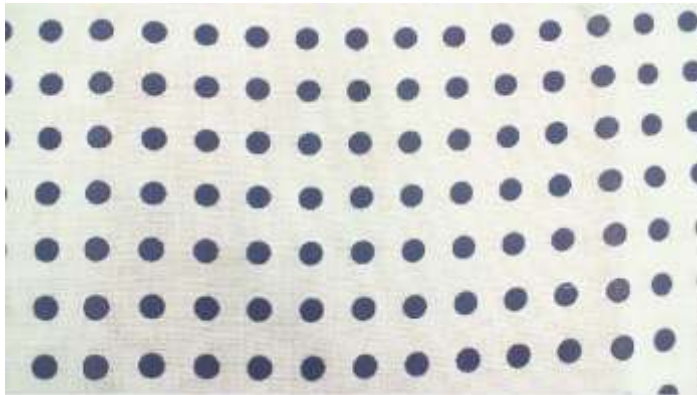


Image anomaly detection and localization using convolutional auto encoder (CAE)

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Introduction

For chemical materials, clothing, and food materials, it is necessary to detect defects and impurities in normal products. However, it is a problem in automatic detection that you do not know what kind of abnormality will occur.



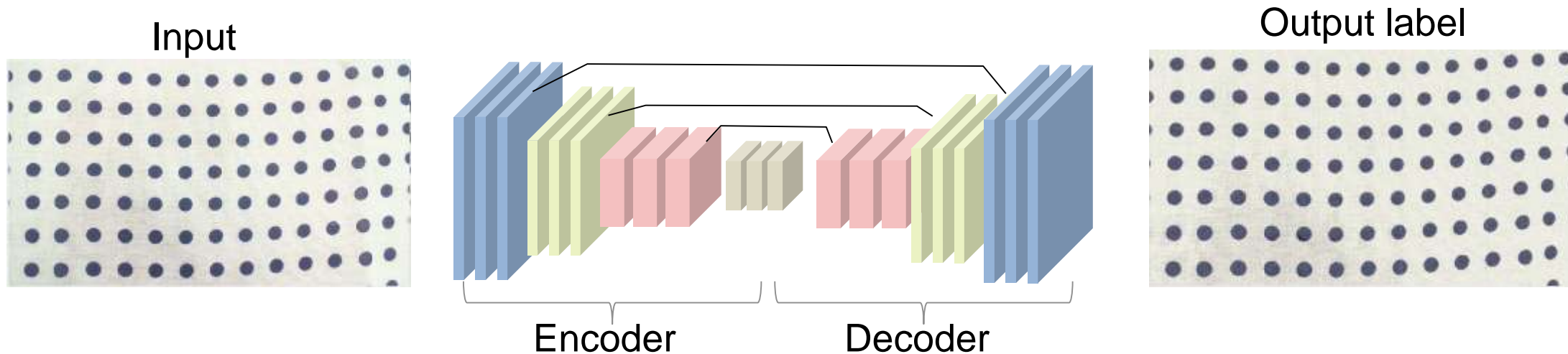
many kind of
abnormality



In this demo, we will try to detect and localize different types of abnormalities by training DNN only with normal image data.

Train Network

- Network has Encoder & Decoder part for Compression and decompression
- Train Network using normal images for both input and output labels

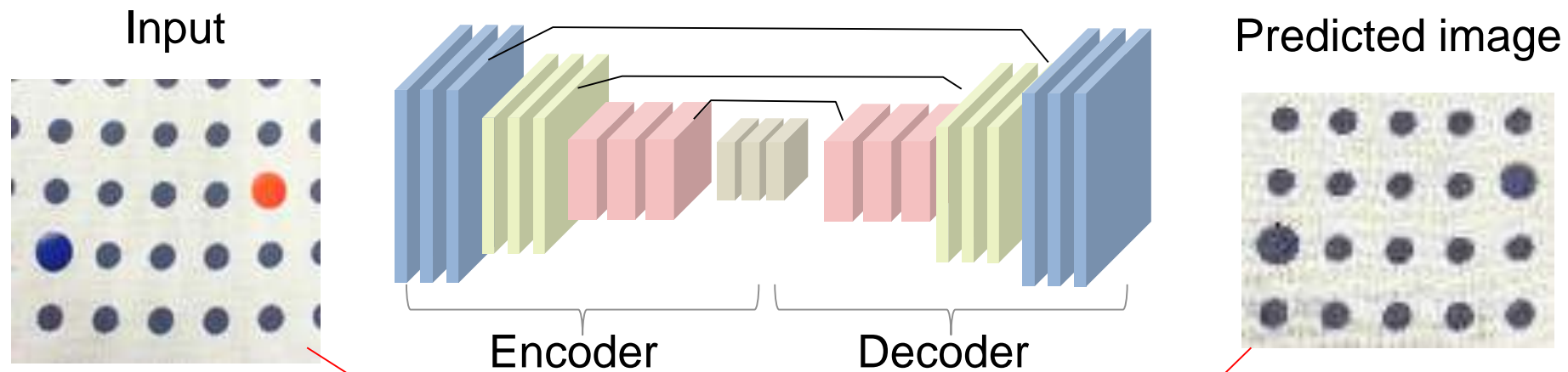


- Prepare network

```
% Customize VGG16-based SegNet to output image
lgraph = segnetLayers(inputsize, numClasses, 'vgg16');
lgraph = removeLayers(lgraph, {'softmax', 'pixelLabels'});
lgraph = addLayers(lgraph, regressionLayer('Name', 'regressionLayer'));
lgraph = connectLayers(lgraph, 'decoder1_relu_1', 'regressionLayer');
```

Image anomaly detection and localization using CAE

Input an abnormal image into the trained network



Calculate the difference
between input and output

Concept:
Features that are not included in
training data cannot be reconstructed
successfully, and reconstruction
errors show anomalies.

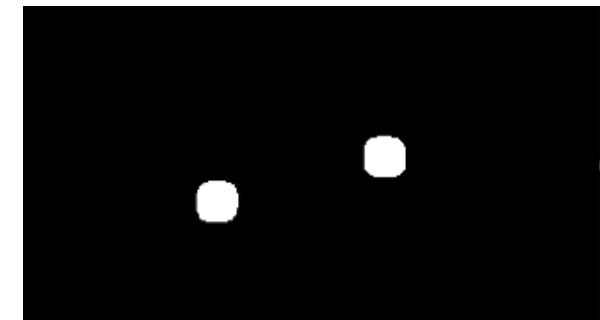
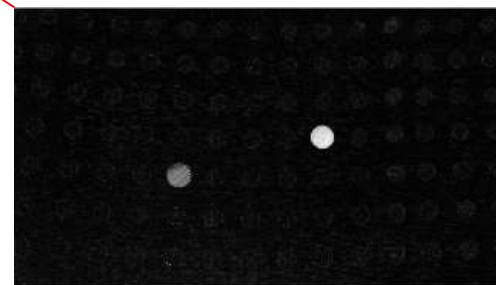
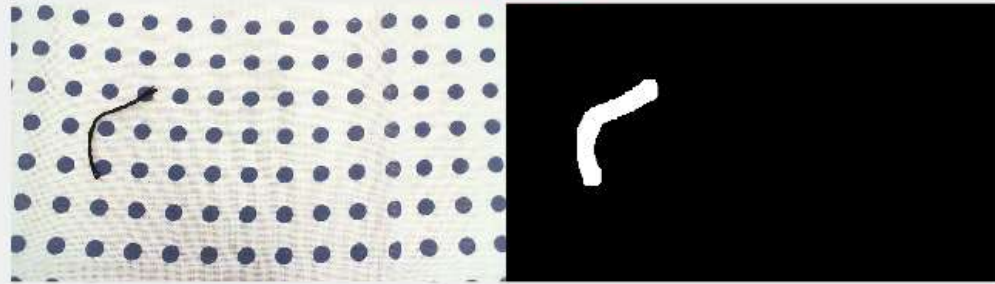
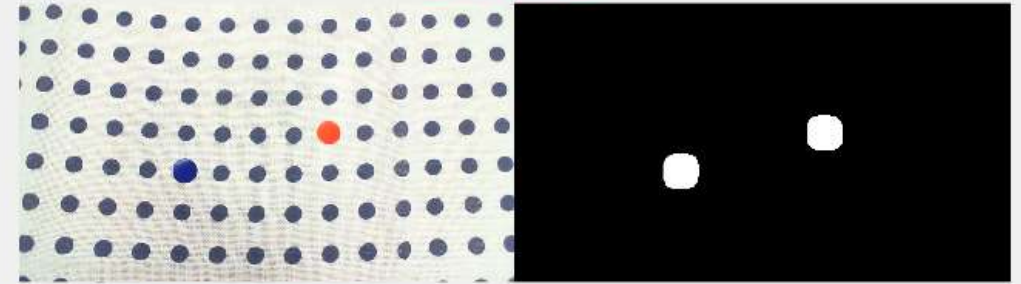


Image anomaly detection and localization using CAE

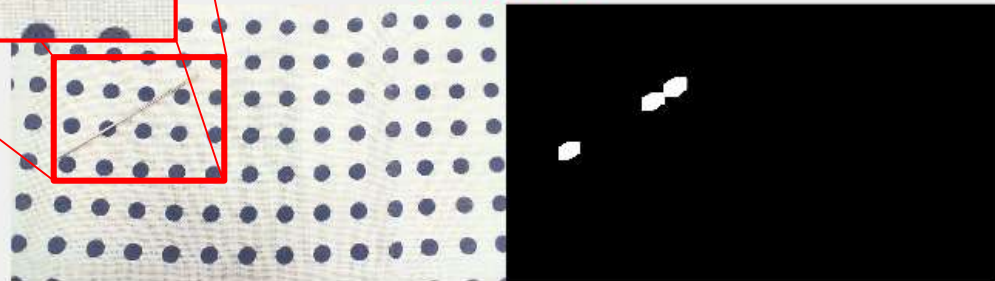
abnormal Yarn



abnormal Different patterns



abnormal Needle



abnormal Stain



The trained network can detect and localize many kind of anomalies.