Aula 10 – Segmentação semântica

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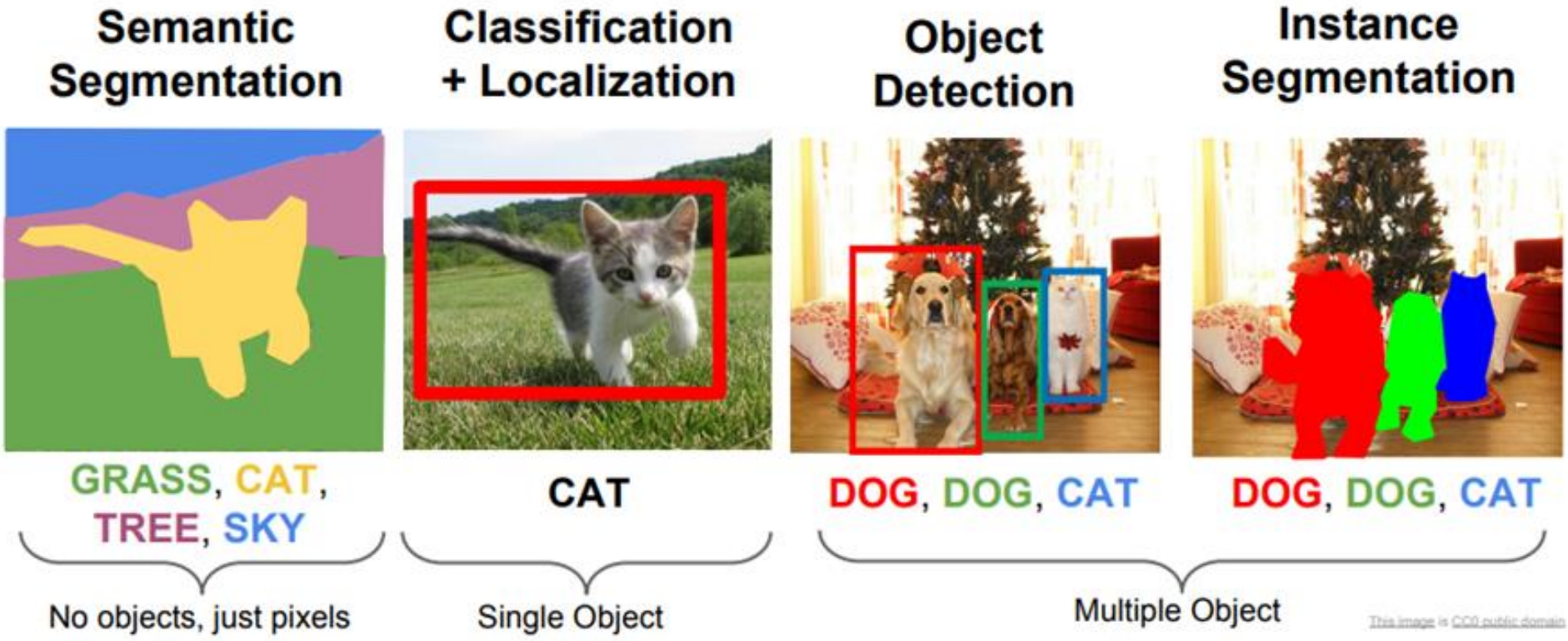
Roteiro

- Localização, detecção e segmentação
- Modelos para segmentação semântica
- Aplicações de segmentação semântica
- U-Net
- Upsampling

Localização, detecção e segmentação



Stanford cs231n (2022): http://cs231n.stanford.edu/slides/2022/lecture_9_jiajun.pdf

Modelos para segmentação semântica

- Fully convolutional network
- Masked R-CNN
- U-Net
- PSPNet
- DeepLab
- ...

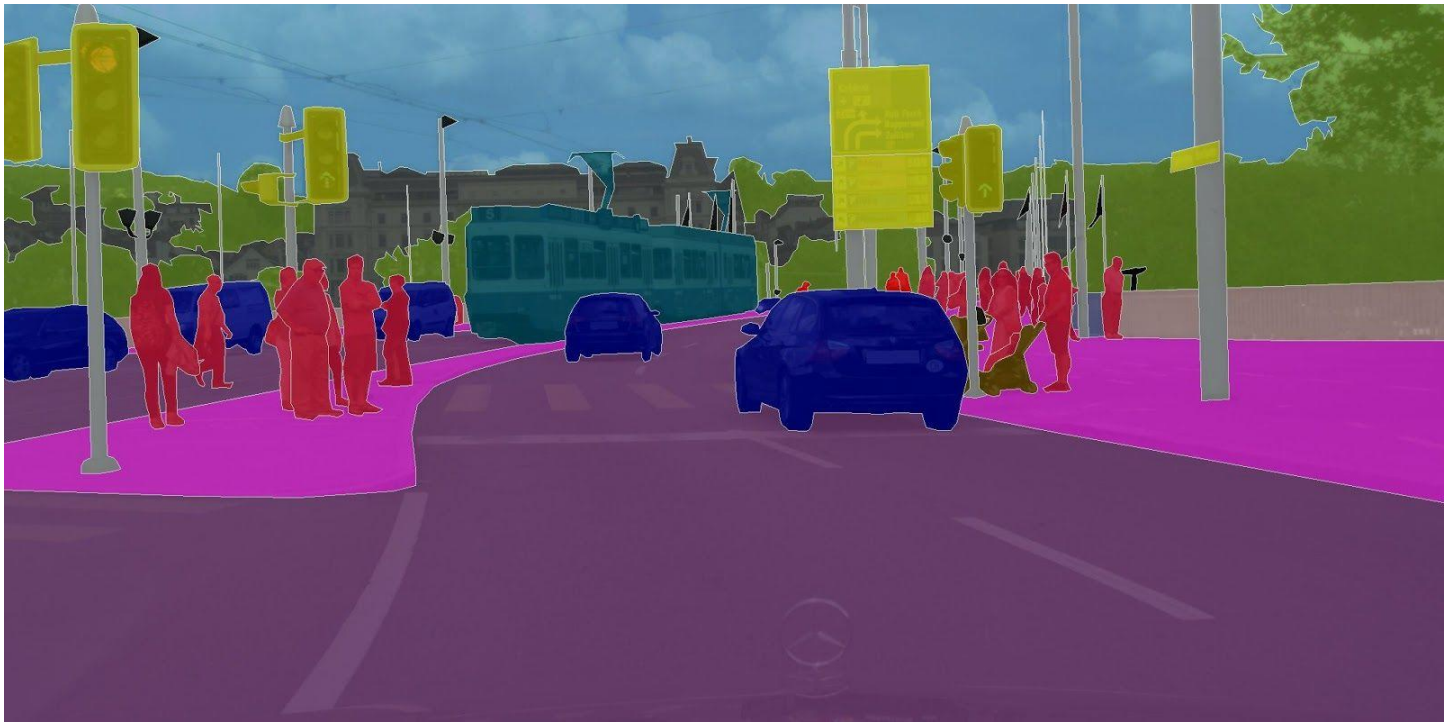
Aplicações de segmentação semântica

- Modo retrato e substituição do fundo

https://ai.googleblog.com/2018/03/mobile-real-time-video-segmentation.html

Aplicações de segmentação semântica

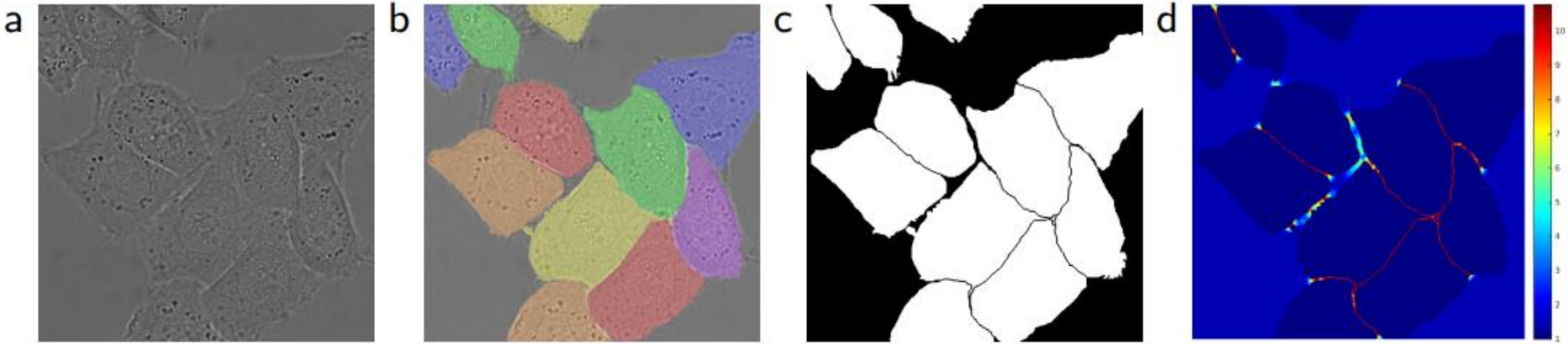
- Self-driving cars



https://ai.googleblog.com/2018/03/mobile-real-time-video-segmentation.html

Aplicações de segmentação semântica

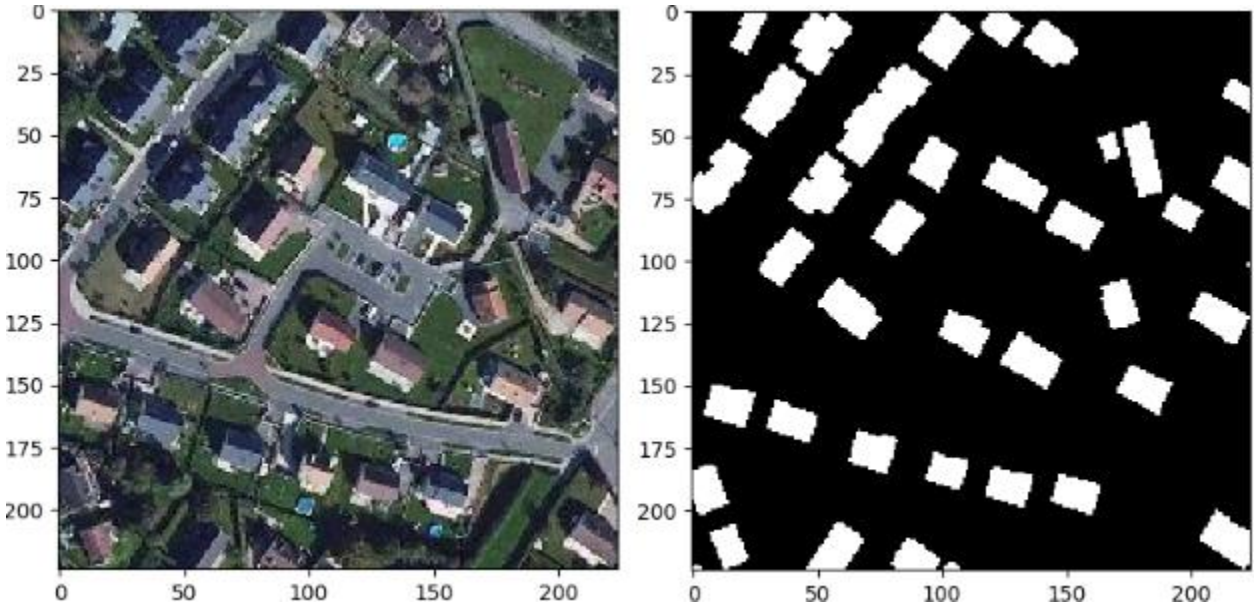
- Imagens biomédicas



Ronneberger, Fischer, Brox. U-Net: Convolutional Networks for Biomedical Image Segmentation. 2015.

Aplicações de segmentação semântica

- Segmentação de imagens de satélite



Satellite Image Segmentation for Building Detection using U-net

Segmentação semântica

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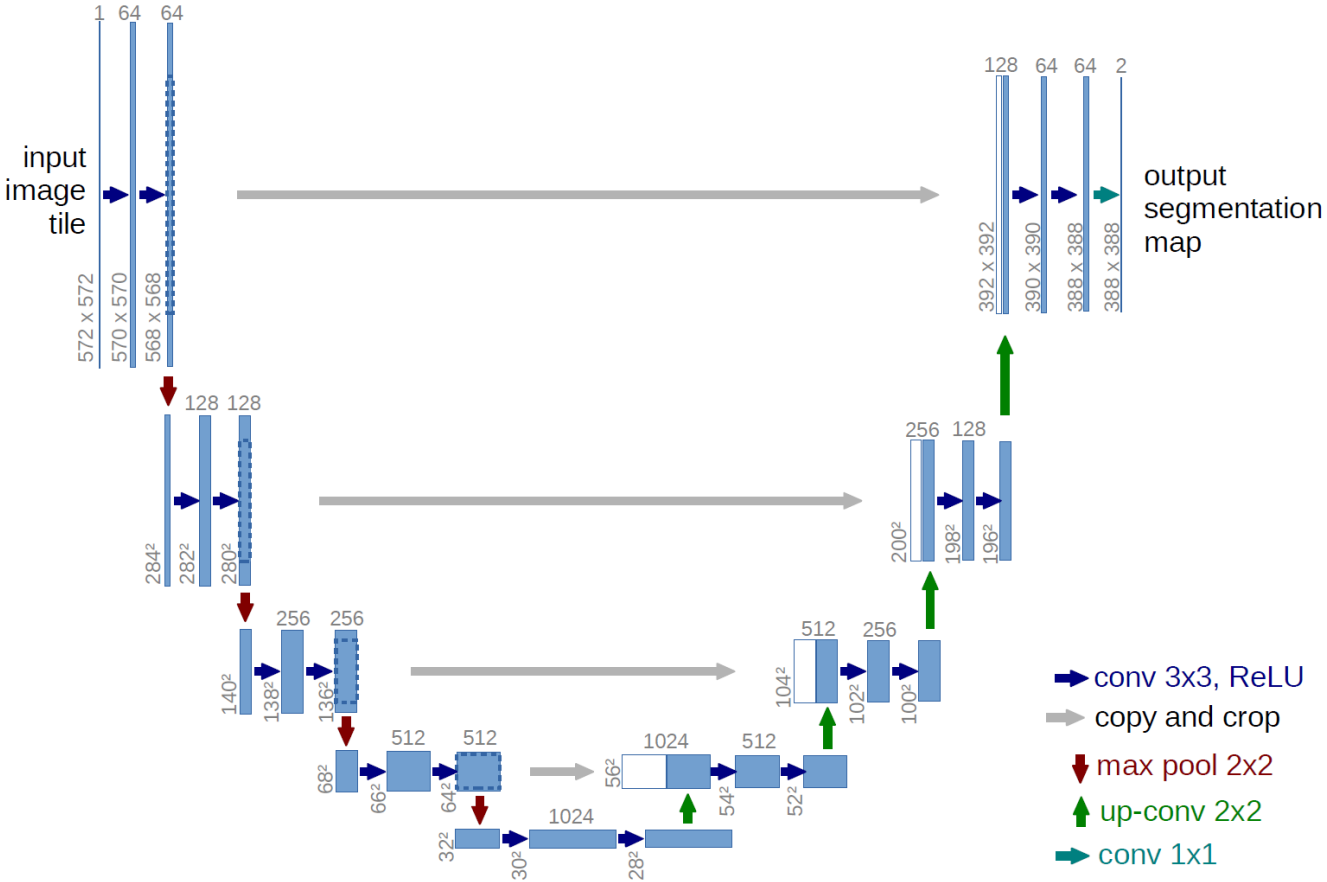
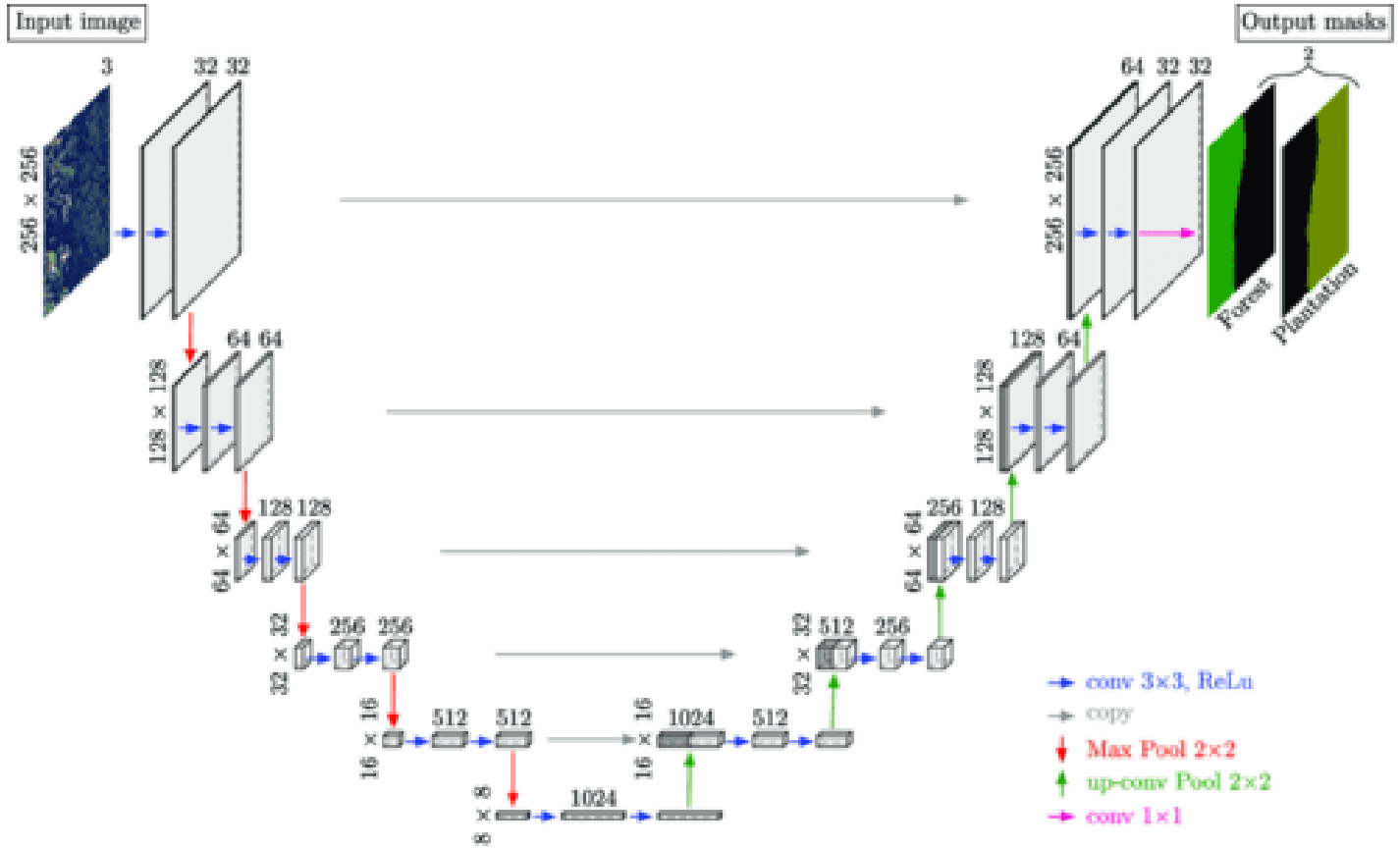
https://www.v7labs.com/blog/semantic-segmentation-guide

U-Net



Ronneberger, Fischer, Brox. U-Net: Convolutional Networks for Biomedical Image Segmentation. 2015.

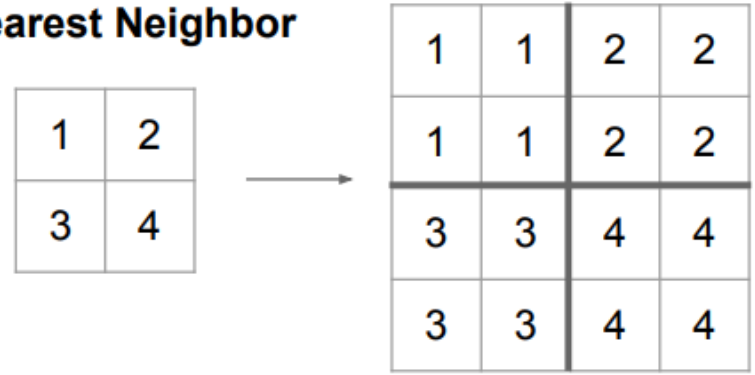
U-Net



https://pyimagesearch.com/2021/11/08/u-net-training-image-segmentation-models-in-pytorch/

Upsampling

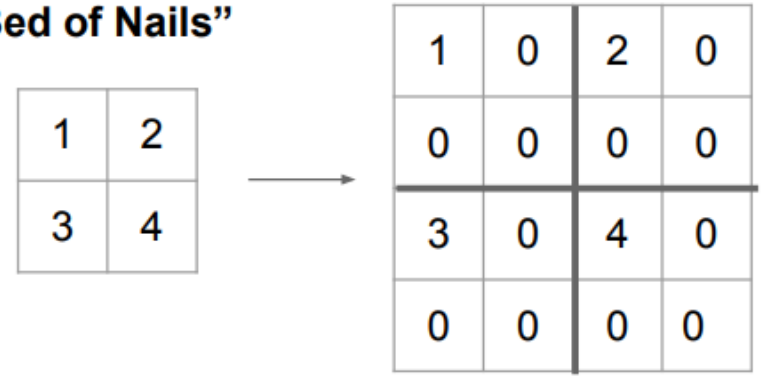
Nearest Neighbor



Input: 2 x 2

Output: 4 x 4

“Bed of Nails”



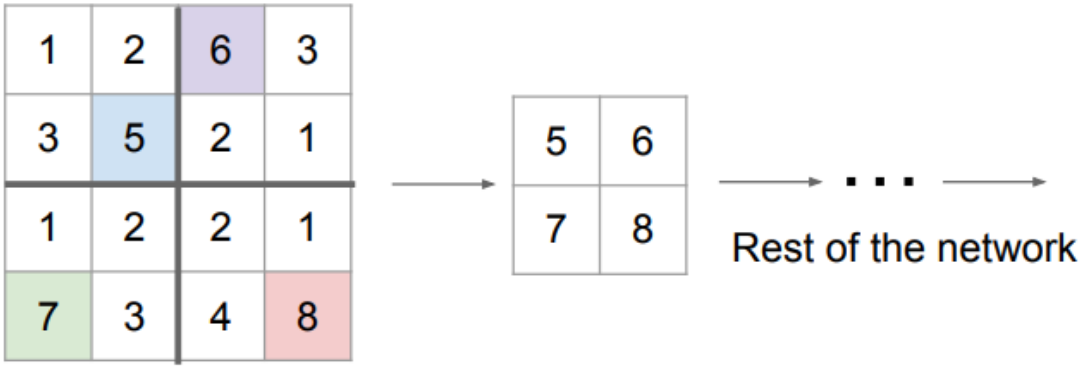
Input: 2 x 2

Output: 4 x 4

http://cs231n.stanford.edu/slides/2017/cs231n_2017_lecture11.pdf

Upsampling

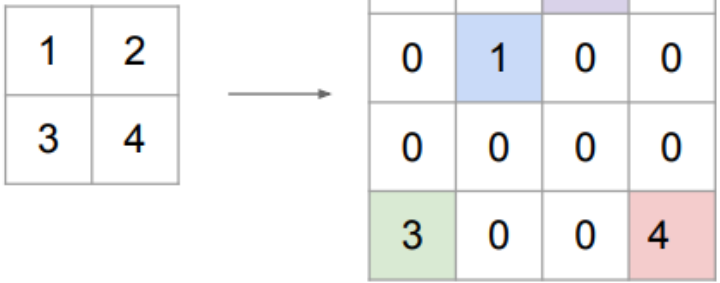
Max Pooling
Remember which element was max!



Input: 4 x 4

Output: 2 x 2

Max Unpooling
Use positions from pooling layer

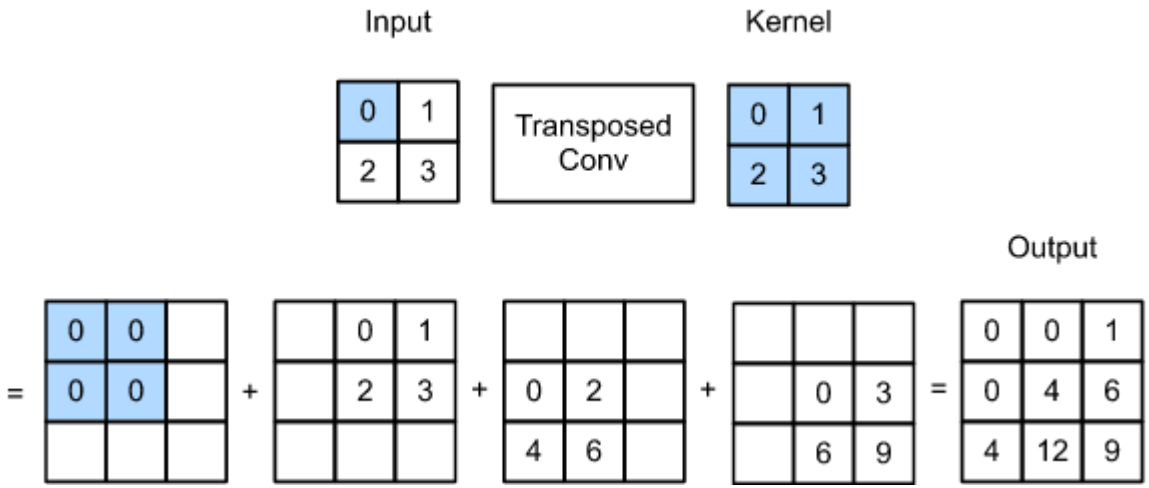


Input: 2 x 2

Output: 4 x 4

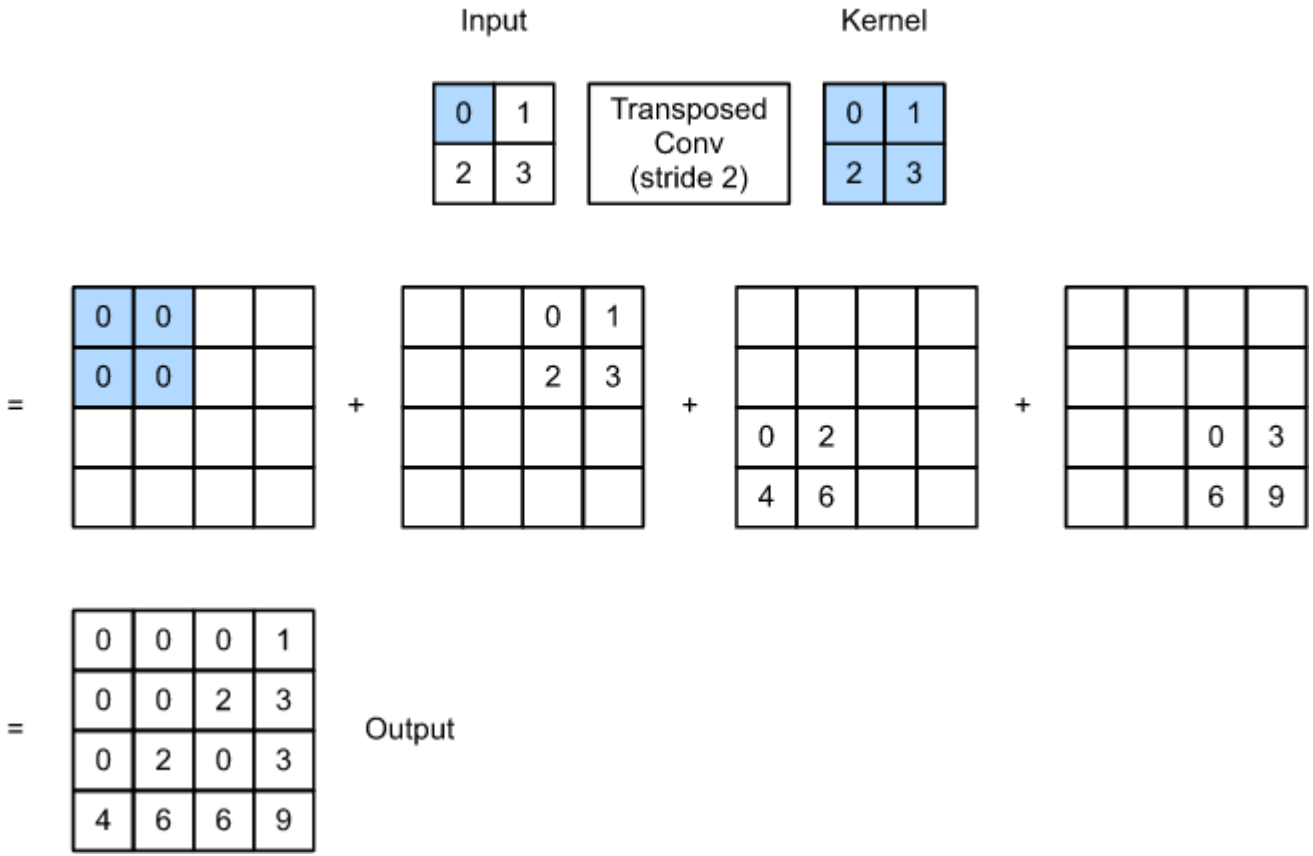
http://cs231n.stanford.edu/slides/2017/cs231n_2017_lecture11.pdf

Convolução transposta



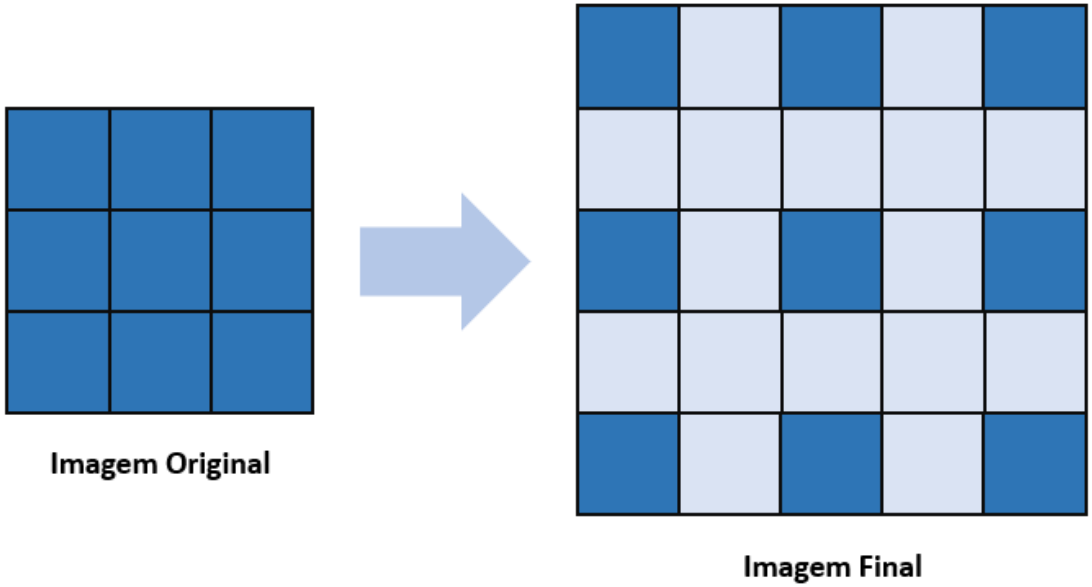
https://d2l.ai/chapter_computer-vision/transposed-conv.html

Convolução transposta



Convolução transposta

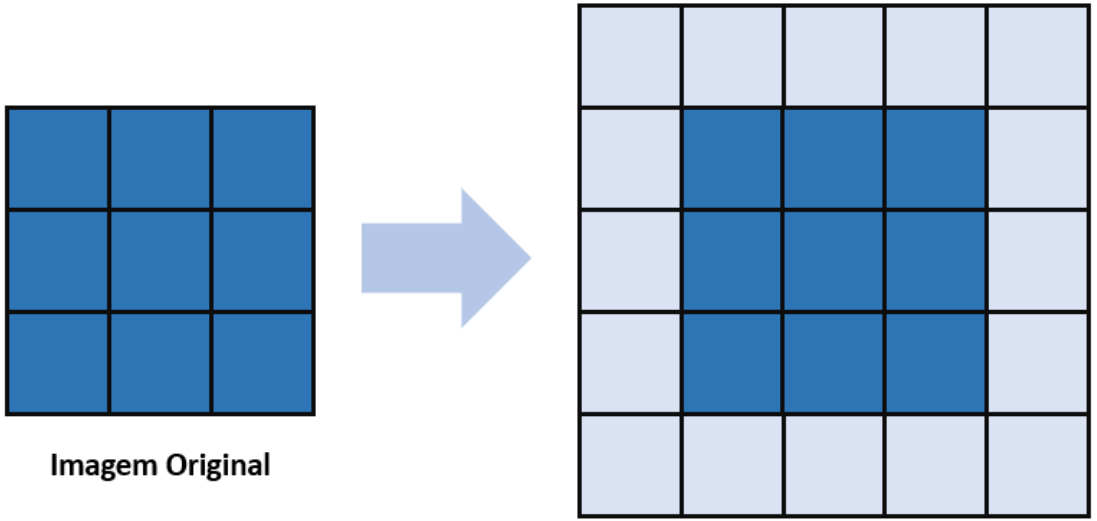
- Stride 2, padding 0



https://didatica.tech/transposed-convolutional-layer/

Convolução transposta

- Stride 1, padding 1



https://didatica.tech/transposed-convolutional-layer/

Convolução transposta

- Stride 2, padding 1

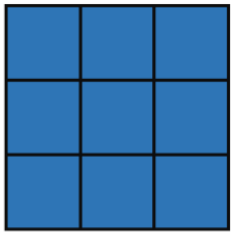


Imagem Original

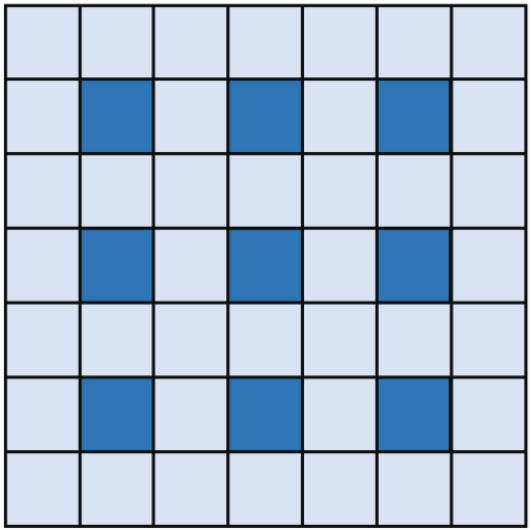


Imagem Final

https://didatica.tech/transposed-convolutional-layer/

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  - https://pyimagesearch.com/2021/11/08/u-net-training-image-segmentation-models-in-pytorch/
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  - https://www.jeremyjordan.me/evaluating-image-segmentation-models/
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  - https://cs229.stanford.edu/proj2017/final-reports/5243715.pdf
- https://d2l.ai/chapter_computer-vision/transposed-conv.html
- https://didatica.tech/transposed-convolutional-layer/

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