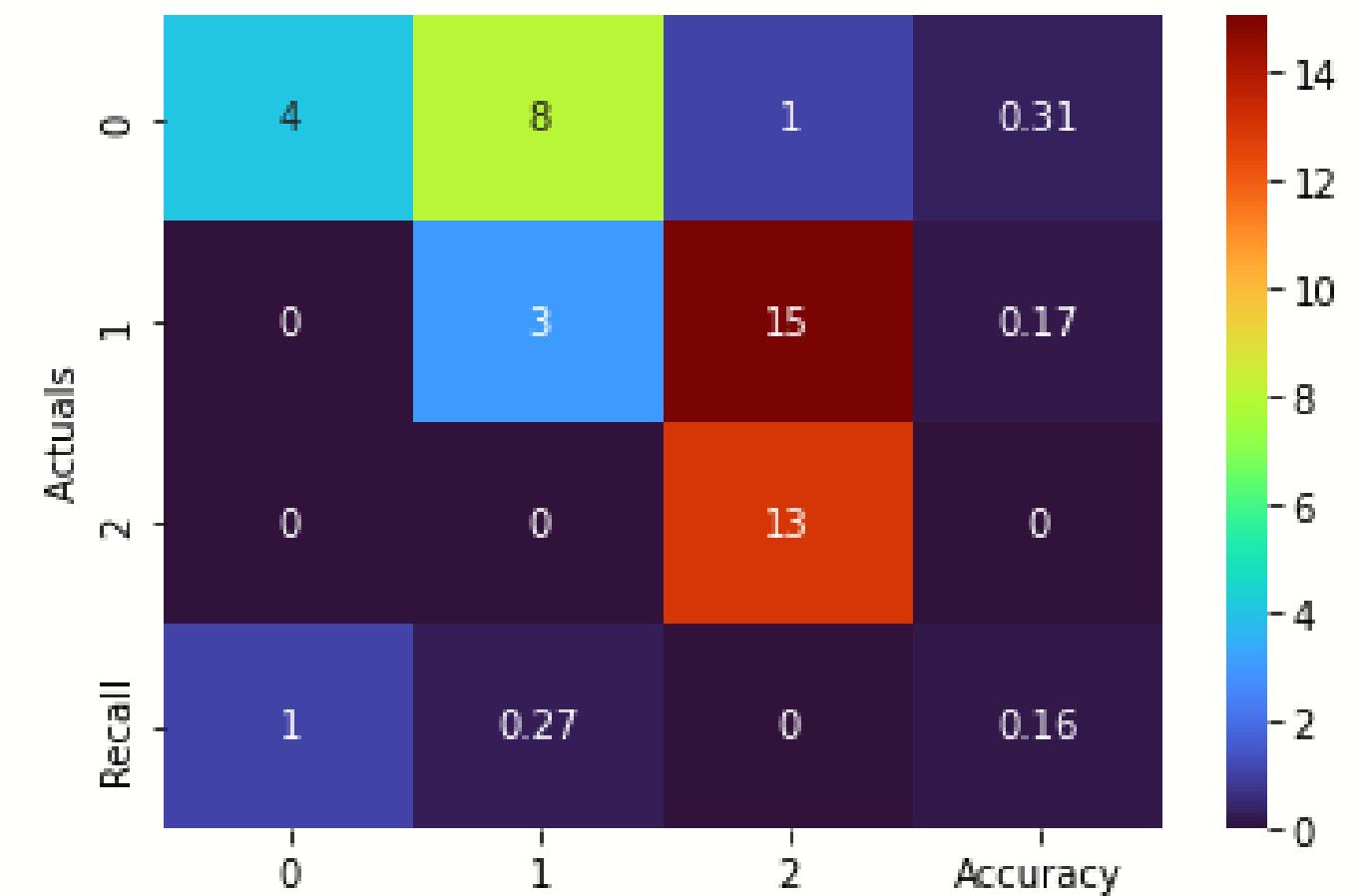
Confusion Matrix

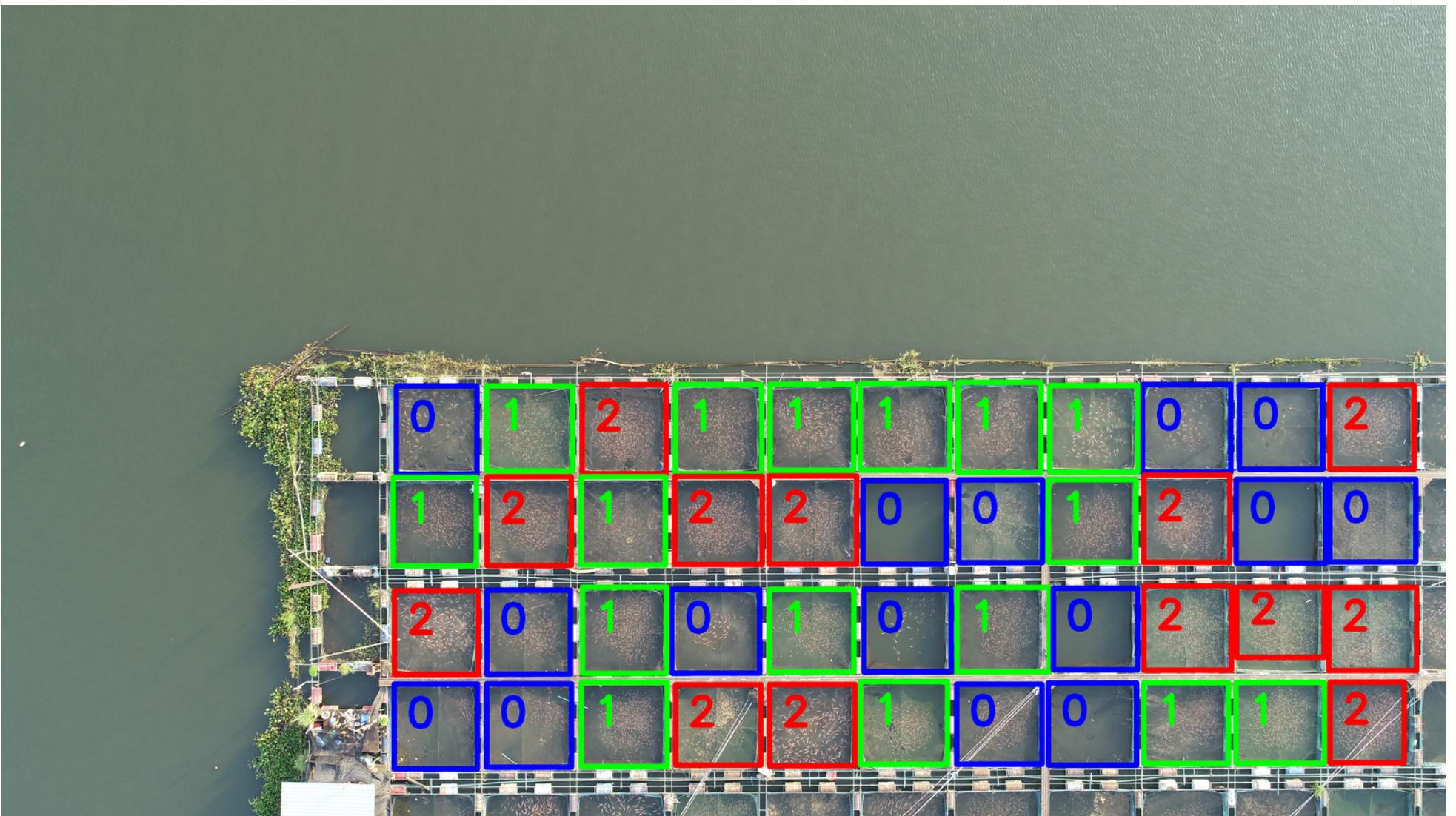




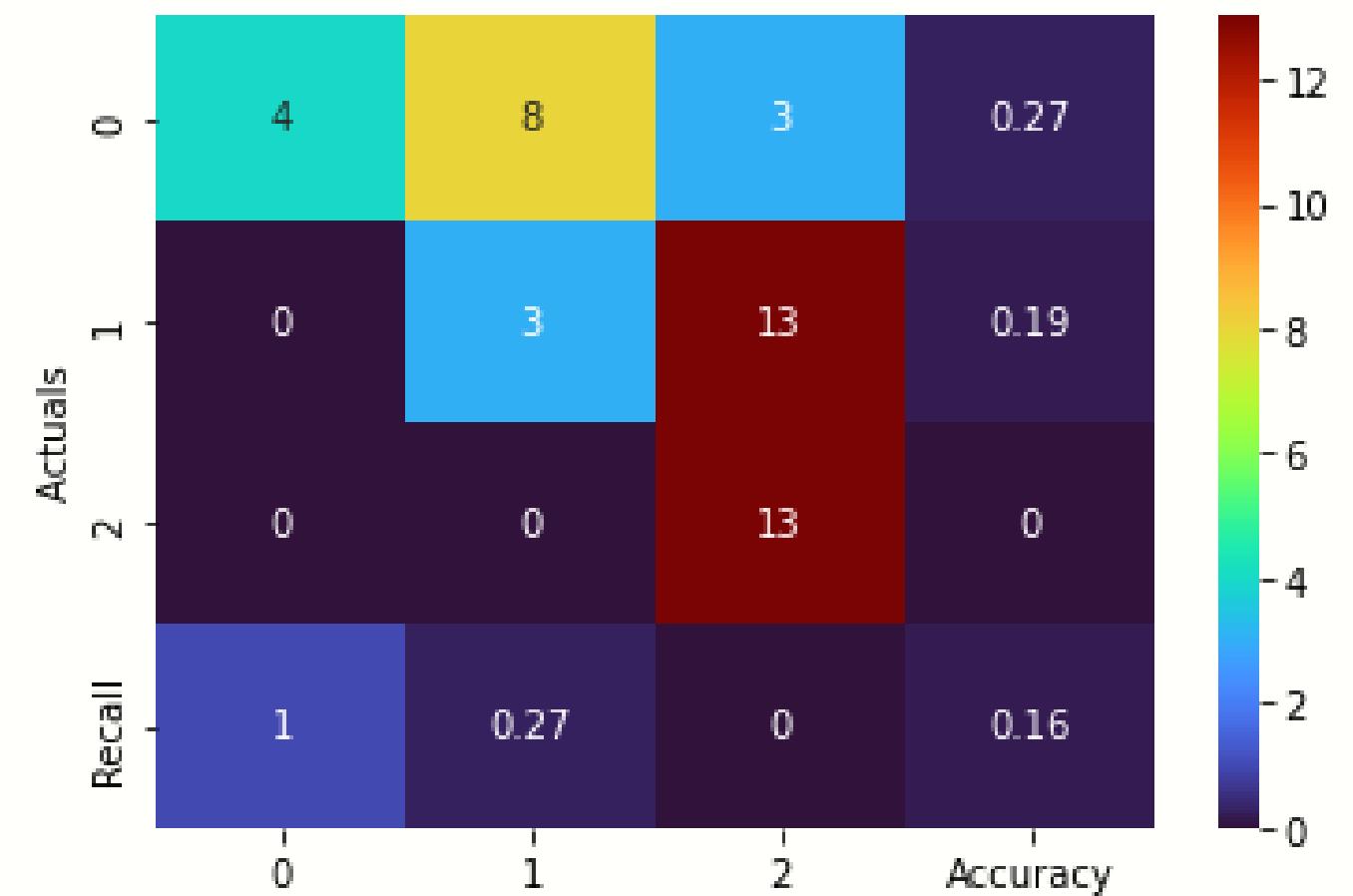
IoU = 0.775

Confusion Matrix





Confusion Matrix



IoU = 0.725



THANK YOU