

# DEFECT DETECTION

Deep learning



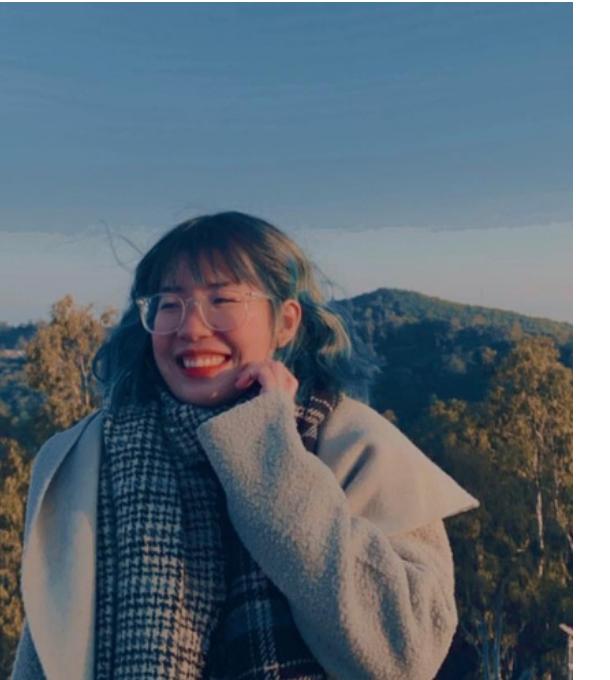
**Duong Thi Thu Phuong**  
33%



**Nguyen Thu Thao**  
28%

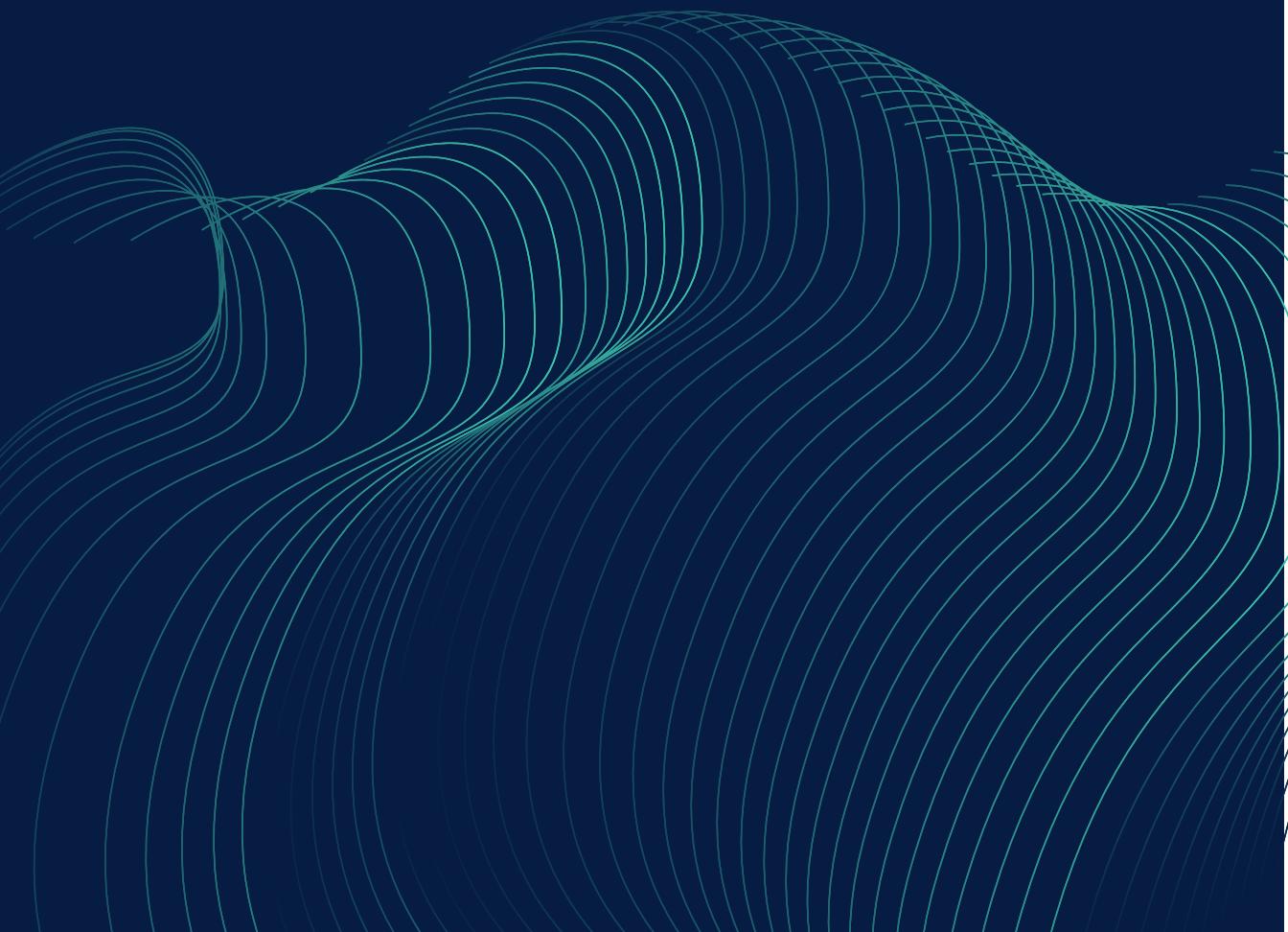


**Nguyen Thuy Linh**  
24%



**Tran Phuong Anh**  
15%

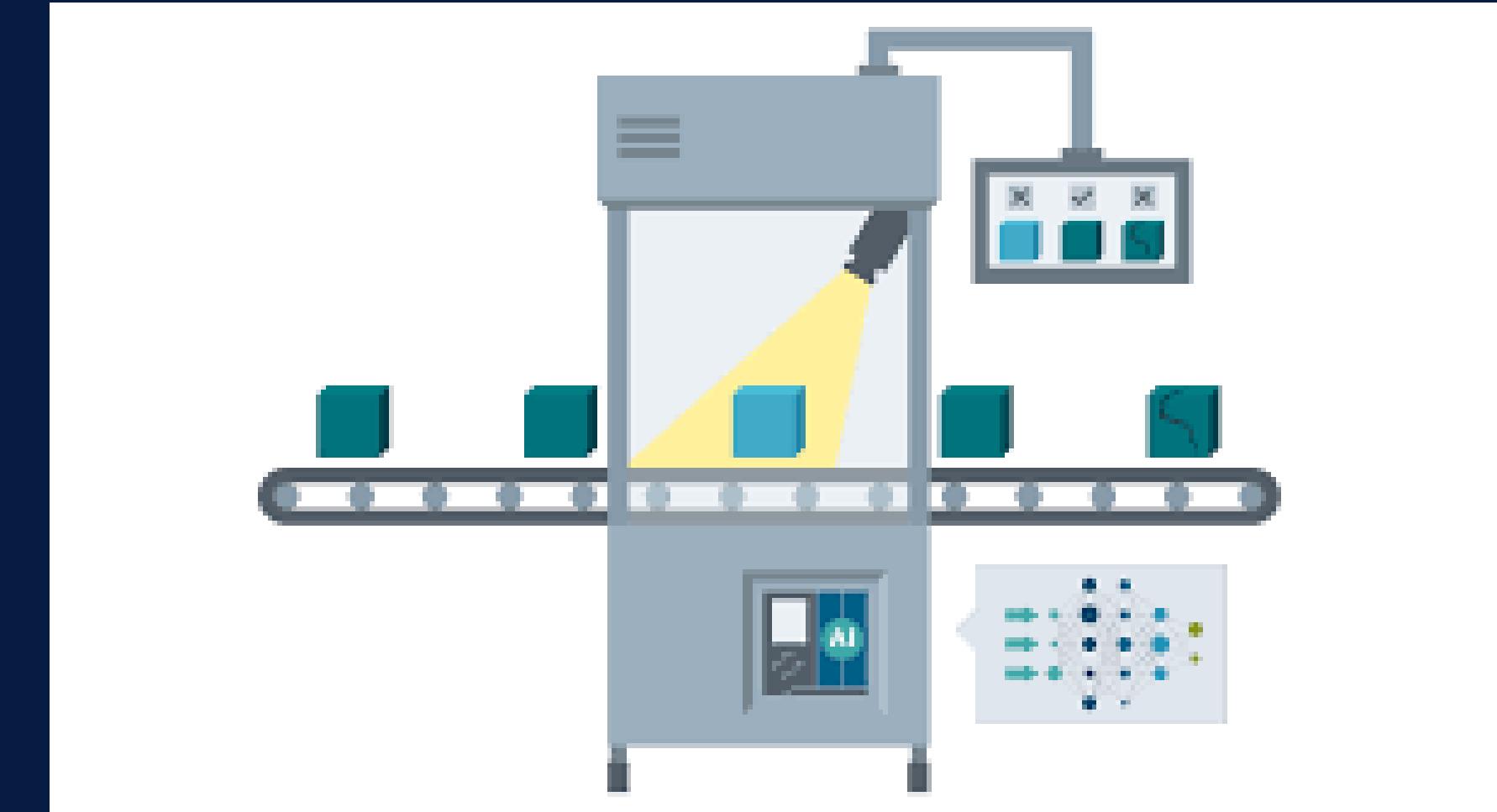
# Our Team



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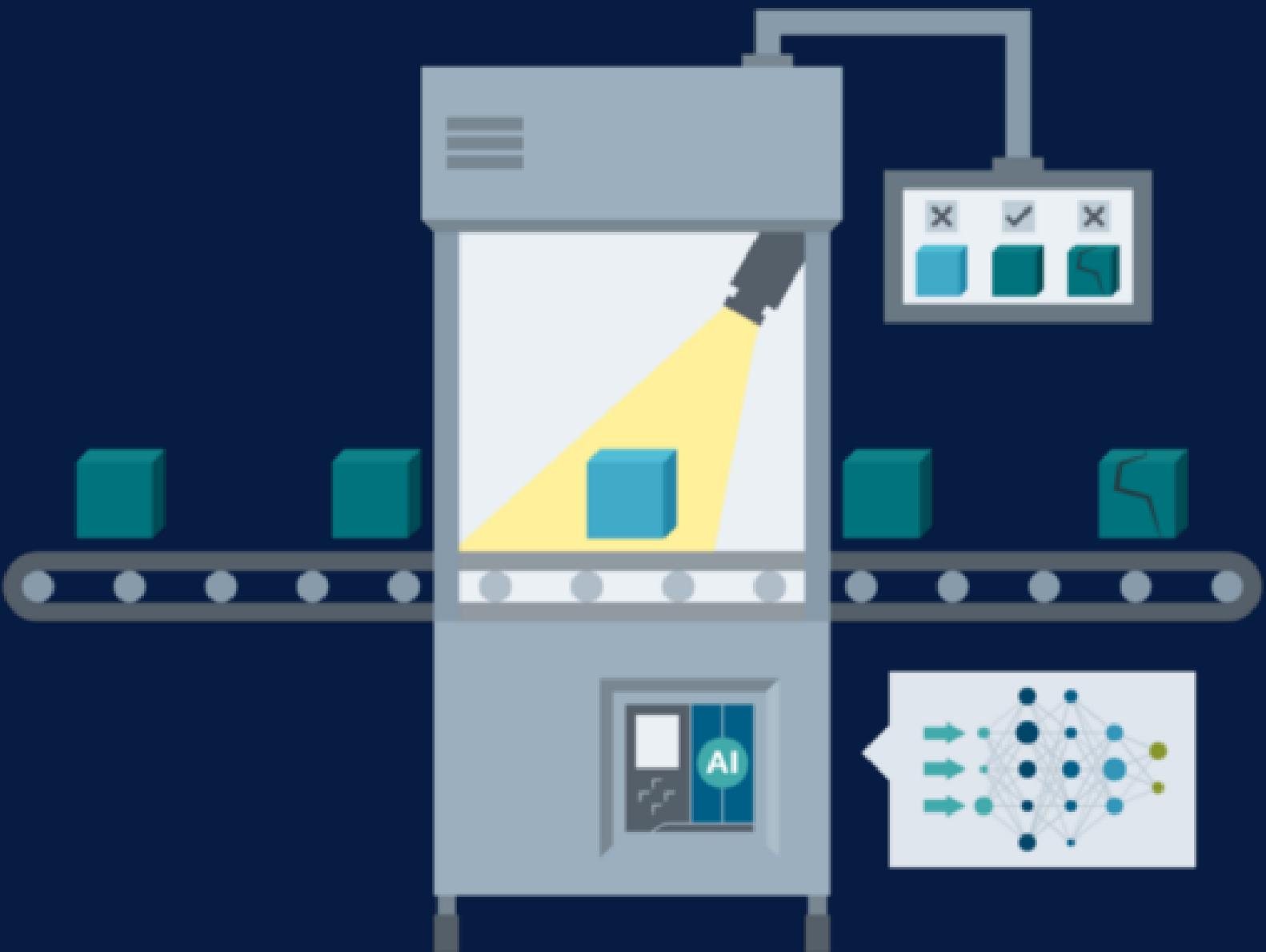


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# 1. INTRODUCTION

The background features a dark blue gradient. Overlaid on it are two sets of thin, wavy teal lines. One set forms a large, sweeping curve from the bottom left towards the center. The other set is located in the top right corner, consisting of several concentric, overlapping circles that also curve slightly.

Currently, in the manufacturing industry, product defect detection and elimination is very urgent. This is a matter of branding of the manufacturing industry. Just a small product error can greatly affect the reputation of the business. Traditional product inspection techniques with a certain process do not guarantee high accuracy and take a lot of time.



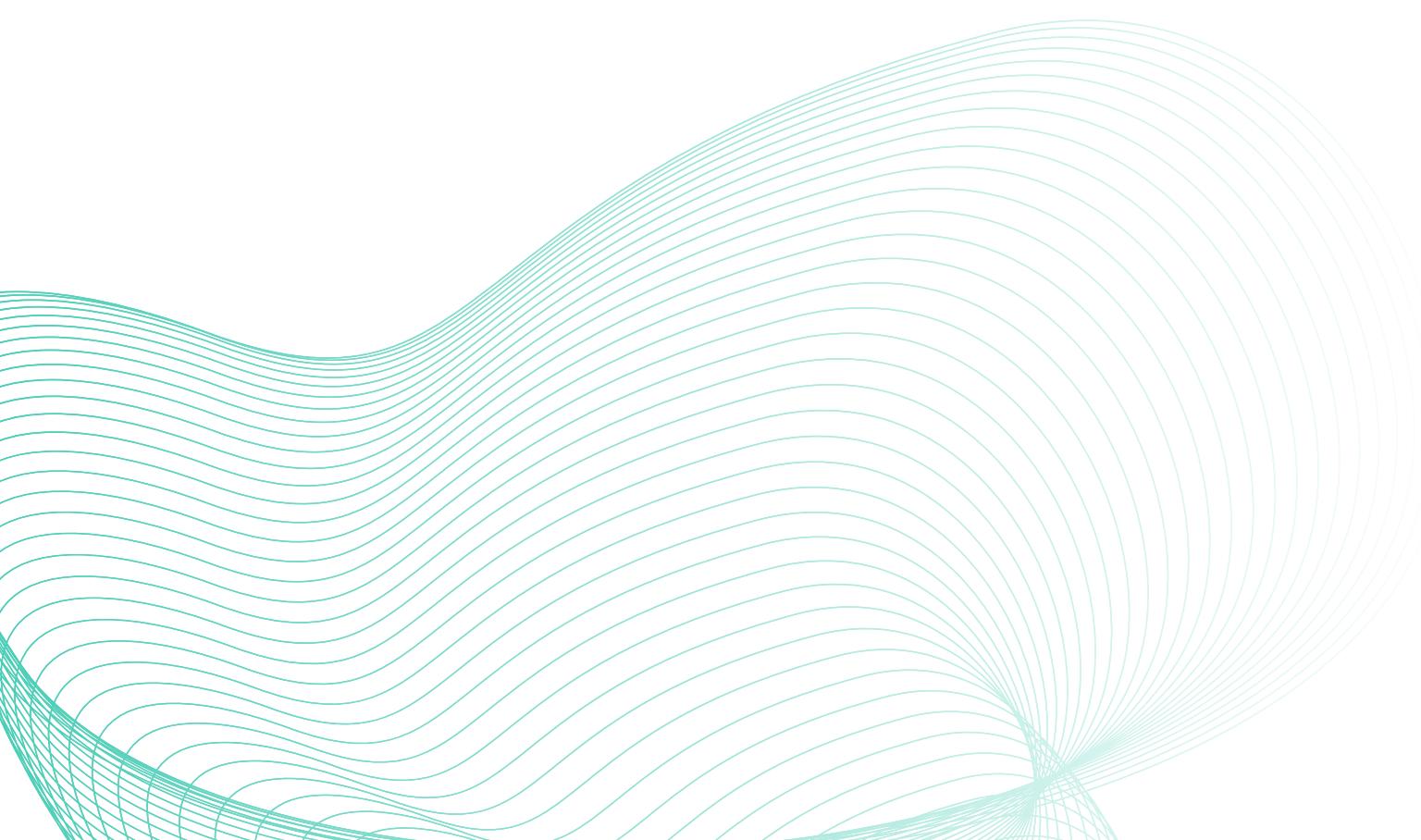
In this project, we would like to present the problem of detecting defective products using the Unet model. This technology is useful when classifying different products that do not have an identification label or when identifying errors by random patterns and locations.

## 2. DATASET

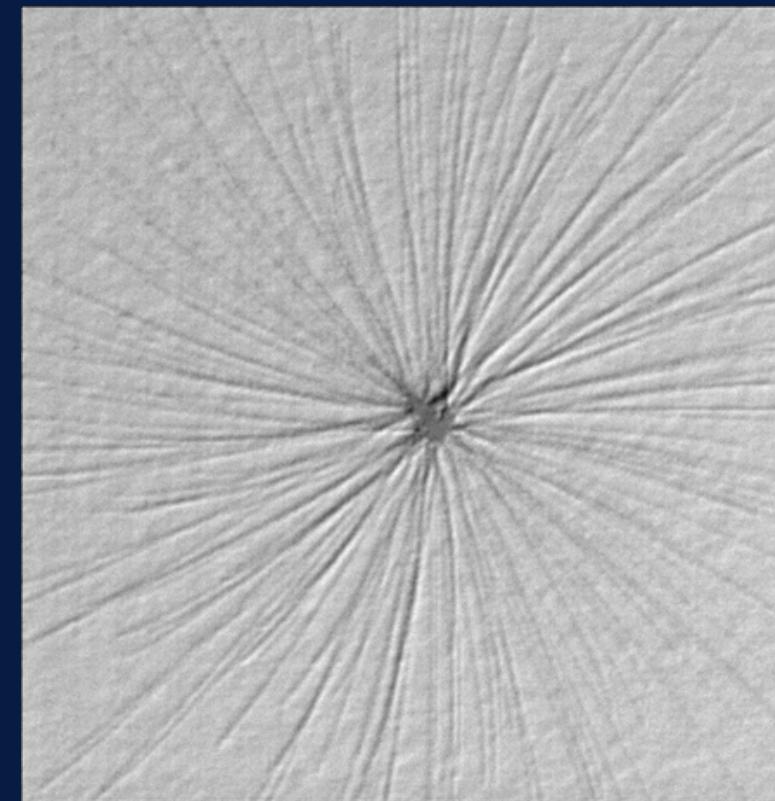
**6900 samples, 12 class**

Dividing into

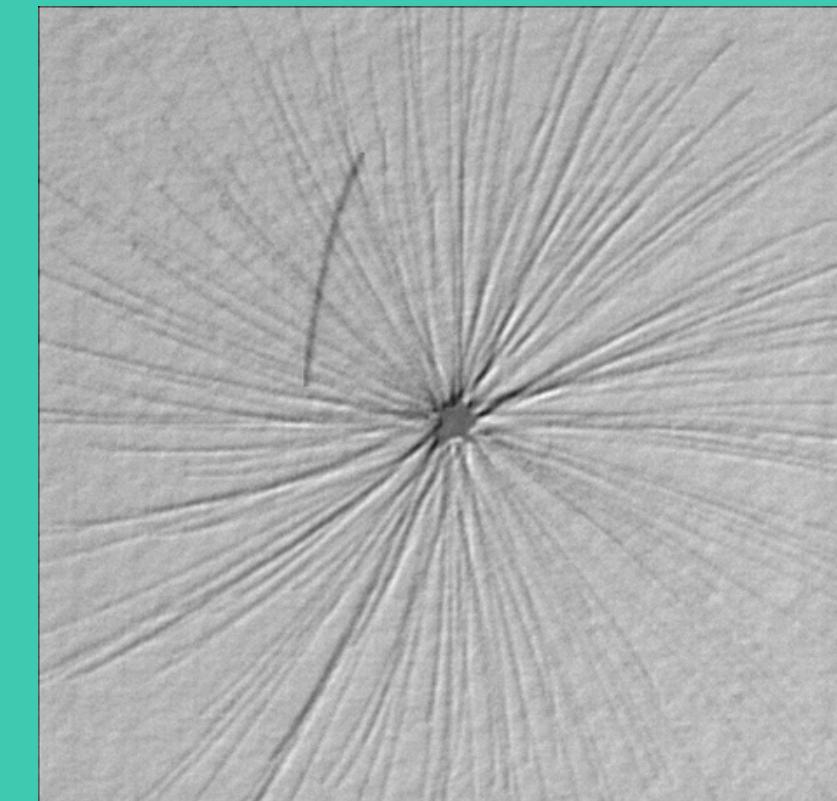
- 6000: defect-free
- 900: defect



Defect-free



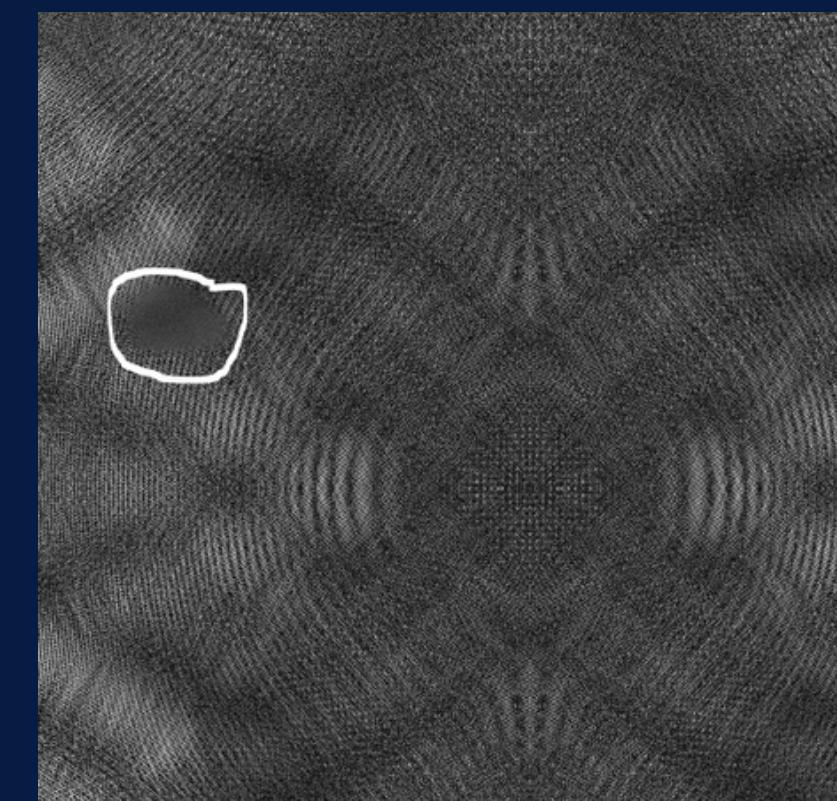
Defect



Defect-free

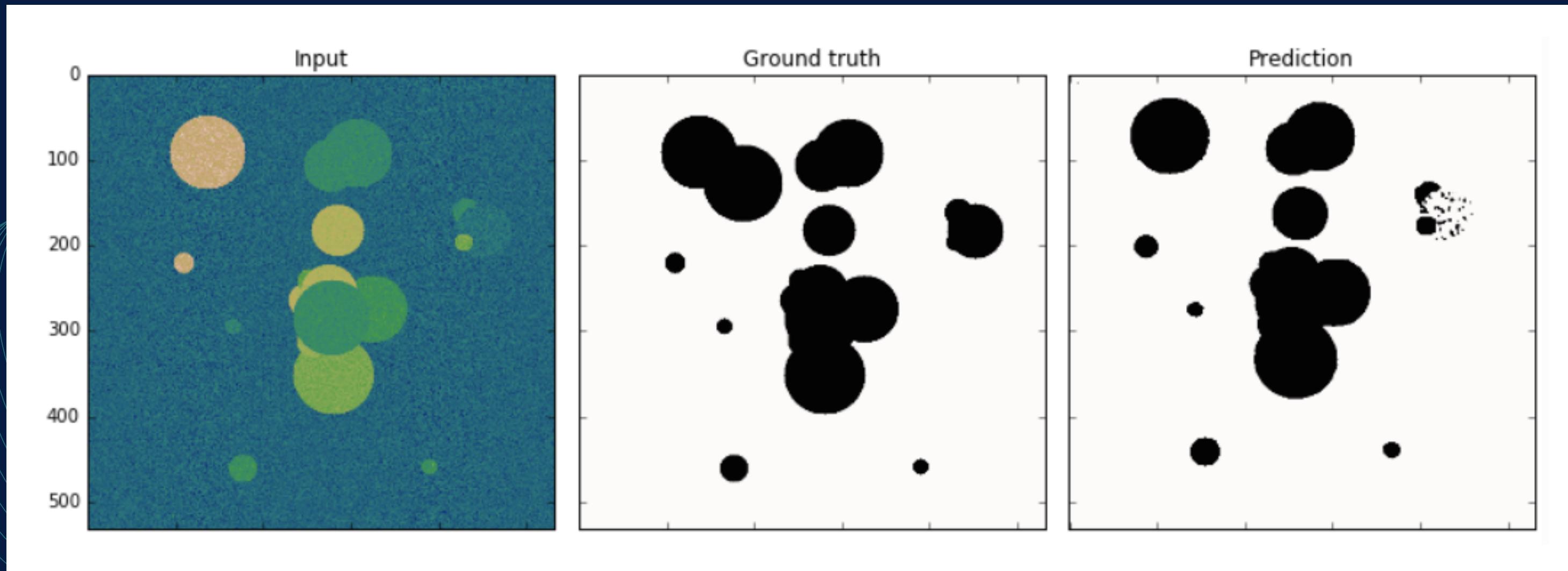


Defect



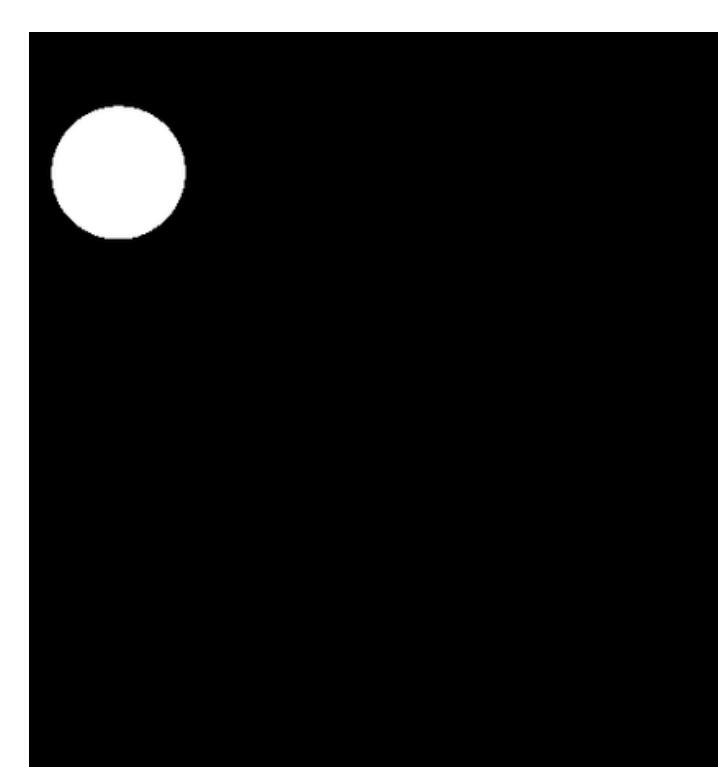
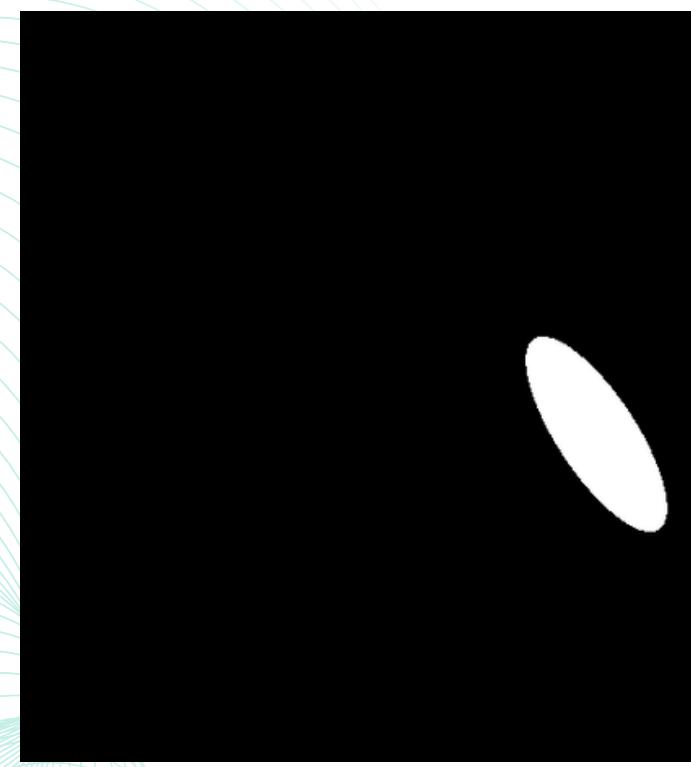
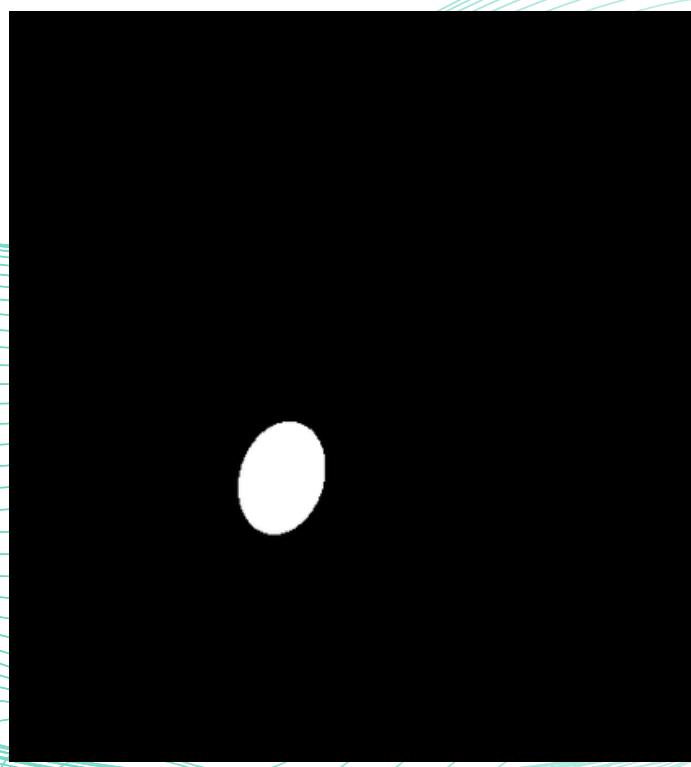
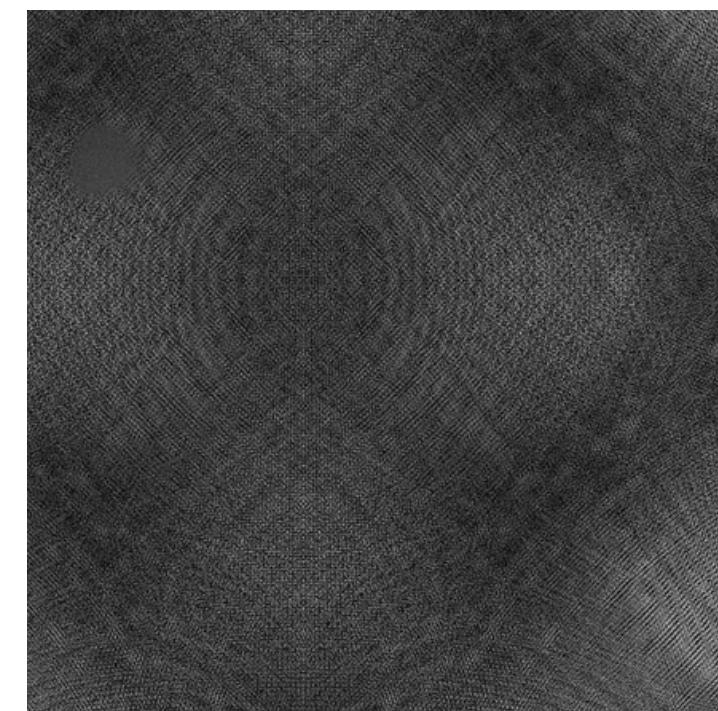
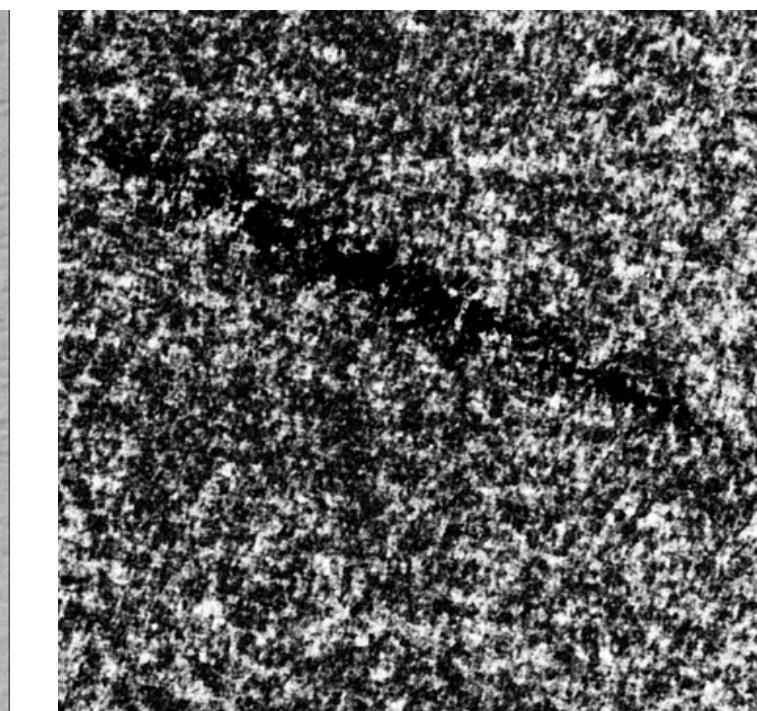
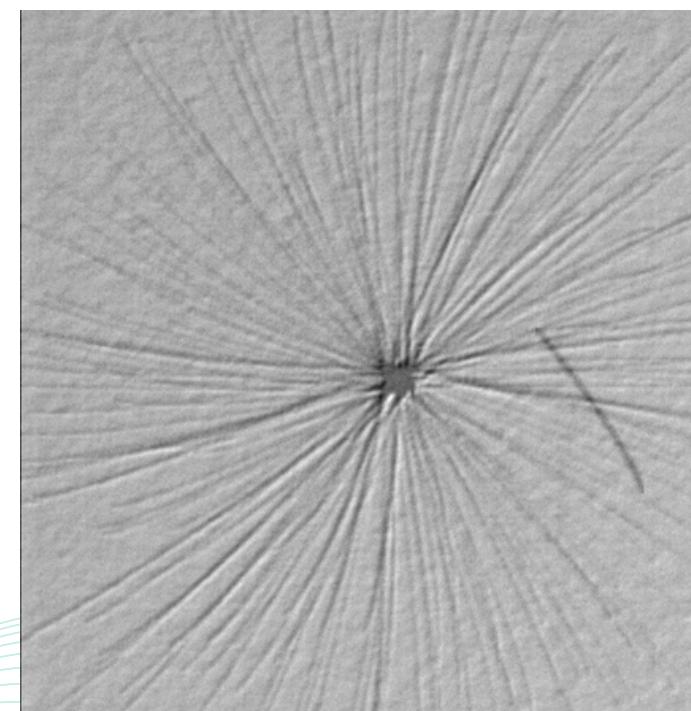
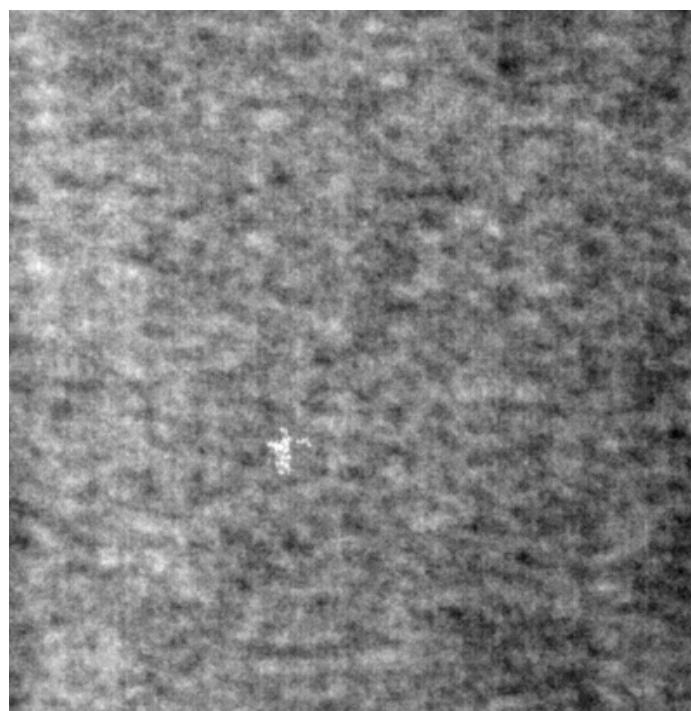
# Input/Output

- Input: a picture
- Output: a segment map



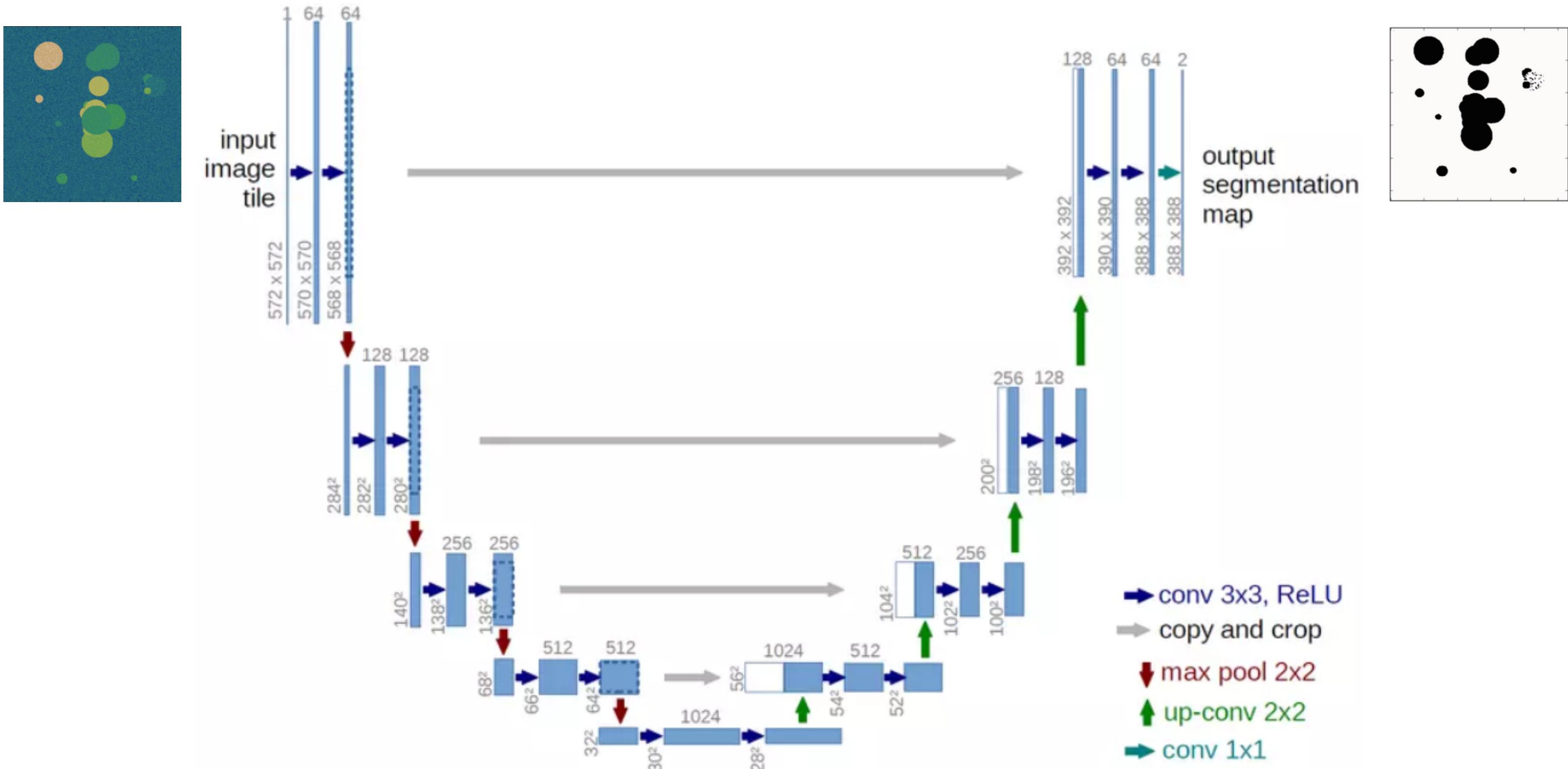
# 3. PREPROCESSING DATA

Create map segmentation for dataset



# 4. MODEL ARCHITECTURE

## Unet



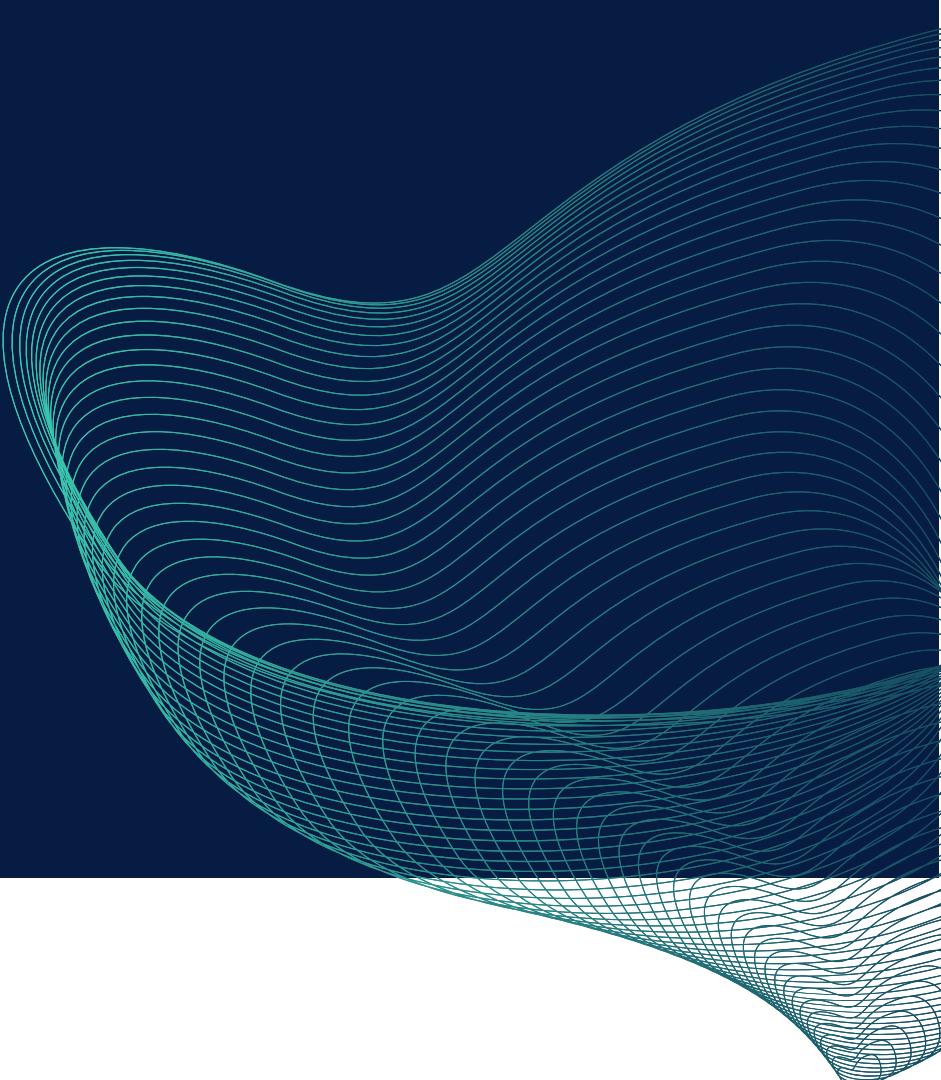
# Loss function

- Focal Loss

$$FP(\mathbf{q}) = -\alpha_i(1 - q_i)^\gamma \log(q_i)$$

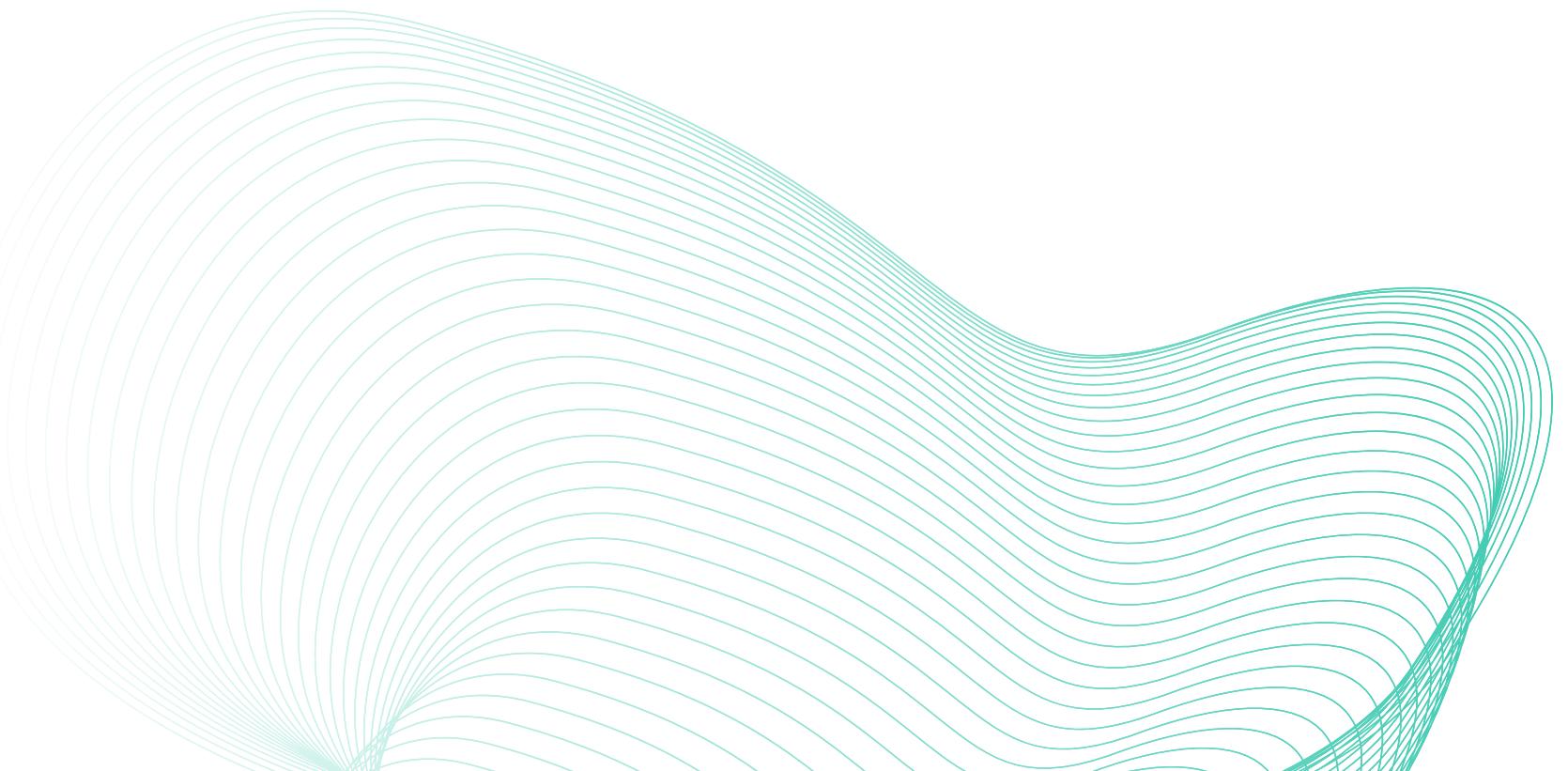
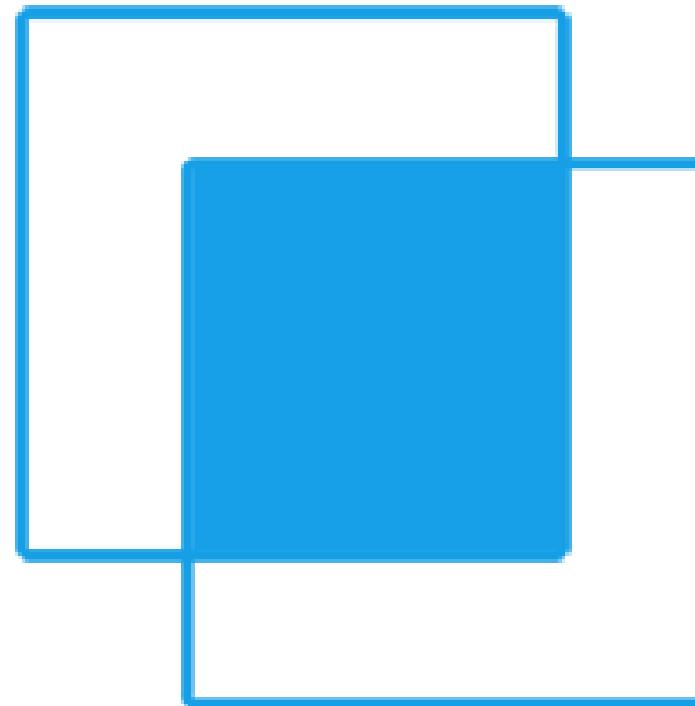
- Dice loss

$$DL(y, \hat{y}) = \frac{y + \hat{y} - 2y\hat{y}}{y + \hat{y} + \alpha}$$



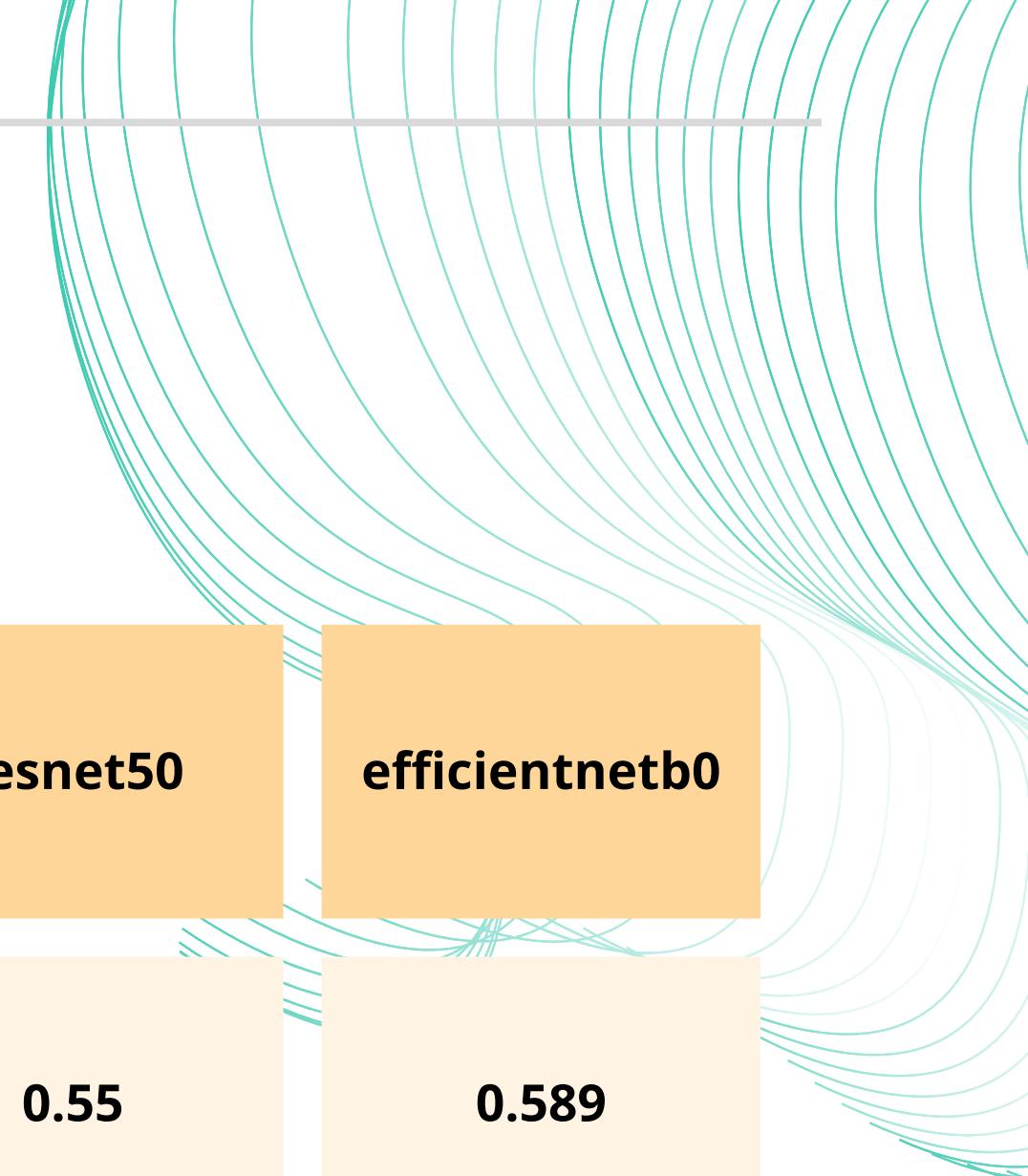
# 5. METRIC

$$\text{IoU} = \frac{\text{Area of Overlap}}{\text{Area of Union}}$$

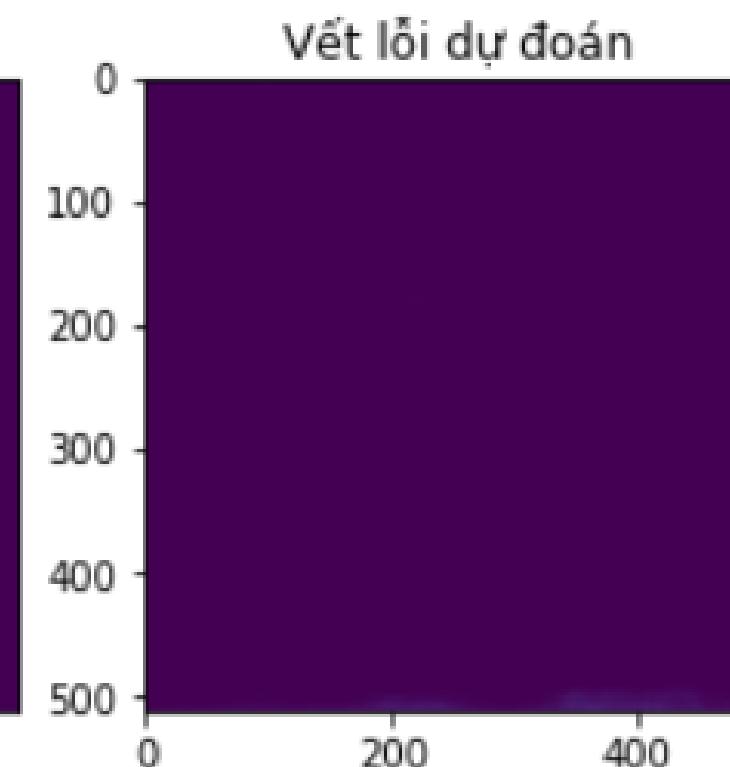
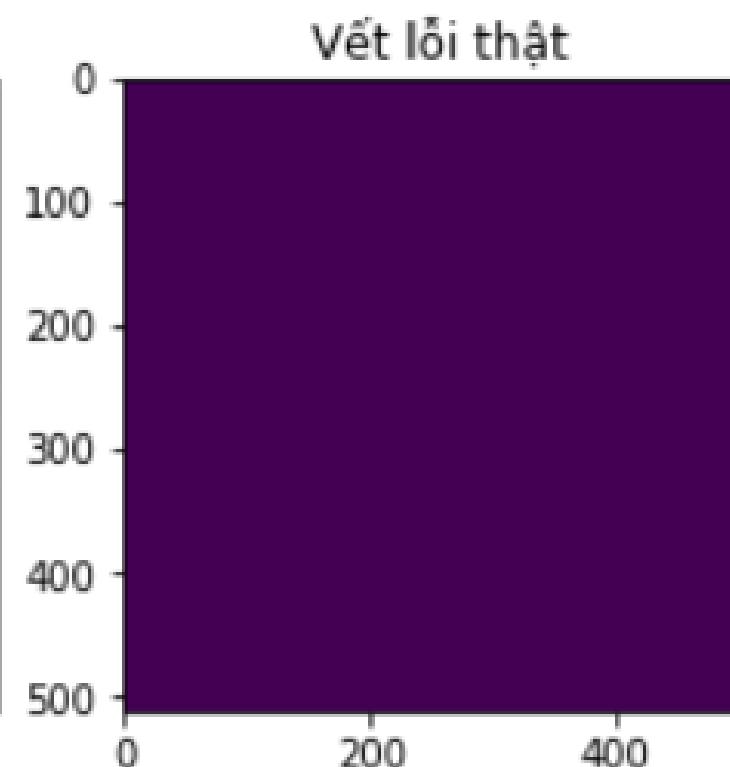
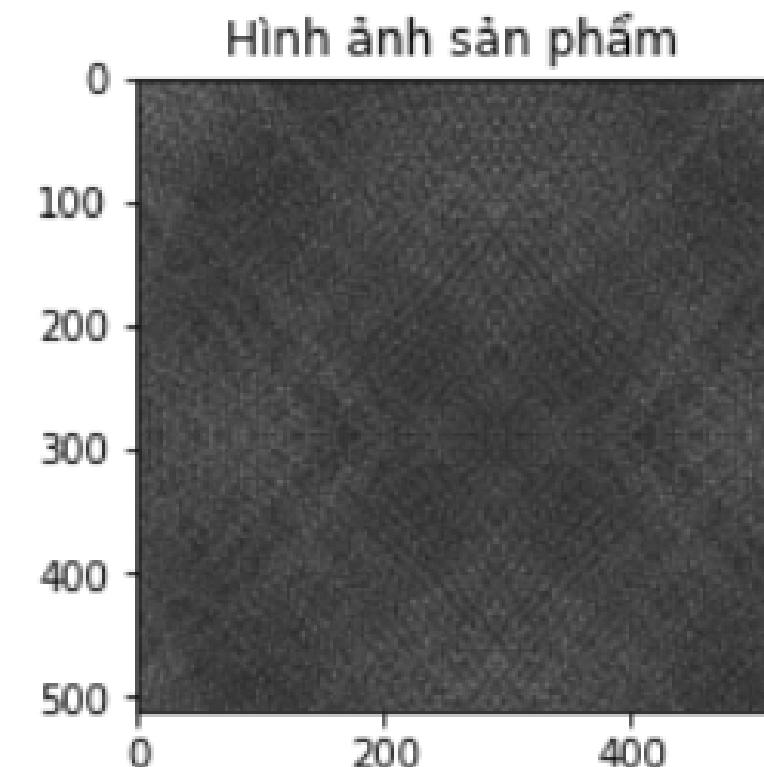
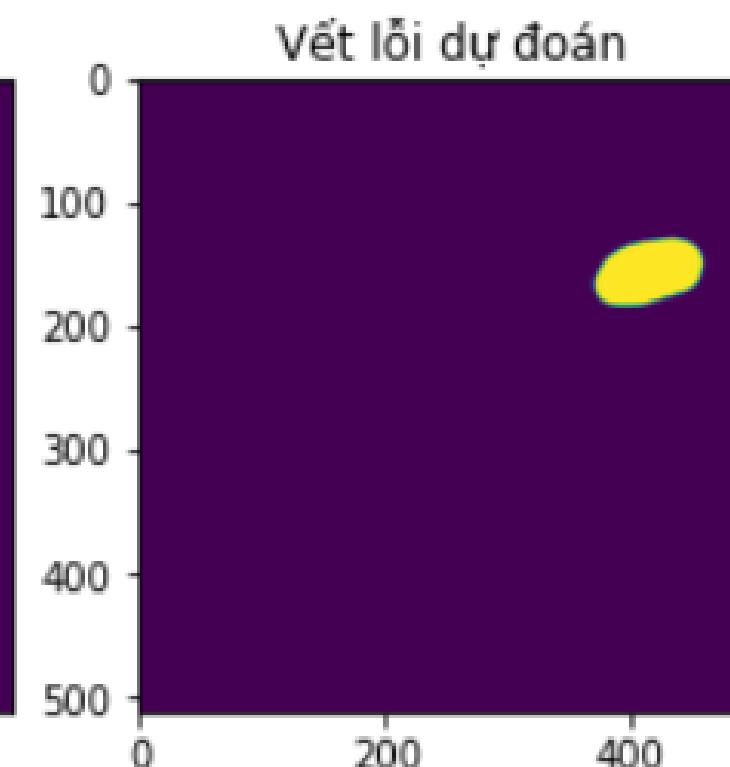
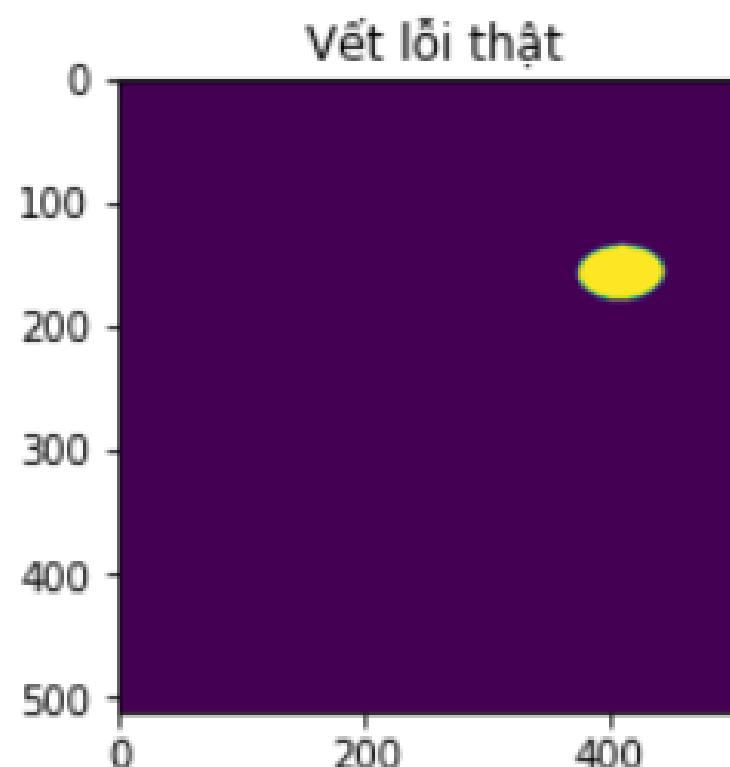
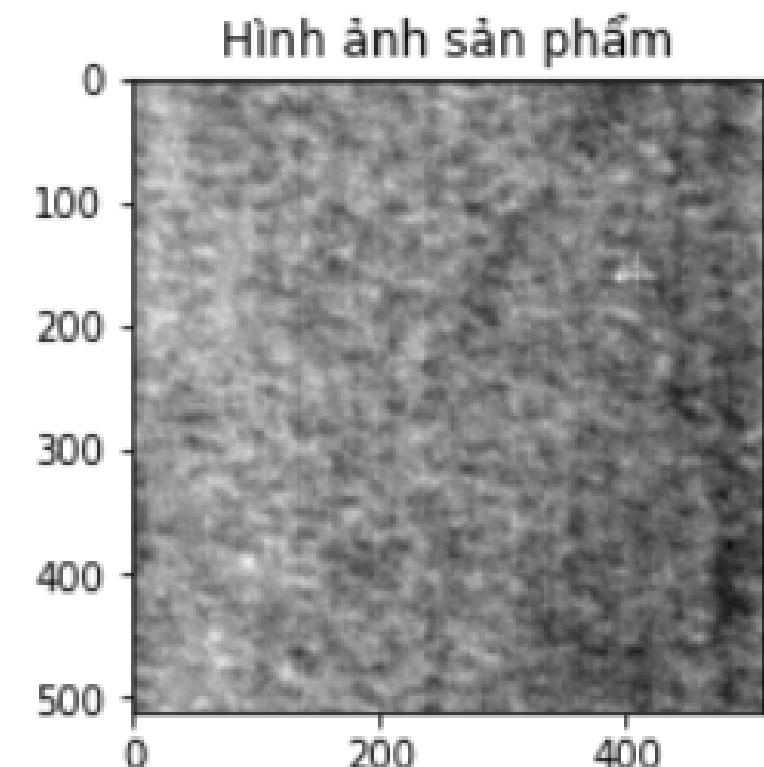


# 6. RESULT

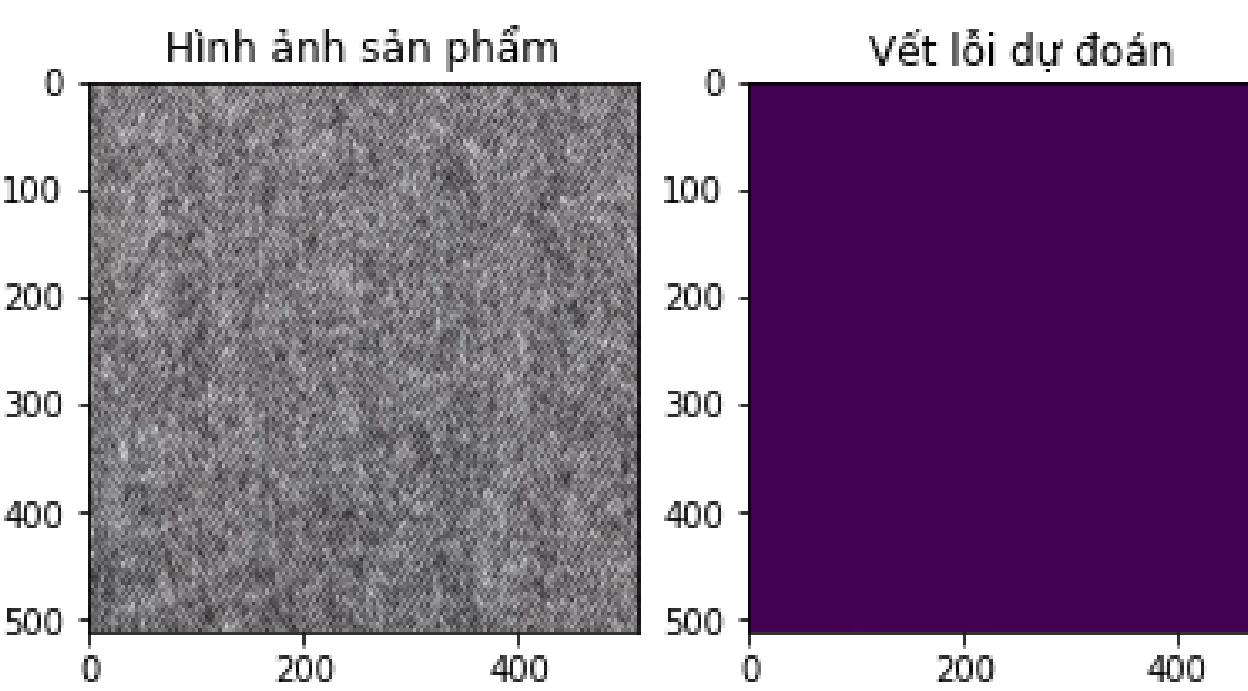
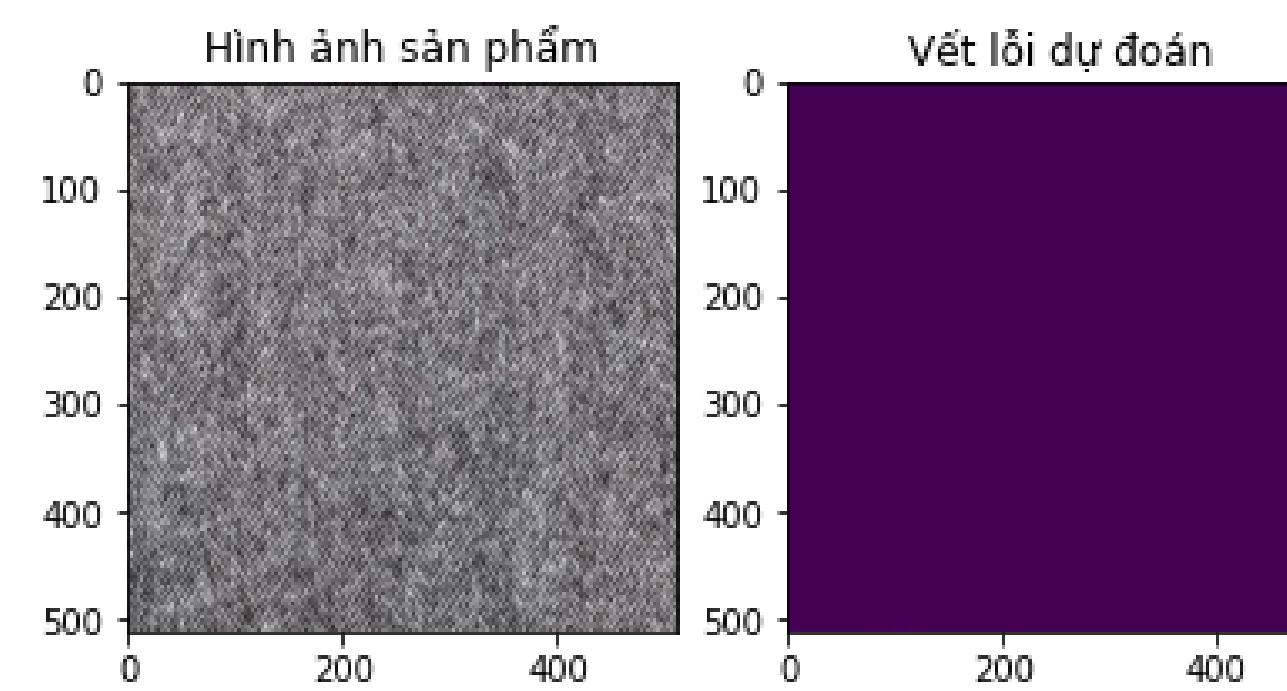
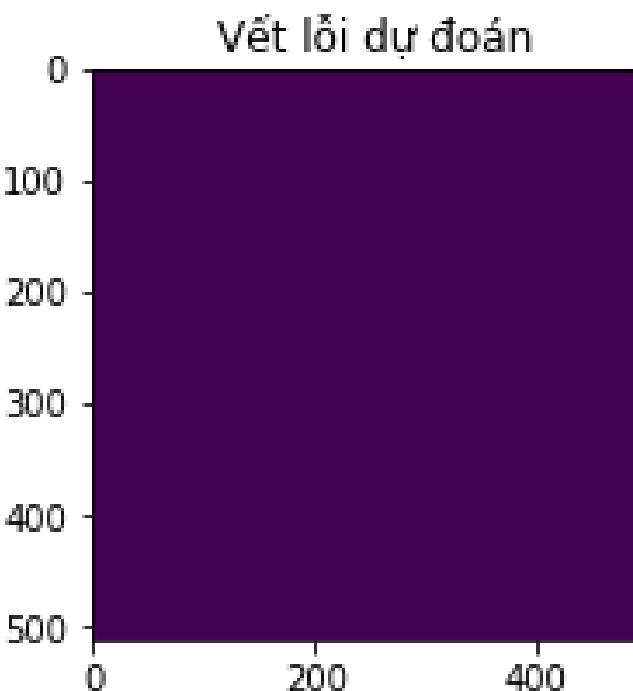
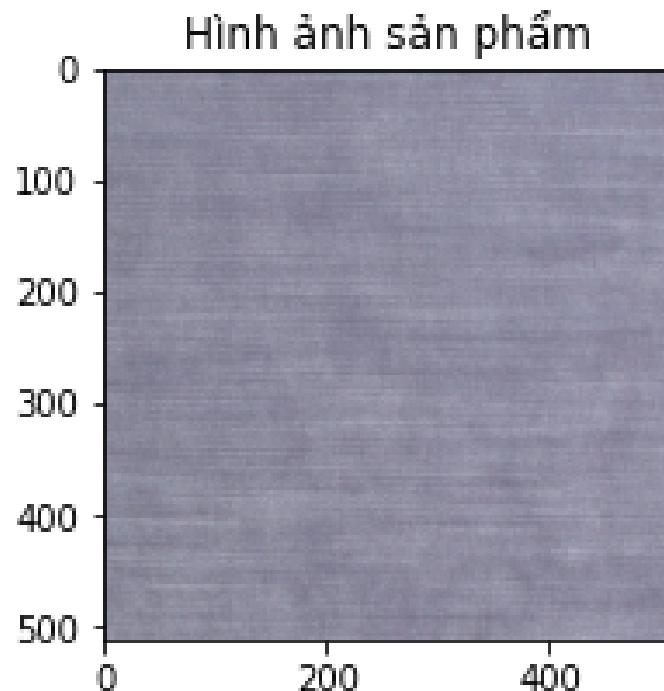
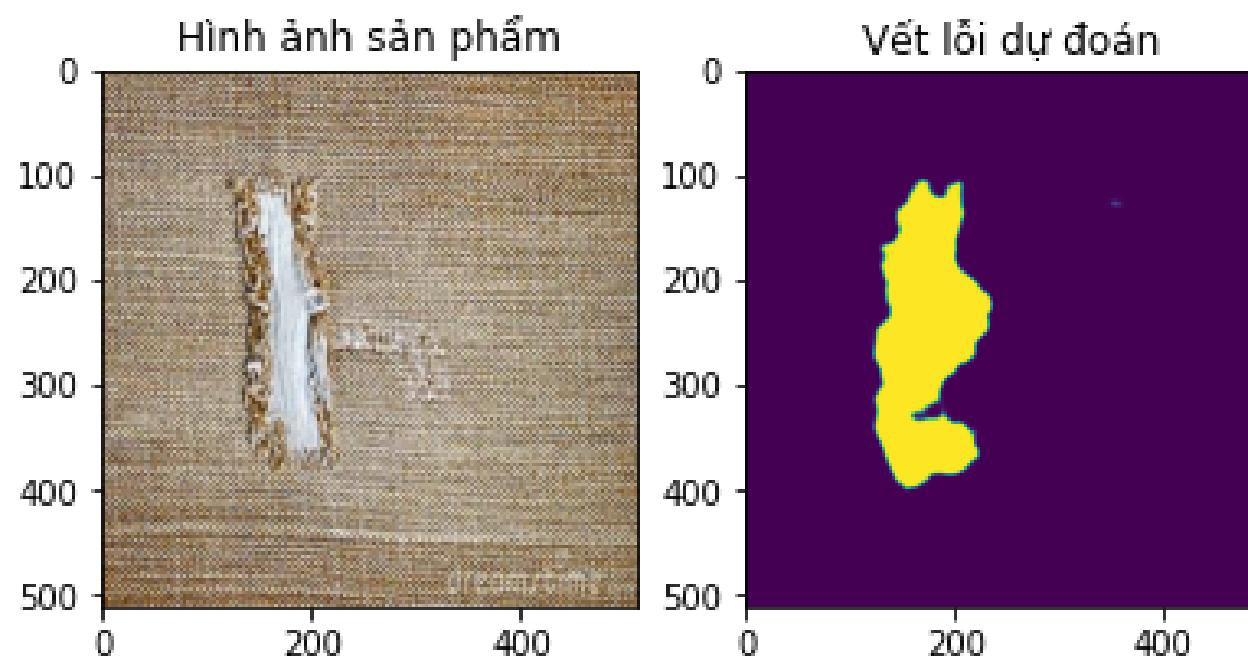
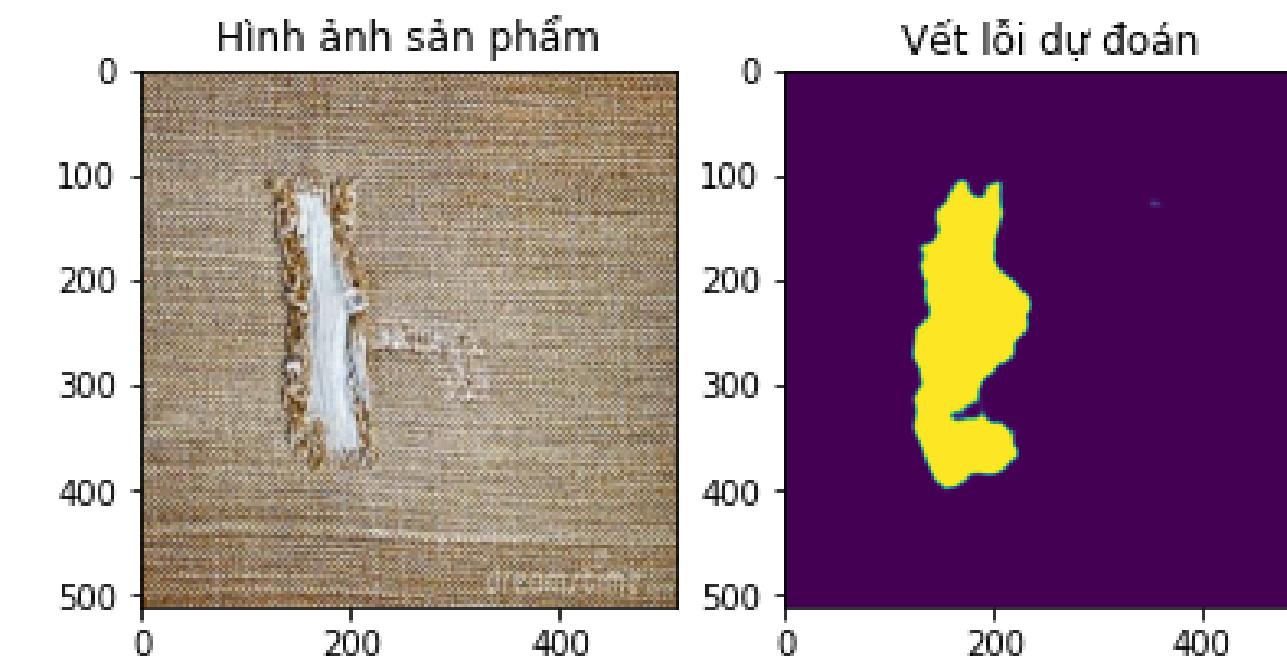
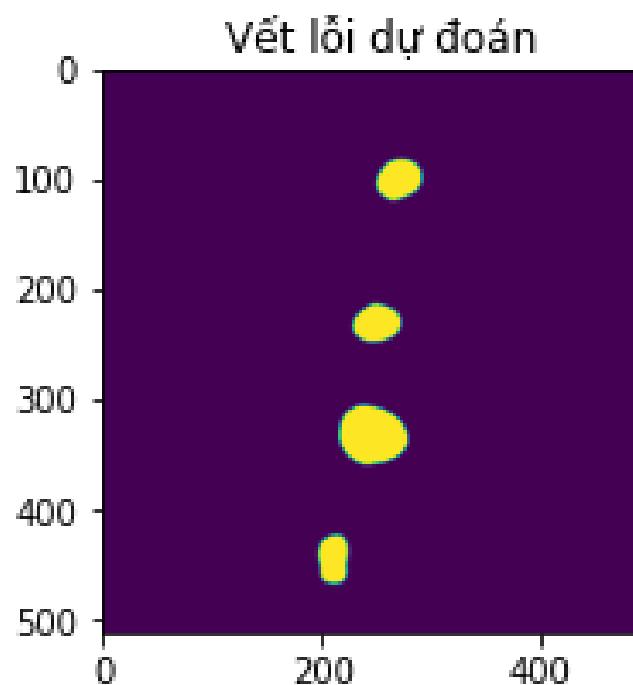
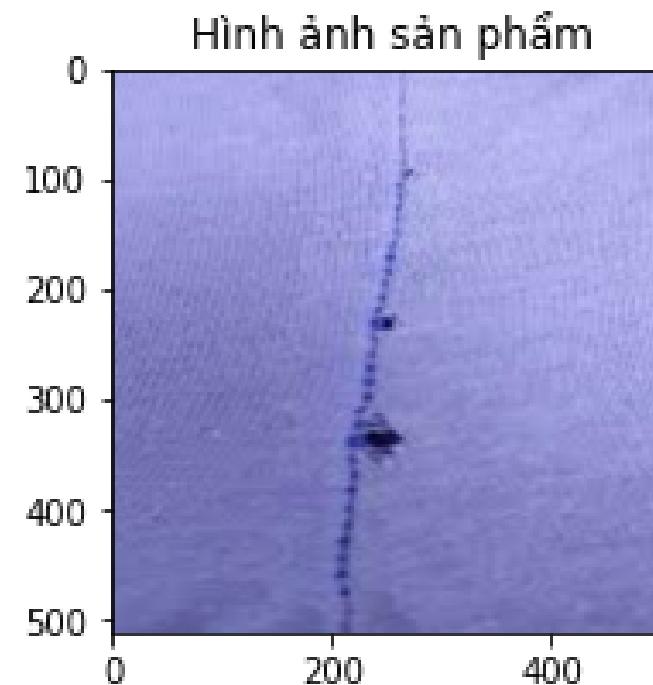
MODEL	seresnet34	resnet34	inceptionv3	mobilenet	resnet50	efficientnetb0
IoU	0.519	0.546	0.627	0.562	0.55	0.589



# Demo



# Test some images that are not in the datasets



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# THANK YOU

