Deep Learning – 103

Deconvolution and more

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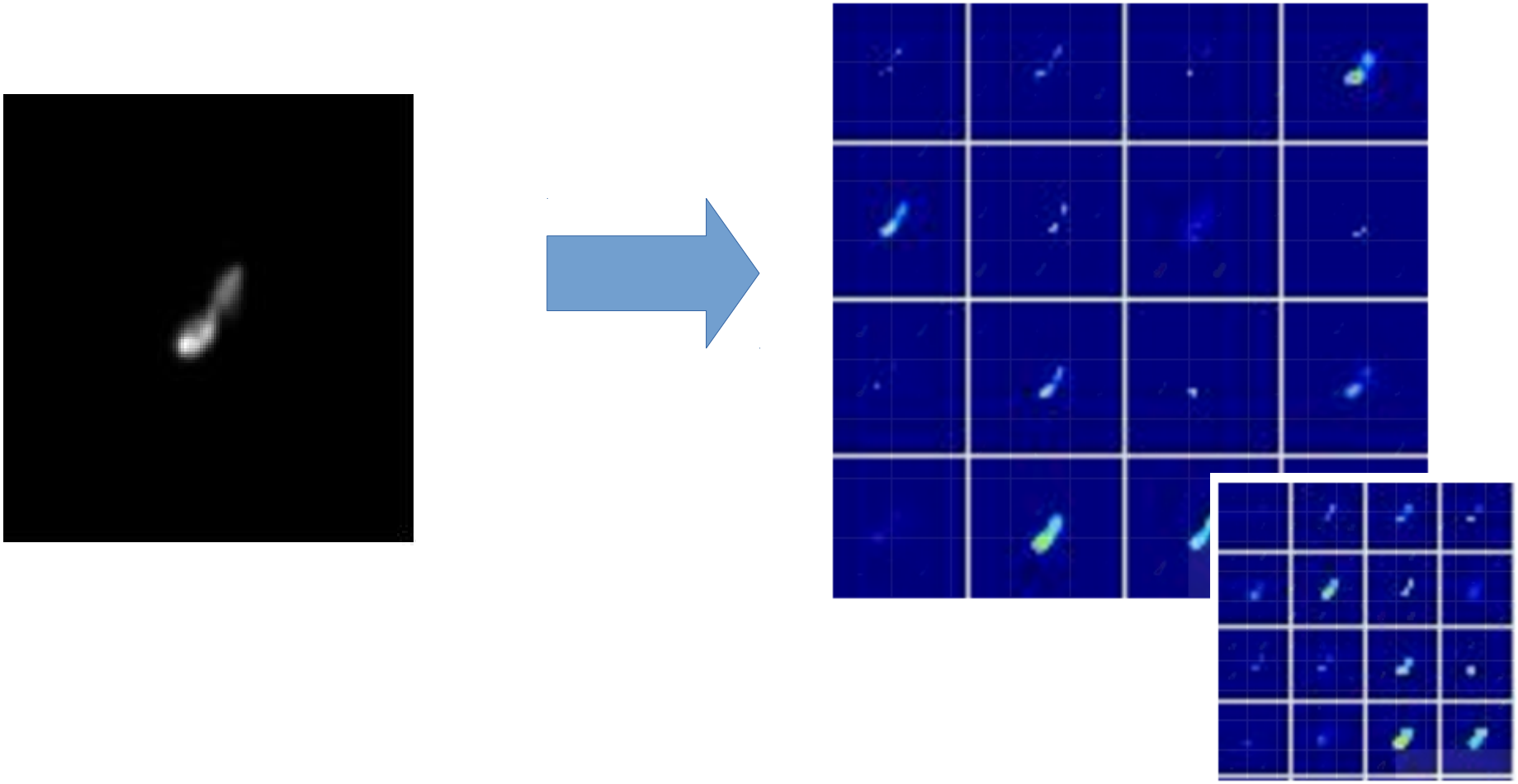
Convolutional Neural Network



Instead of predicting a class for an object in an image, can you classify each pixel in the image to which the object belongs ?

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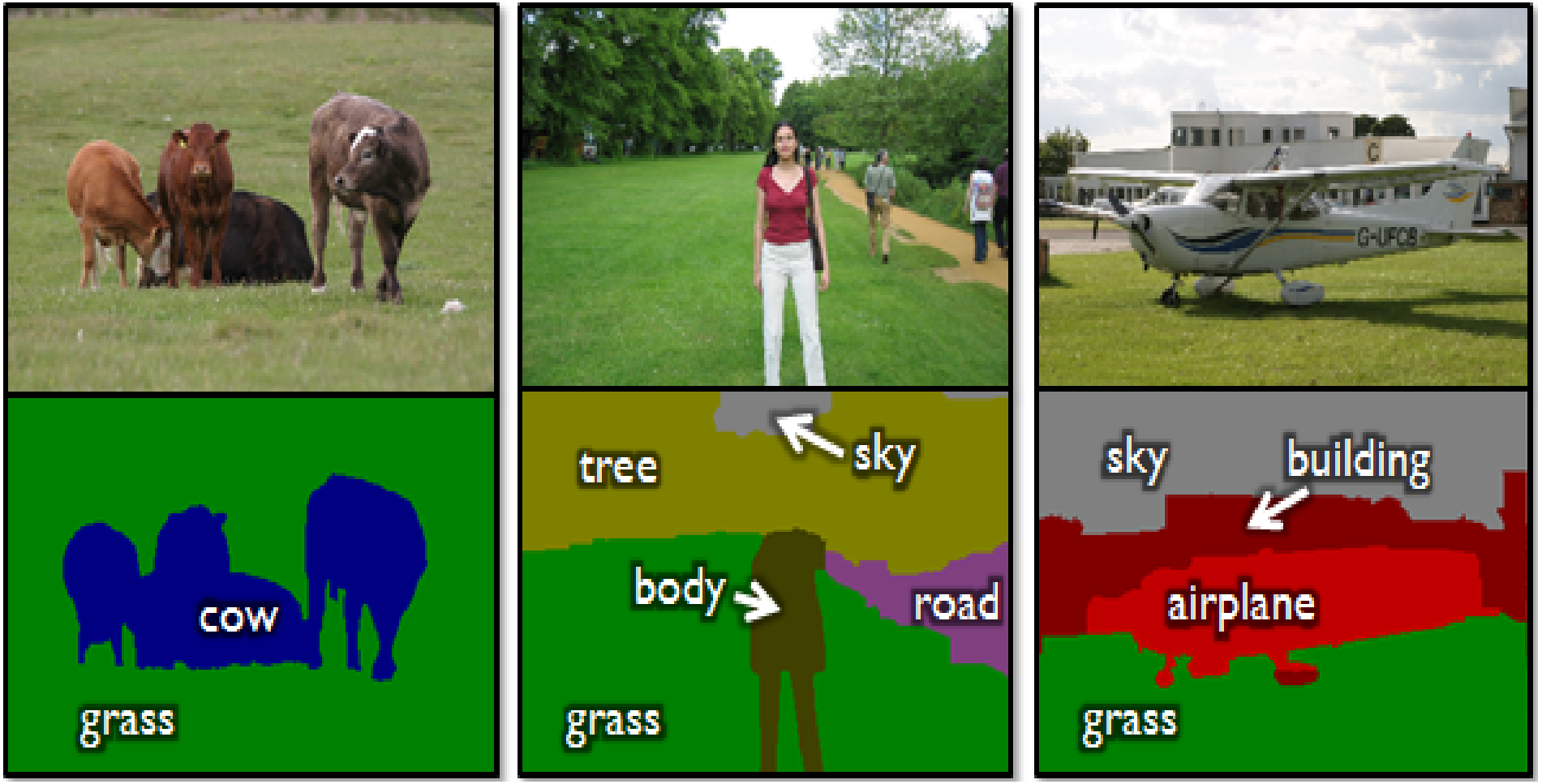
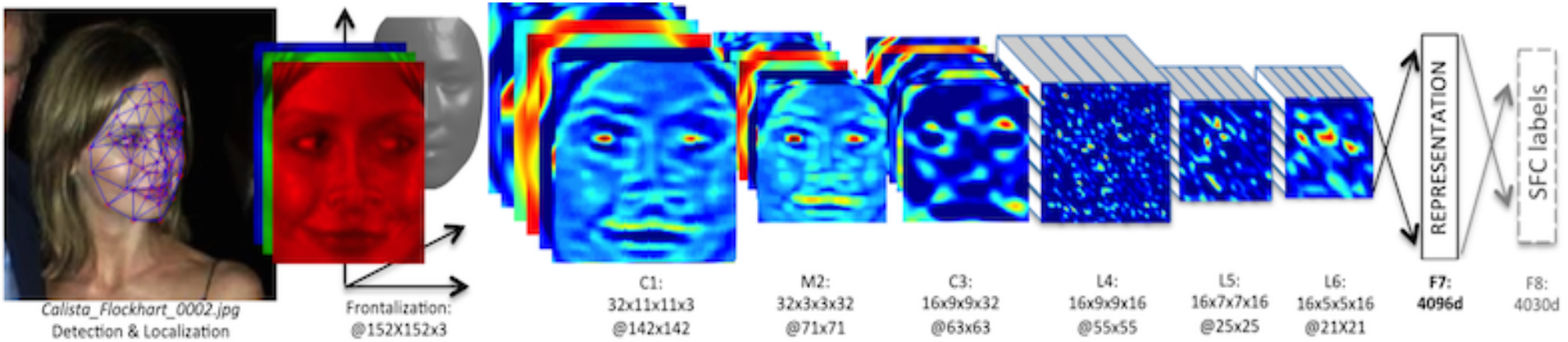
Semantic Segmentation

Semantic Segmentation



Semantic Segmentation

How to do it with ConvNets ?

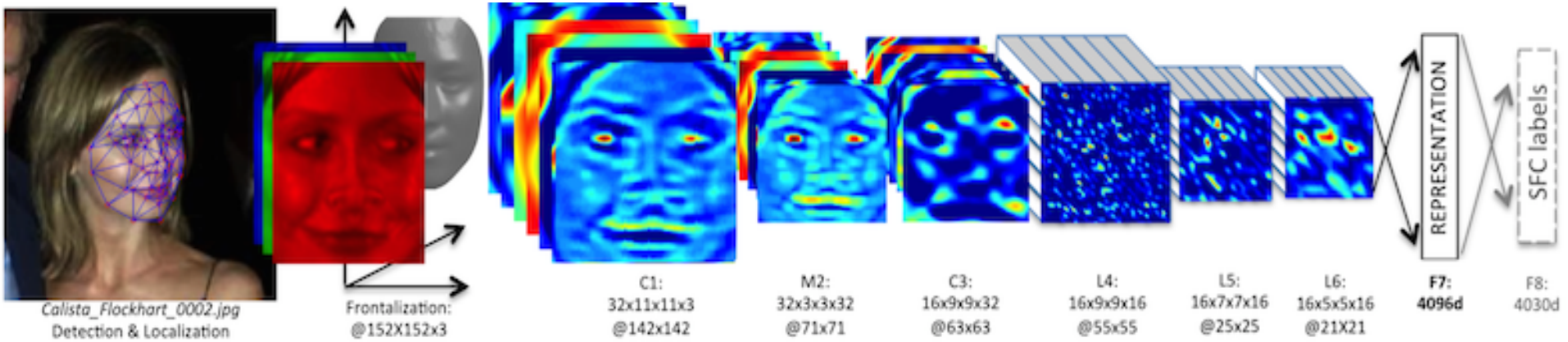


ConvNets maps your input into a lower dimensional space in the forward direction

Something like a downsampled version of your input in another dimension

Semantic Segmentation

How to do it with ConvNets ?



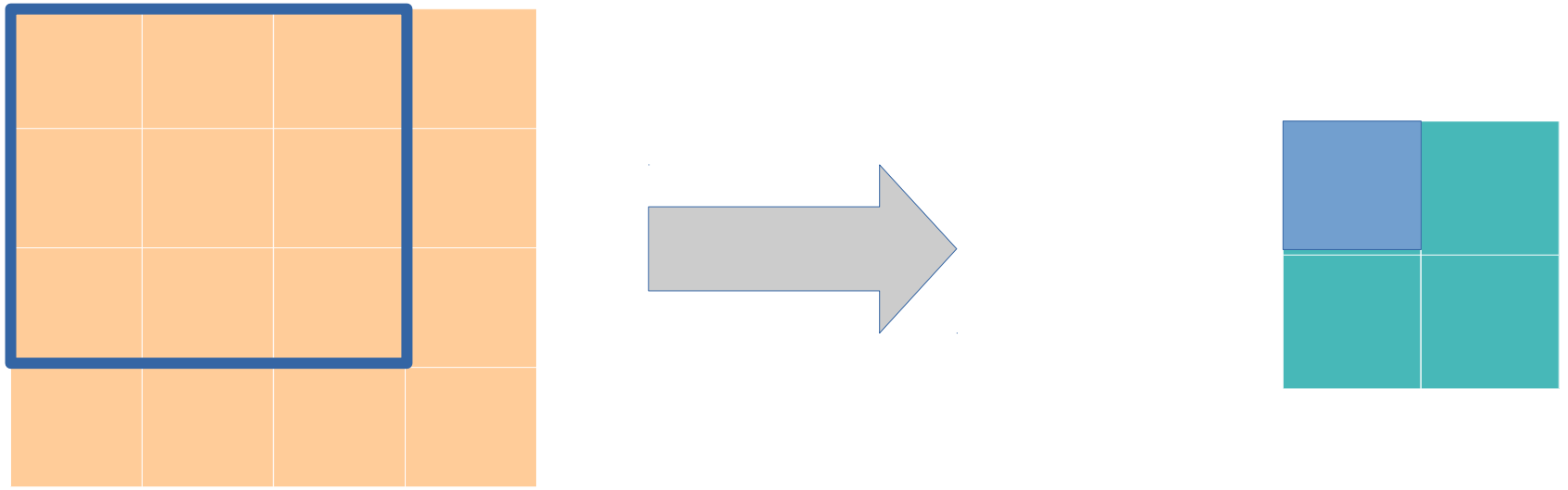
So what happens if you can do the reverse operation ?

Inverse Convolution

Learnable Upsampling

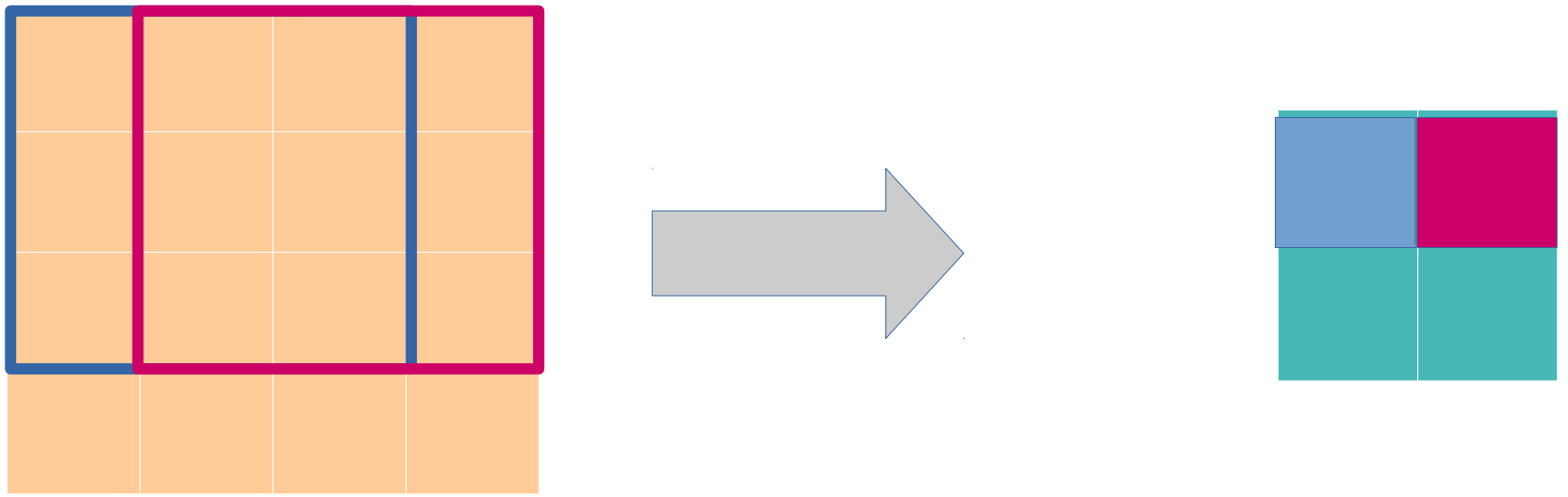
Inverse Convolution

Convolution revisited



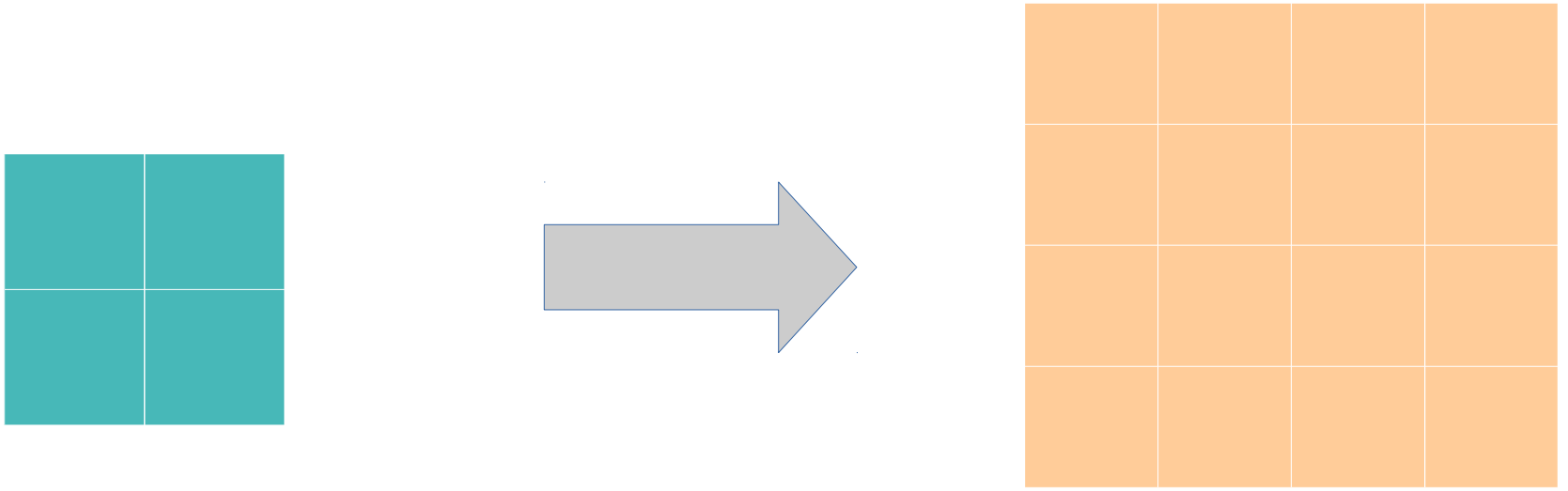
Inverse Convolution

Convolution revisited



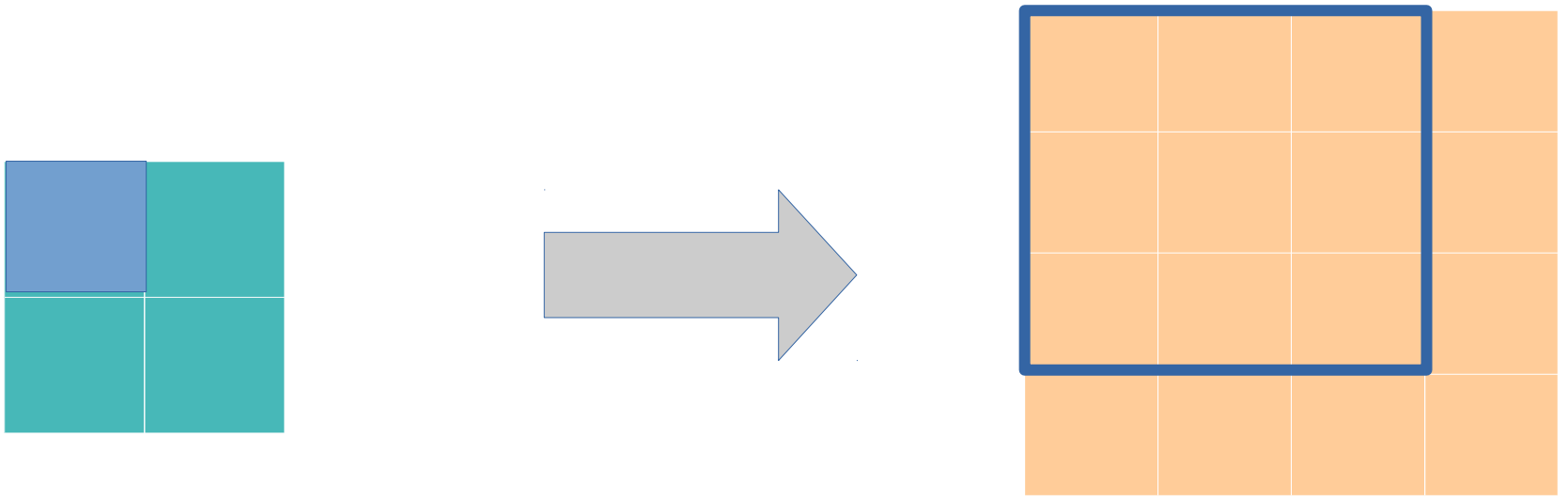
3 x 3 Convolution, Stride 1, Pad 0

Inverse Convolution



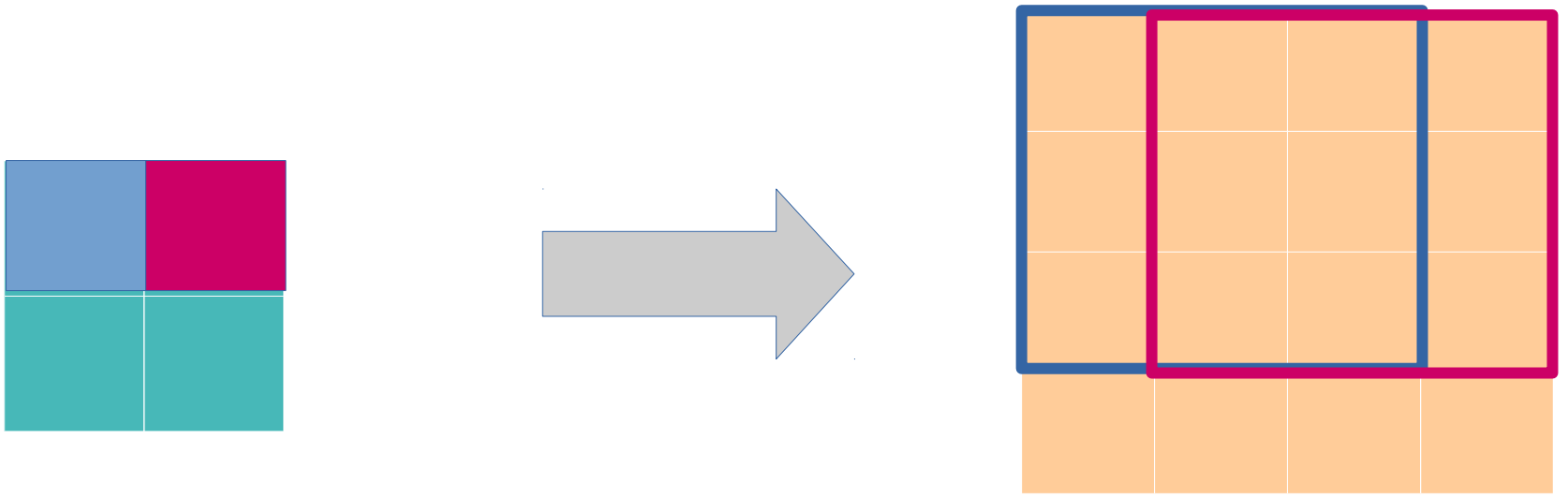
3 x 3 Convolution, Stride 1, Pad 0

Inverse Convolution



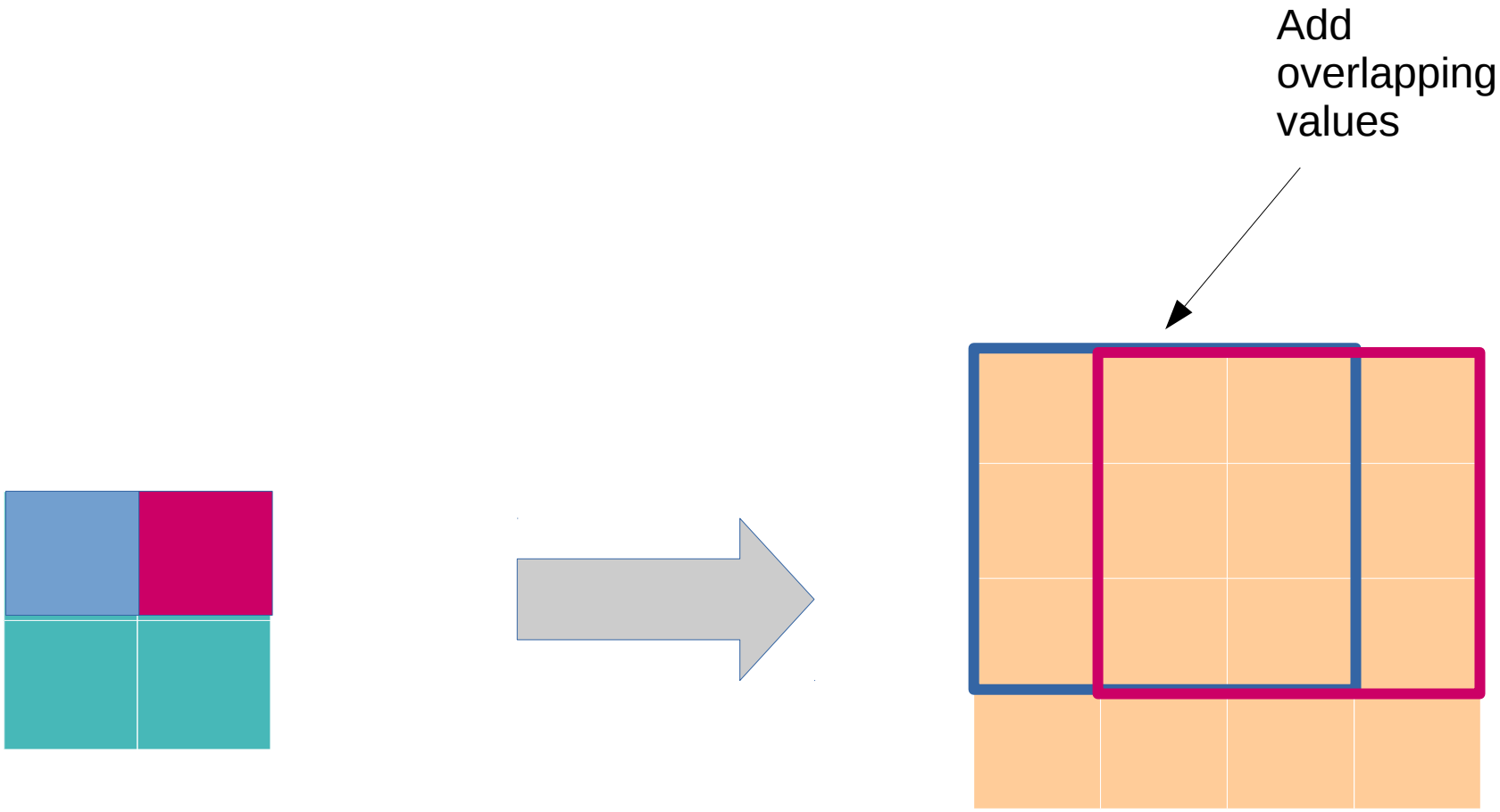
3 x 3 Convolution, Stride 1, Pad 0

Inverse Convolution



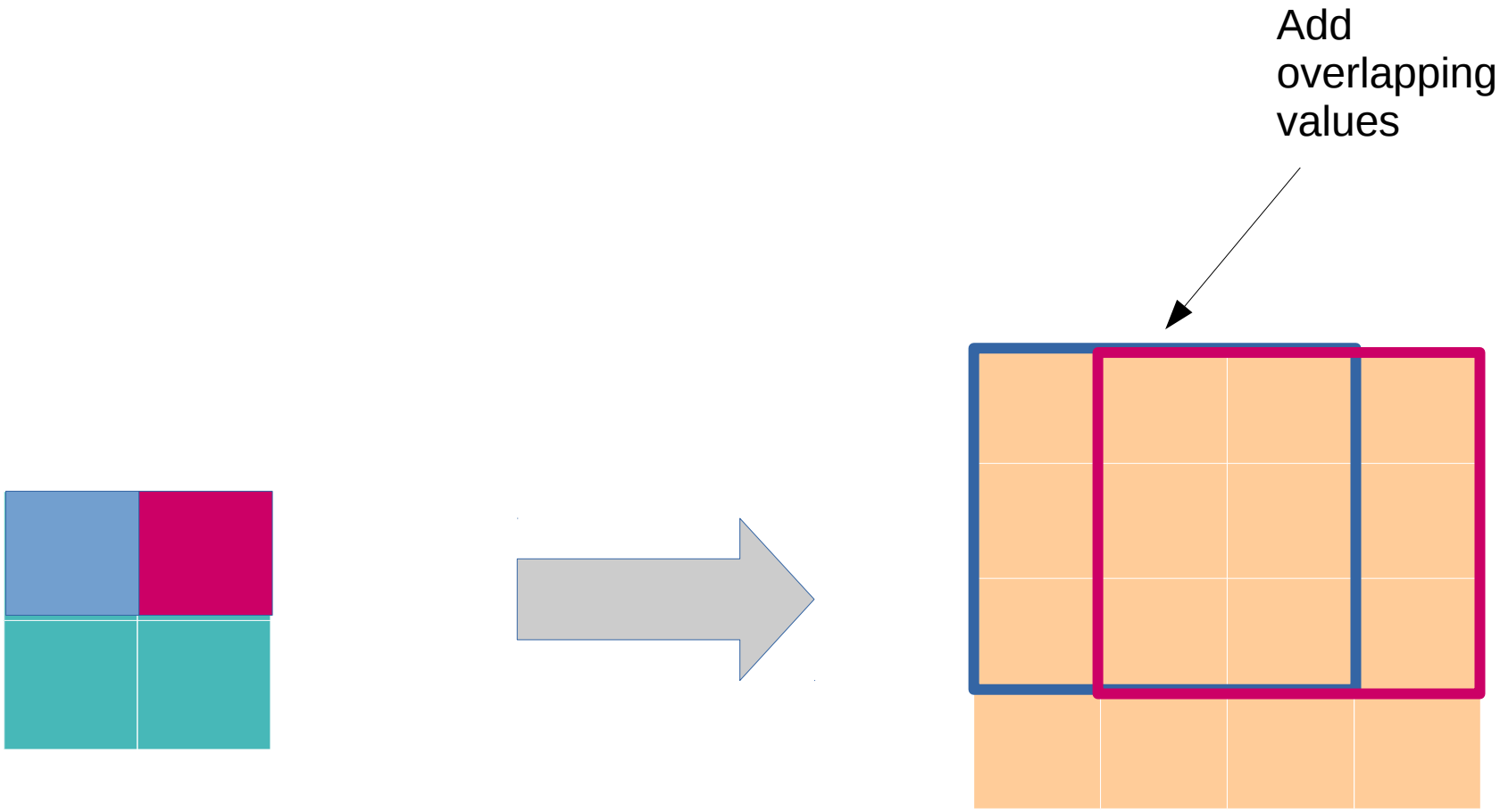
3 x 3 Convolution, Stride 1, Pad 0

Inverse Convolution



3 x 3 Convolution, Stride 1, Pad 0

Inverse Convolution



3 x 3 Convolution, Stride 1, Pad 0

Learn the weights using backpropagation

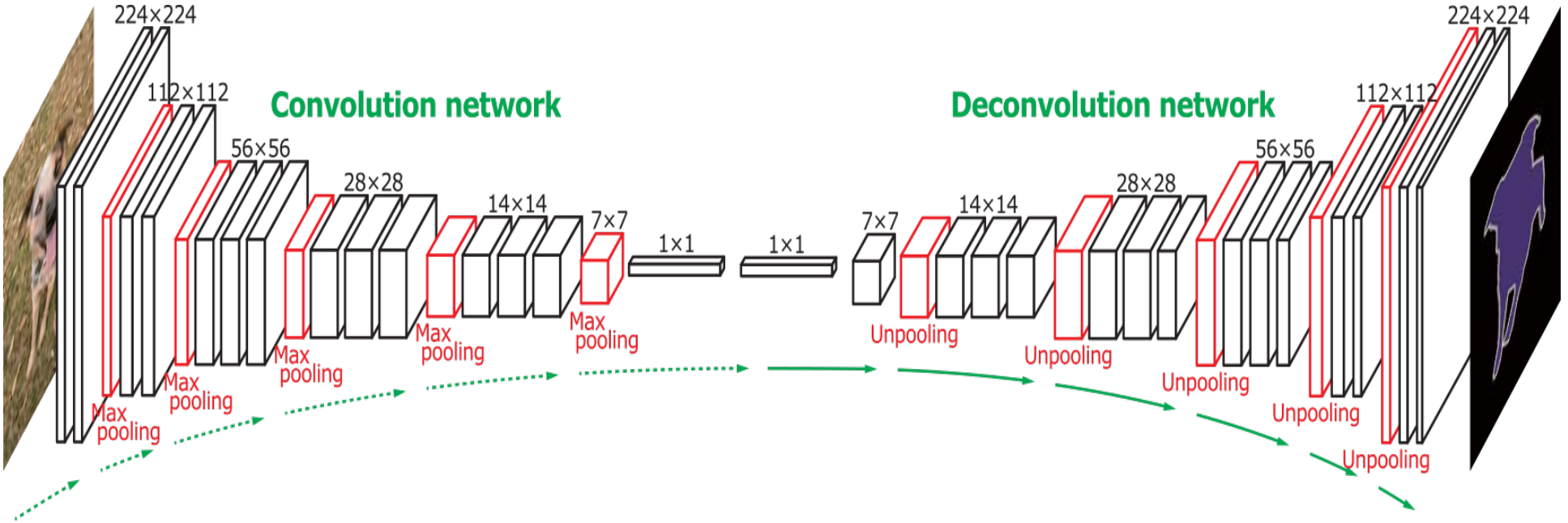
Learnable Upsampling

How do you learn ?

Input is actual image is output is the pixel labels (mask)

Learnable Upsampling

How do you learn ?



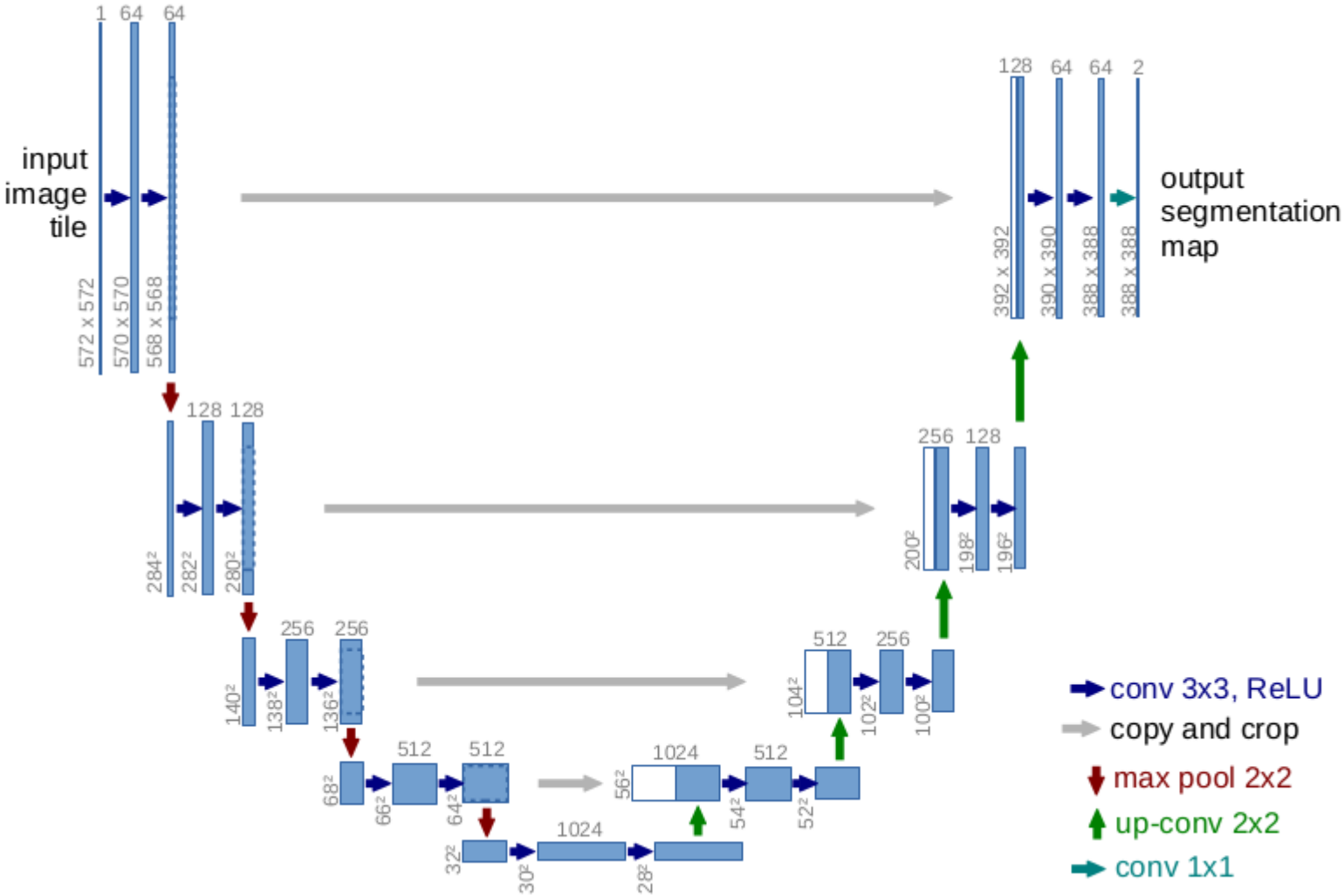
Just mirror image your input convolutional layers and optimize for the masked output

Semantic Segmentation

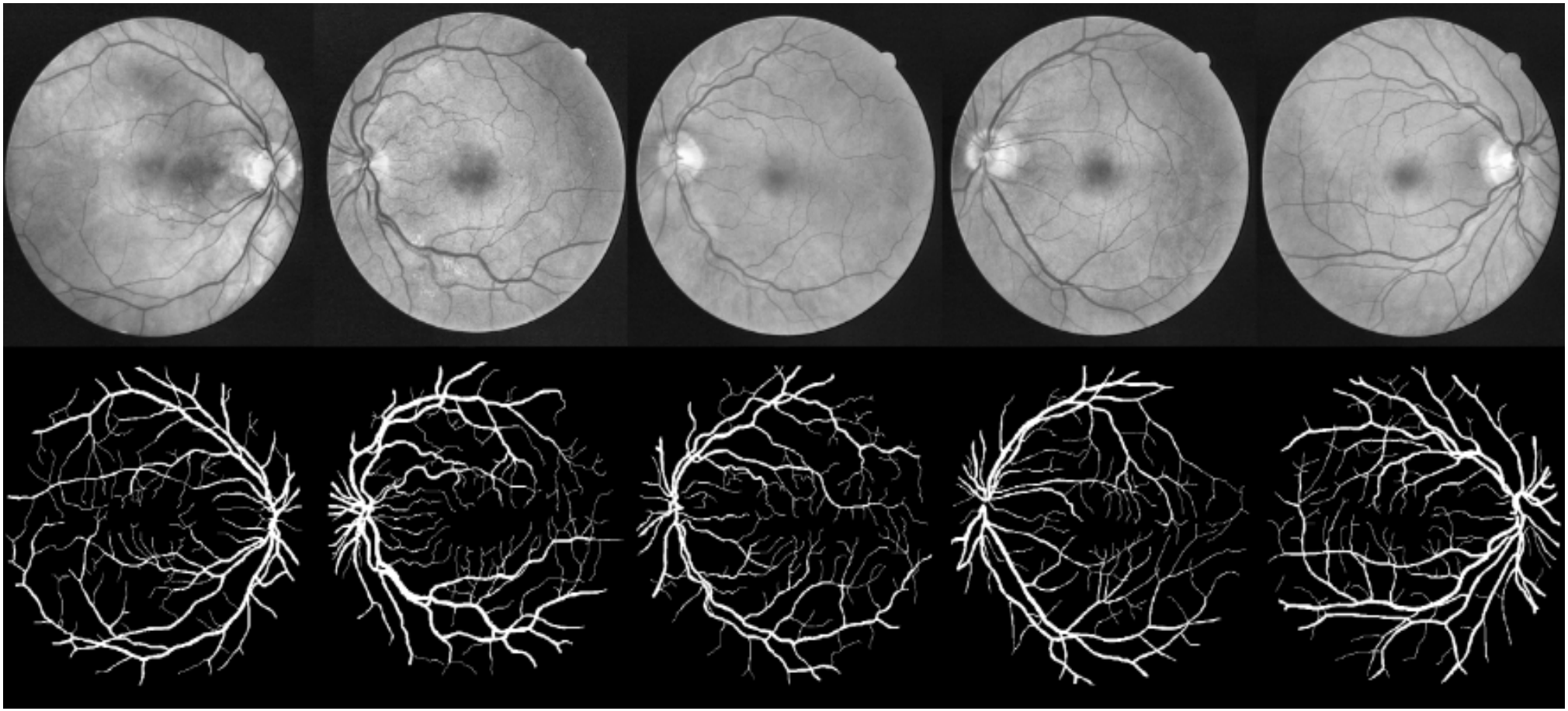
U-Net for Segmentation

Olaf Ronneberger, Philipp Fischer, and Thomas Brox

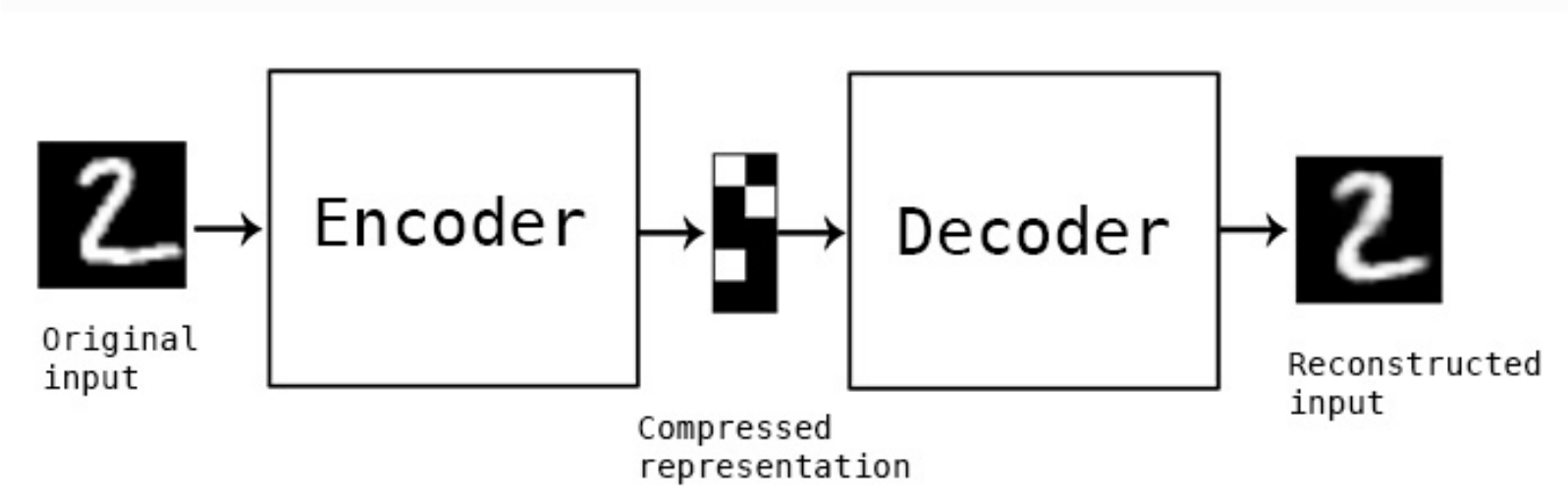
Computer Science Department and BIOSS Centre for Biological Signalling Studies,



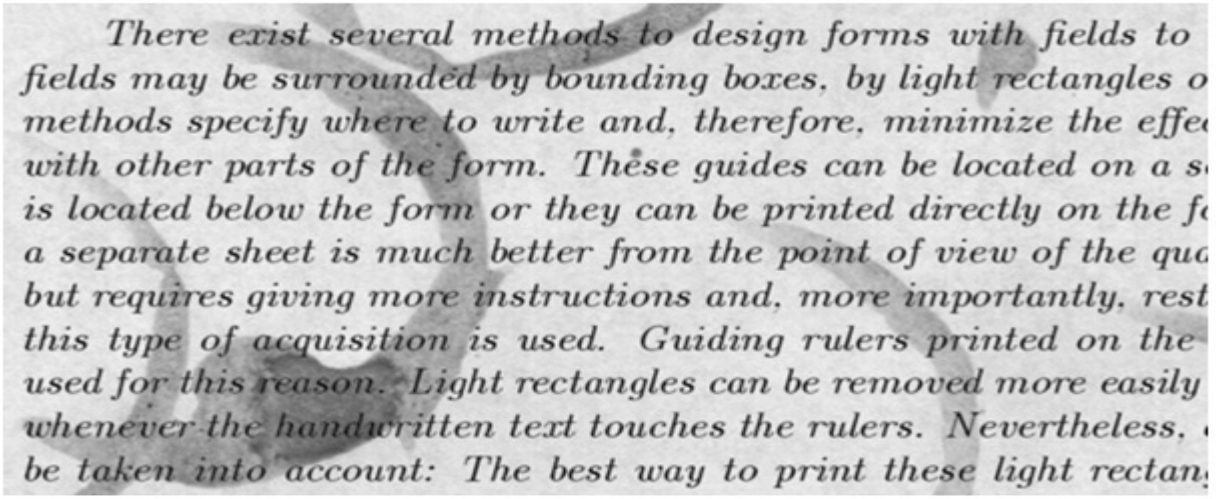
U-Net for Segmentation

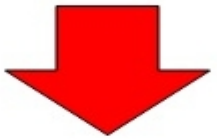


Autoencoders



Autoencoders





There exist several methods to design forms with fields to
fields may be surrounded by bounding boxes, by light rectangles o
methods specify where to write and, therefore, minimize the effe
with other parts of the form. These guides can be located on a s
is located below the form or they can be printed directly on the f
a separate sheet is much better from the point of view of the qua
but requires giving more instructions and, more importantly, rest
this type of acquisition is used. Guiding rulers printed on the
used for this reason. Light rectangles can be removed more easily
whenever the handwritten text touches the rulers. Nevertheless,
be taken into account: The best way to print these light rectan

Choosing the right Deep Net

LSTMs

Restricted Boltzmann Machine

Deep Belief Nets

Recurrent Networks

Deep Q networks

AutoEncoders

ConvNets

Choosing the right Deep Net

Supervised Learning

1. Convolutional Neural Networks [Text, Images, Time Series]
2. Recurrent Nets [Time Series, Text data, Speech data]
3. Deep Belief Networks (DBN) [Images]
4. Recurrent Neural Tensor Network (RNTN) [Text]

Choosing the right Deep Net

Unsupervised Learning , Feature Extraction

1. Autoencoders

2. Restricted Boltzmann Machines (RBM)

Choosing the right Deep Net

Reinforcment Learning

1. Deep Q Networks (DQN)