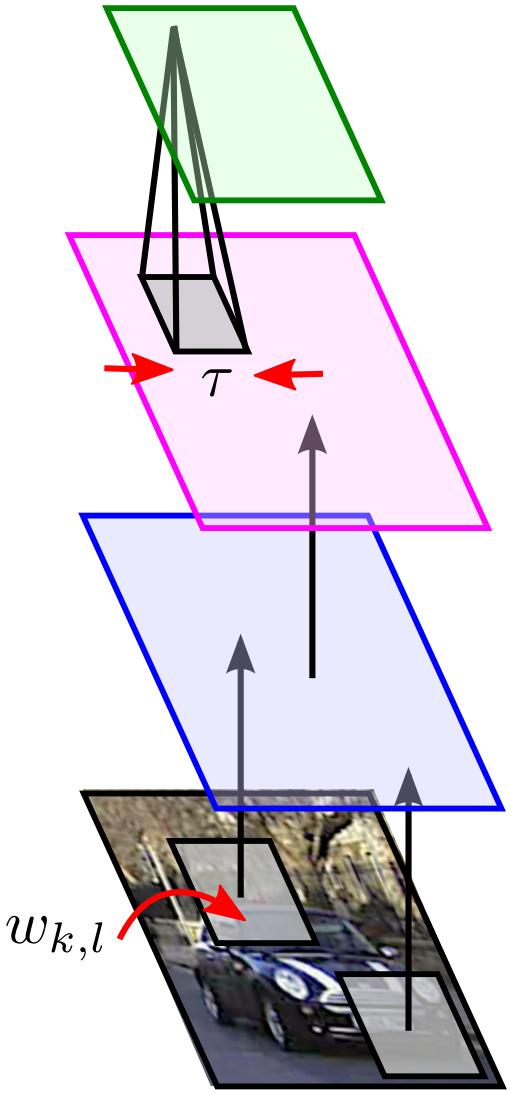
Deep Learning
Summary of lecture 4

Dr. Richard E. Turner (ret26@cam.ac.uk)

Engineering Tripos Part IB
Paper 8: Information Engineering

Summary of lecture 4



$$x_{i,j} = \max_{|k|<\tau,|l|<\tau} y_{i-k,j-l}$$

mean or subsample also used

pooling stage

$$y_{i,j} = f(a_{i,j})$$

e.g. $f(a) = [a]_+$

$f(a) = \text{sigmoid}(a)$

non-linear stage

$$a_{i,j} = \sum_{k,l} w_{k,l} z_{i-k,j-l}$$

convolutional stage

$z_{i,j}$

input image

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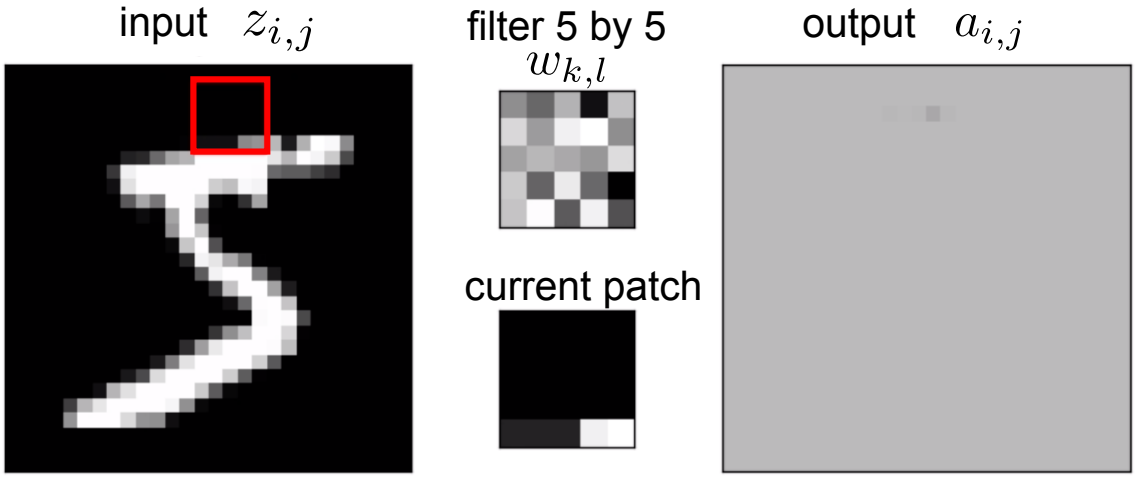

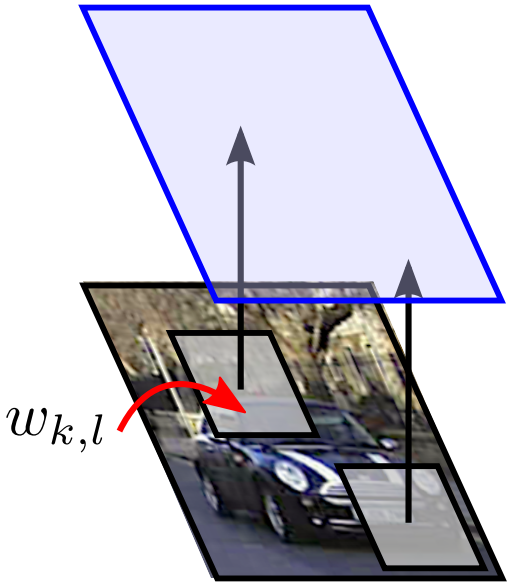

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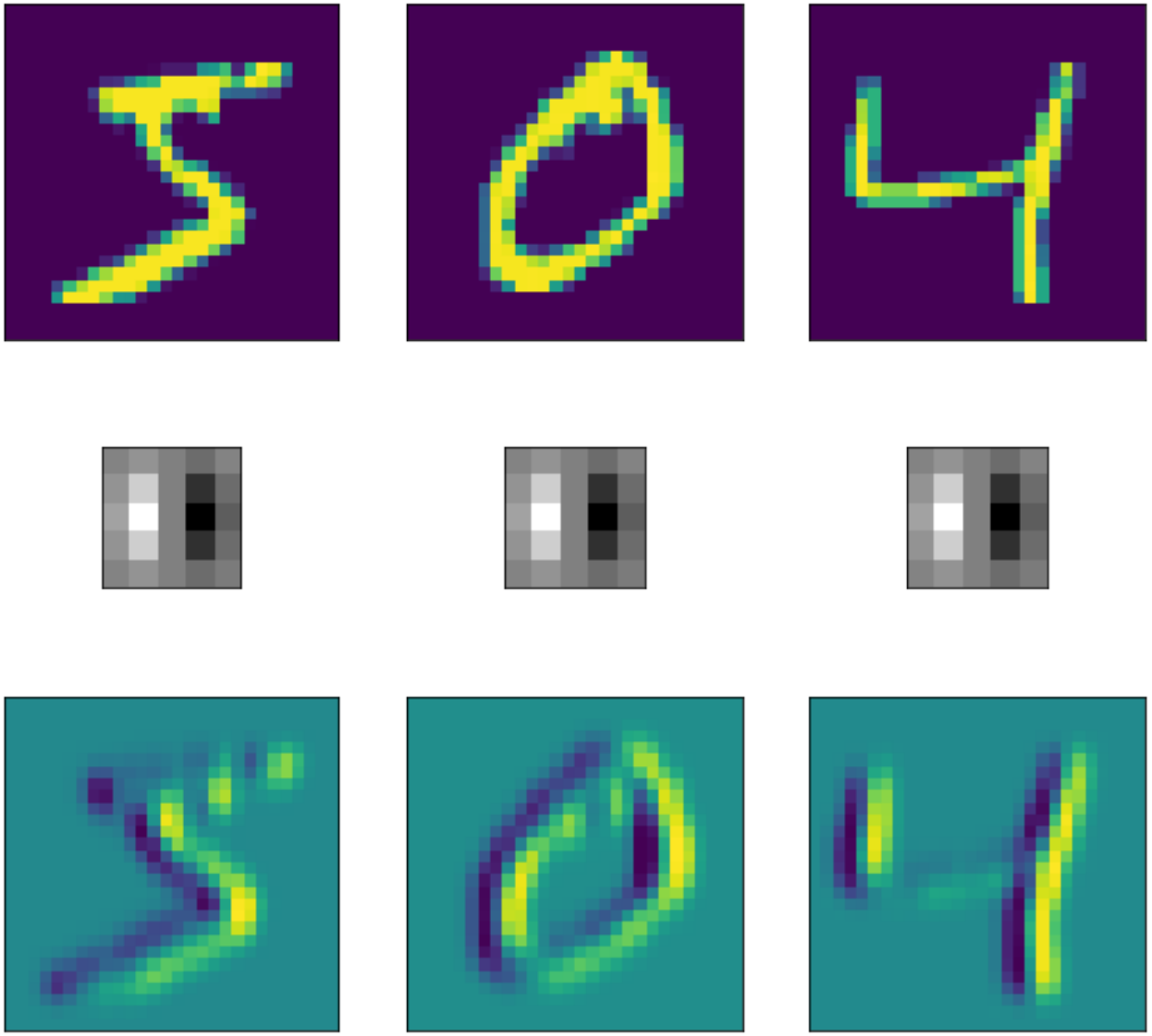

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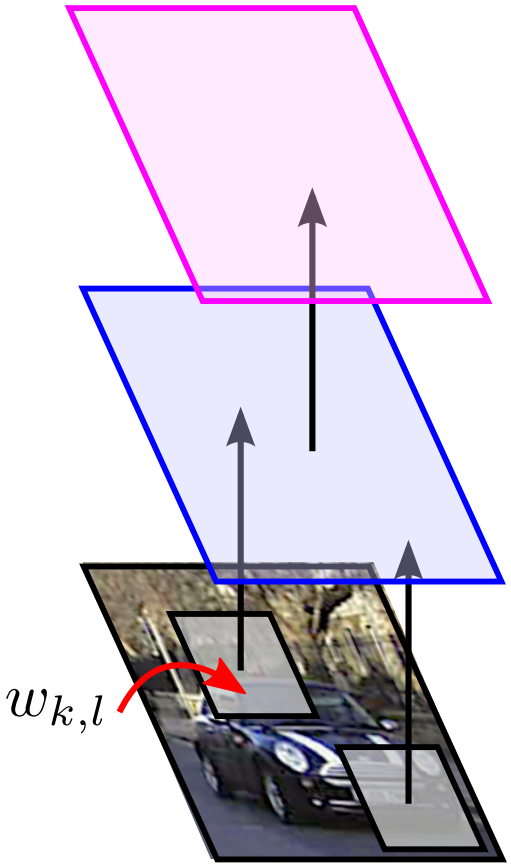

$y_{i,j} = f(a_{i,j})$

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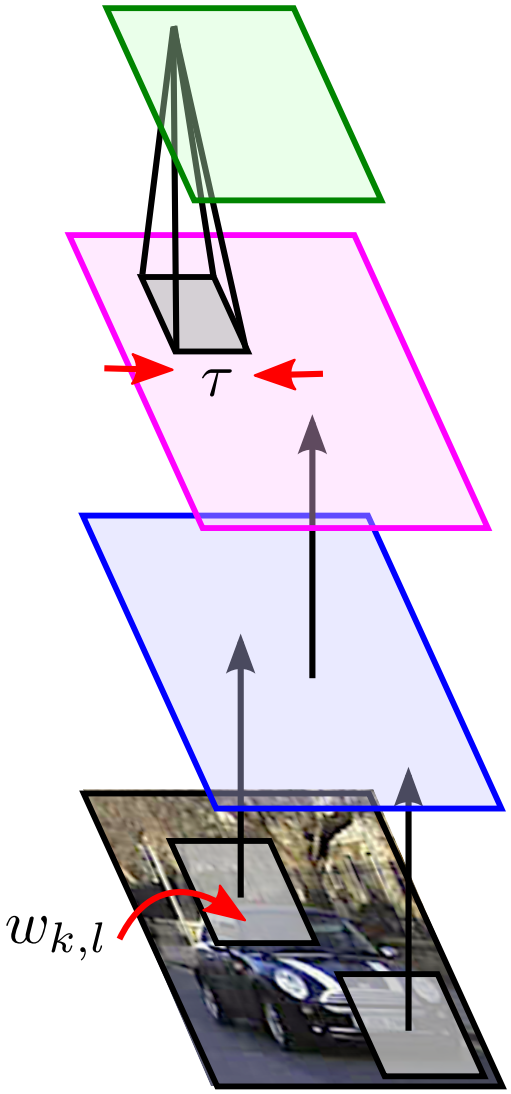
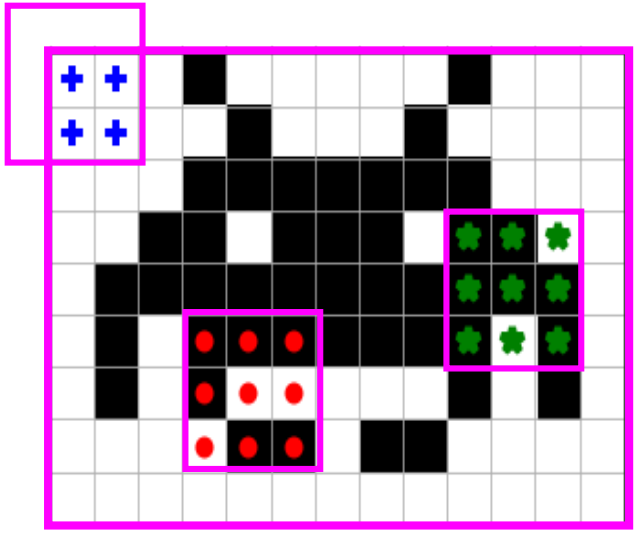


$$x_{i,j} = \max_{|k|<\tau,|l|<\tau} y_{i-k,j-l}$$

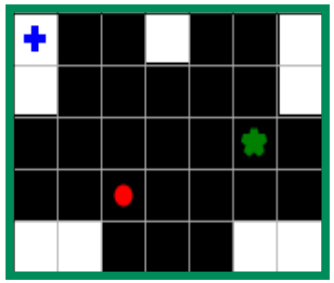
mean or subsample also used

pooling stage



y

$\tau=3$



x

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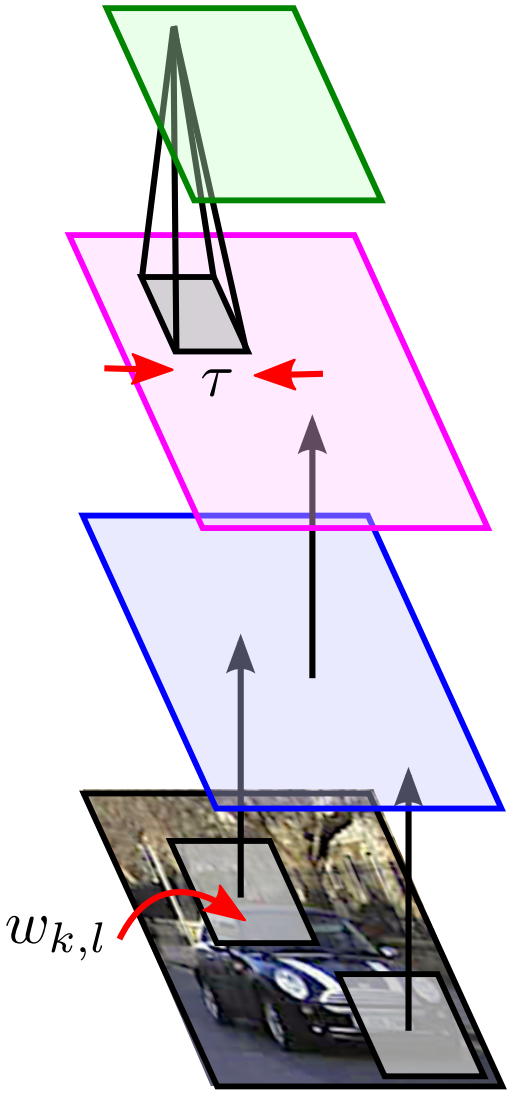

$$x_{i,j} = \max_{|k|<\tau,|l|<\tau} y_{i-k,j-l}$$

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pooling stage

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only parameters

convolutional stage

$z_{i,j}$

input image