school of ai

Segmentation

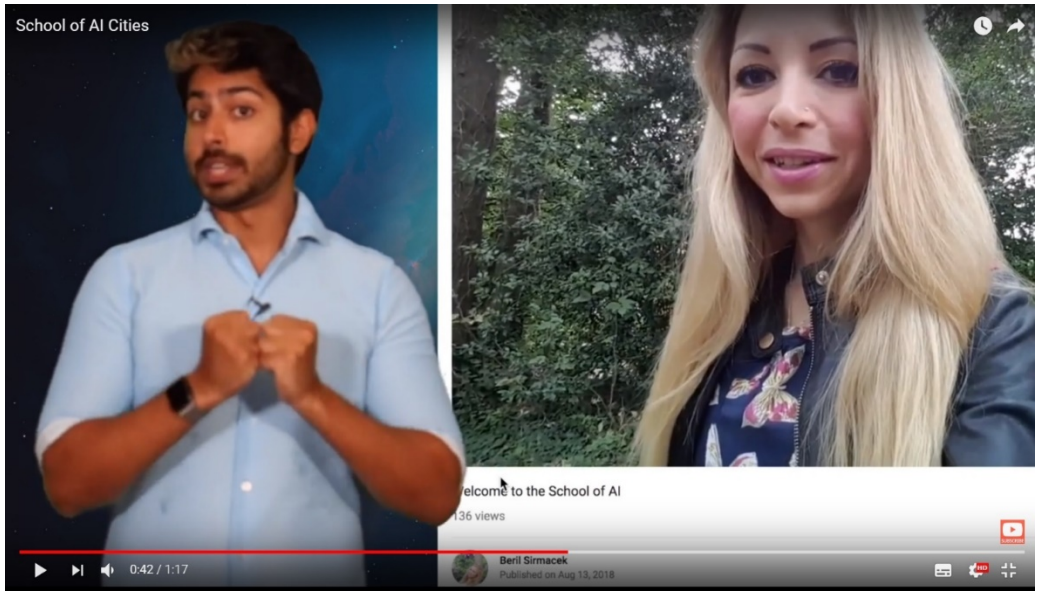
Beril Sirmacek

February 2019, Enschede

Classification

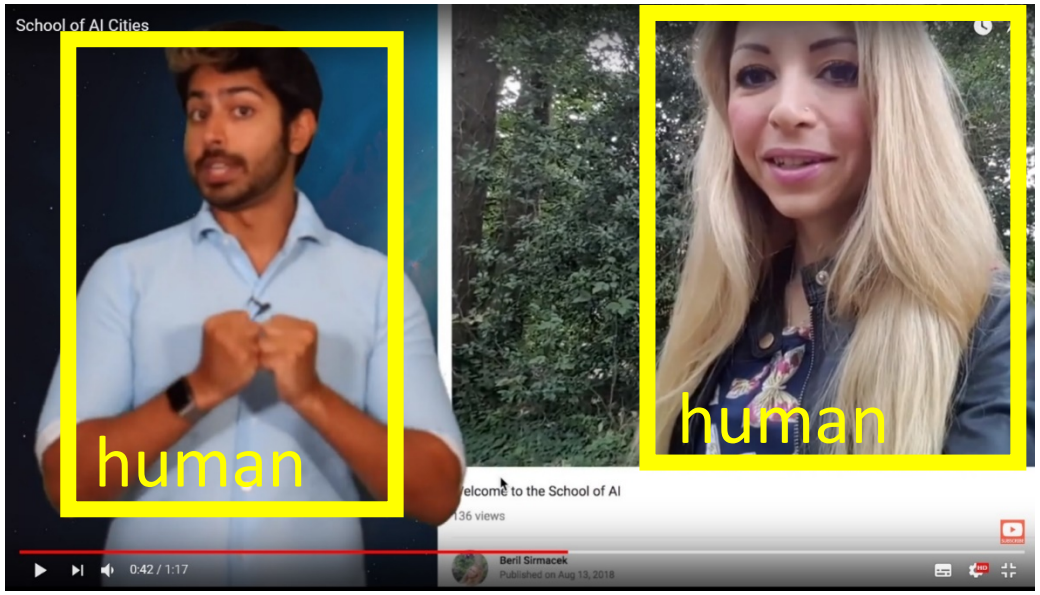
A photo with flowers

A photo with humans



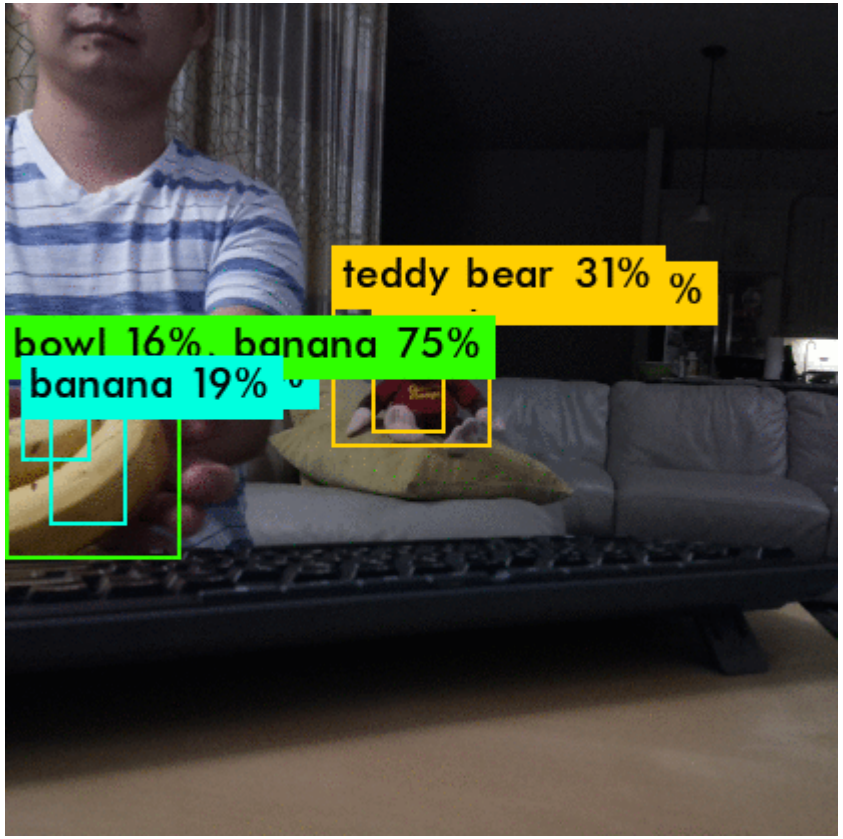
Detection


1.20
120
flowers
flowers


School of AI Cities
human
human
elcome to the School of AI
136 views
0:42 / 1:17
Beril Sirmacek
Published on Aug 13, 2018

Detection

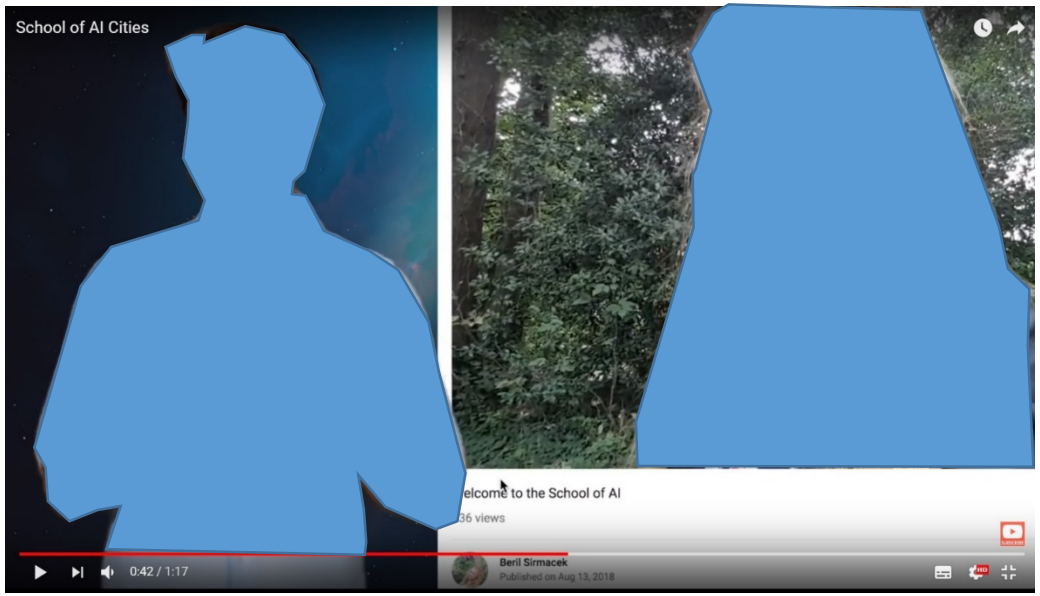
You Only Look Once (YOLO)



Segmentation

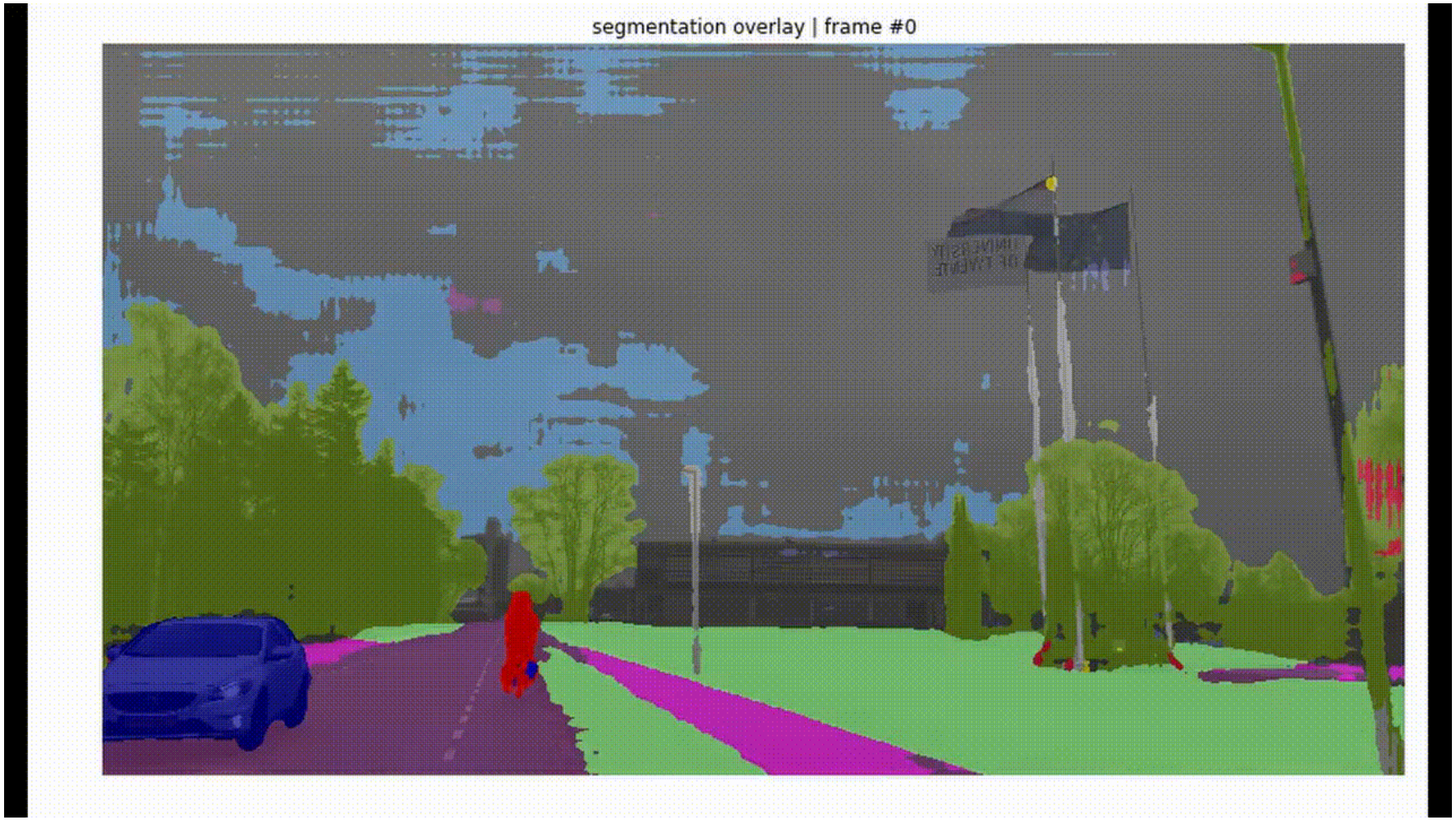
flowers

human

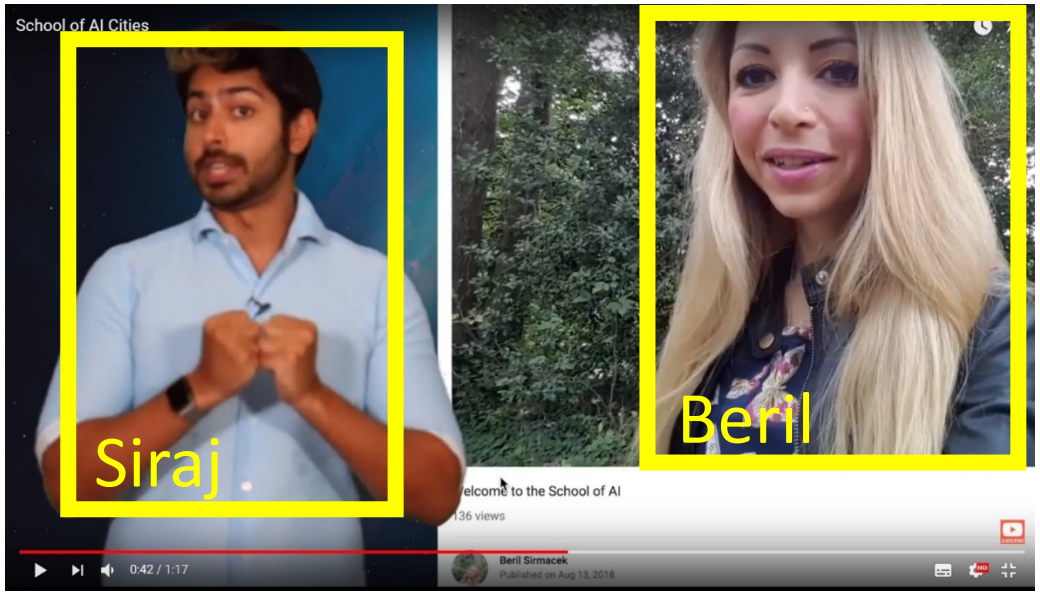


Segmentation

DeepLab



Recognition

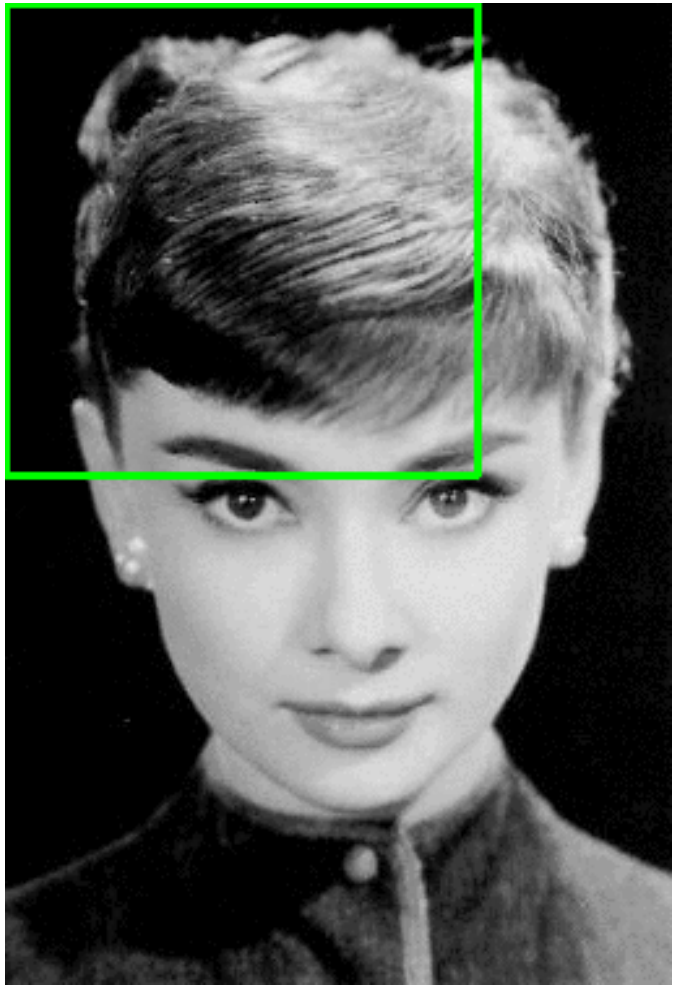


Segmentation

Usage areas

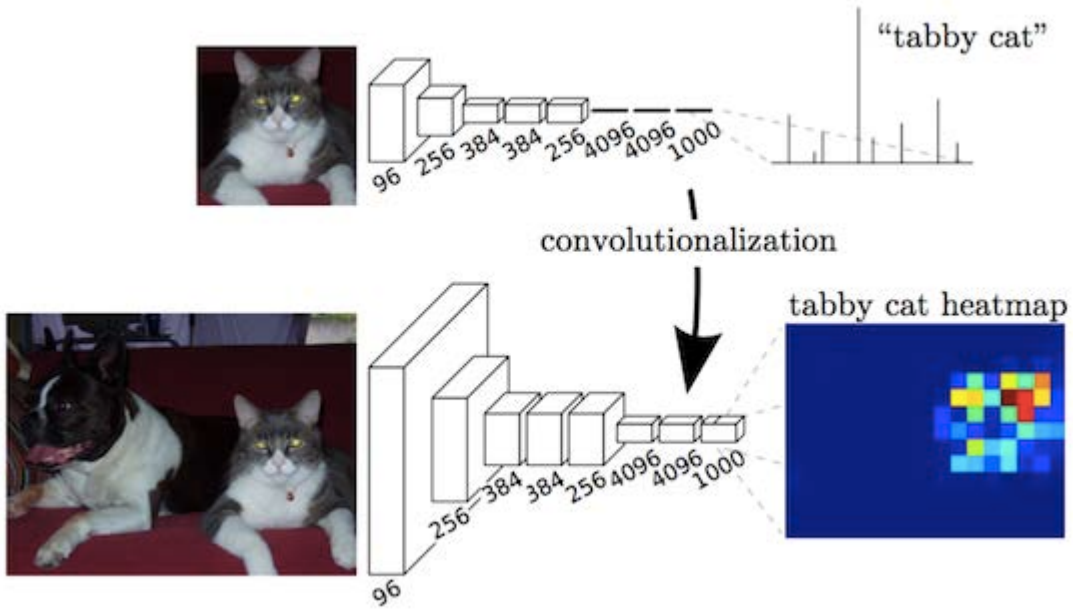
- Self-driving cars
- Medical diagnosis
- Coloring old images (or cartoons)

SLIDING WINDOW CLASSIFIERS



- Which pixel is which class?
- How big is the window?

FCN



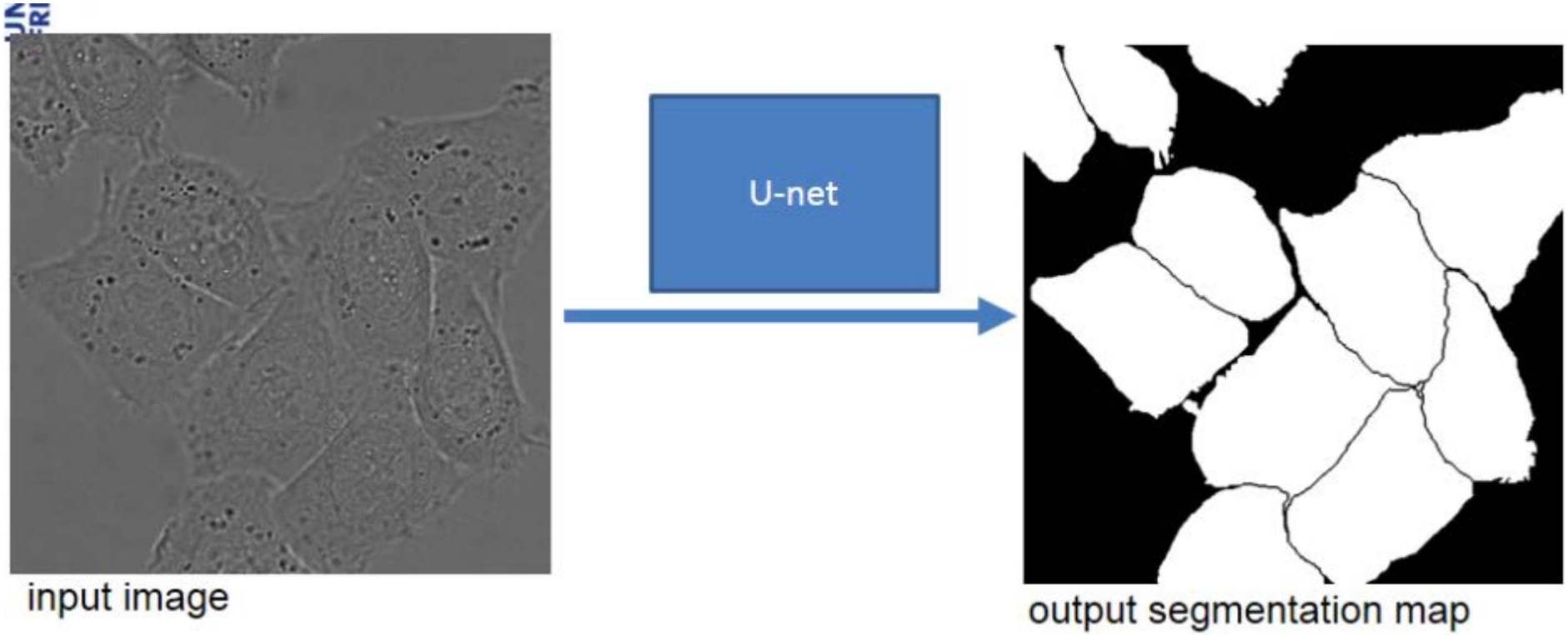
Fully Convolutional Networks for Semantic Segmentation

Jonathan Long* Evan Shelhamer* Trevor Darrell
UC Berkeley

- CNN CLASSIFICATION GIVES DIFFERENT LABELS FOR THE OVERLAPS

U-NETS

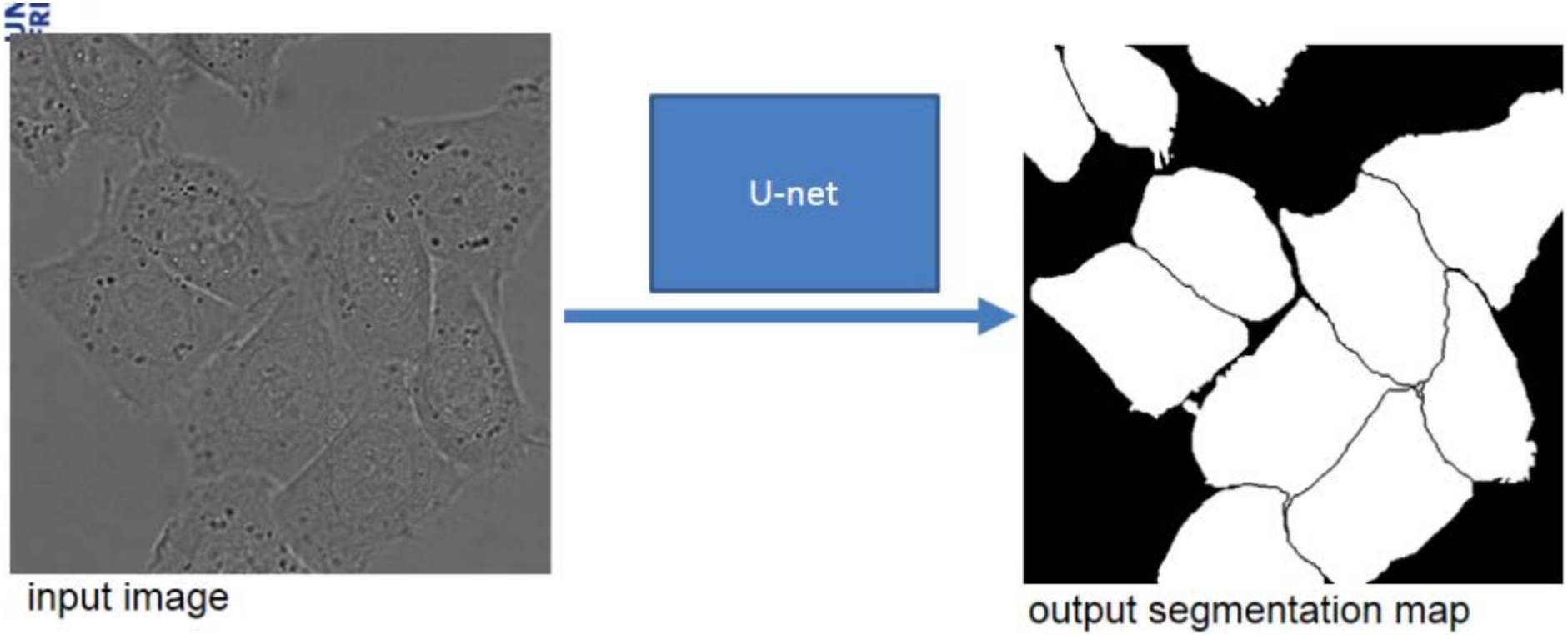
- End to End solution: Raw image in, Segmented image out



https://lmb.informatik.uni-freiburg.de/people/ronneber/u-net/

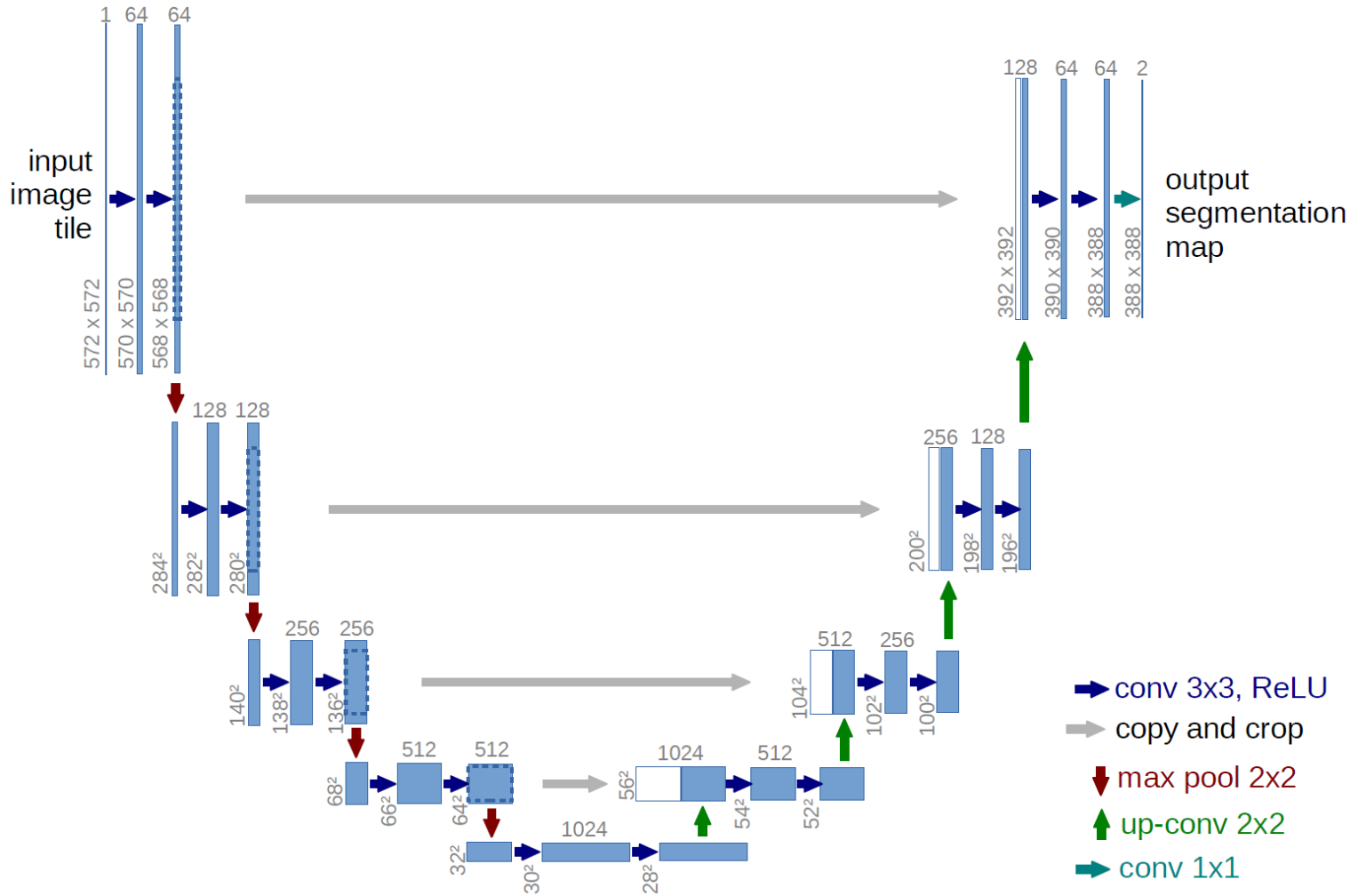
U-NETS

- Trained with 30 labelled images! (including touching objects of the same class)



https://lmb.informatik.uni-freiburg.de/people/ronneber/u-net/

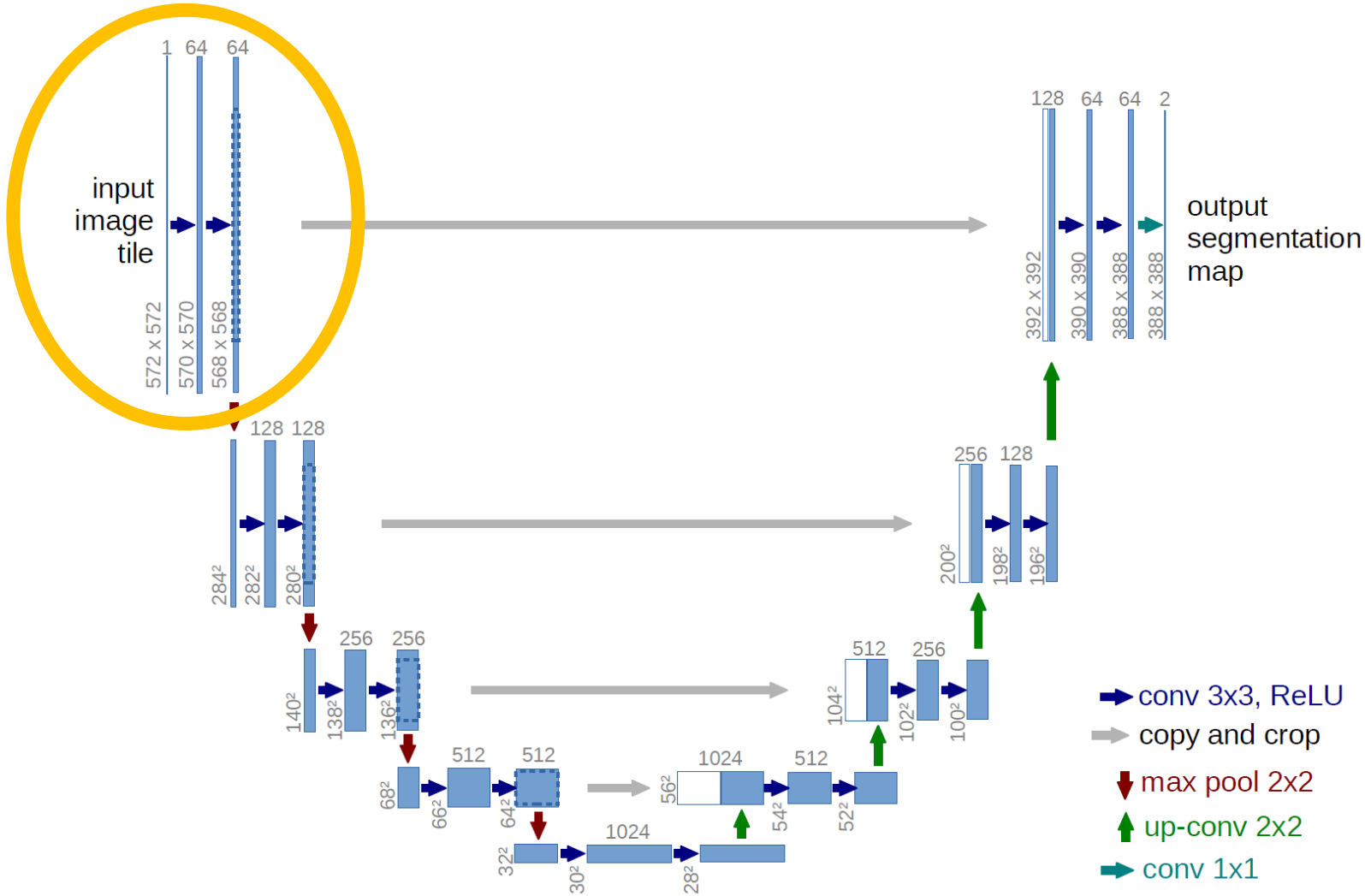
U-NETS



https://lmb.informatik.uni-freiburg.de/people/ronneber/u-net/

U-NETS

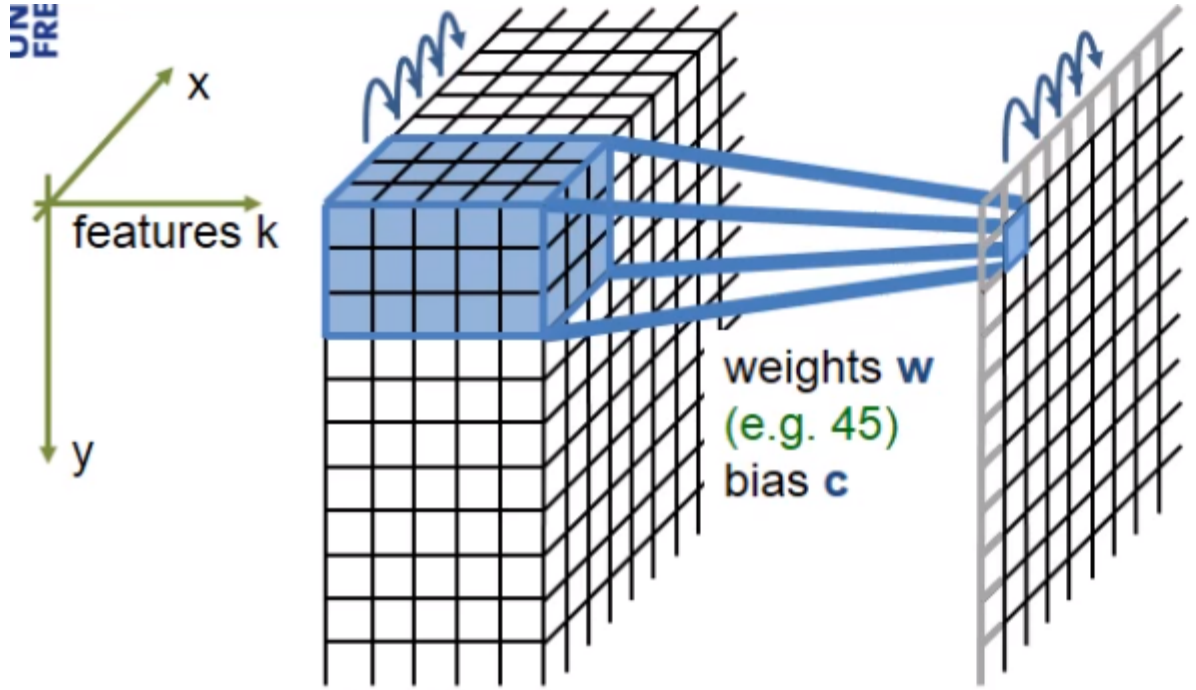
Convolutions with non-linear activation functions

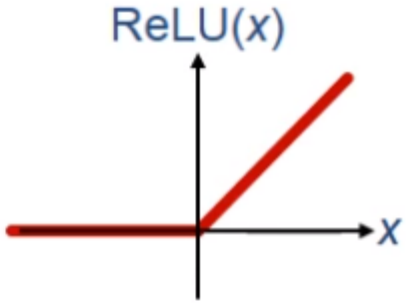


https://lmb.informatik.uni-freiburg.de/people/ronneber/u-net/

U-NETS

Convolutions with non-linear activation functions



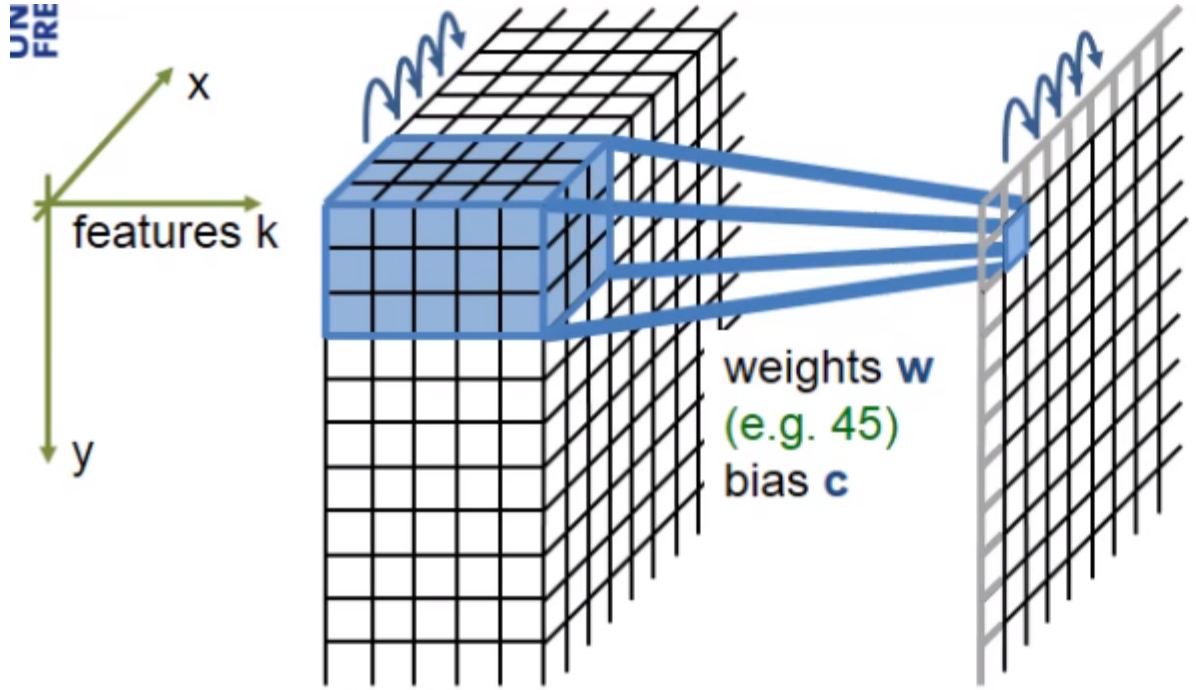


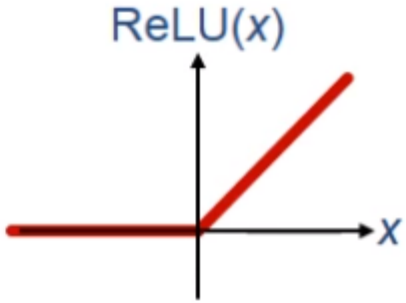
$$b_{x,y,l} = \mathrm{ReLU}\Big(\sum_{\substack{i\in\{-1,0,1\} \\ j\in\{-1,0,1\} \\ k\in\{1,\dots,K\}}} w_{i,j,k,l} \cdot a_{x+i,y+j,k} + c_l \Big)$$

https://lmb.informatik.uni-freiburg.de/people/ronneber/u-net/

U-NETS

Convolutions with non-linear activation functions





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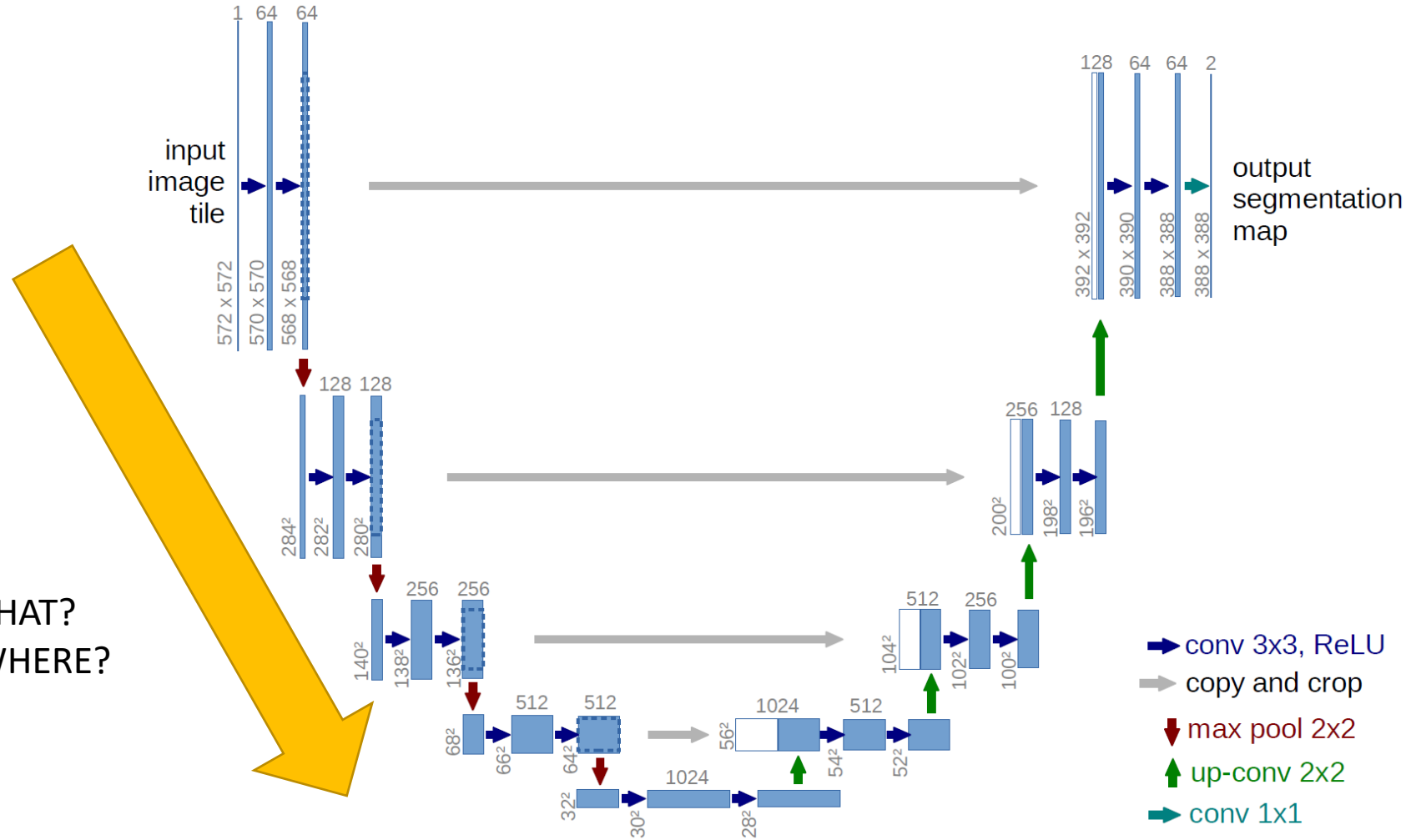
U-NETS



Increase WHAT?
Decrease WHERE?

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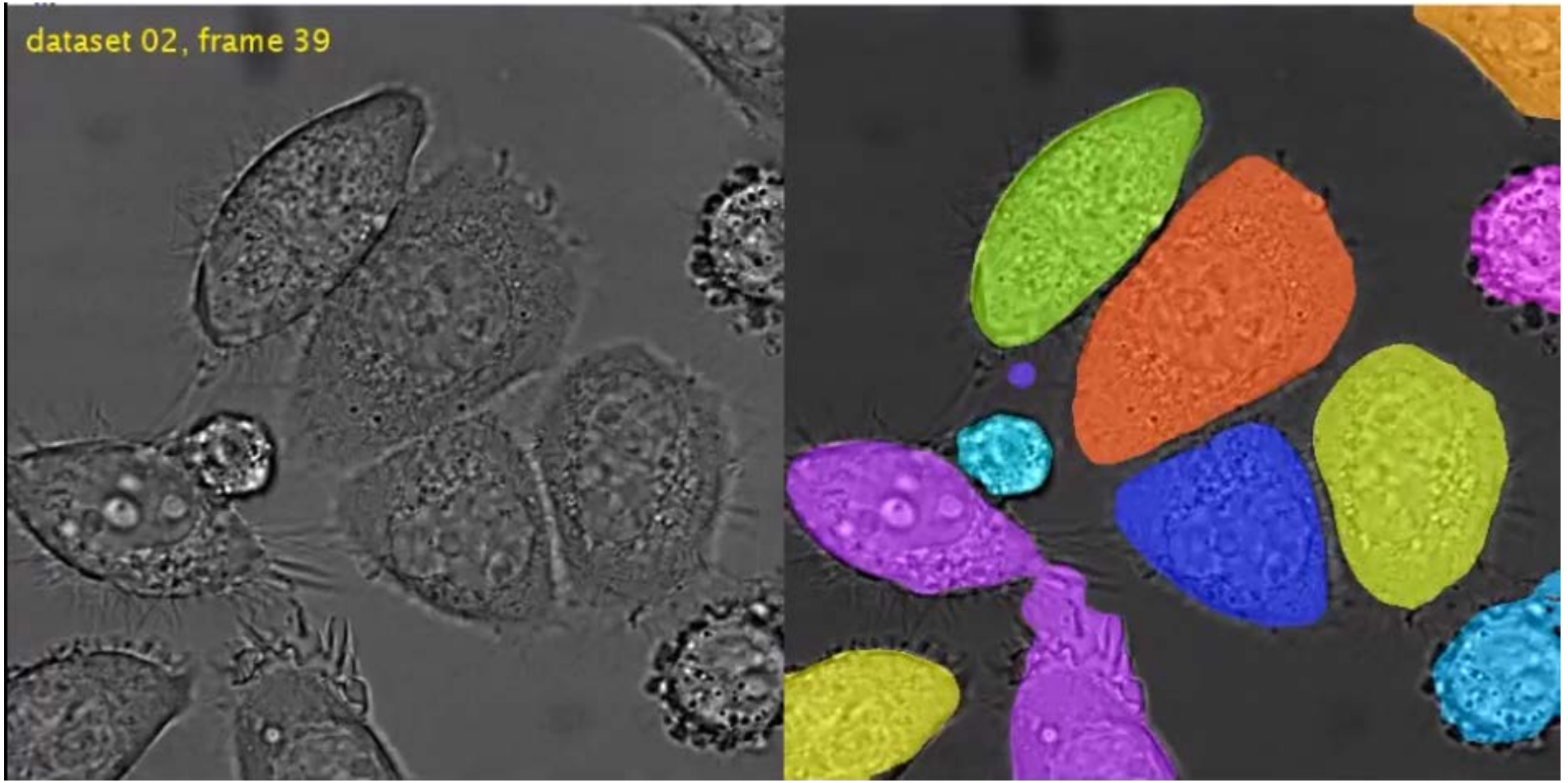
U-NETS



https://lmb.informatik.uni-freiburg.de/people/ronneber/u-net/

U-NETS

Was it an **UNSUPERVISED LEARNING**
OR **SUPERVISED LEARNING**?

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