



Image Segmentation  
**( Current Aim )**

Image Classification  
**( The Aim in the Future )**

# What is ground truth for image segmentation?

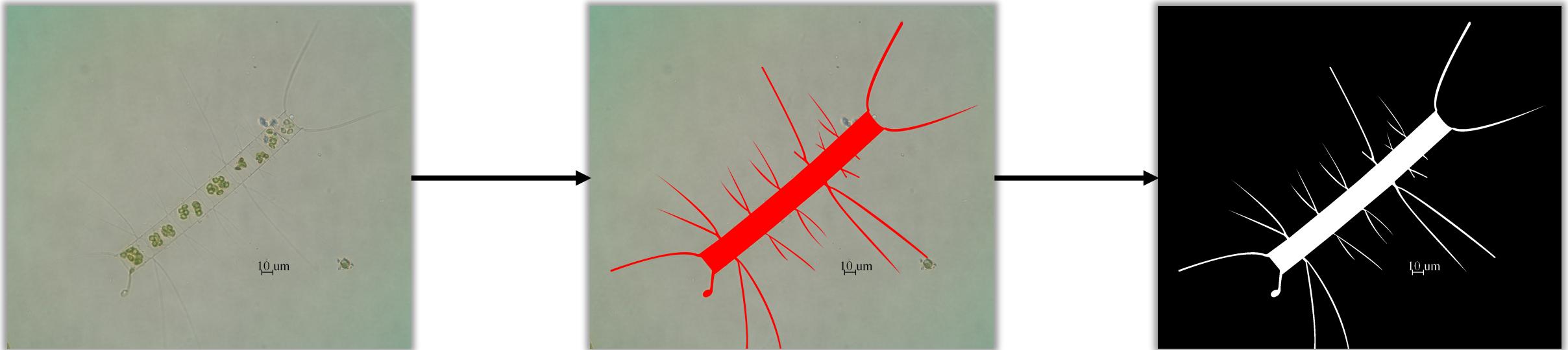


Original image



Ground truth image

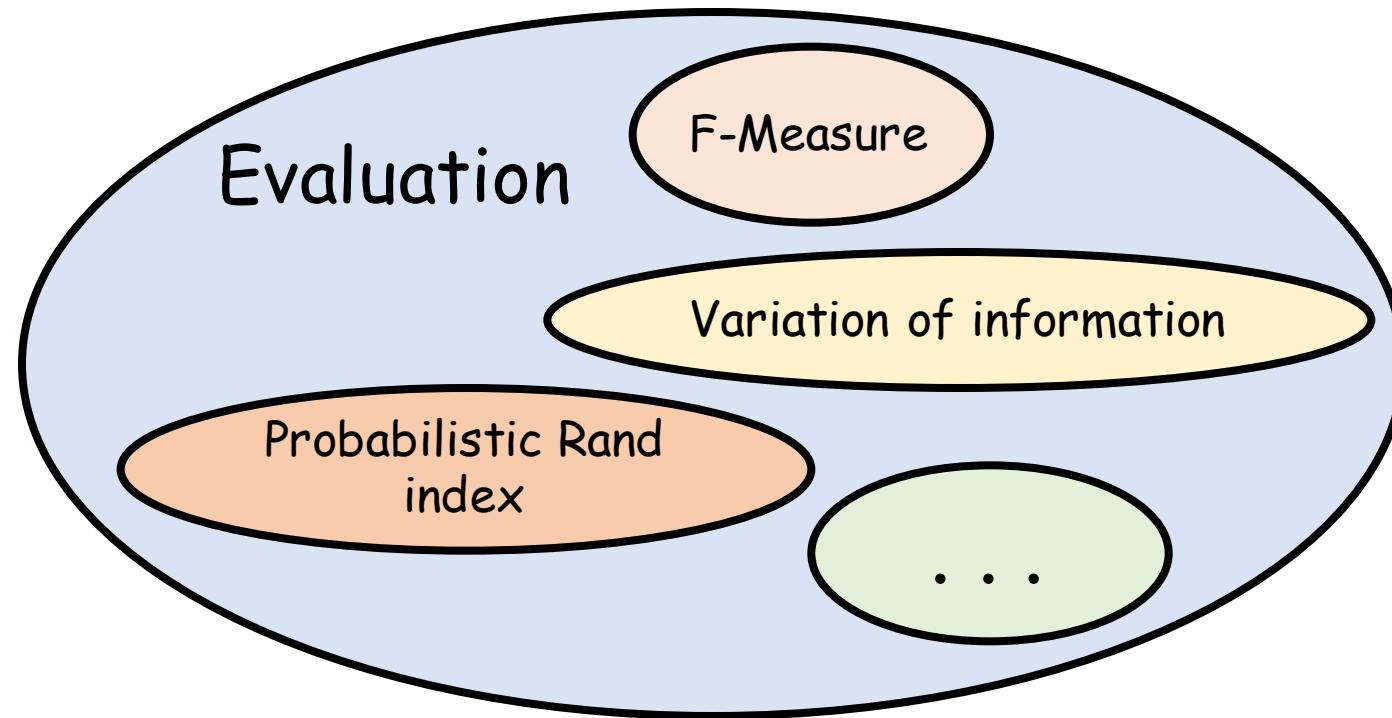
# How to create a ground truth for image segmentation?



Labeled manually

# Evaluation of Segmentation :

For image segmentation, it's a tool to assess whether the performance of segmentation is good or not.



# Precision and Recall:

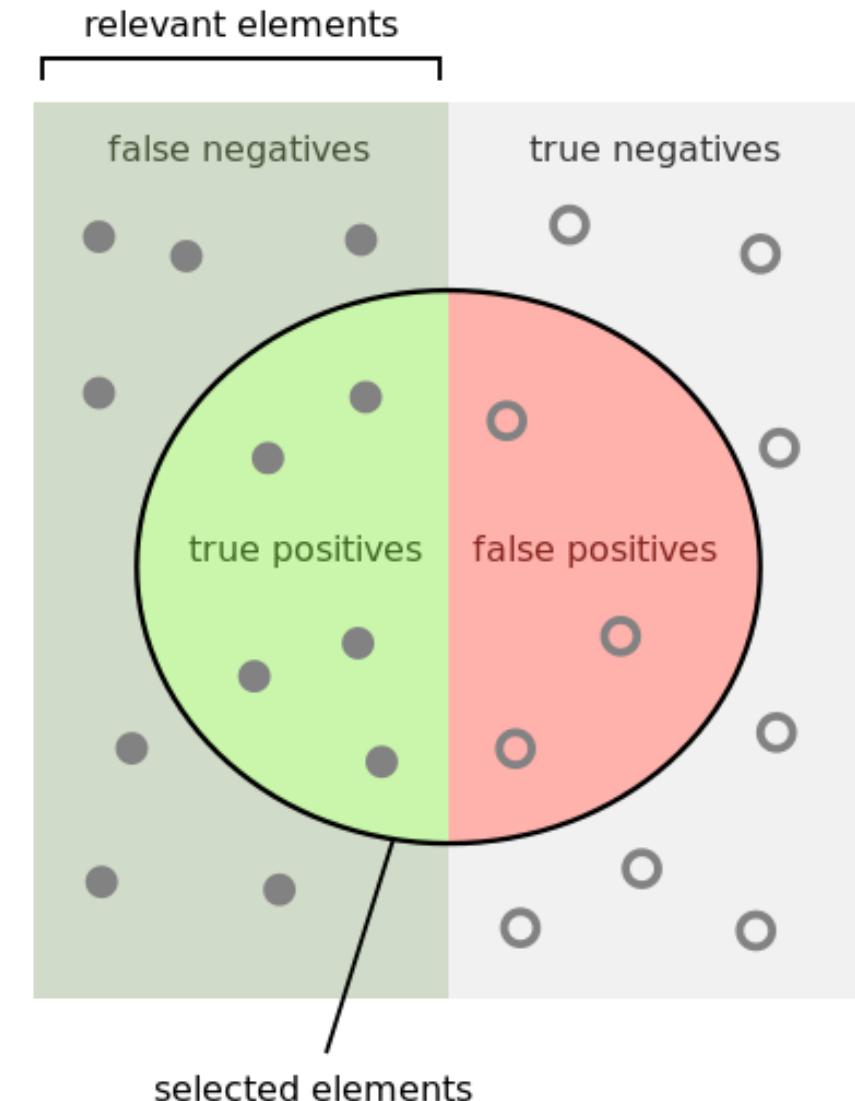
For binary classification

How many selected items are relevant?

$$\text{Precision} = \frac{\text{true positives}}{\text{true positives} + \text{false positives}}$$

How many relevant items are selected?

$$\text{Recall} = \frac{\text{true positives}}{\text{true positives} + \text{false negatives}}$$



**Precision:**  $Precision = \frac{TP}{TP + FP}$

**Recall:**  $Recall = \frac{TP}{TP + FN}$

$TP$ : True Positives

$TN$ : True Negatives

$FP$ : False Positives

$FN$ : False Negatives

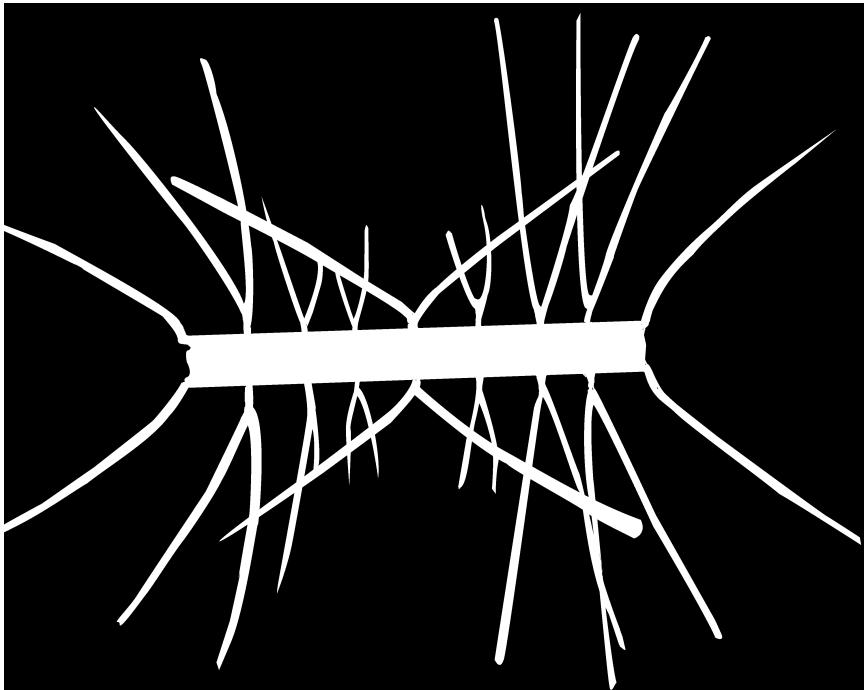
F-Measure:

a measure that combines precision and recall  
is a harmonic mean of precision and recall.

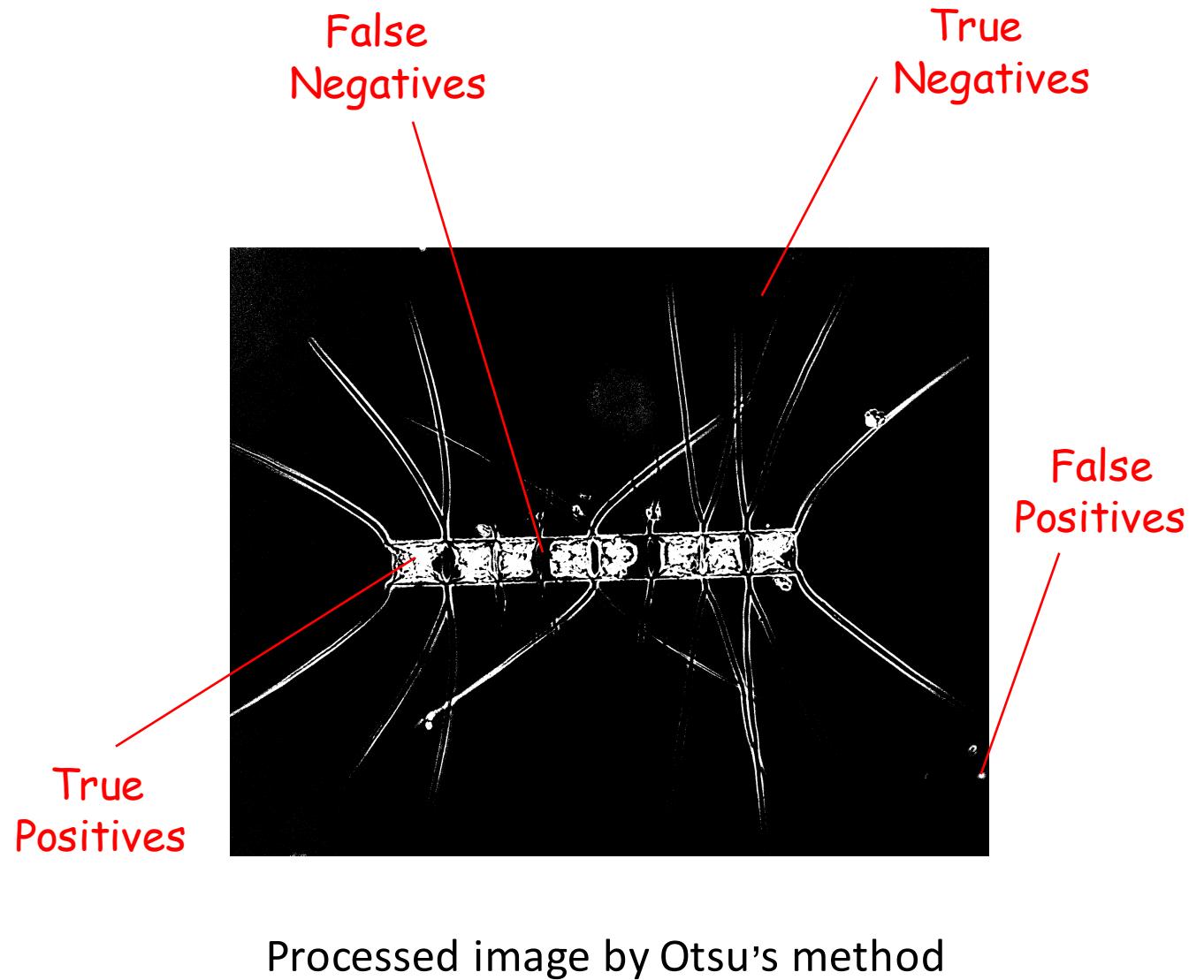
$$F_\beta = \frac{(1 + \beta^2) \cdot Precision \cdot Recall}{\beta^2 \cdot Precision + Recall}$$

When  $\beta = 1$ ,  $F_1 = 2 \frac{Precision \cdot Recall}{Precision + Recall}$

# A Simple Example:

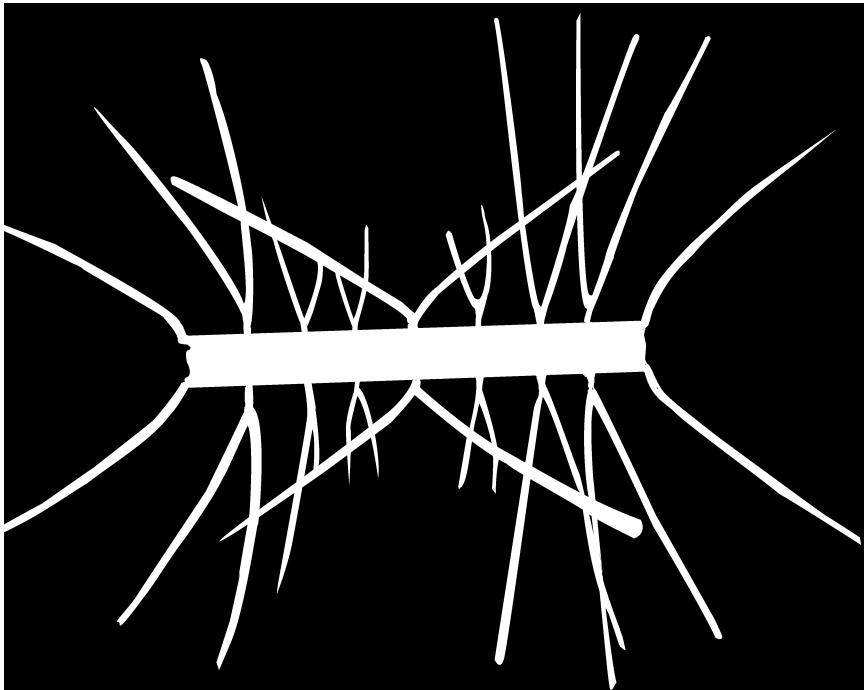


Ground truth image

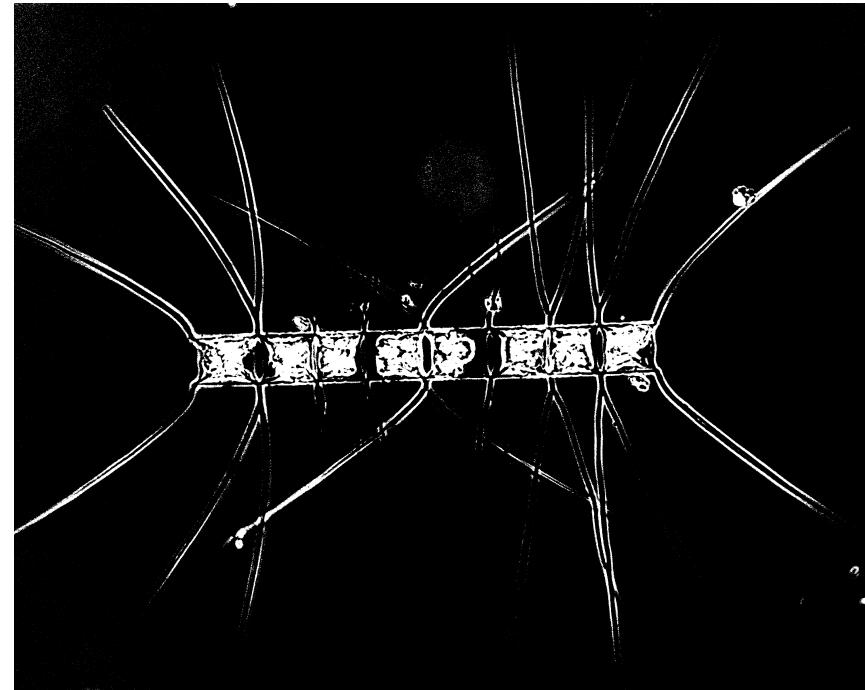


Processed image by Otsu's method

# A Simple Example:



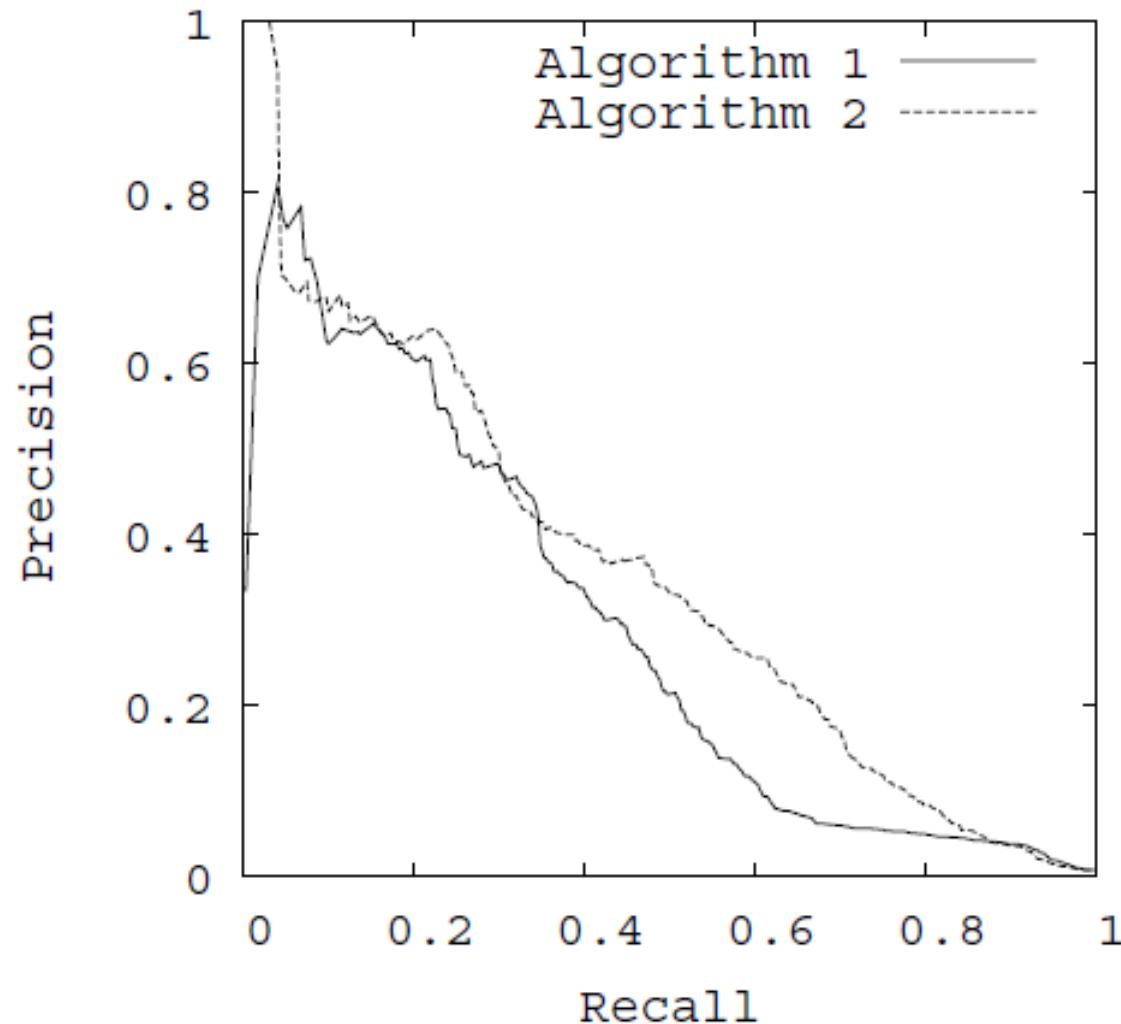
Ground truth image



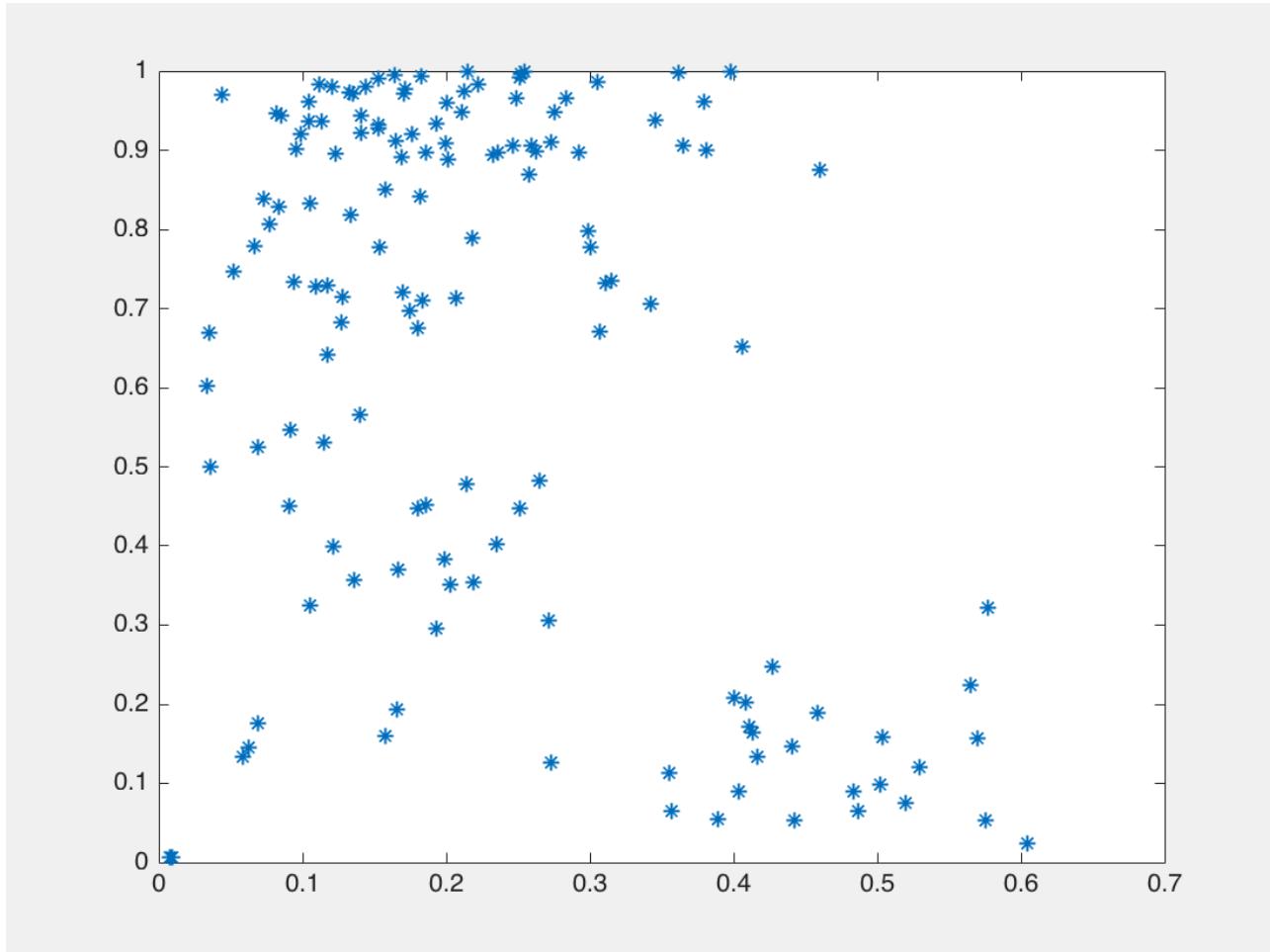
Processed image by Otsu's method

In a dataset, one image corresponds to a precision value and recall value

# Precision and Recall Curve:

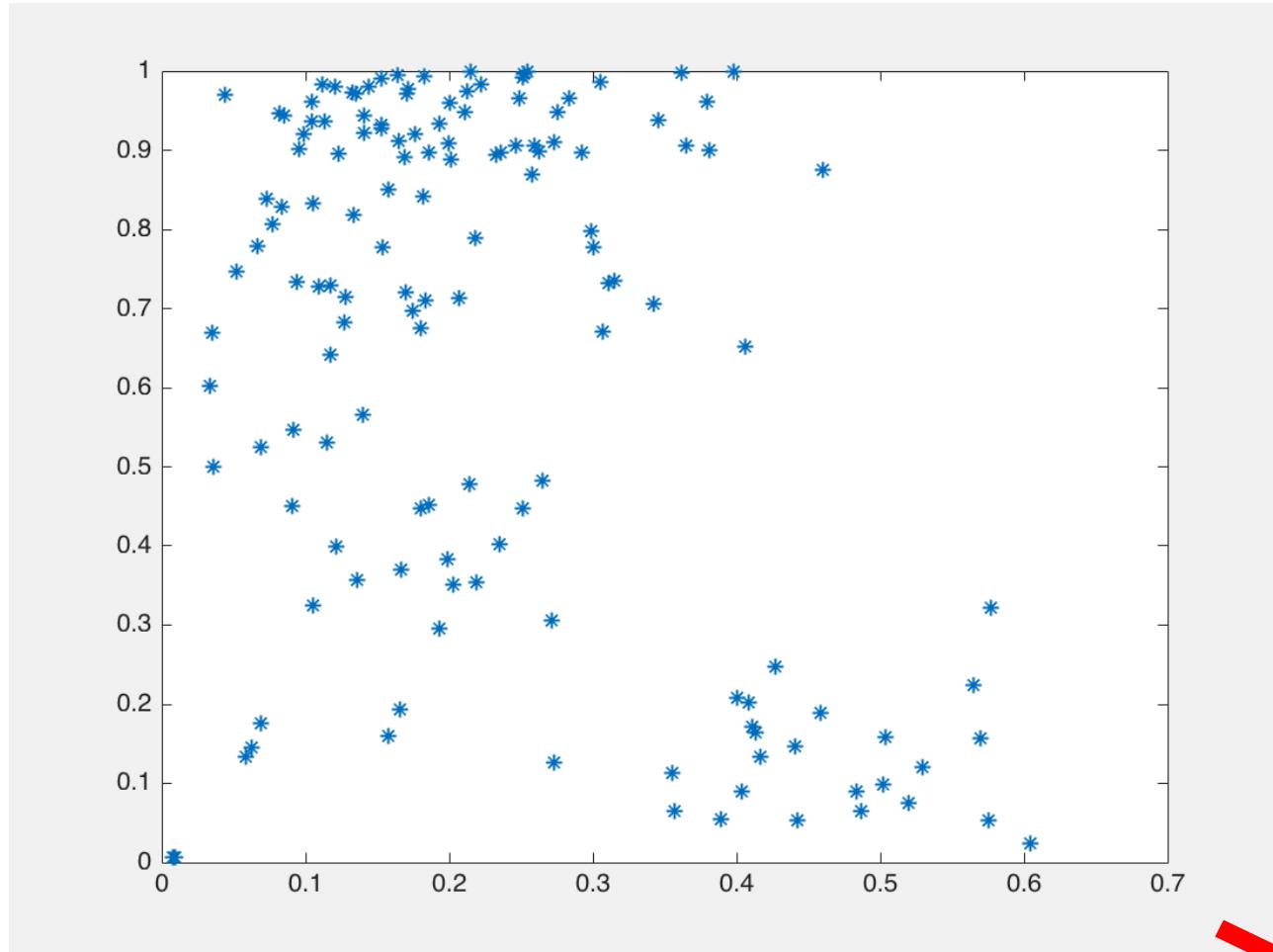


# How to draw precision and recall curve?

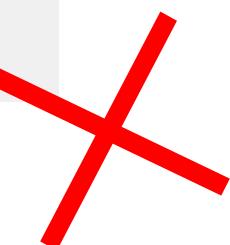


A point corresponds to a image

# How to draw precision and recall curve?



A point corresponds to a image

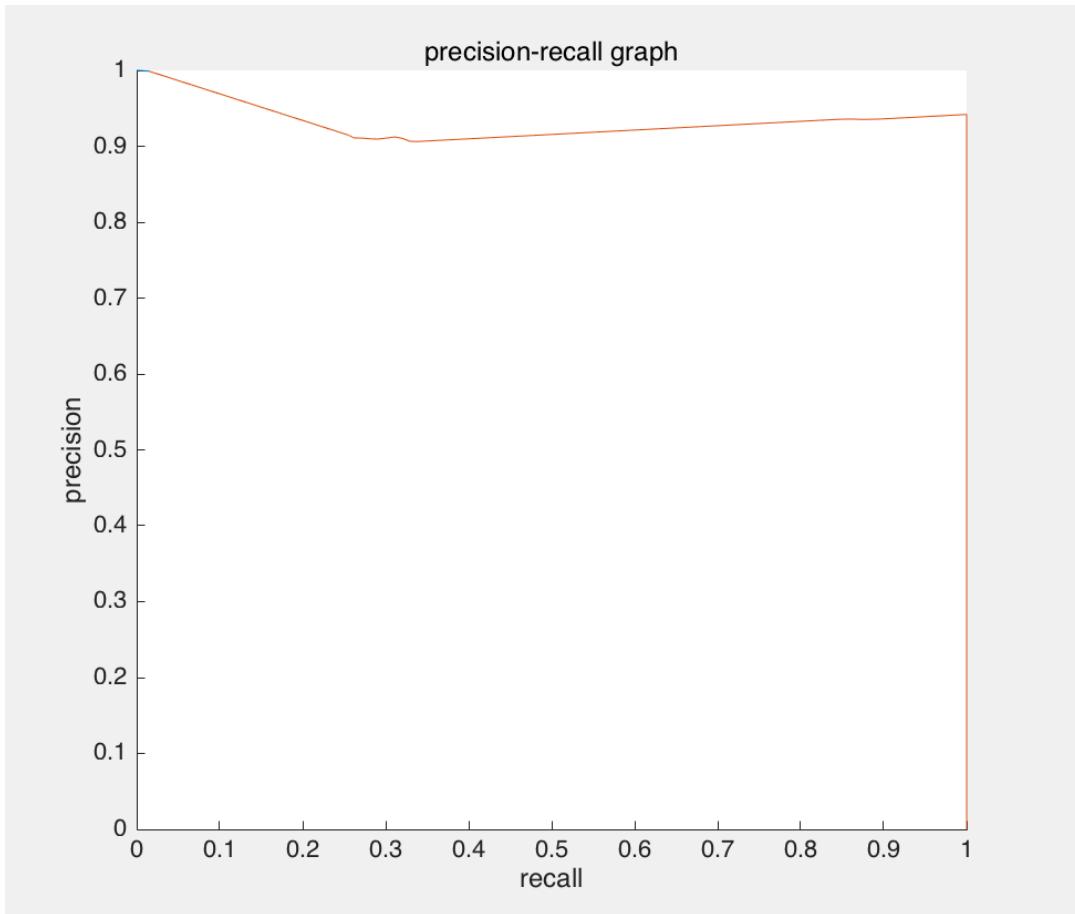




Processed image



Ground truth image



Thank you