后厂理工学院
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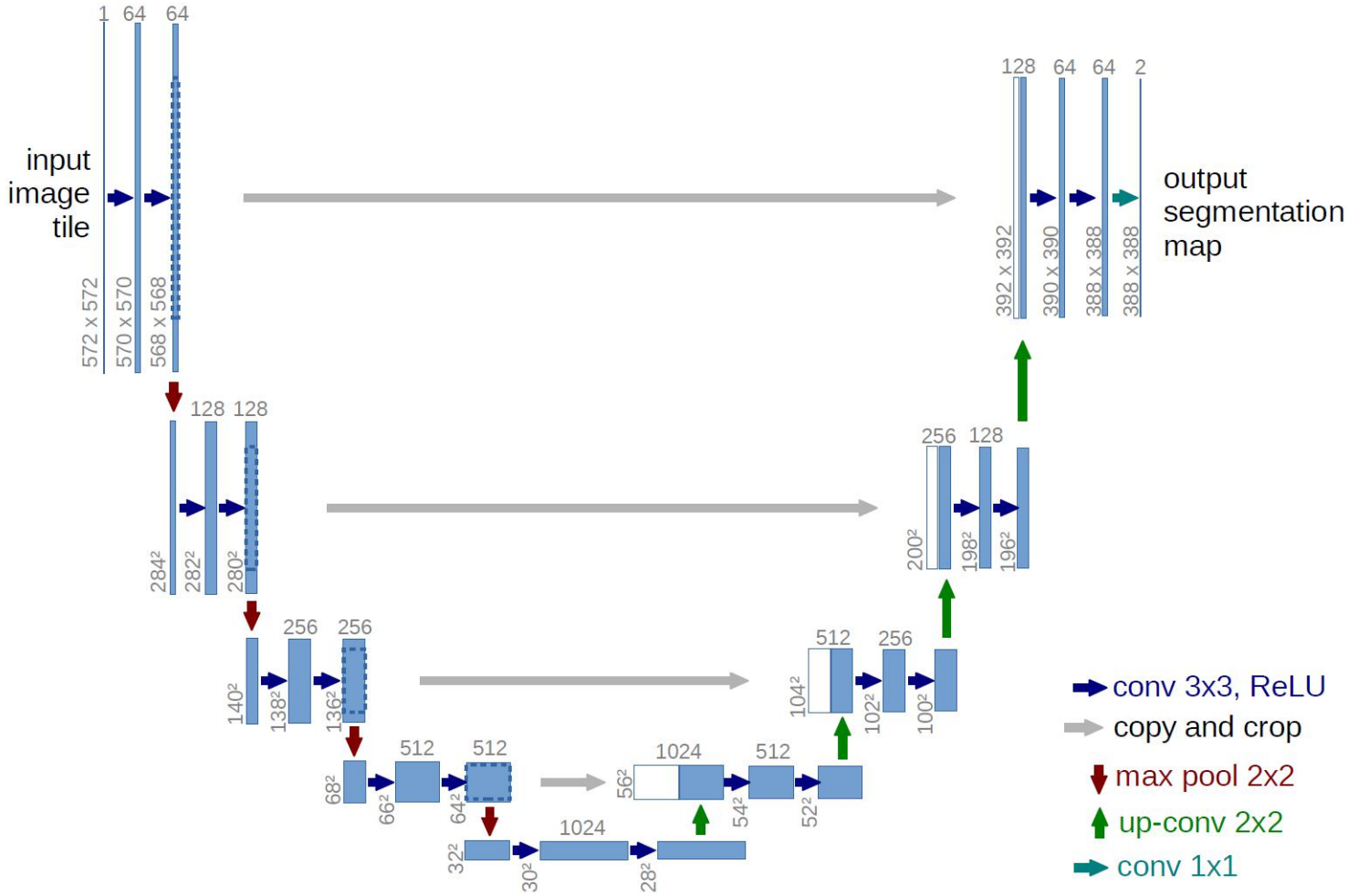
Lane Segmentation Week 3

HCT CV Course

主要内容



2D目标检测：

Anchor free

学习目标

- 掌握U-Net的原理和实现

U-Net → GAN

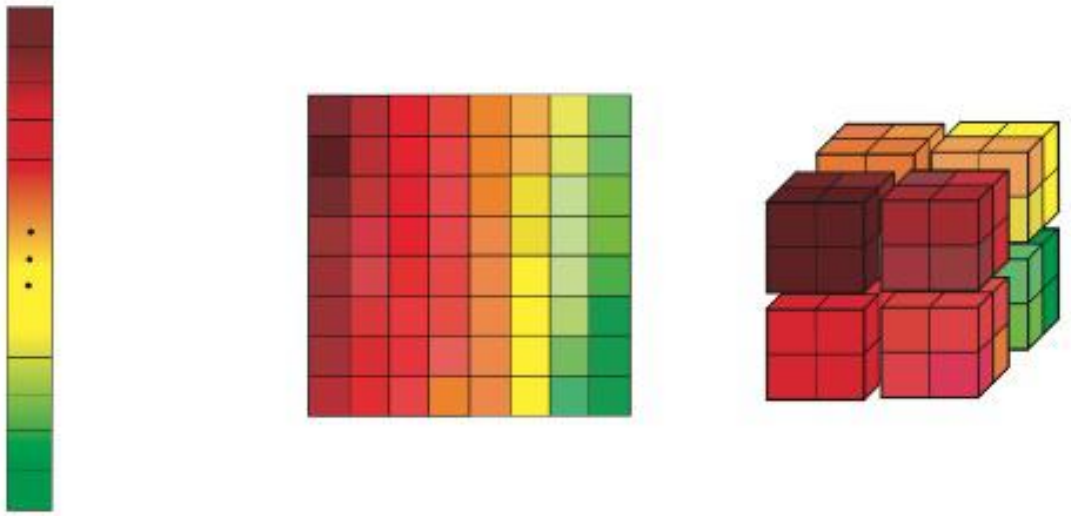
Pytorch 1.4 → 更新

https://pytorch.org/blog/pytorch-1-dot-4-released-and-domain-libraries-updated/

Tensor

tensor = multidimensional array

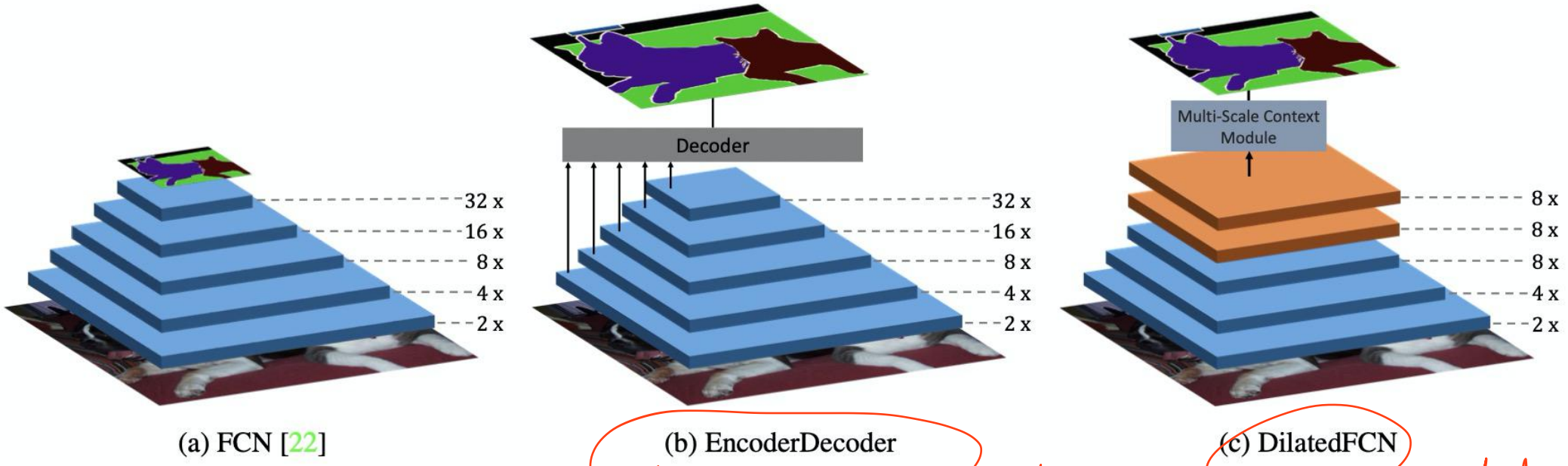
vector | matrix | tensor



$\mathbf{v} \in \mathbb{R}^{64}$ $X \in \mathbb{R}^{8x8}$ $\mathcal{X} \in \mathbb{R}^{4x4x4}$

Make your hand dirty

Semantic Segementation



(a) FCN [22]

(b) EncoderDecoder

(c) DilatedFCN

Unet

deep lab v3+

Notes

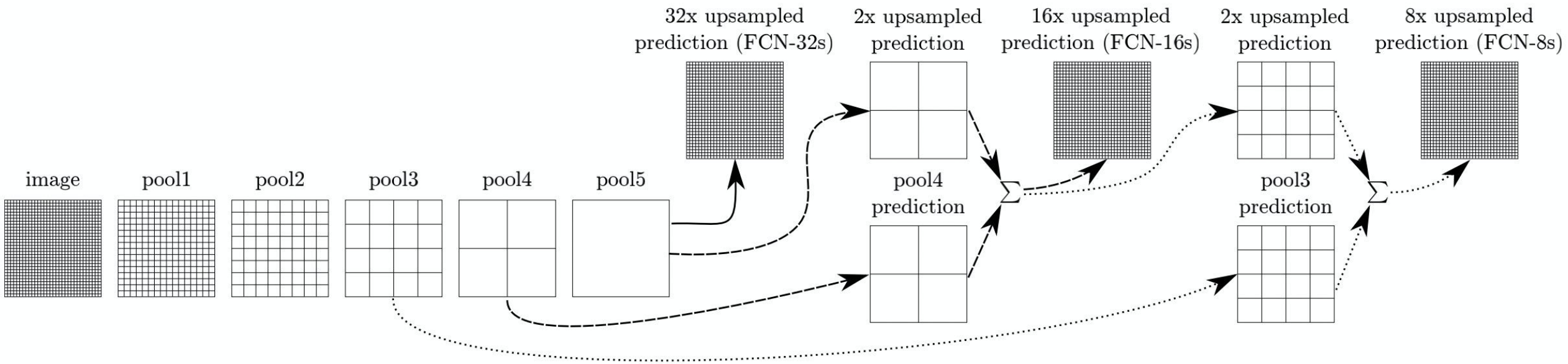
FCN对Deconv采用双线性插值，

crop.

参数不可优化.

转置卷积、kernel=2n. stride=n.

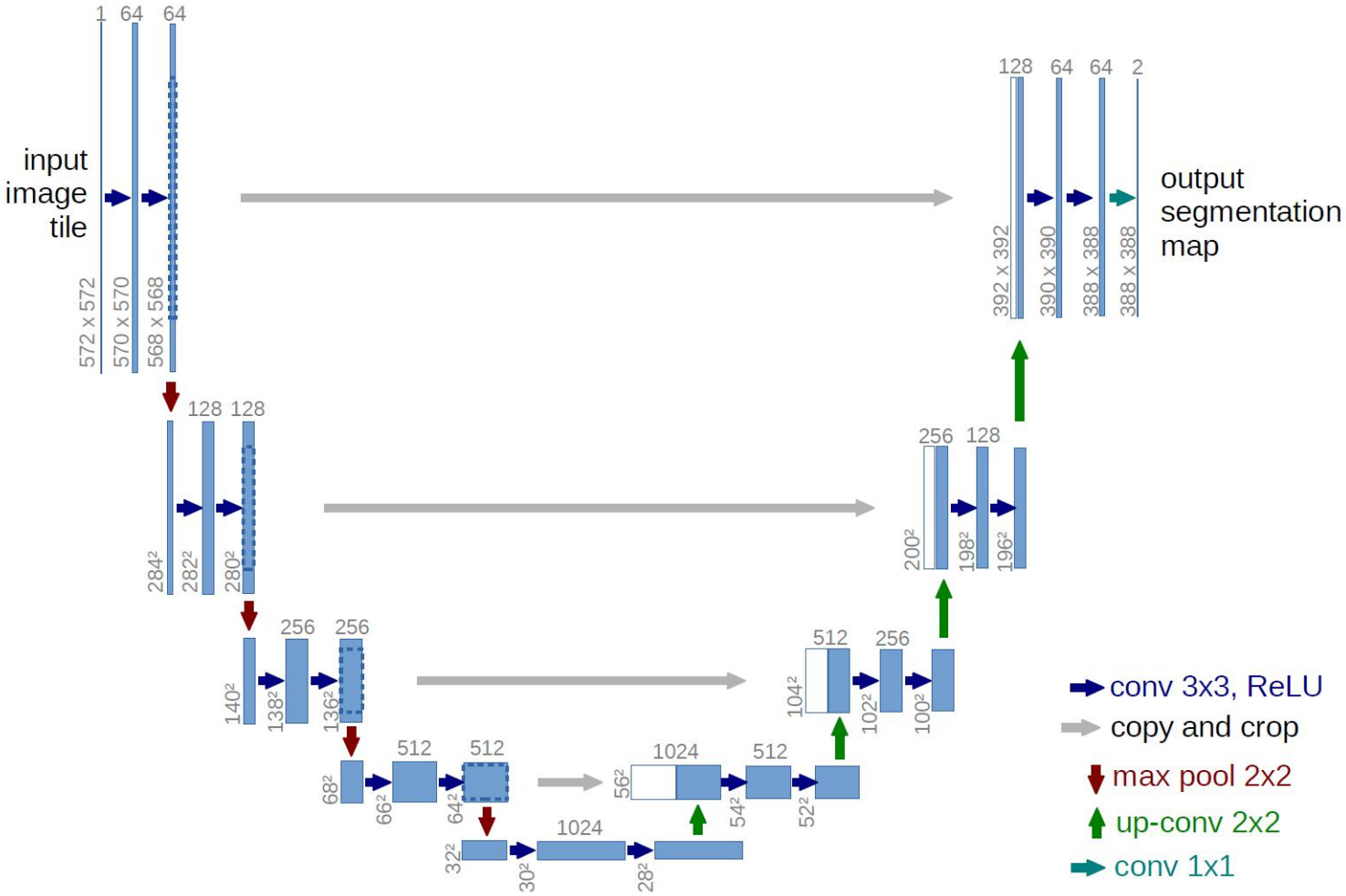
FCN



Notes

U-Net

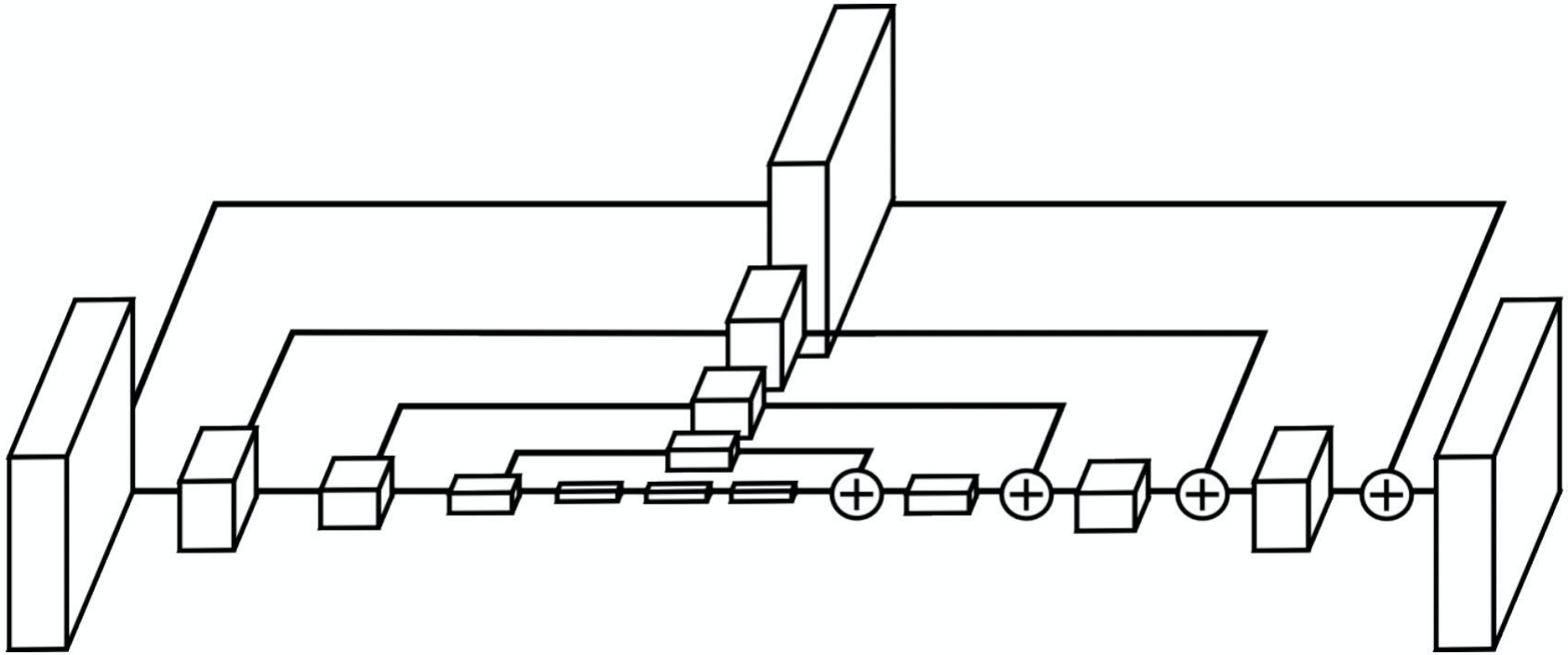
1. encoder-decoder
2. skip connection



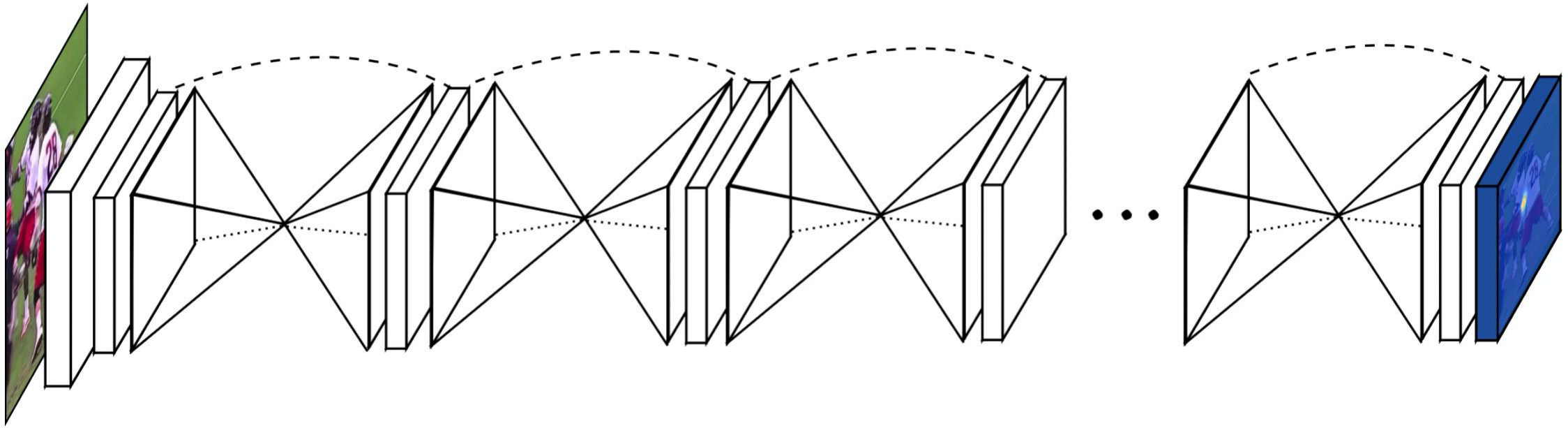
对称

Notes

Human Pose Estimation



Human Pose Estimation



Human Pose Estimation

设定骨骼 → 关键点

object detection → anchor free.

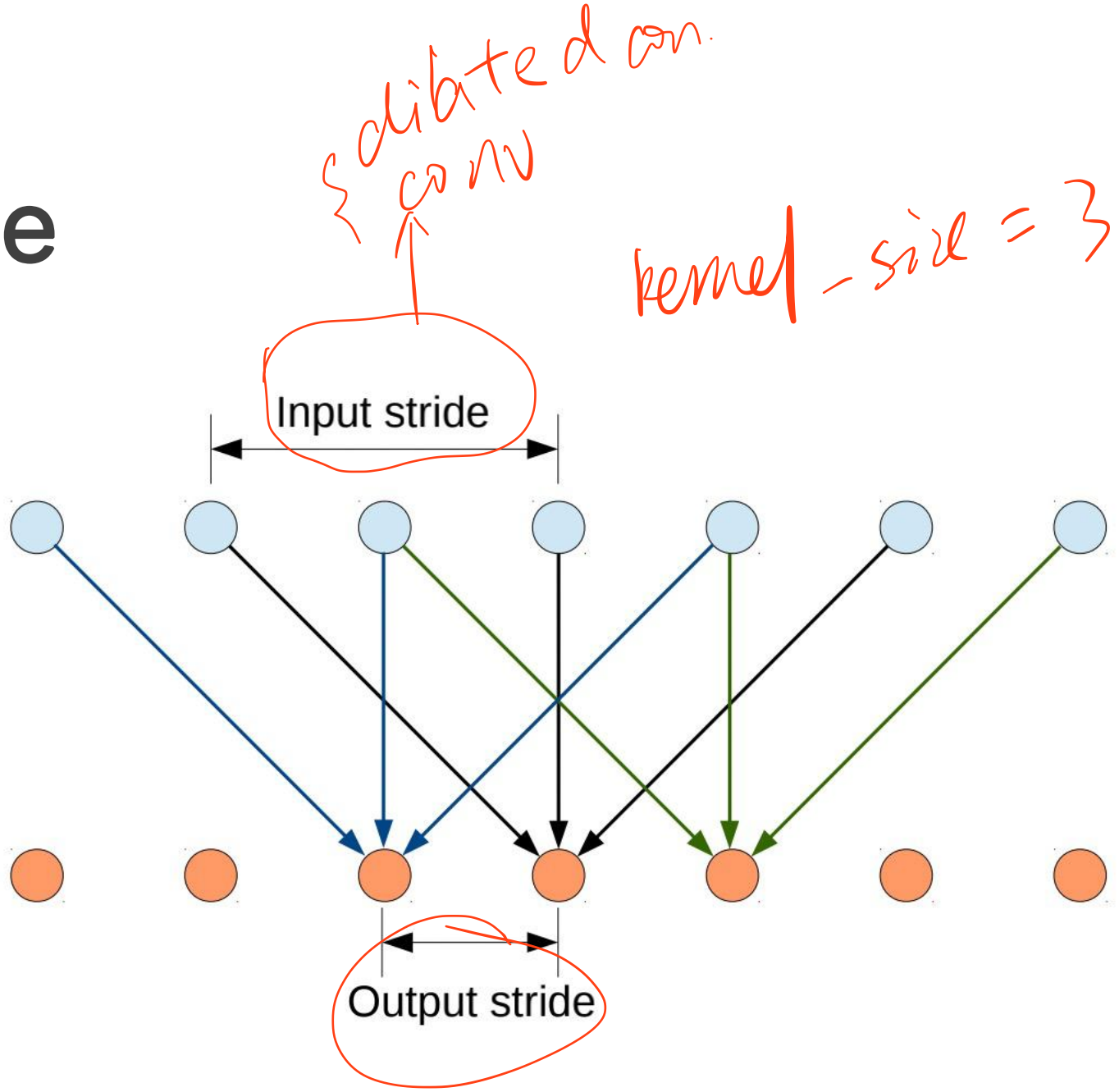
semantic segmentation

Notes

用 segmentation 统一

- 关键点检测
- 目标检测

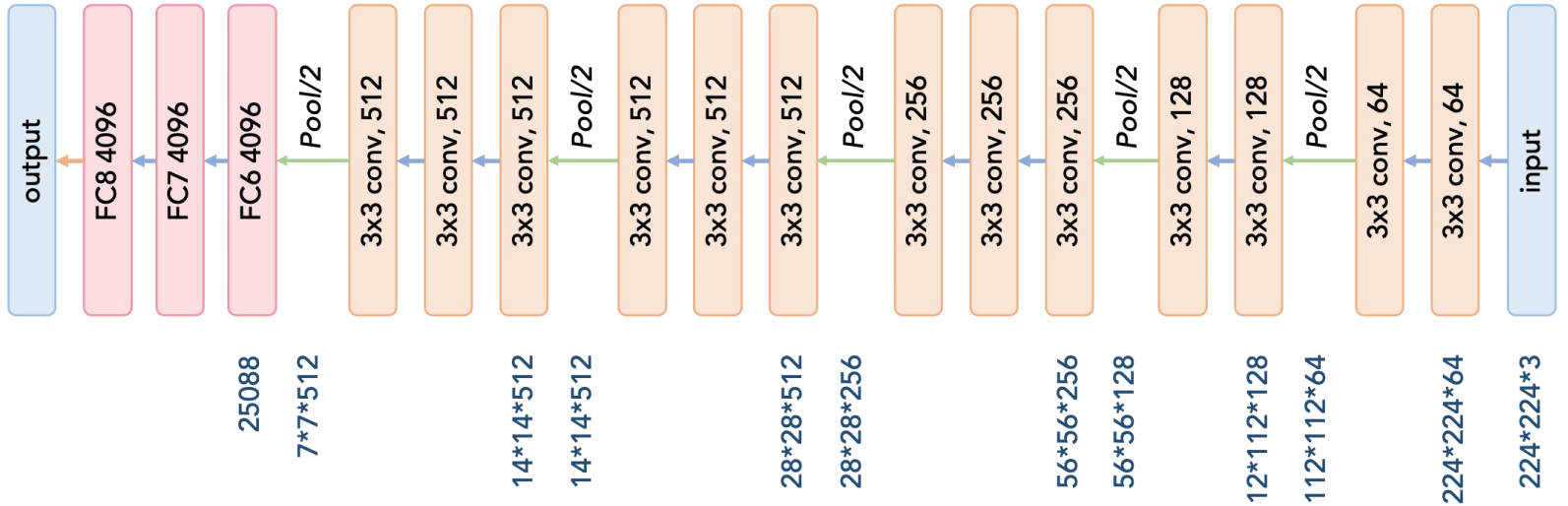
Stride



Notes

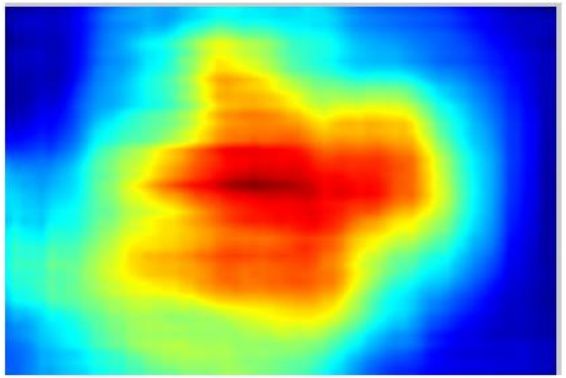
receptive field

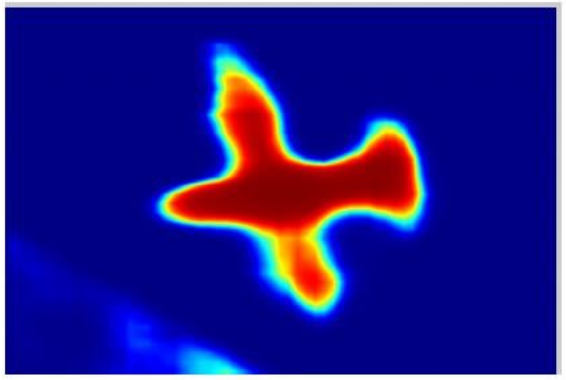
(k, s)	(k, s)'	receptive field
7 x 1	404 x 32	404 x 404
2 x 2	212 x 32	212 x 212
3 x 1	196 x 16	196 x 196
3 x 1	164 x 16	164 x 164
3 x 1	132 x 16	132 x 132
2 x 2	100 x 16	100 x 100
3 x 1	82 x 8	92 x 92
3 x 1	76 x 8	76 x 76
3 x 1	60 x 8	60 x 60
2 x 2	44 x 8	44 x 44
3 x 1	40 x 4	40 x 40
3 x 1	32 x 4	32 x 32
3 x 1	24 x 4	24 x 24
2 x 2	16 x 4	16 x 16
3 x 1	14 x 2	14 x 14
3 x 1	10 x 2	10 x 10
2 x 2	6 x 2	6 x 6
3 x 1	5 x 1	5 x 5
3 x 1	3 x 1	3 x 3



Notes

Coarse Output





Image/G.T.

DCNN output

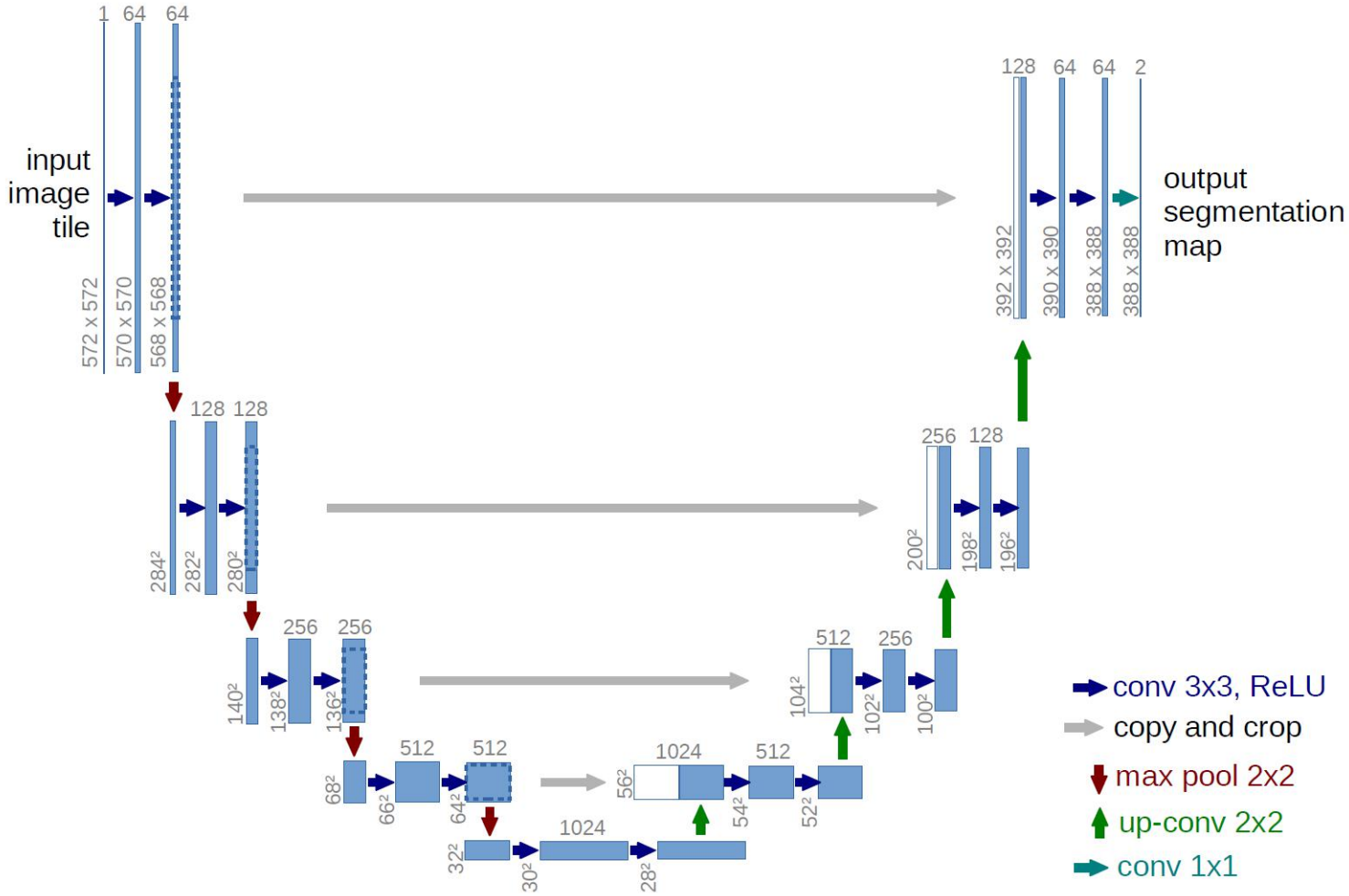
Notes

U-Net Architecture

- Encoder-Decoder → 结构.
- Skip Connection

Notes

Encoder



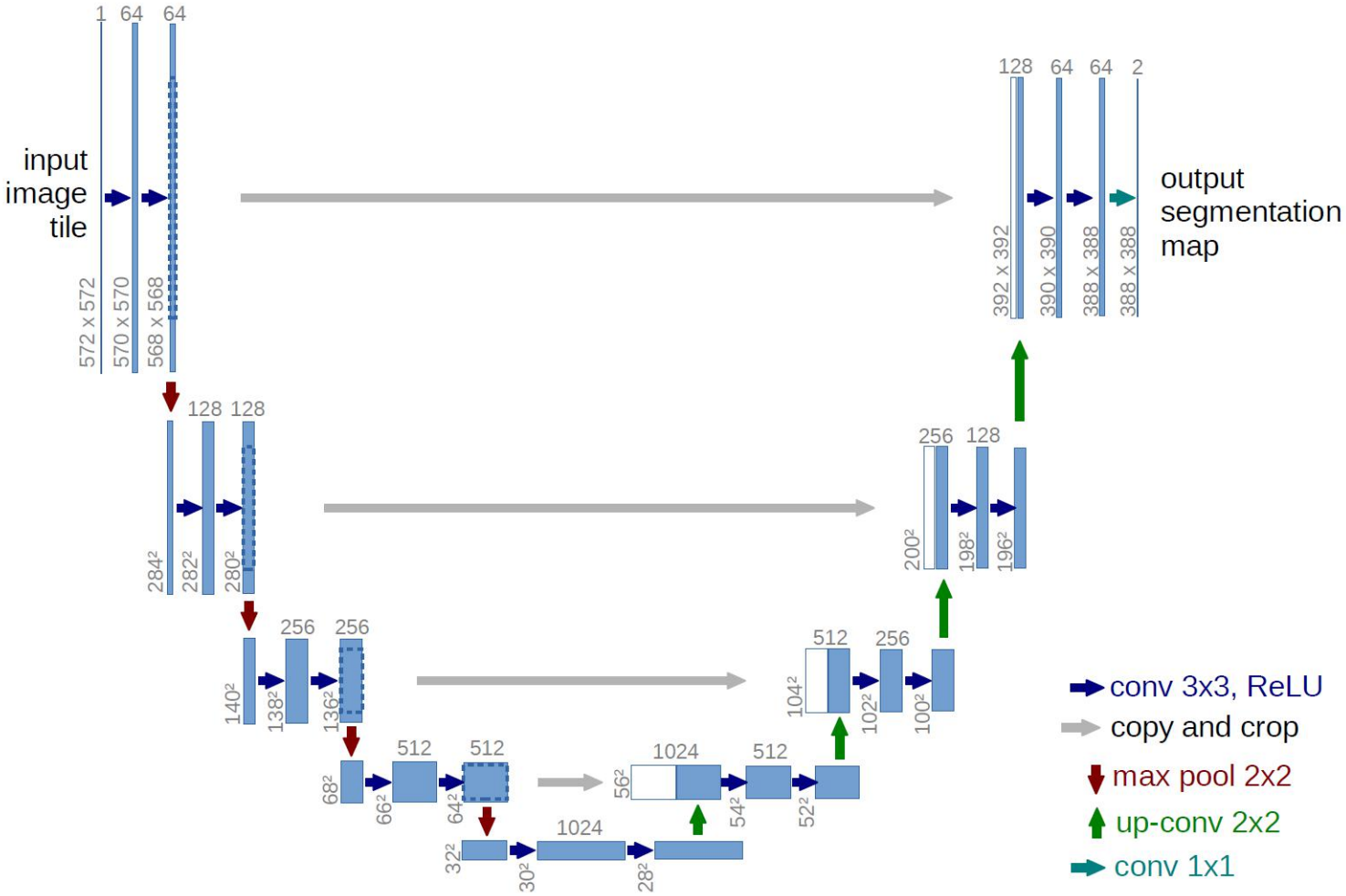
Notes

Encoder

- Pre-Trained Model

Notes

Decoder



Notes

Decoder

- Deeper

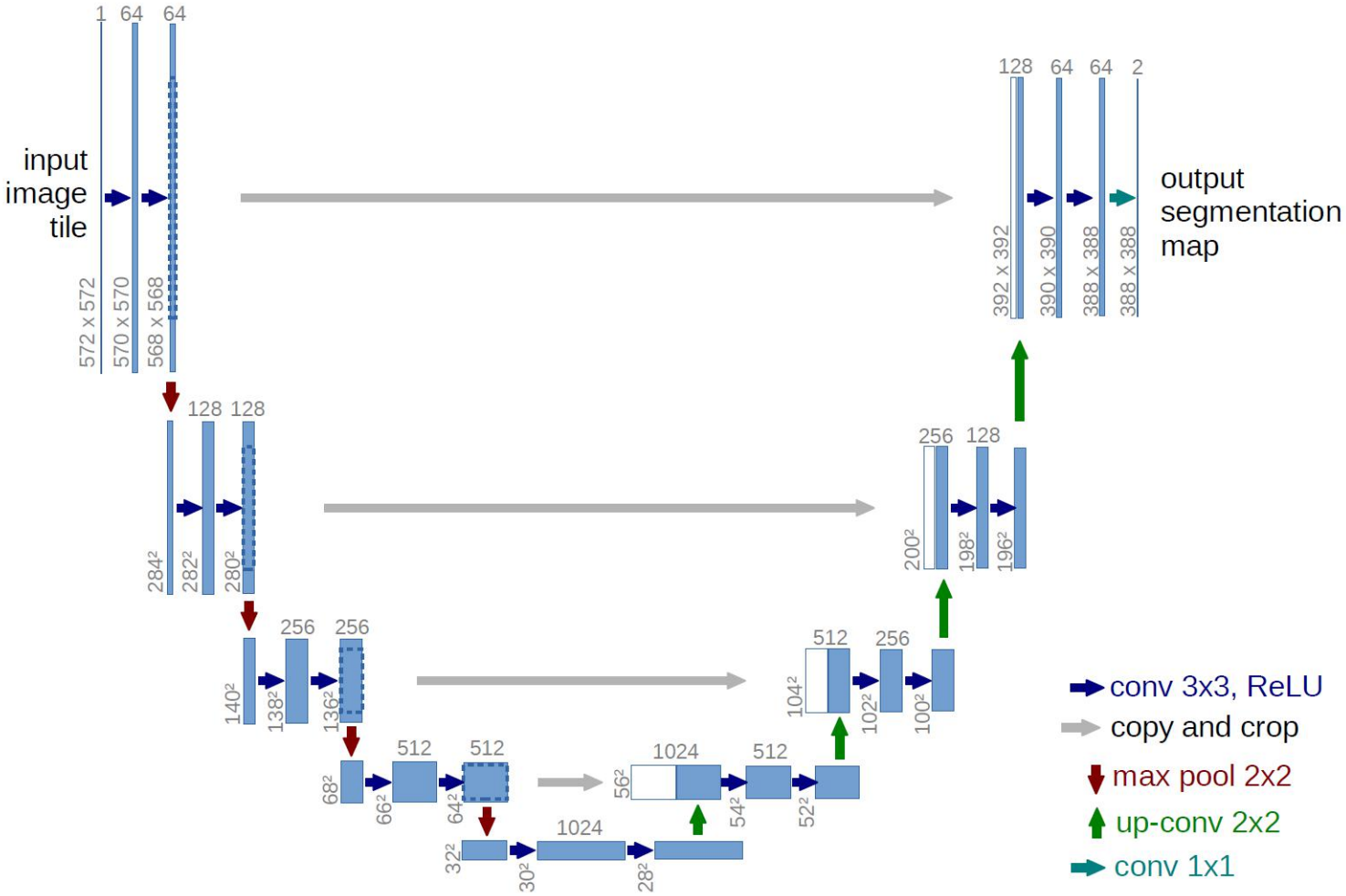
Notes

Decoder

- bilinear interpolation
- transposed convolution

Notes

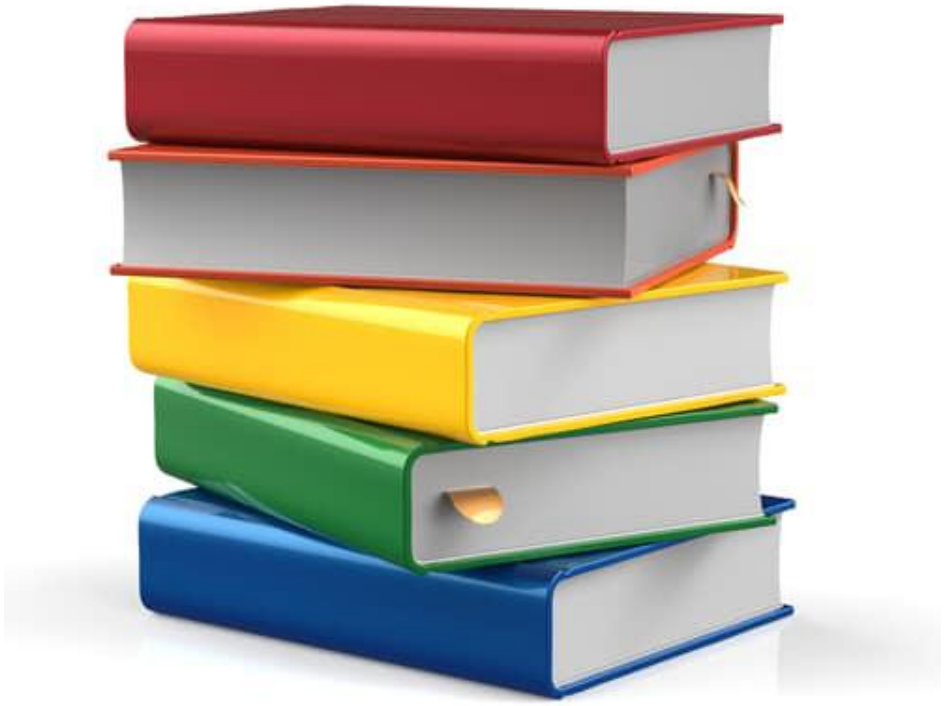
Skip Connection



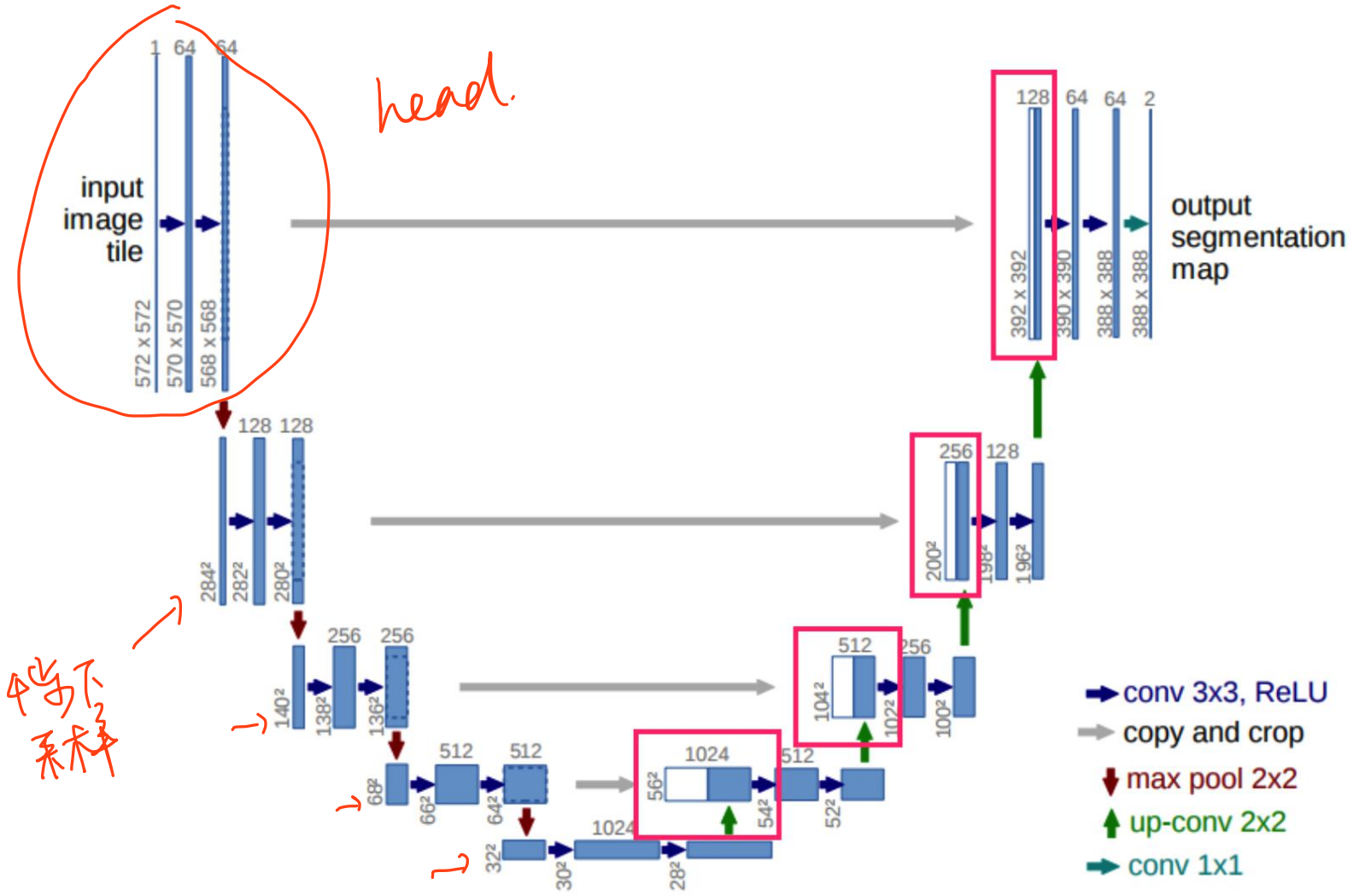
Notes

Skip Connection

- Concat



concat

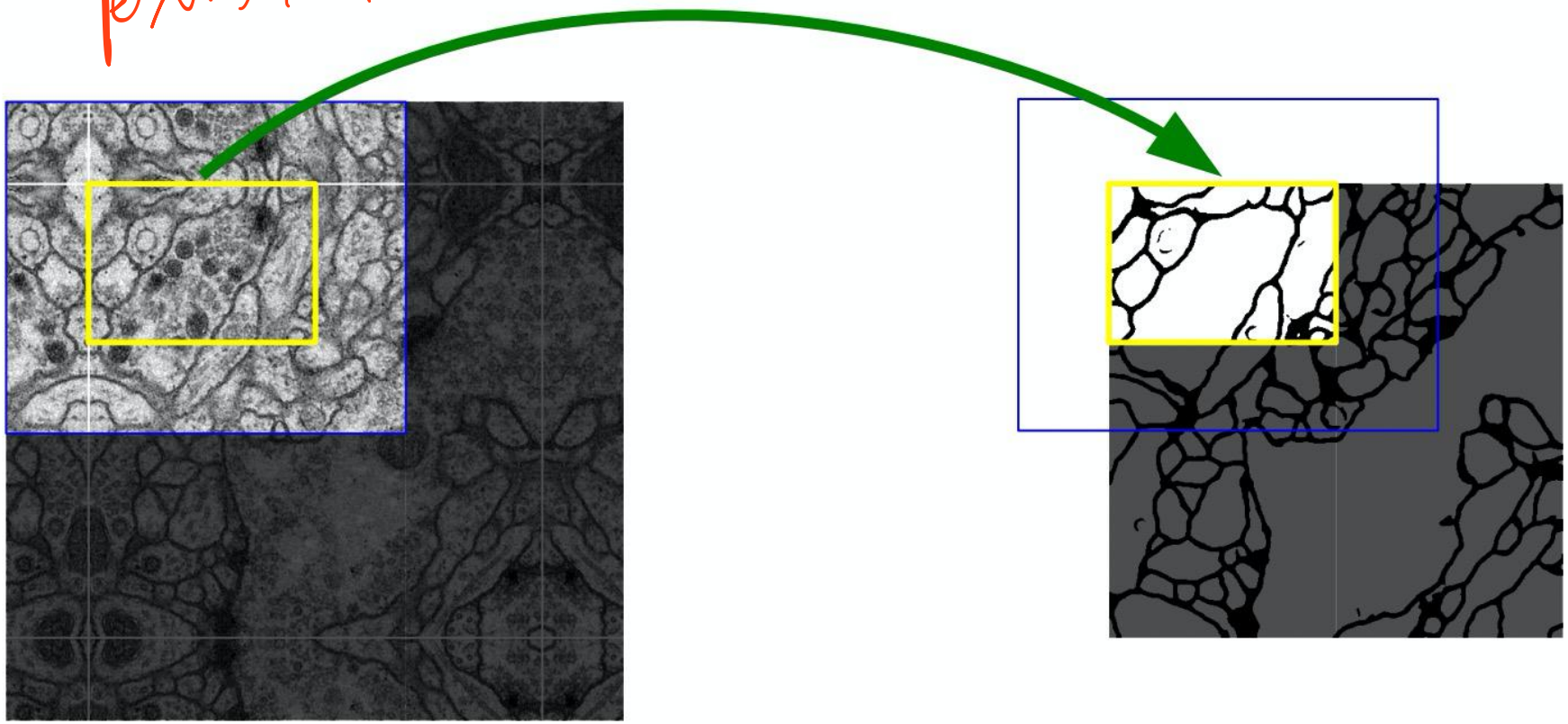


Notes

Overlap-tile strategy

- seamless segmentation of arbitrary large images

Overlap-tile strategy



Notes

Padding

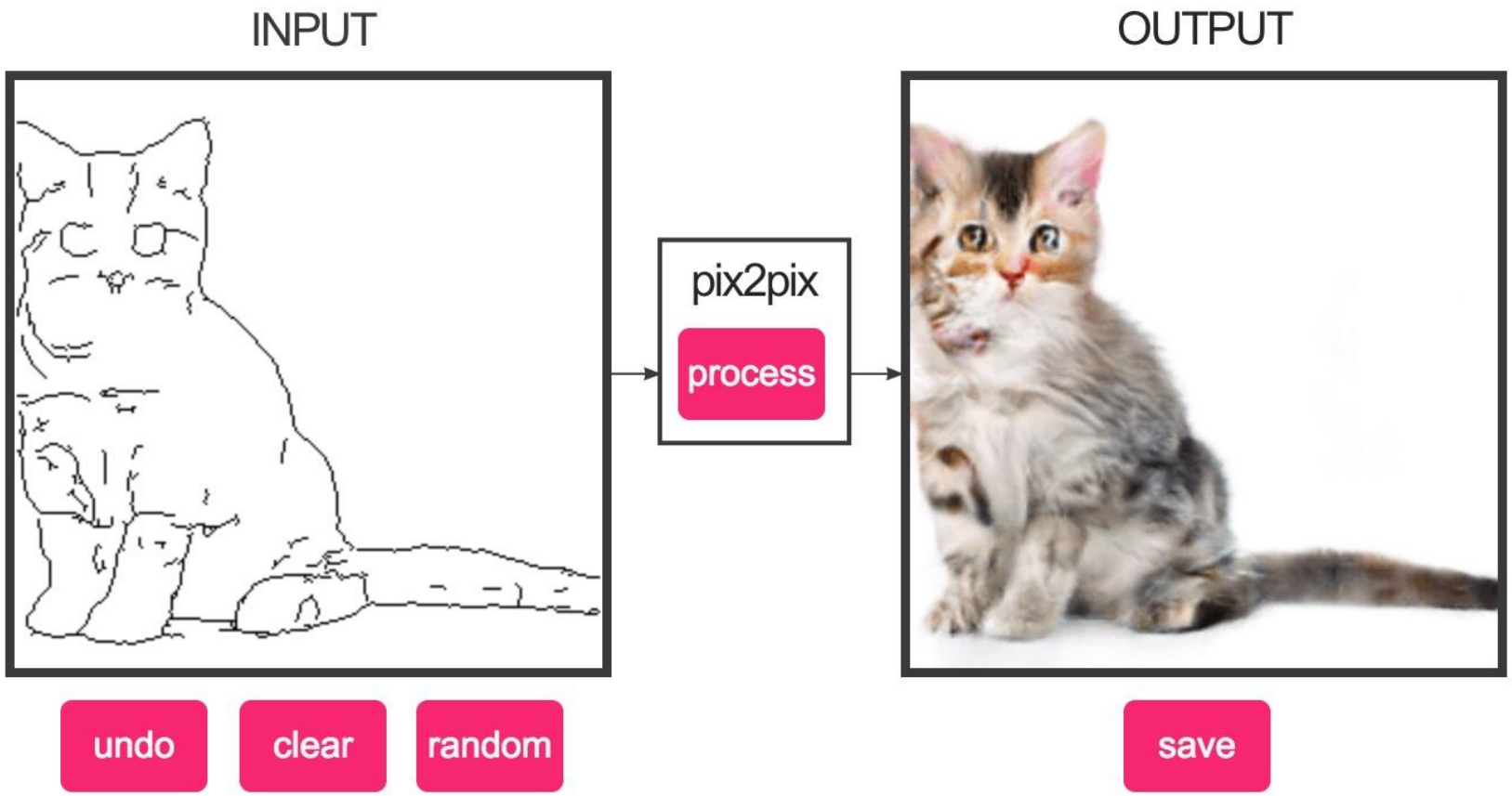
- same
- valid

Notes

Pix2Pix

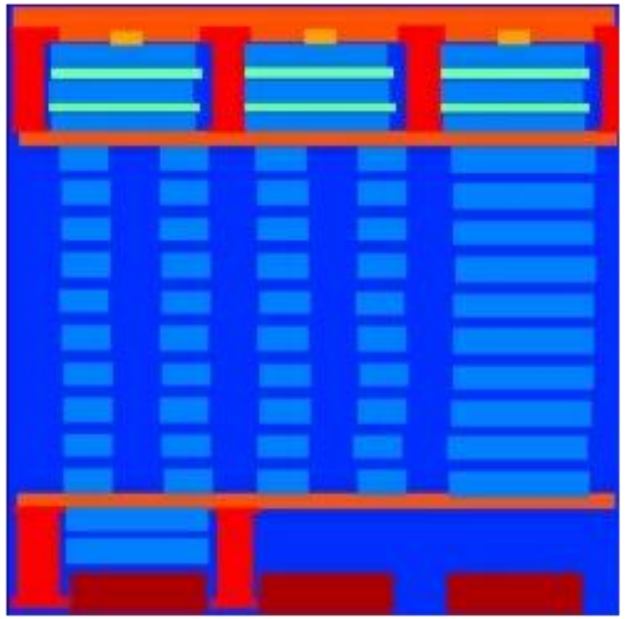
- The Pix2Pix Generative Adversarial Network, or GAN, is an approach to training a deep convolutional neural network for image-to-image translation tasks.

Pix2Pix



Pix2Pix

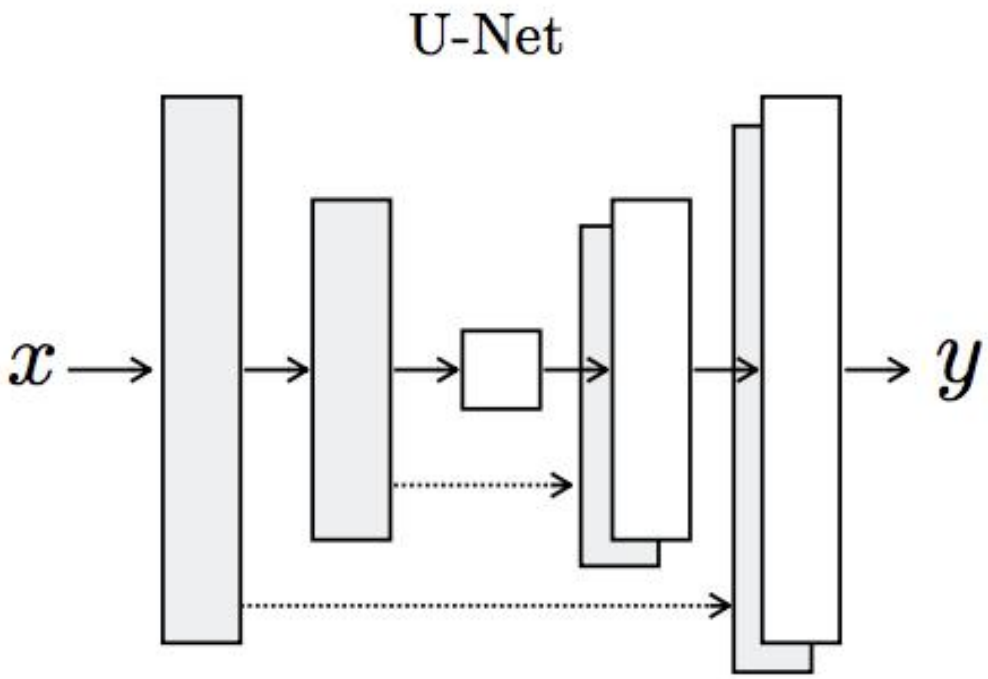
Input Image



Ground Truth

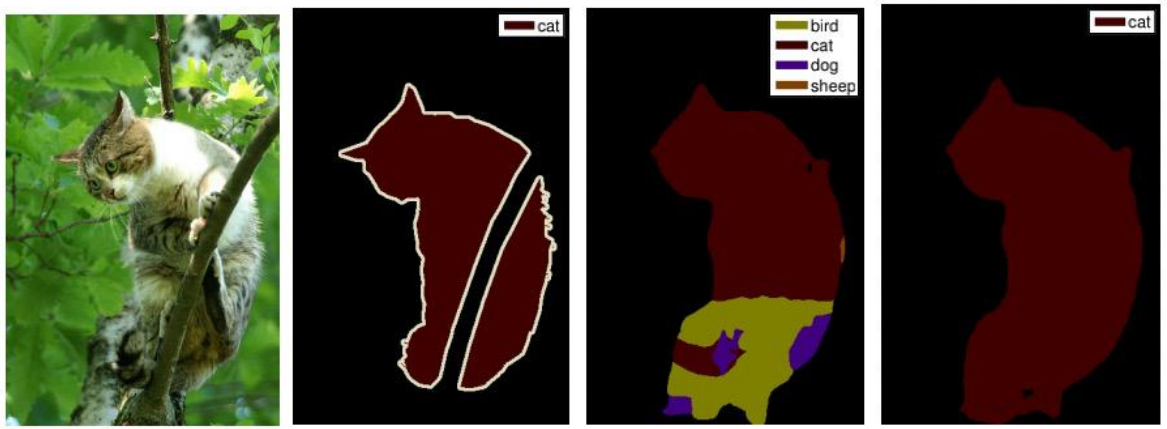
Predicted Image

U-Net

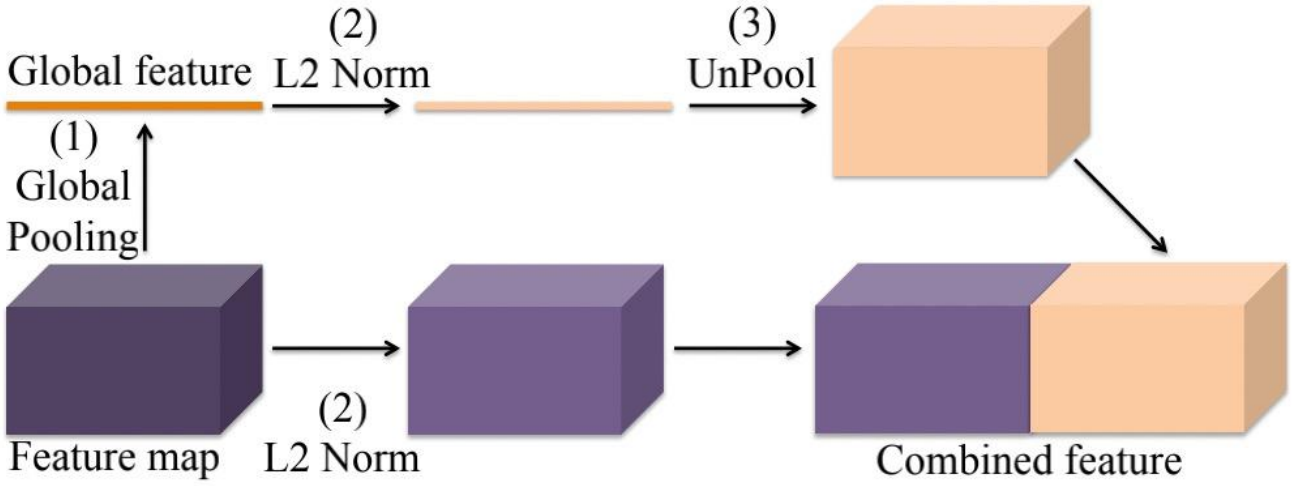


Notes

Global Context



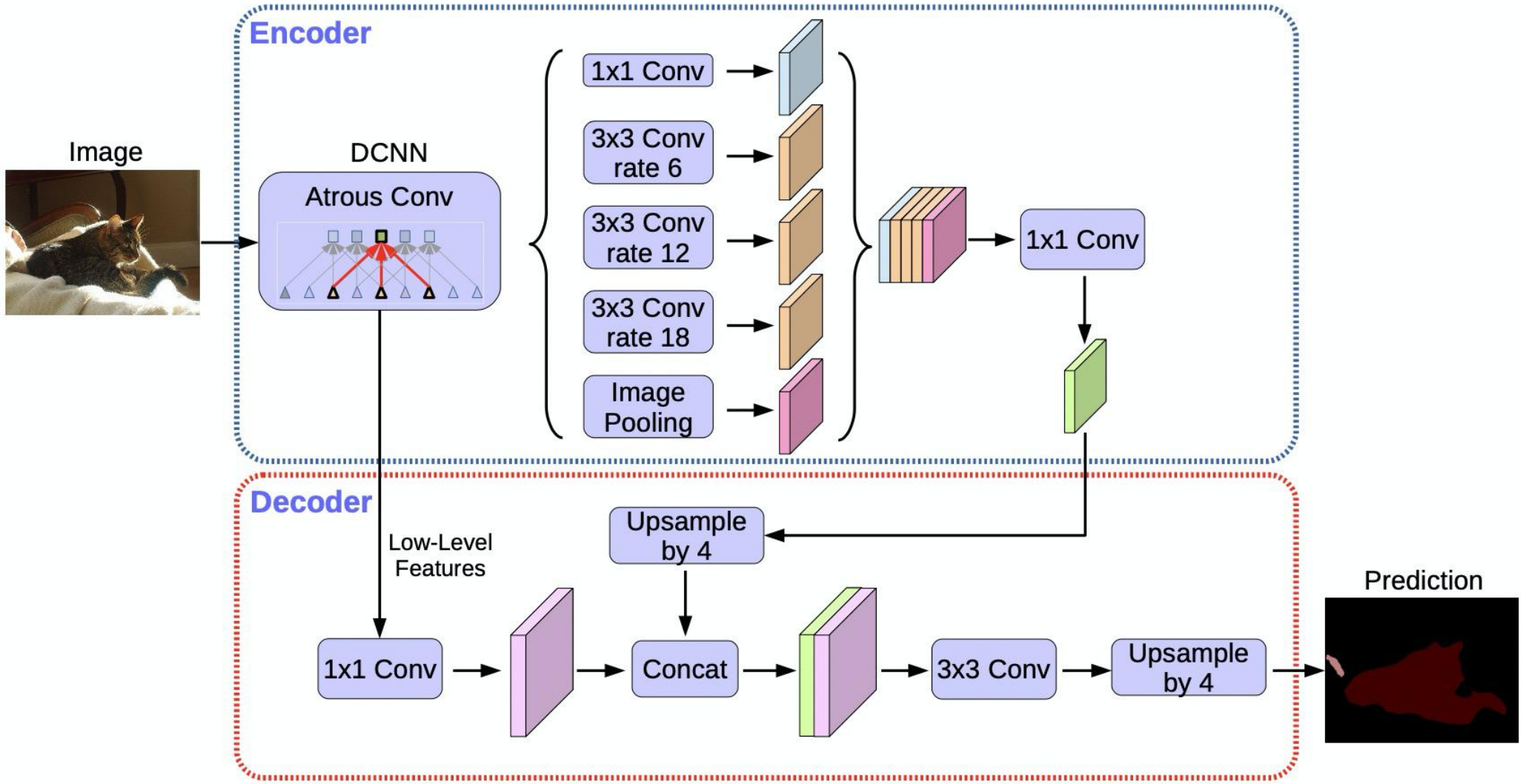
(a) Image (b) Truth (c) FCN (d) ParseNet



(e) ParseNet contexture module overview.

Notes

Deeplab v3+



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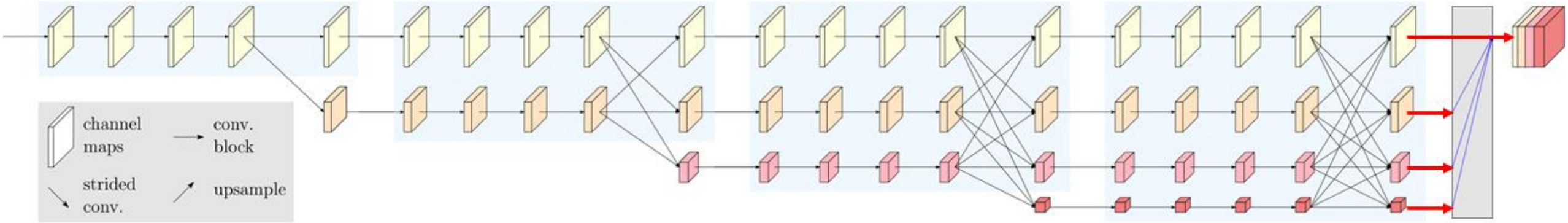
HRNet



Notes

课程总结

- U-Net的原理和实现

重难点

- Encoder-Decoder
- Skip Connection

课程作业

- 借鉴ResNet的Residual Block实现U-Net

参考资料

- U-Net: Convolutional Networks for Biomedical Image Segmentation

  https://arxiv.org/abs/1505.04597
- U-Net-Pytorch

  https://github.com/jvanvugt/pytorch-unet/blob/master/unet.py
- U-Net-PP

  https://github.com/PaddlePaddle/PaddleSeg/blob/release/v0.3.0/pdseg/models/modeling/unet.py
- U-Net-PP-LaneSeg

  https://github.com/gujingxiao/Lane-Segmentation-Solution-For-BaiduAI-Autonomous-Driving-Competition/blob/master/models/unet_base.py

Next Week: Project I

- https://aistudio.baidu.com/aistudio/competition/detail/5
- https://github.com/gujingxiao/Lane-Segmentation-Solution-For-BaiduAI-Autonomous-Driving-Competition

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