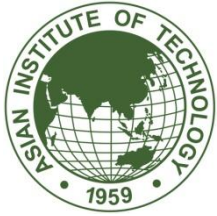
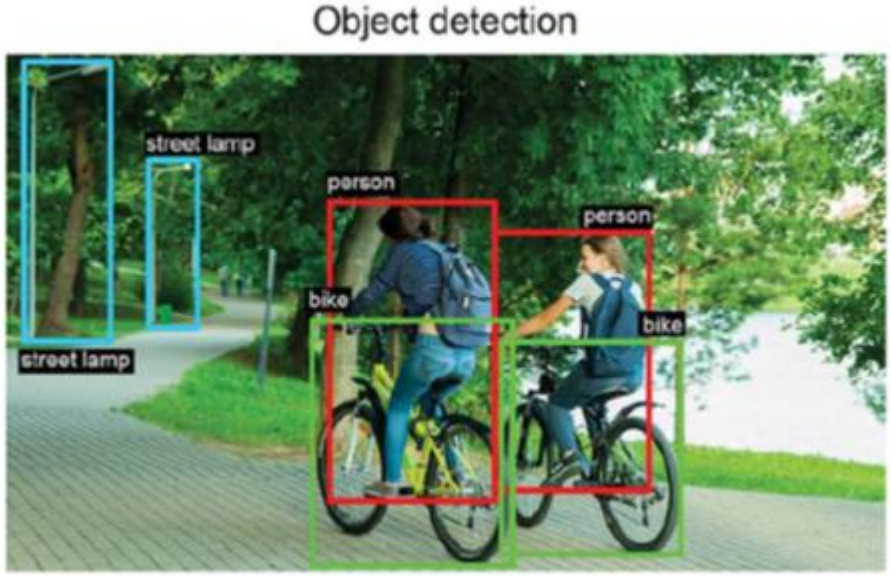


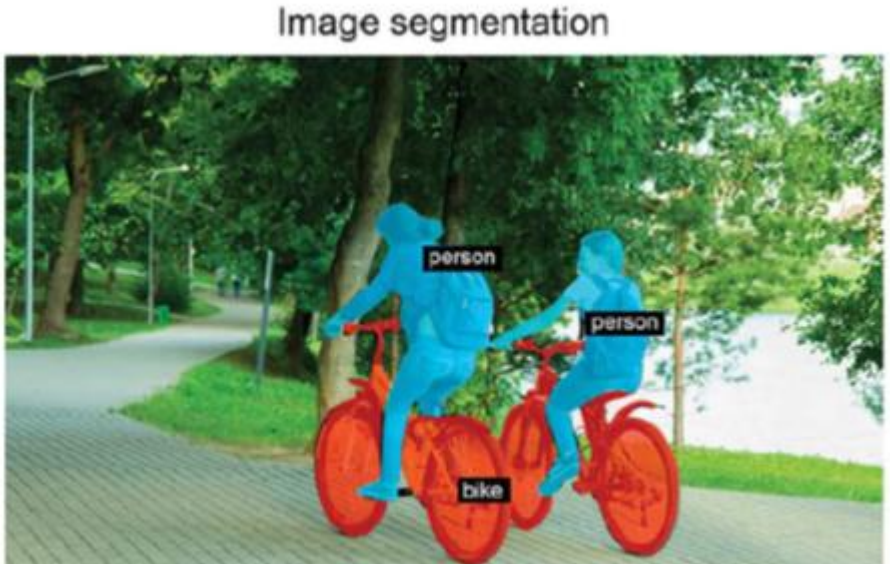
Segmentation

Dr. Mongkol Ekpanyapong

Object detection vs. Image Segmentation

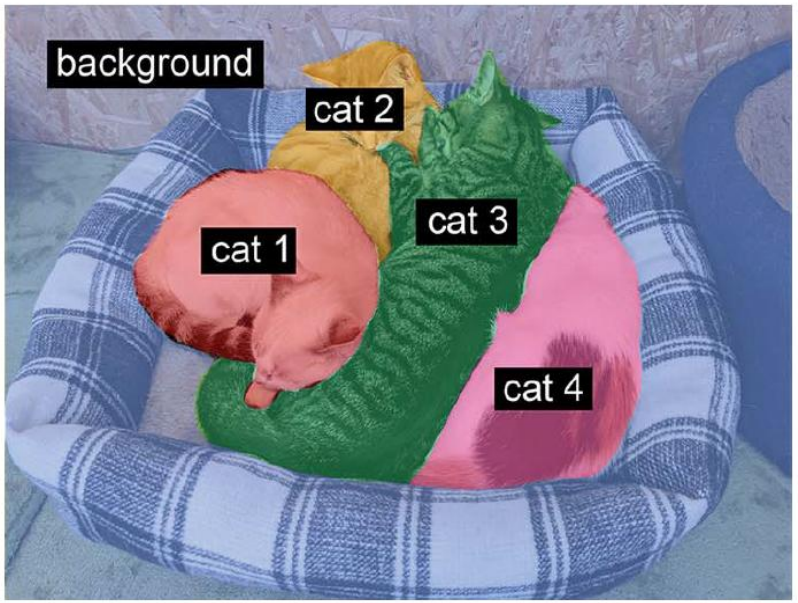
- Segmentation: We want to predict the class of every pixel in the image



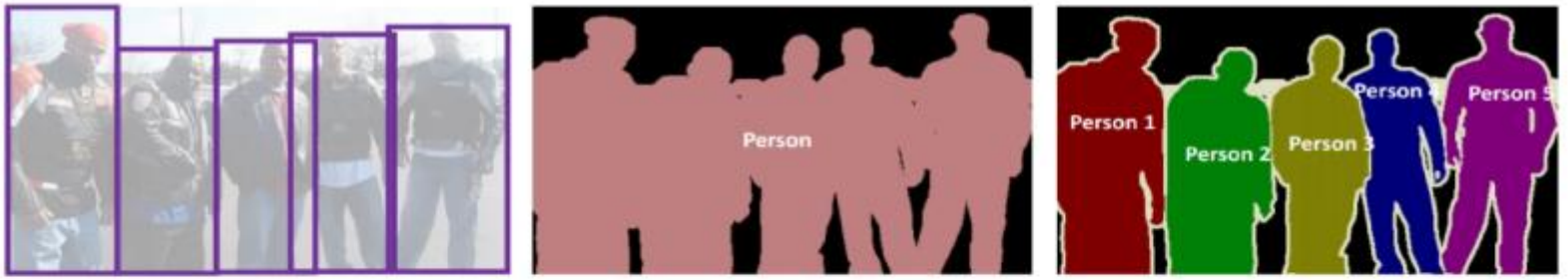


Semantic vs. Instance Segmentation

- Semantic segmentation: predict each pixel into a class
- Instance segmentation: predict each pixels into a class and differentiate individual instances



Example



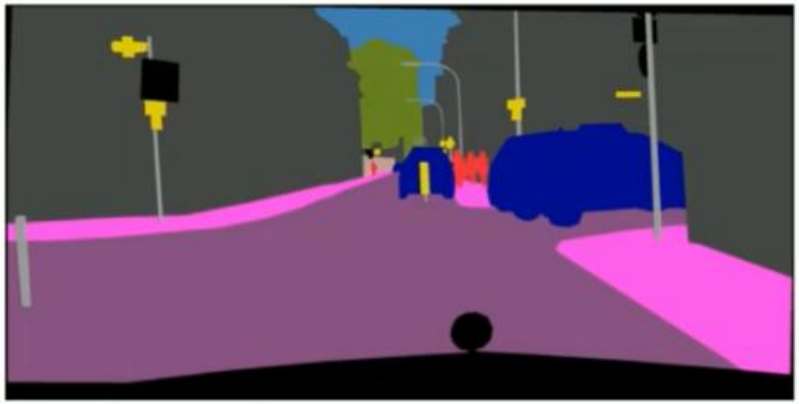
Object Detection | Semantic Segmentation | **Instance Segmentation**

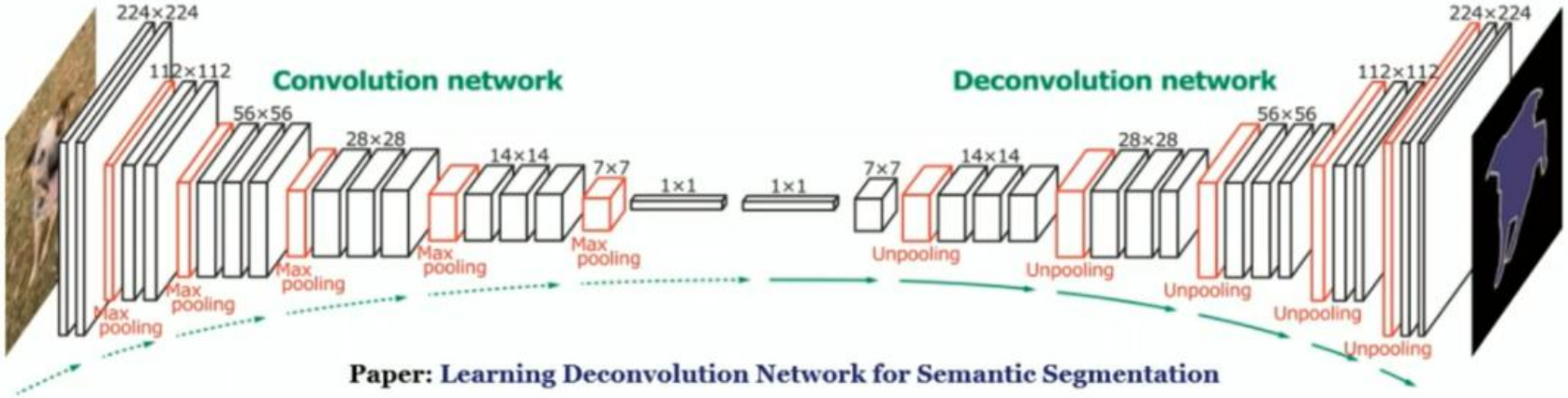
https://www.researchgate.net/figure/Semantic-segmentation-left-and-Instance-segmentation-right-8_fig1_339328277

Input Image | Semantic Segmentation | Instance Segmentation

https://datascience.stackexchange.com/questions/52015/what-is-the-difference-between-semantic-segmentation-object-detection-and-insta

Example: Image Segmentation





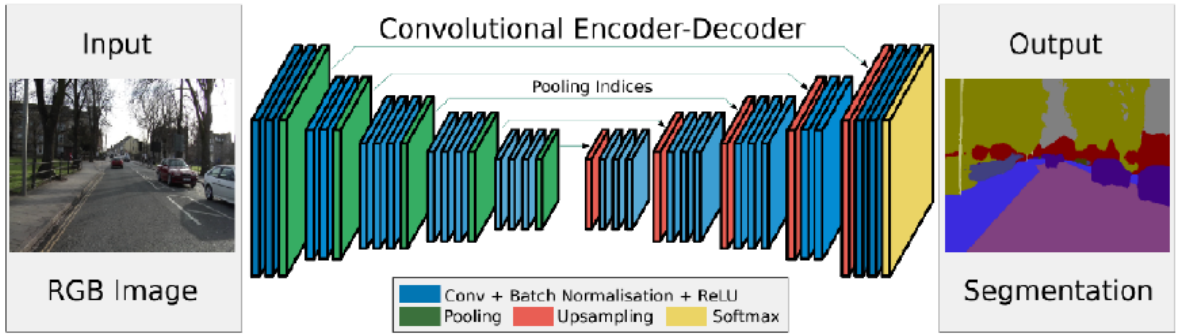
Paper: Learning Deconvolution Network for Semantic Segmentation

Popular Segmentation models

- SegNet
- U-net
- Deep Lab V3
- Mask R-CNN

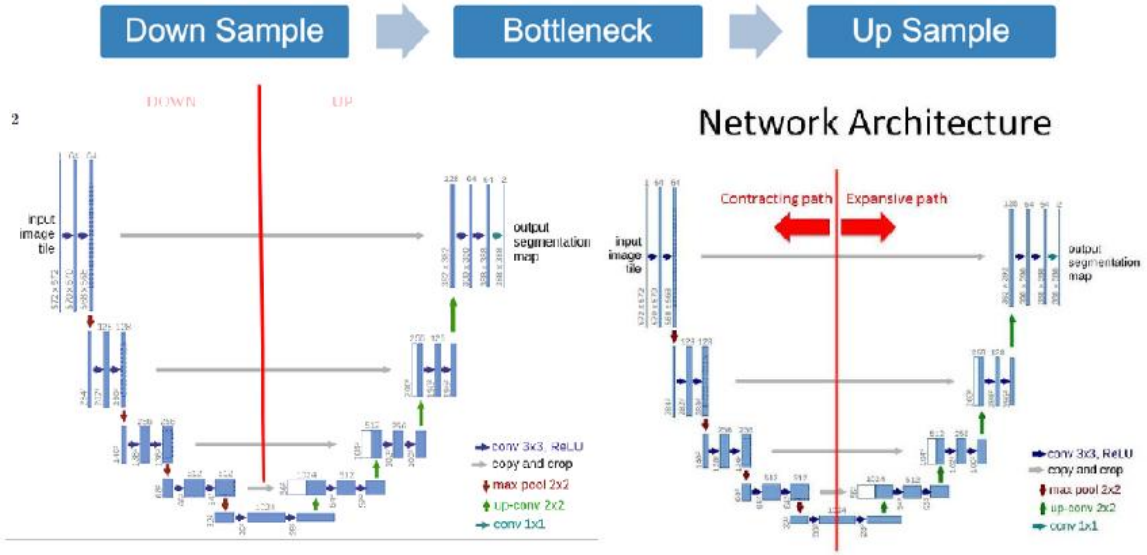
SegNet

- Developed in 2015, SeqNet is a semantic segmentation model
- It consists of an encoder and decoder network
- The architecture of the encoder is VGG16



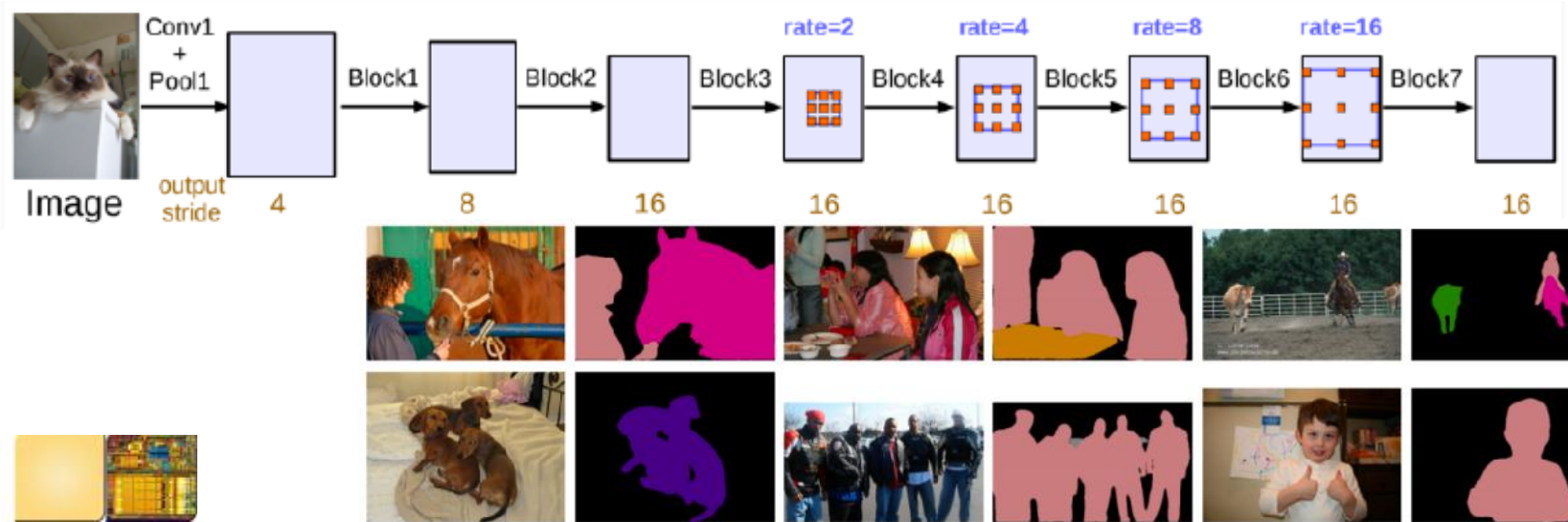
U-Net

- Also introduced in 2015
- It targets for biomedical applications
- It is also based on encoder-decoder network



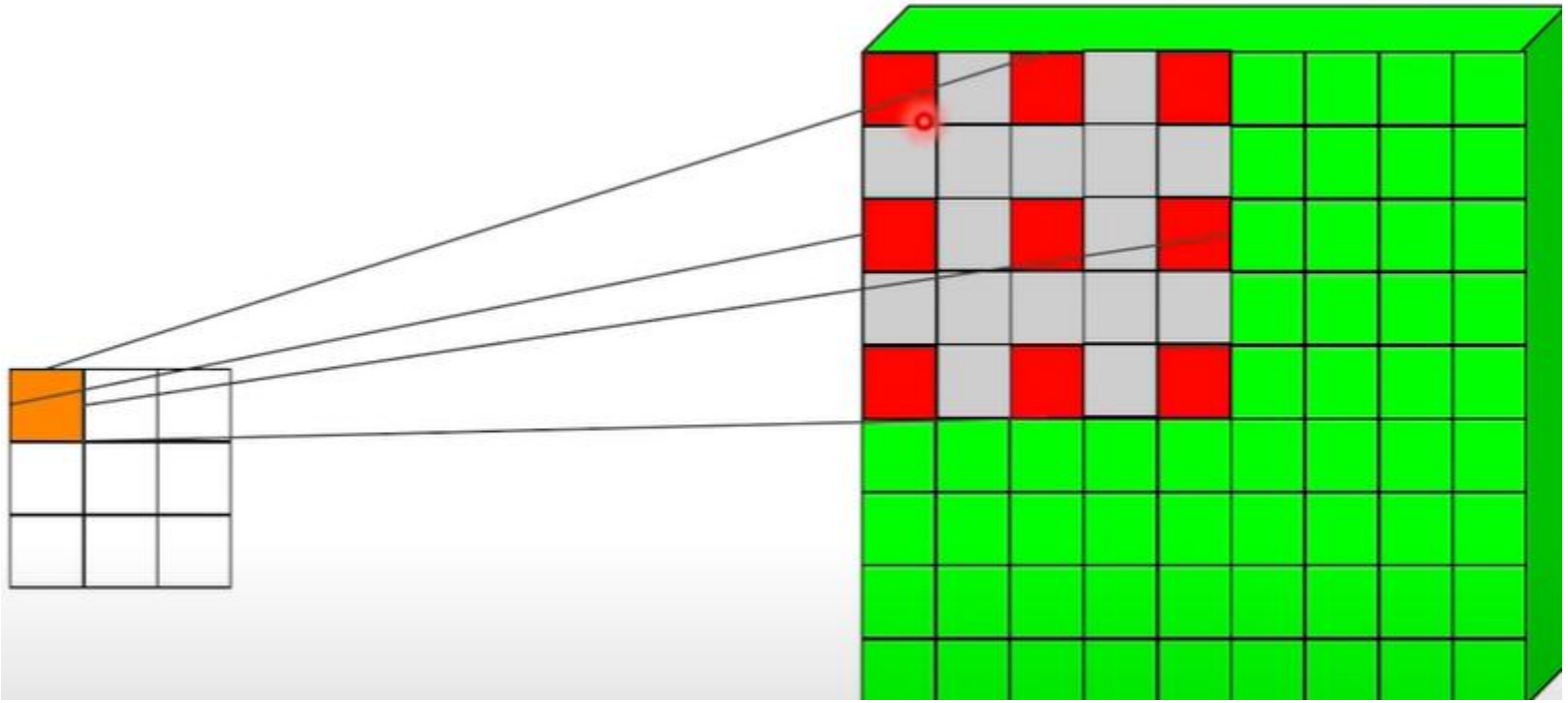
DeepLab

- Developed by Google in 2014
- Currently, DeepLabv3 (2017) is the current state of the art
- DeepLab is using Dilated Convolution

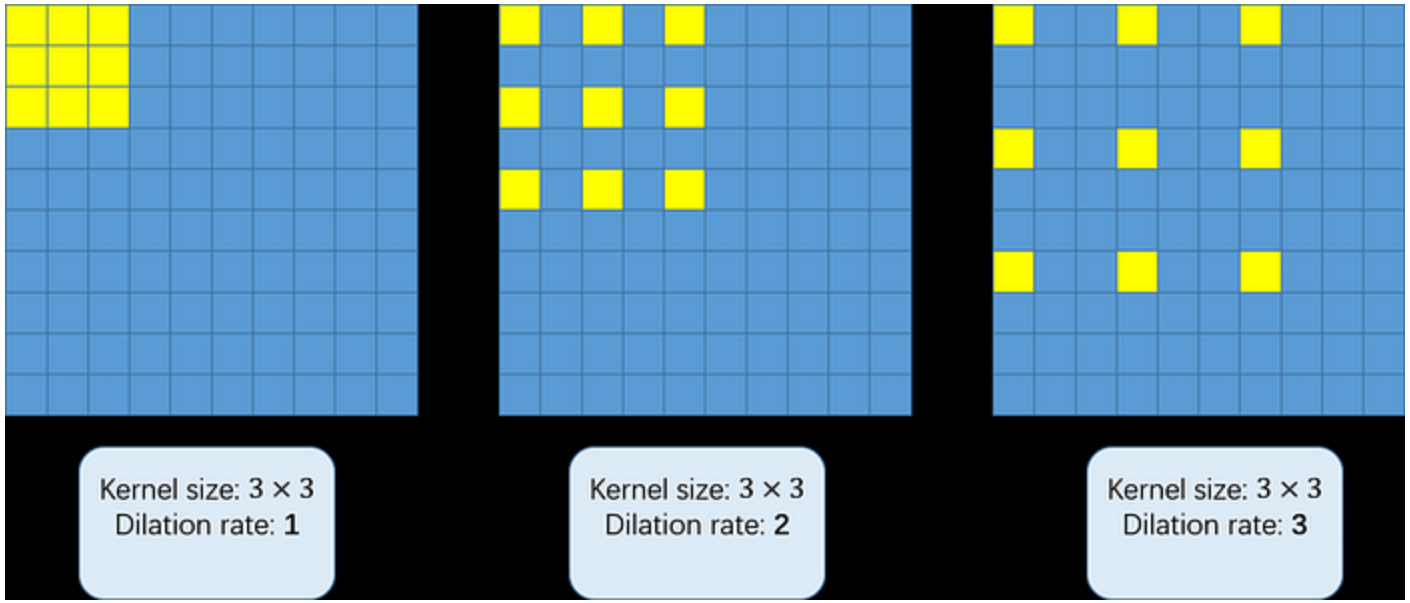


Dilated Convolution

Dilation rate (k) = 2

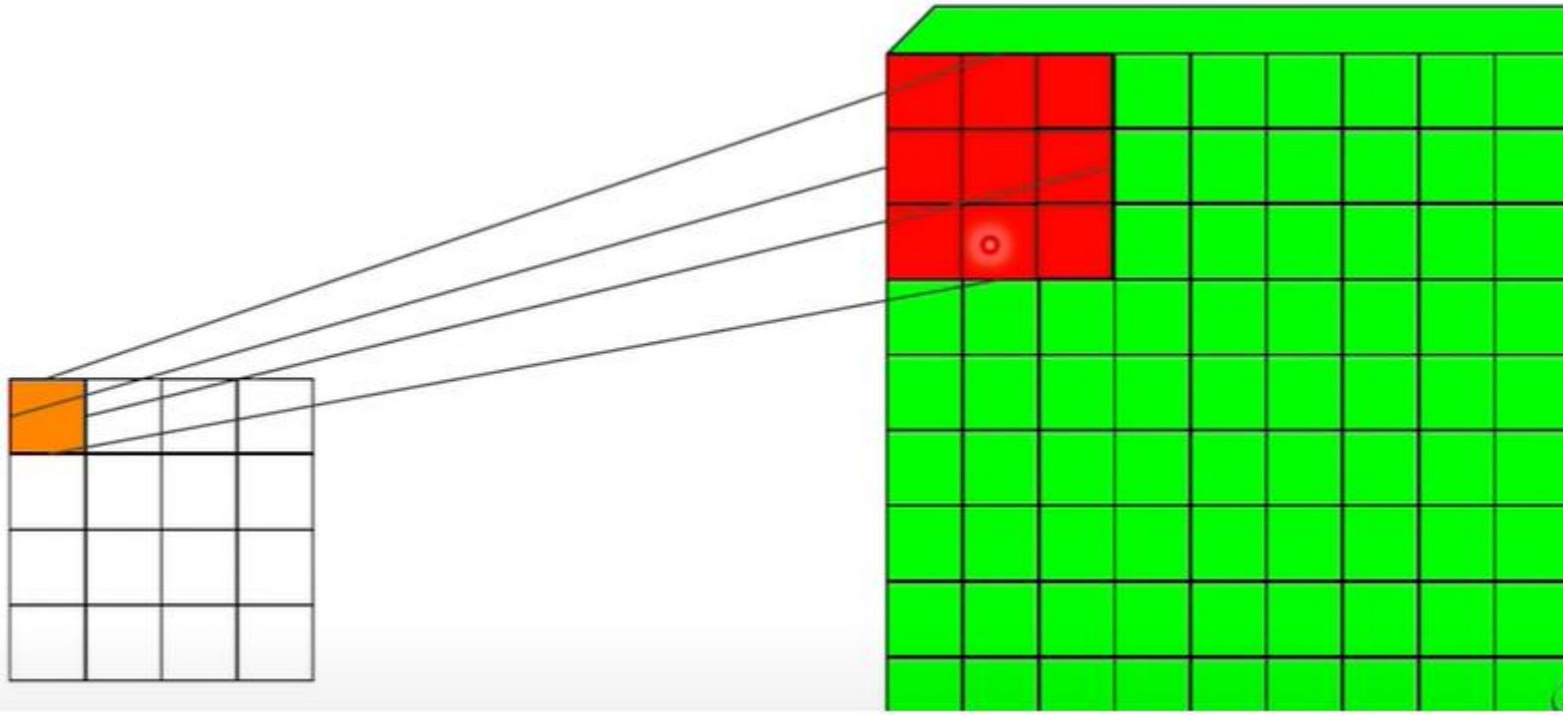


Dilation rate



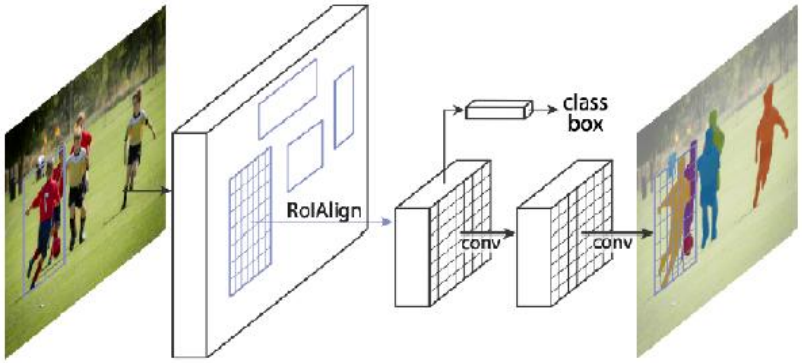
https://medium.com/@akp83540/dilation-rate-in-a-convolution-operation-a7143e437654

Transpose Convolution



Mask R-CNNs

- Published in 2017
- It is used in instance segmentation



Questions?

Final Exam

- It is about classify objects and vehicle
- Training data will be given on 15 November
- Test data will be given on 2 December and you have to submit report before getting test dataset
- For classification, You must show the prediction of each test images so that we will count the accuracy
- For detection problem, You must show the prediction of each test images and bounding box so that we will count the mAP
- There will be an unbalanced training dataset

Exam Paper

- Methodology (your architecture)
- Model + Source code (Cheating = 0 scores)
- Training results (Loss and accuracy)
- Test accuracy will have high marks on final score
- If the accuracy is about the same, faster model will get higher score

You can brainstorm before the final exam, but I do not expect same codes, same model architecture, same hyper parameters, and same accuracy)

Project Report

Submit 4 pages IEEE paper format along with presentation

- Introduction
- Literature Review
- Methodology
- Experimental results
- Conclusions