

電子工程系專題研究報告

--自動結帳櫃檯

0612020 吳峻陞 0612128 林俊德

Content

A 、 Concept of Project

B 、 Saliency — Salient Object Detection

C 、 Defects of the Algorithm

D 、 Improvements



Concept of Project



How to make it do the
checkout all by itself ?

Self Checkout Machine nowadays
Still need to handcrafted operations

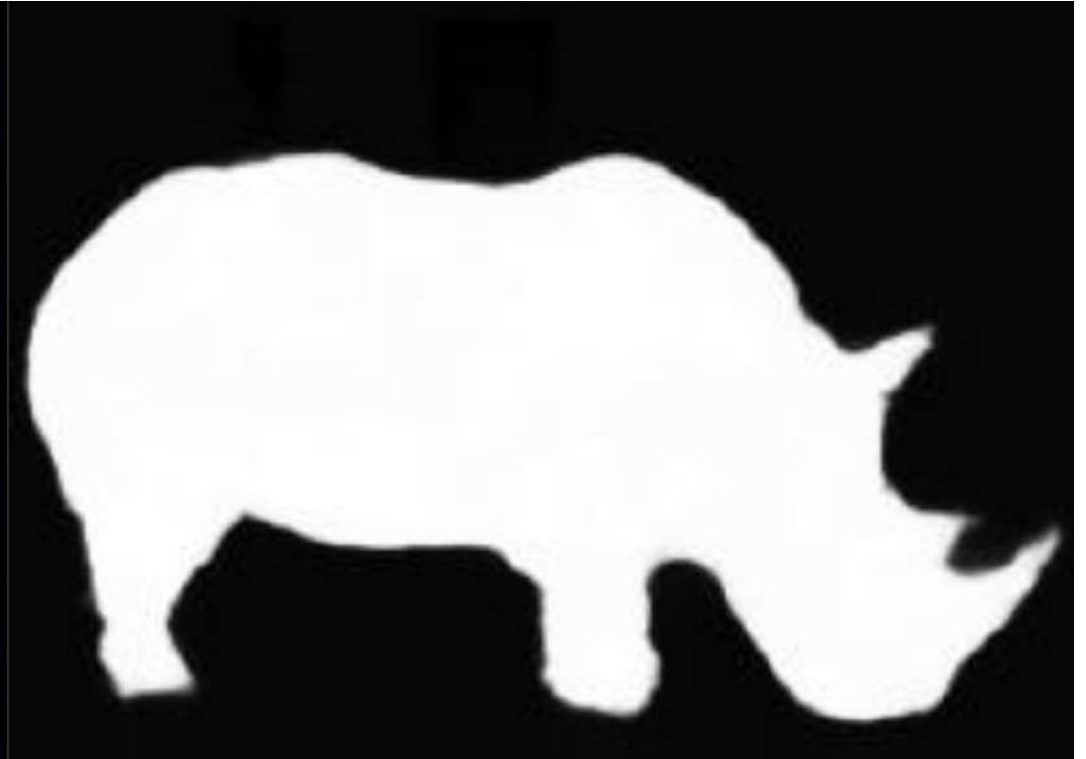
By the Camera !



Combine the 360-degree photos, we can instantly know what customers buy.

Then, how can we implement the idea?

Salient Object Detection





Saliency

— Salient Object Detection

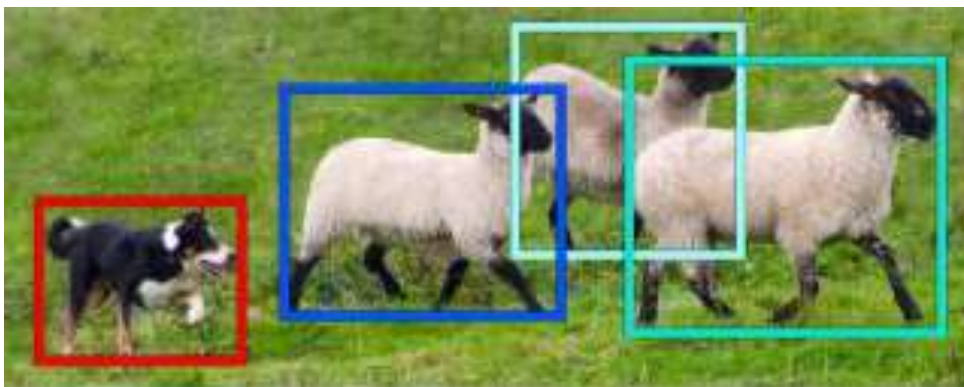
Four Ways of Image Detection



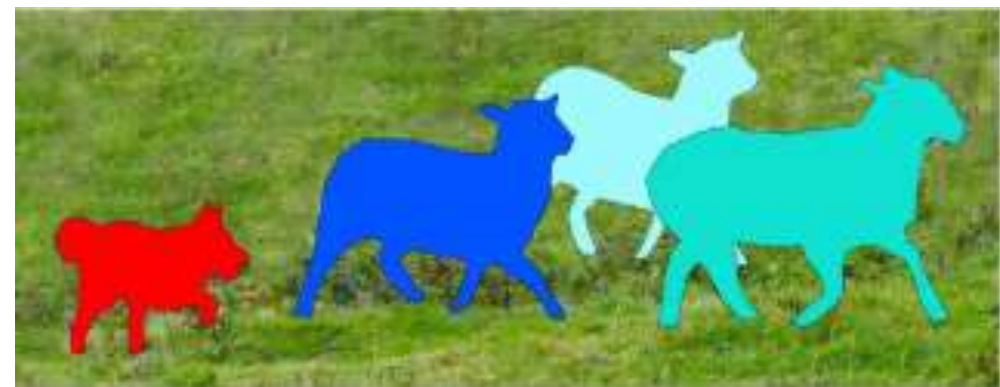
Image Recognition



Semantic Segmentation

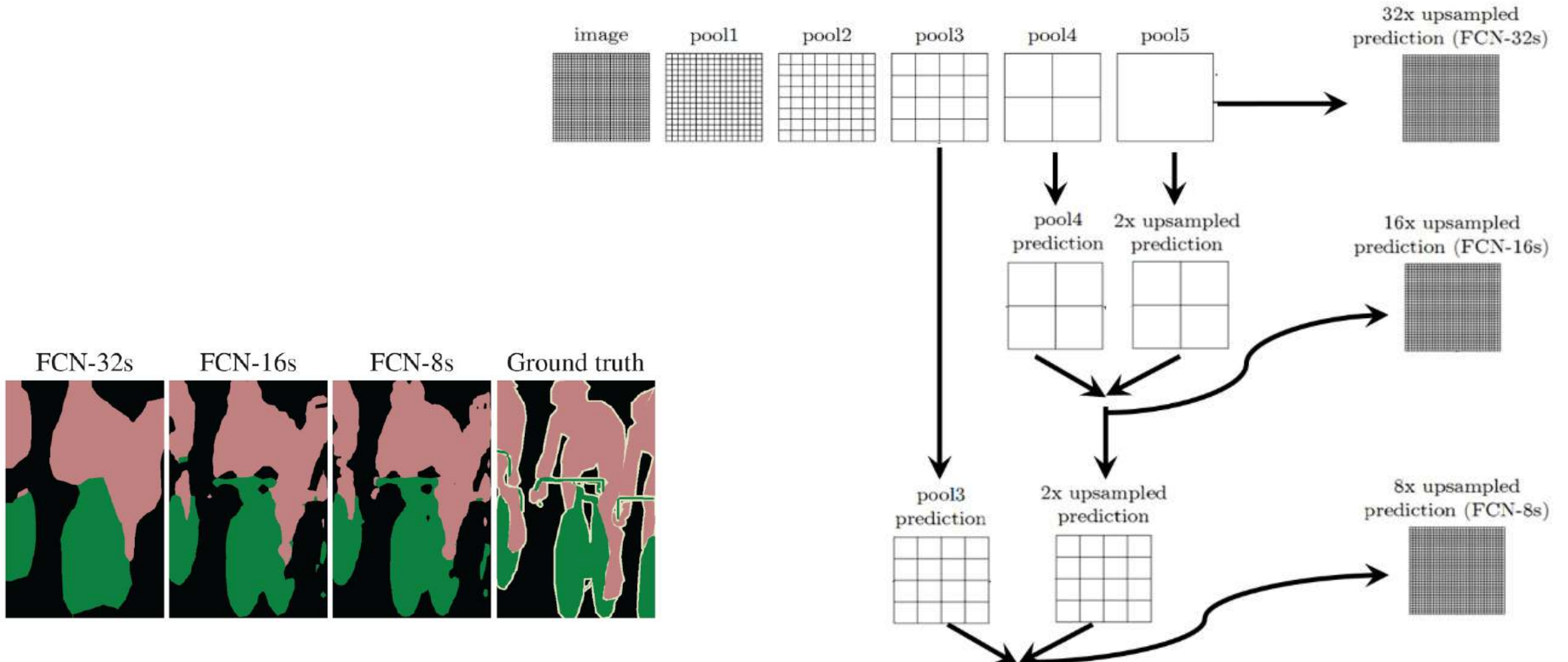


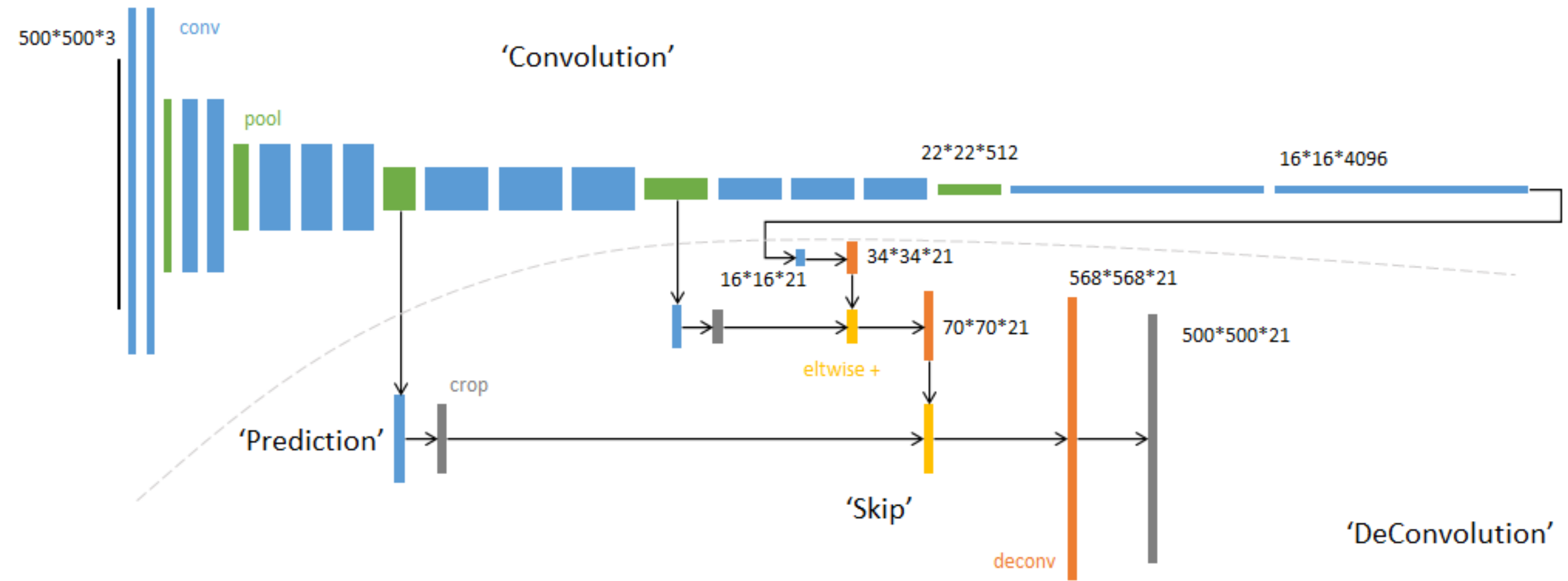
Object Detection



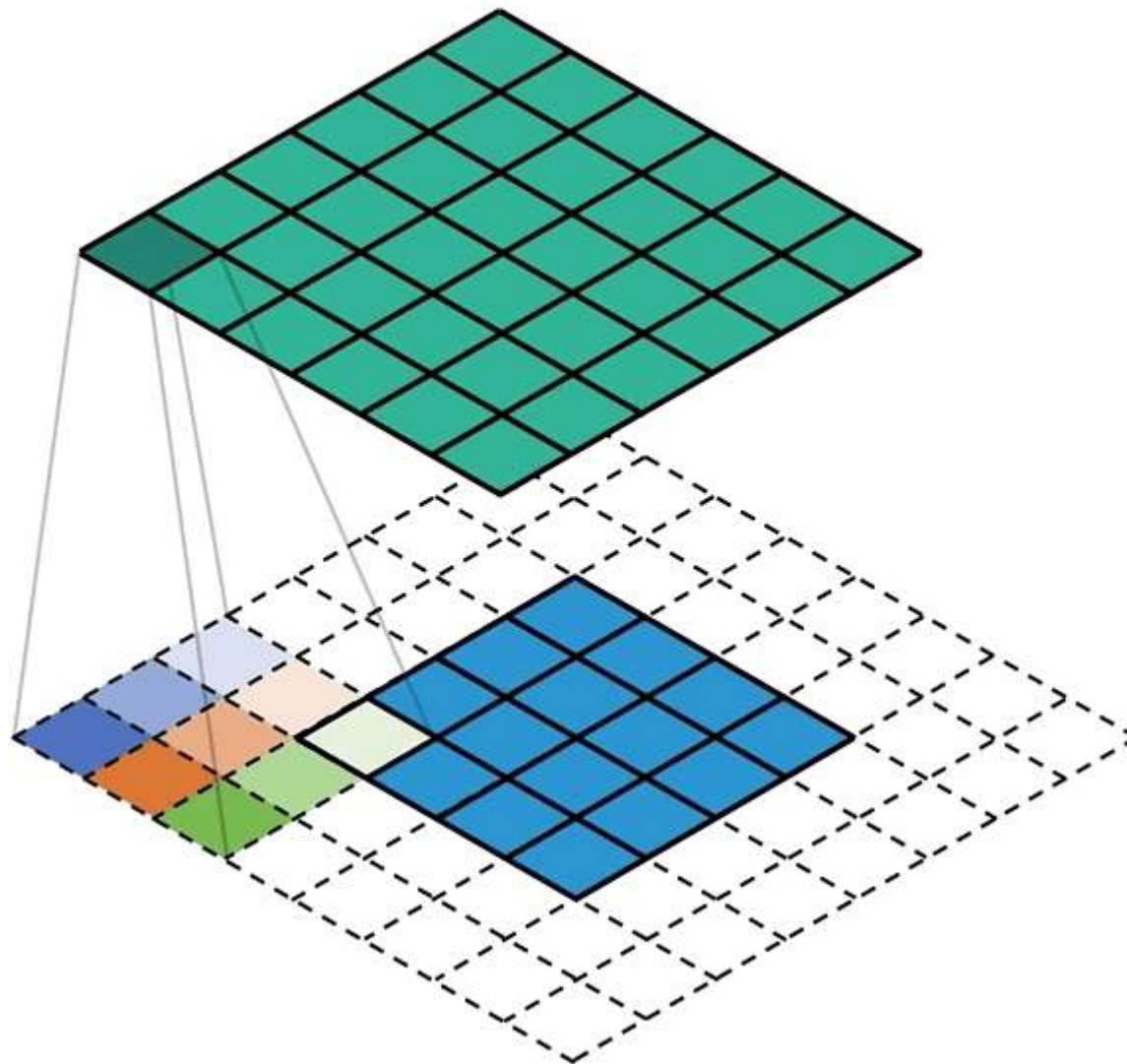
Instance Segmentation

FCN (Fully Connected Convolutional Neural Network)

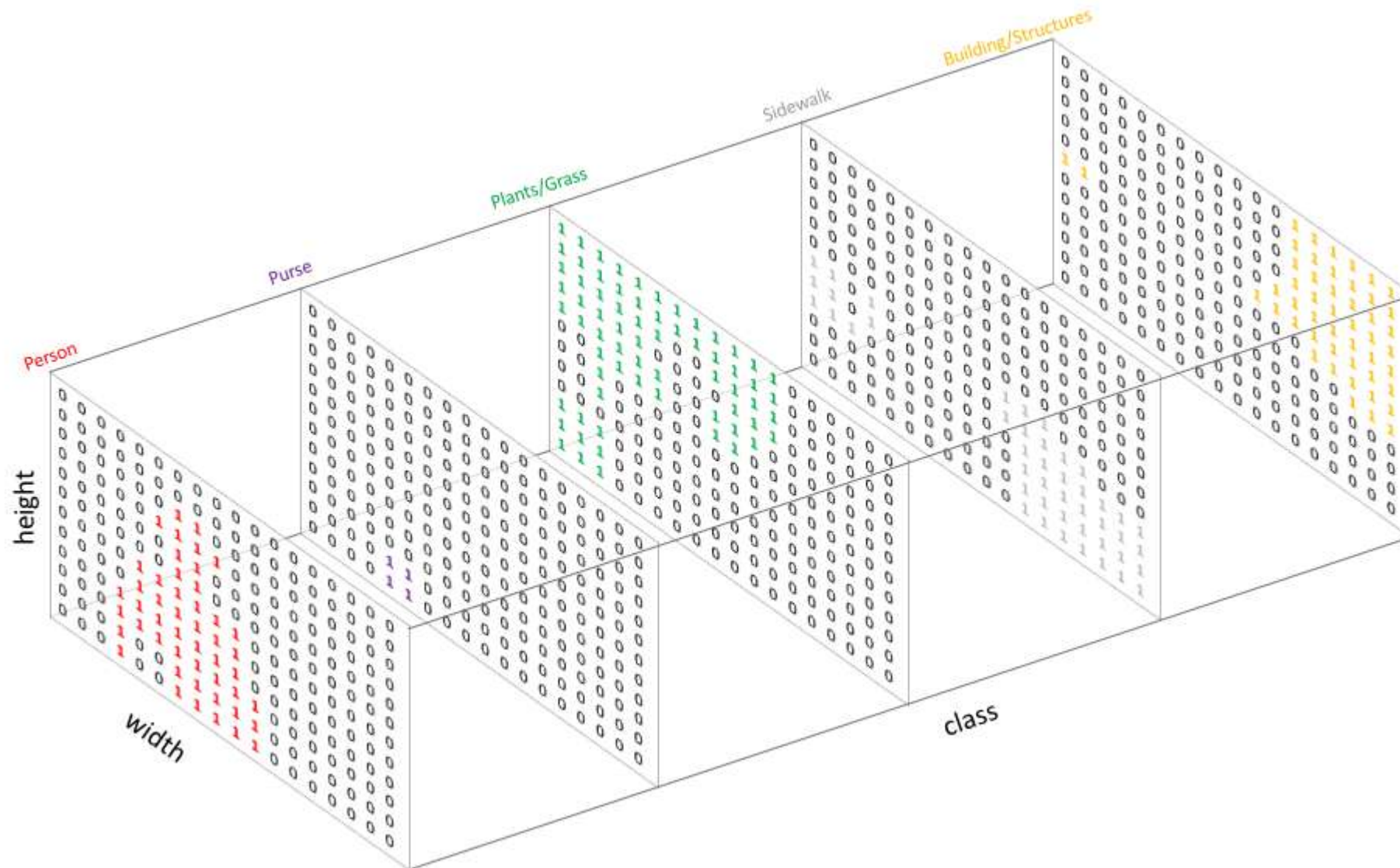




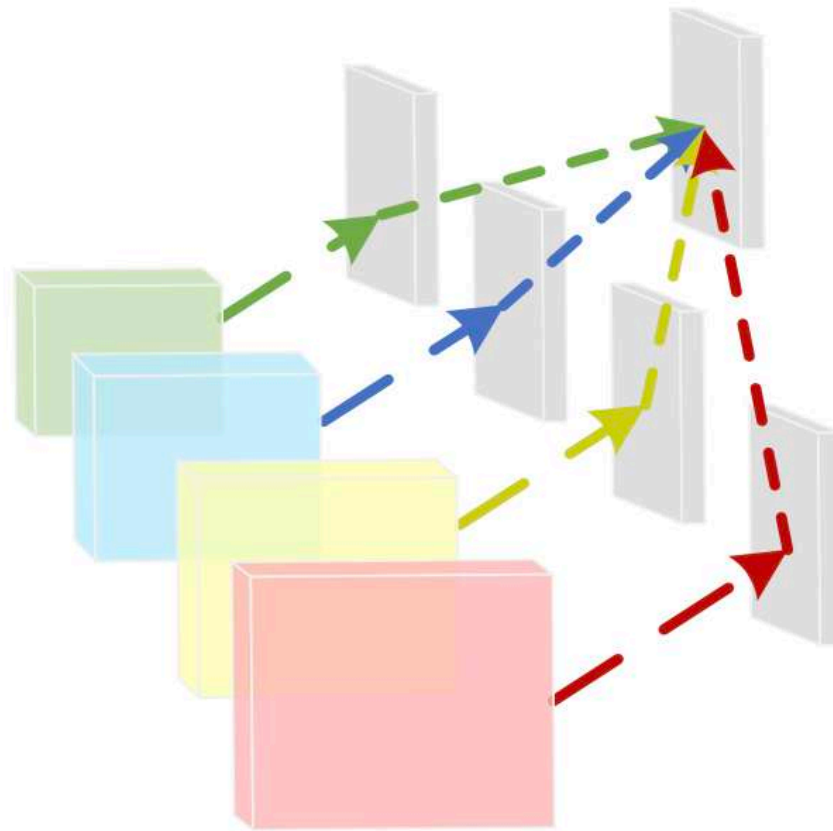
Deconvolution



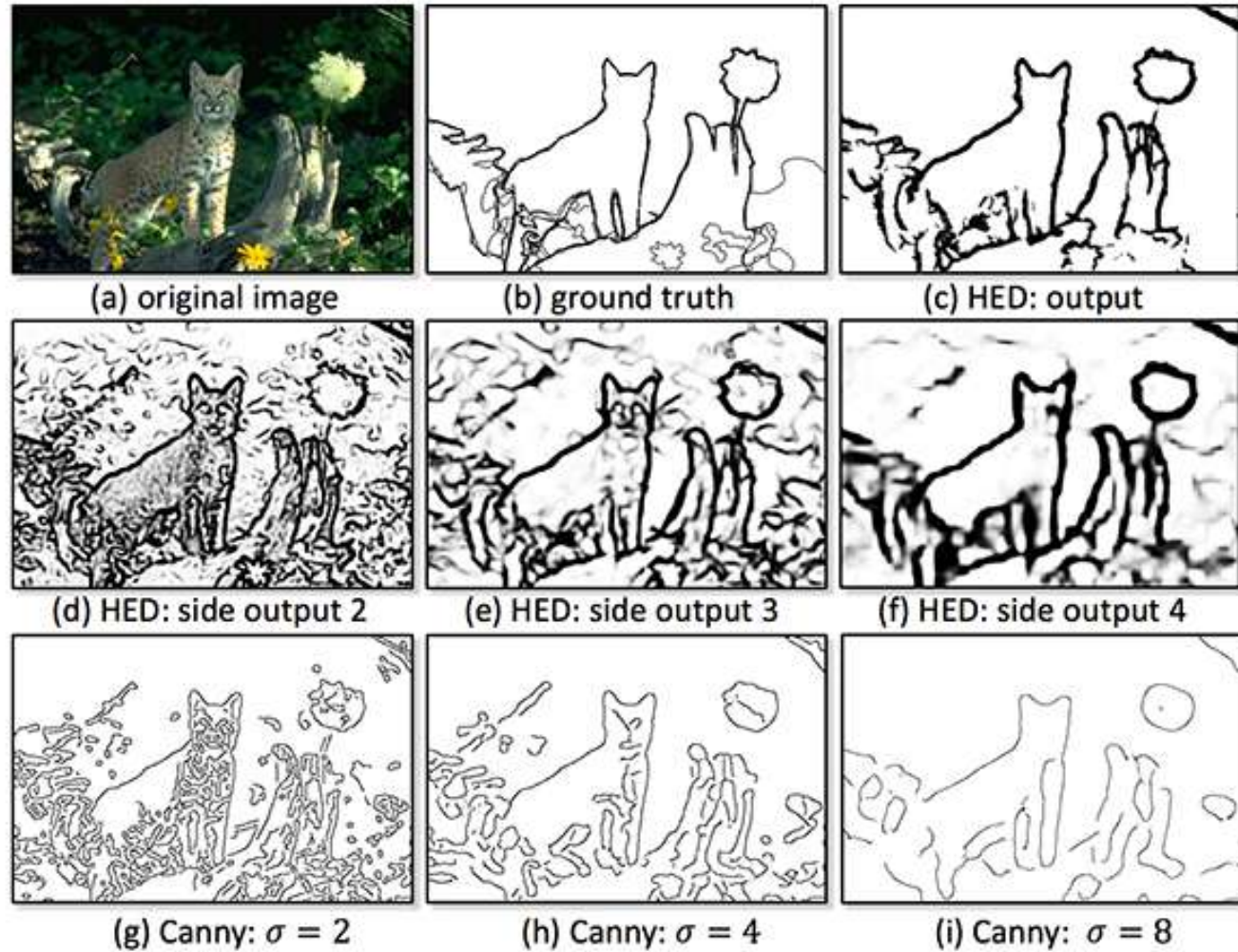
Output

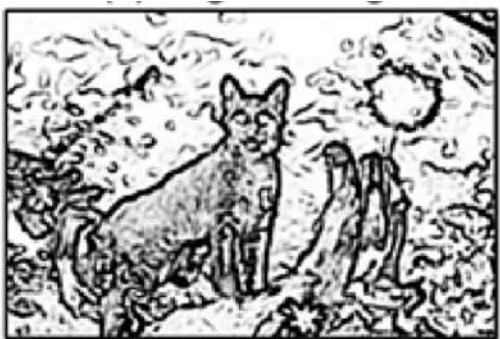


HED (Holistically Nested Edge Detection)



HED (Holistically Nested Edge Detection)

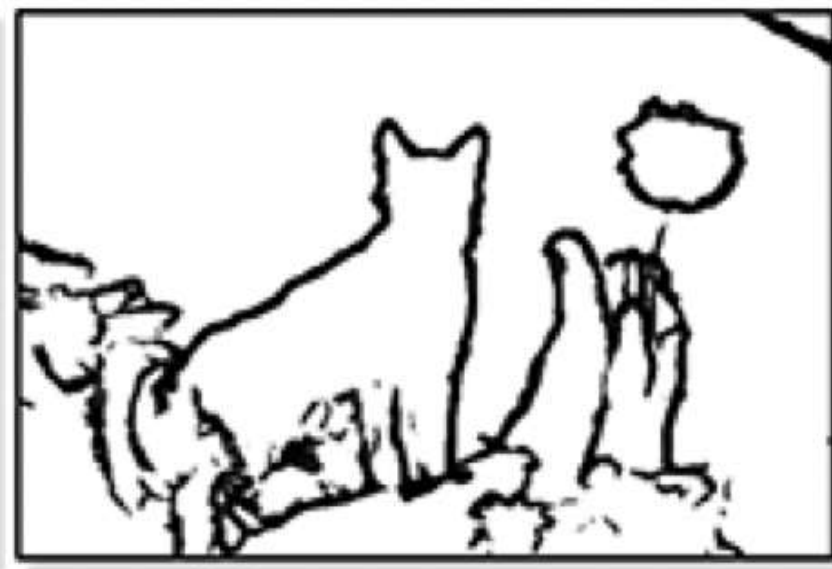




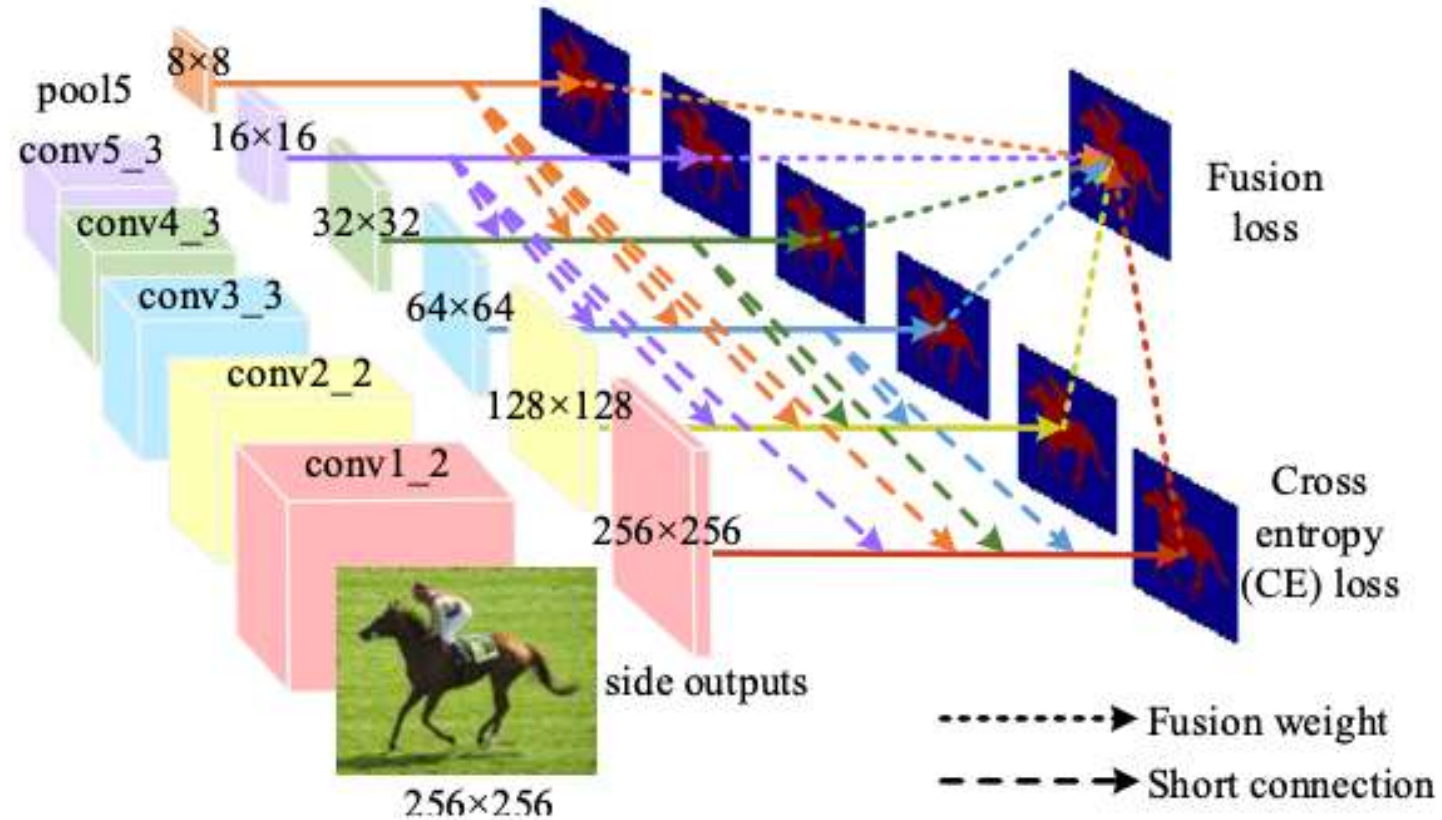
+



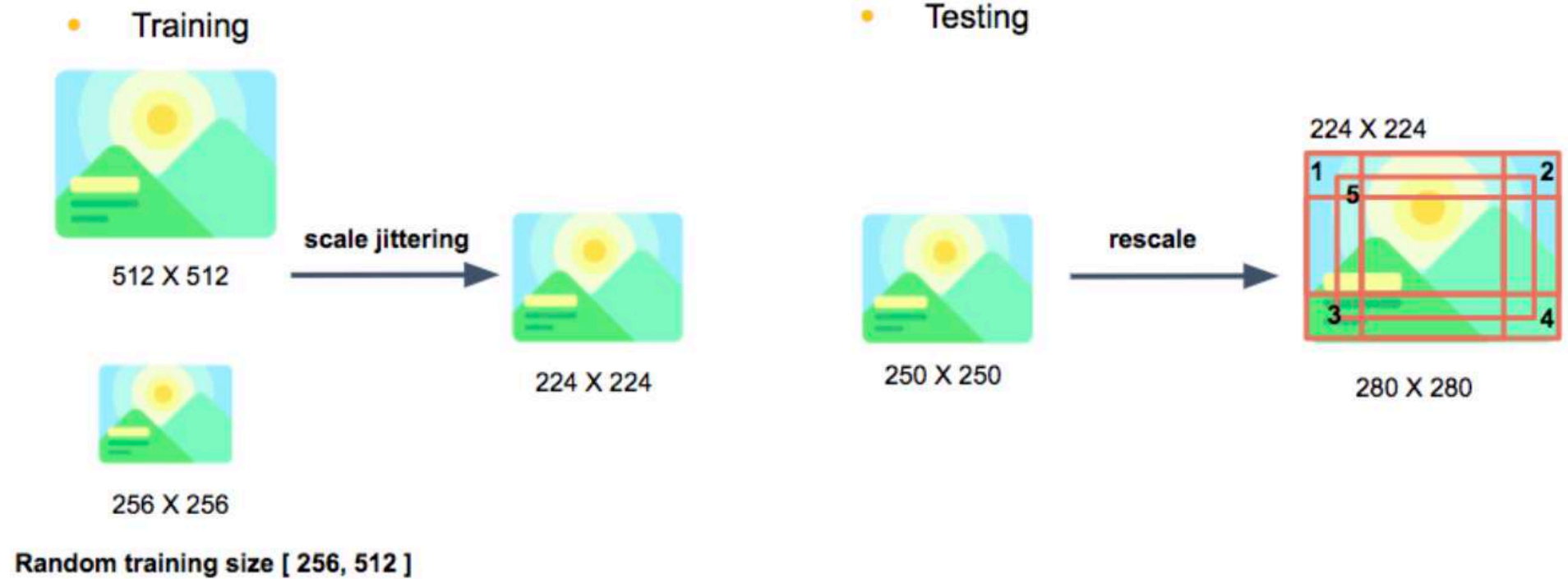
+



VGG (Visual Geometry Group)



VGG (Visual Geometry Group)



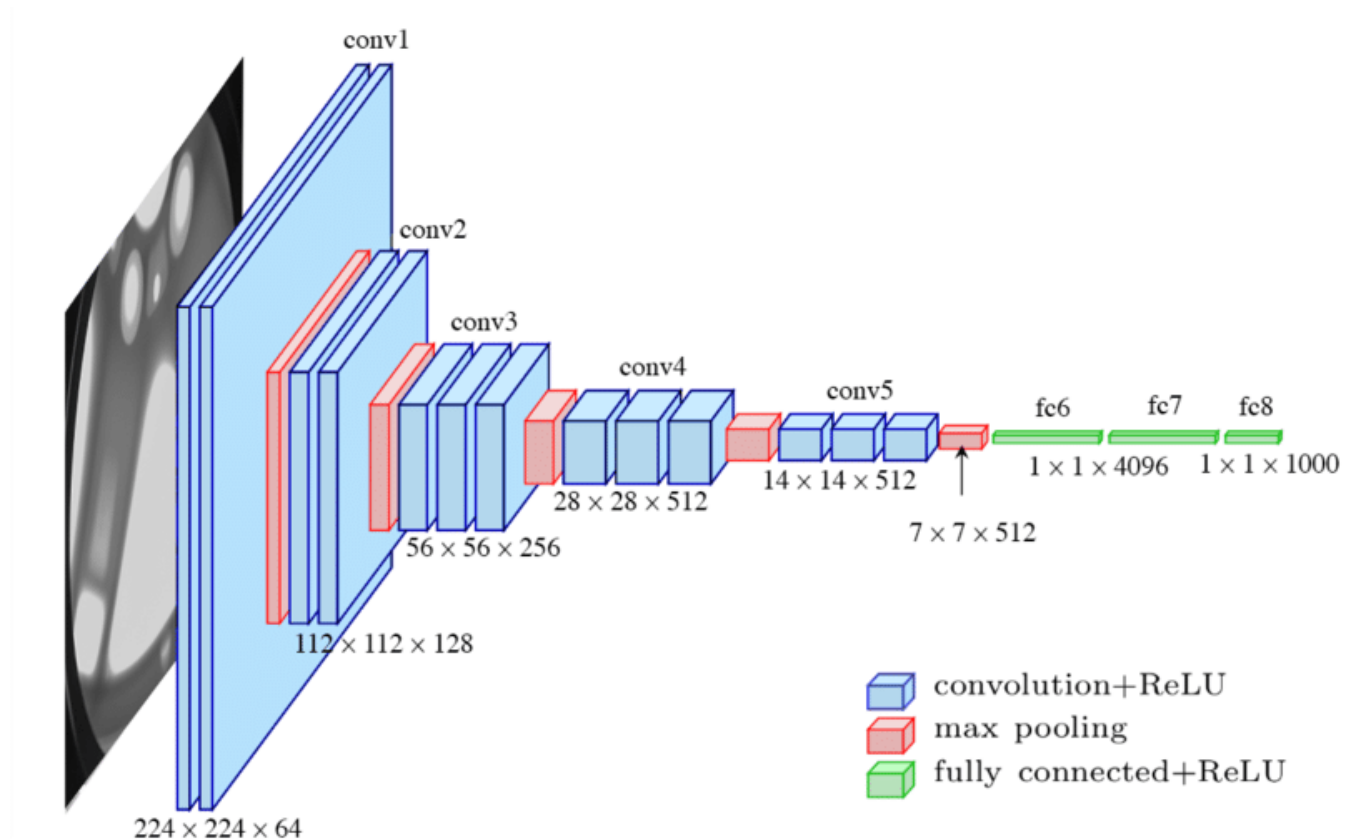
VGG (Visual Geometry Group)

ConvNet Configuration					
A	A-LRN	B	C	D	E
11 weight layers	11 weight layers	13 weight layers	16 weight layers	16 weight layers	19 weight layers
input (224 × 224 RGB image)					
conv3-64	conv3-64 LRN	conv3-64 conv3-64	conv3-64 conv3-64	conv3-64 conv3-64	conv3-64 conv3-64
maxpool					
conv3-128	conv3-128	conv3-128 conv3-128	conv3-128 conv3-128	conv3-128 conv3-128	conv3-128 conv3-128
maxpool					
conv3-256 conv3-256	conv3-256 conv3-256	conv3-256 conv3-256	conv3-256 conv3-256 conv1-256	conv3-256 conv3-256 conv3-256	conv3-256 conv3-256 conv3-256 conv3-256
maxpool					
conv3-512 conv3-512	conv3-512 conv3-512	conv3-512 conv3-512	conv3-512 conv3-512 conv1-512	conv3-512 conv3-512 conv3-512	conv3-512 conv3-512 conv3-512 conv3-512
maxpool					
conv3-512 conv3-512	conv3-512 conv3-512	conv3-512 conv3-512	conv3-512 conv3-512 conv1-512	conv3-512 conv3-512 conv3-512	conv3-512 conv3-512 conv3-512 conv3-512
maxpool					
FC-4096					
FC-4096					
FC-1000					
soft-max					

Transfer Learning

→ more complicated structure will take the trained data to be the initial

VGG (Visual Geometry Group)





Defects of The Algorithm

Implementation



Target focused,
surroundings blurred



Target focused,
surroundings focused



Target blurred,
surroundings blurred

Implementation



Target focused, surroundings blurred

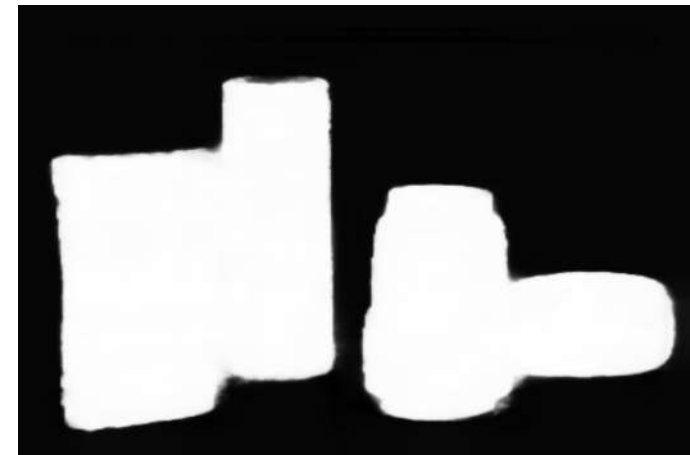


Target focused, surroundings focused

Implementation



Target focused, surroundings blurred



Target focused, surroundings focused

Implementation (Separation test)



Implementation





Causes of Impacts

A 、 Depth of Field

B 、 Reflective of Light

C 、 Separation Distance between two objects

D 、 Object's color contrast

E 、 Difference between object and surroundings

F 、 Size difference between Input graph and training data



Improvements

A 、 Backgrounding

B 、 Line Up in Parallel

C 、 Light Location to Avoid Reflective of Light

D 、 Object Classification

E 、 Movable Camera to Get different perspective

*Thanks
For
Listening*