



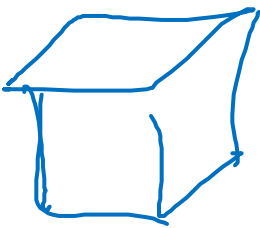
deeplearning.ai

# Convolutional Networks in 1D or 3D

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1D and 3D  
generalizations of  
models

# Convolutions in 2D and 1D



$$14 \times 14 \times \underline{3} * 5 \times 5 \times \underline{3}$$

$$\rightarrow \underline{10 \times 10 \times 16}$$

$$\underline{10 \times 10 \times 16} * \underline{5 \times 5 \times 16}$$

$$\rightarrow \underline{6 \times 6 \times 32}$$

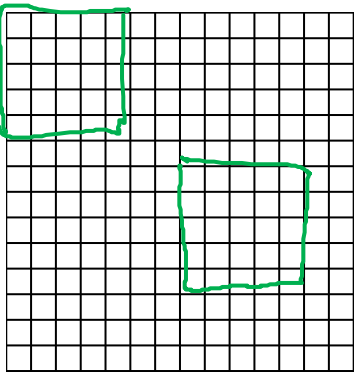
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$$14 \times \underline{1} * 5 \times \underline{1}$$

$$\rightarrow 10 \times \underline{16}$$

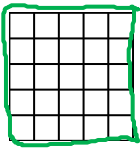
$$\underline{10 \times 16} * \underline{5 \times 16}$$

$$\rightarrow \underline{6 \times 32}$$

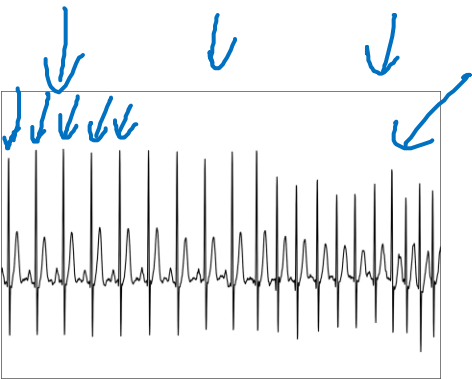


2D input image  
 $14 \times 14$

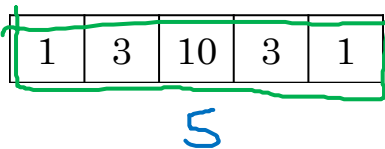
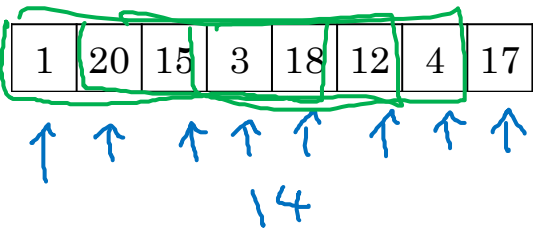
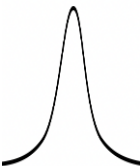
\*



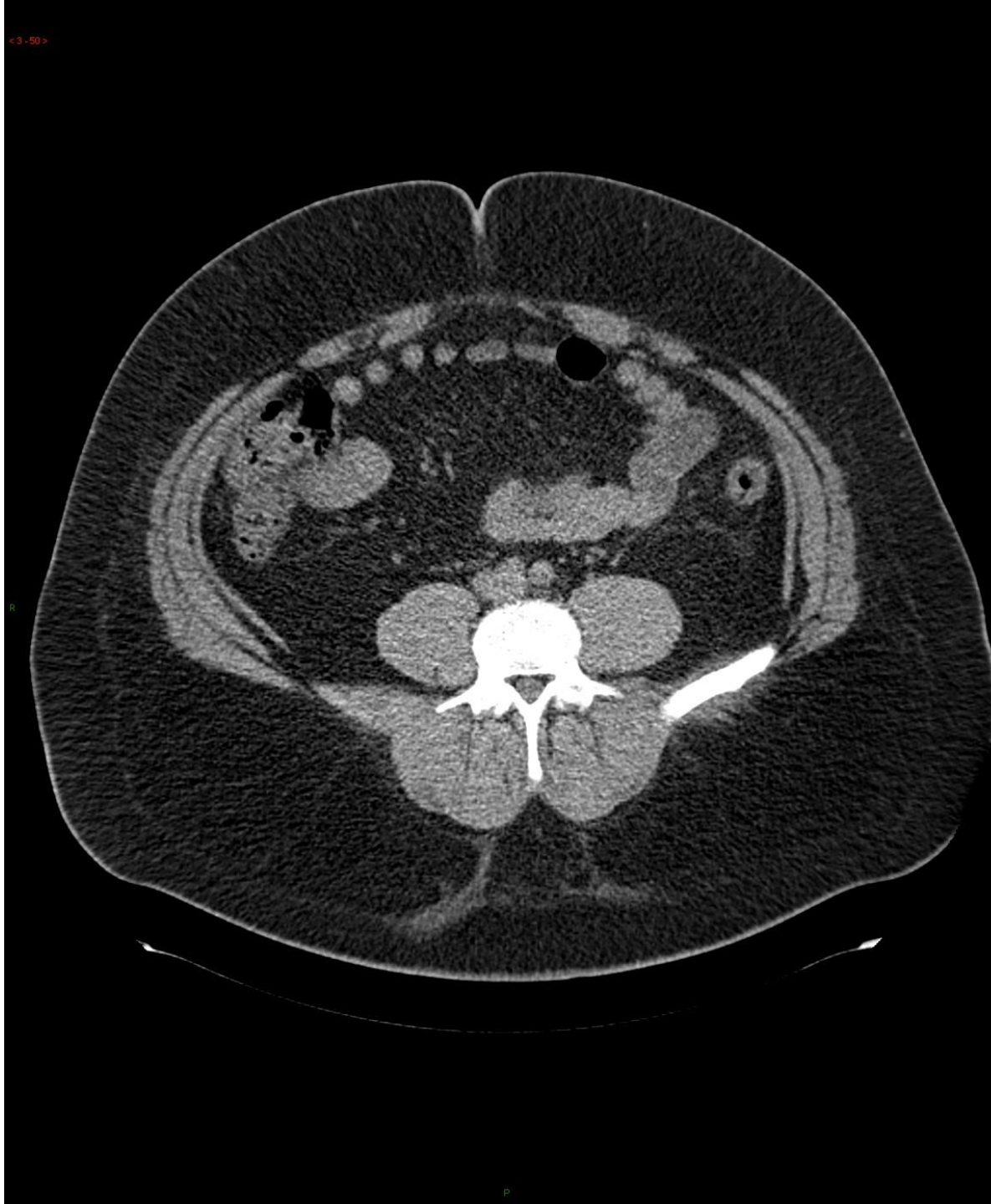
2D filter  
 $5 \times 5$



\*



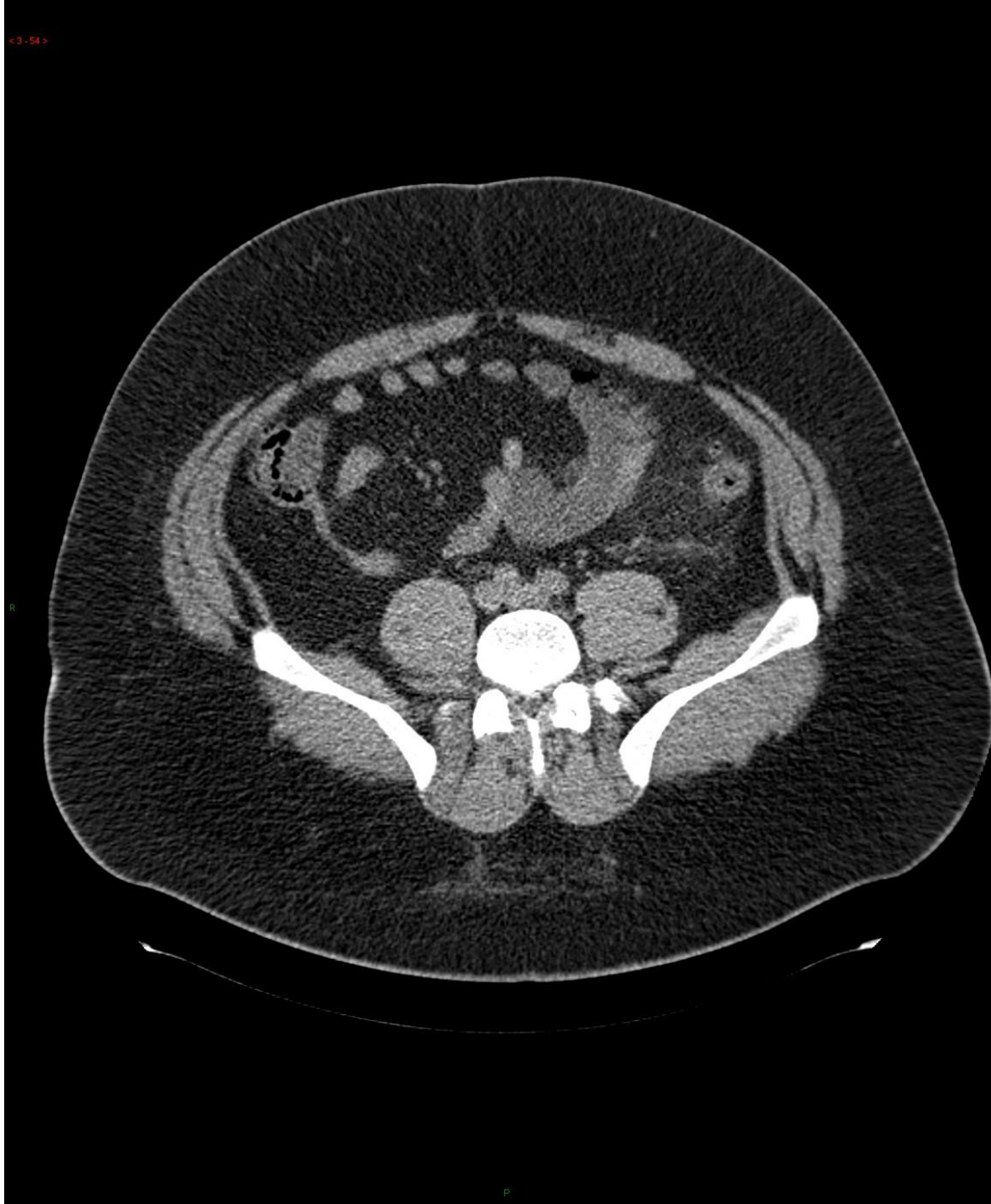
3D data



3D data

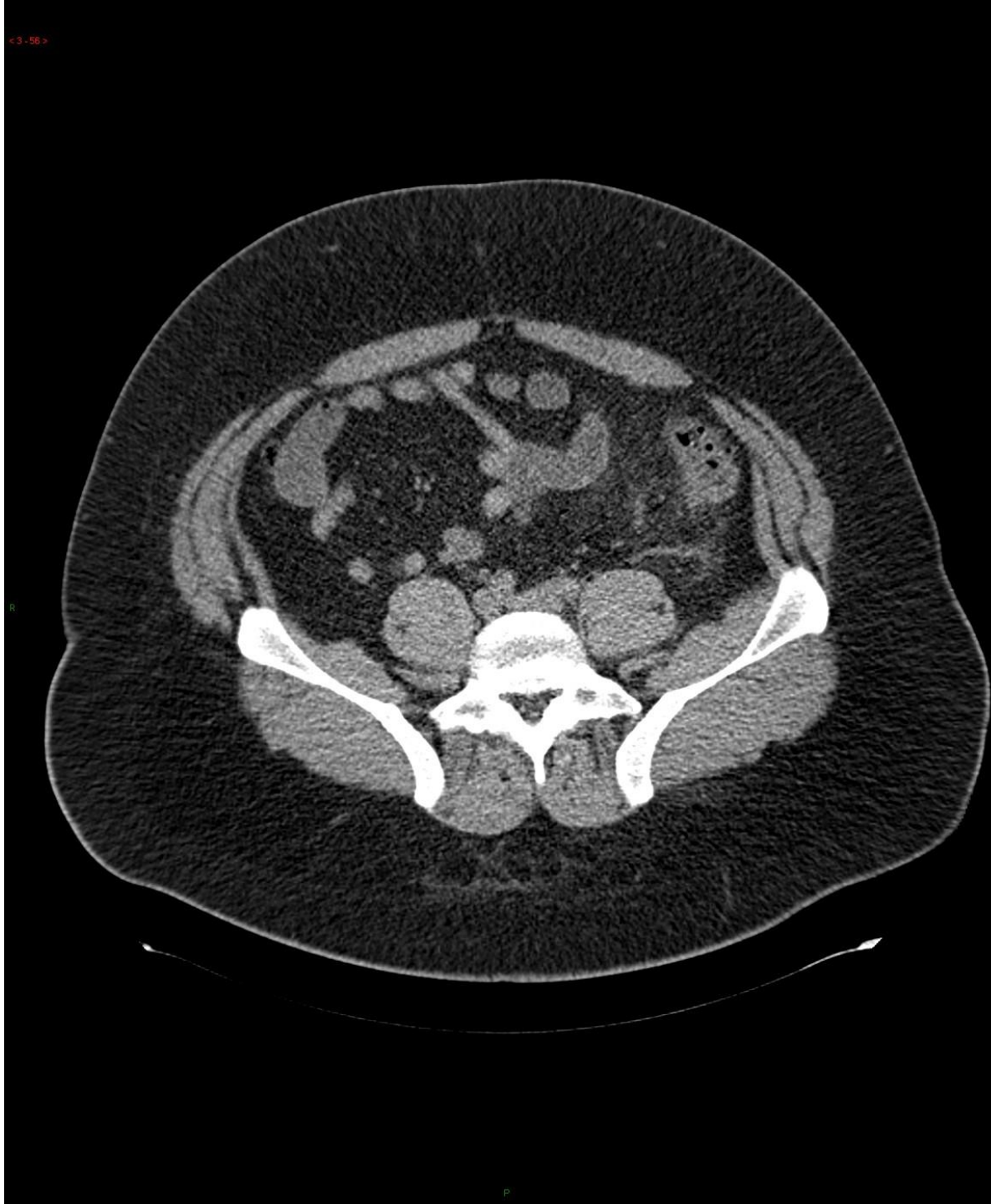


3D data

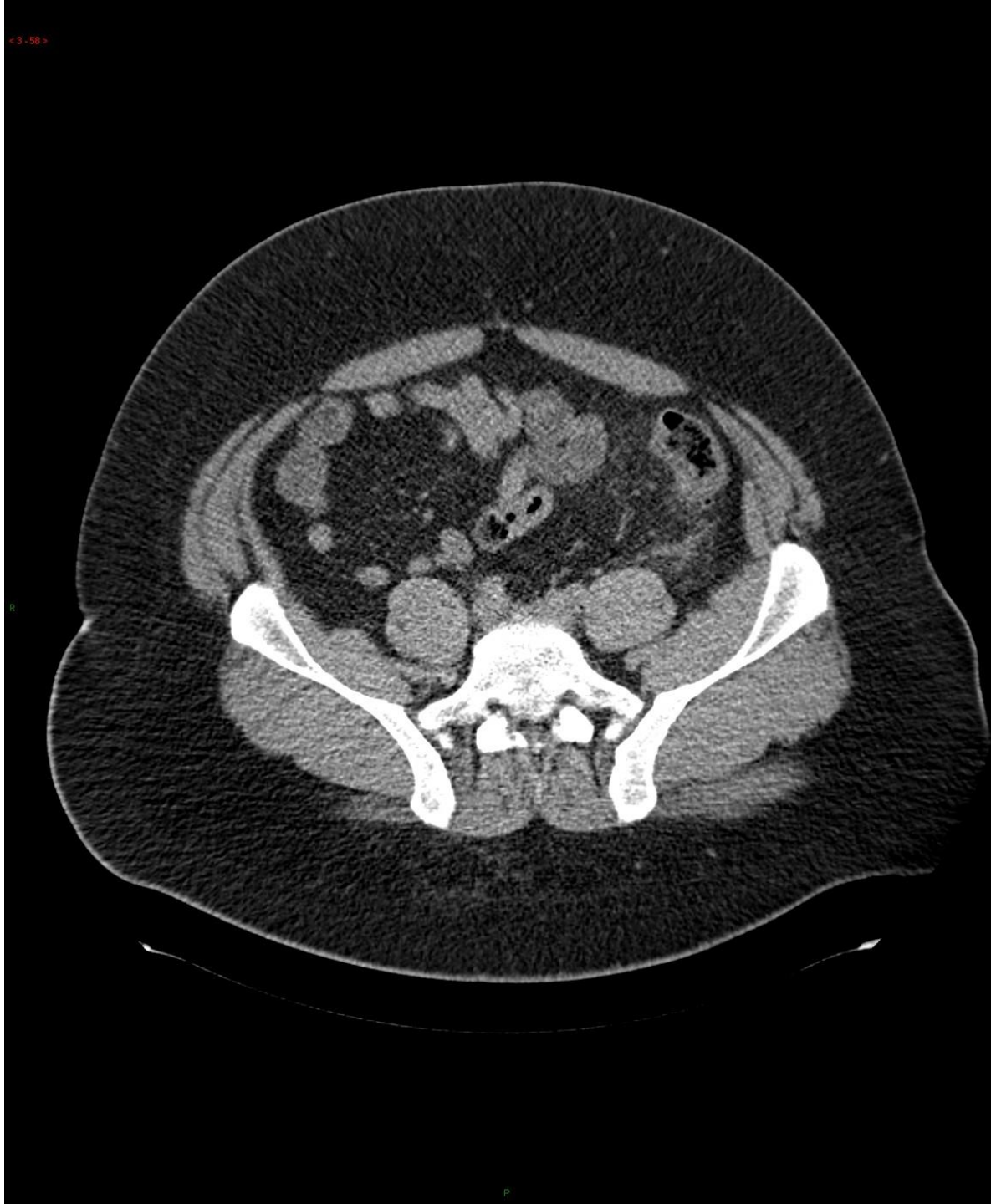




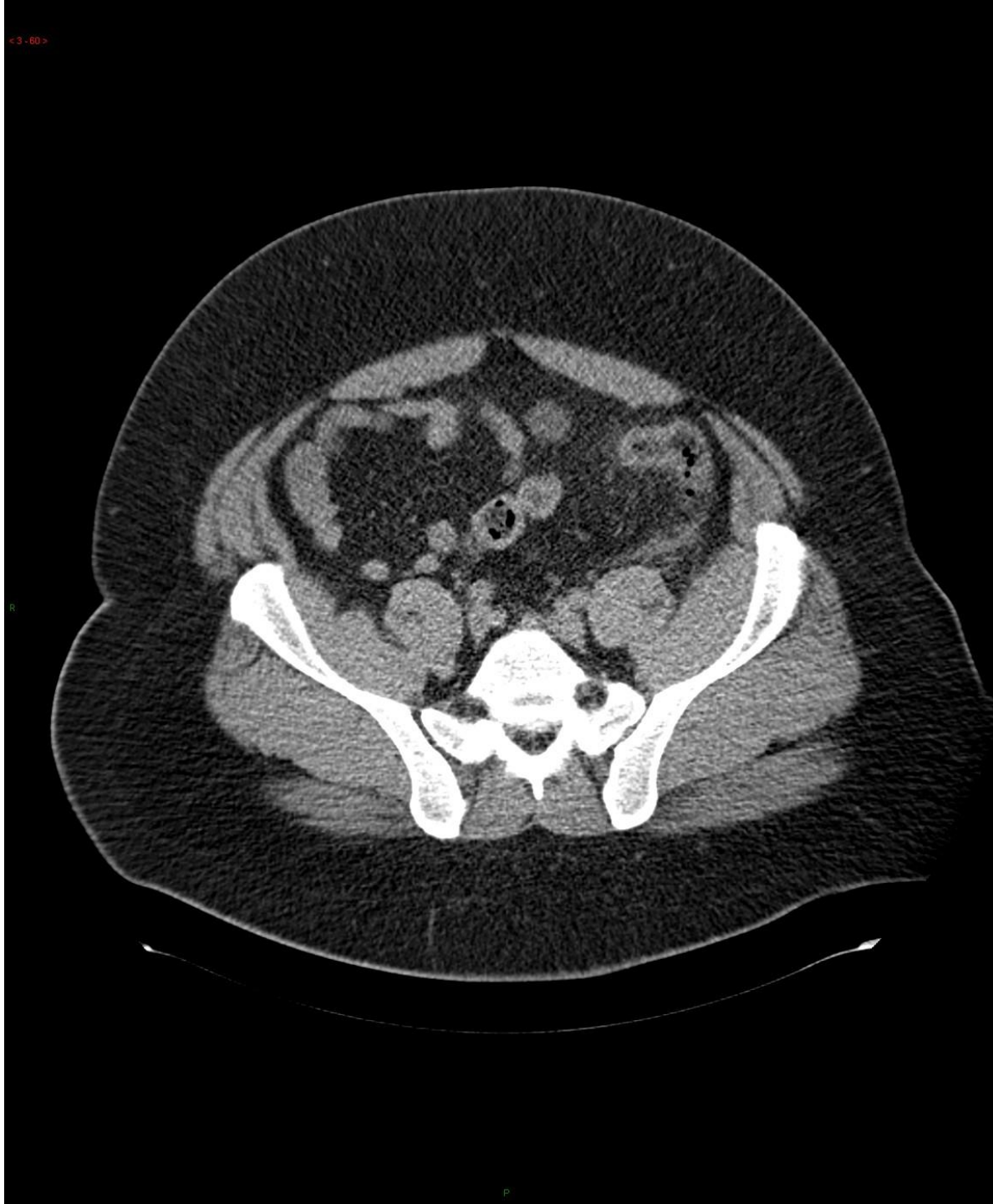
3D data



# 3D data

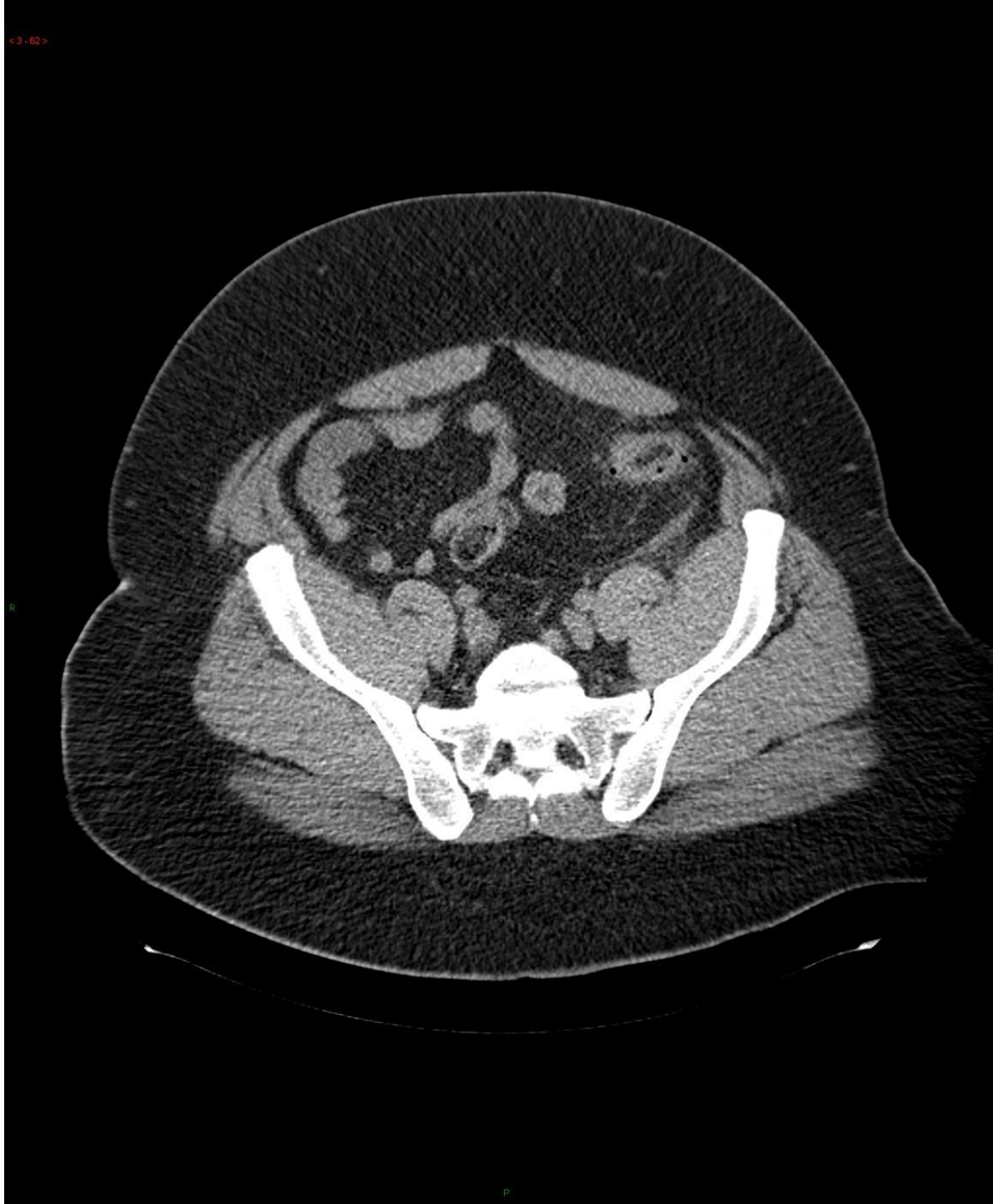


# 3D data





# 3D data



# 3D data



3D data

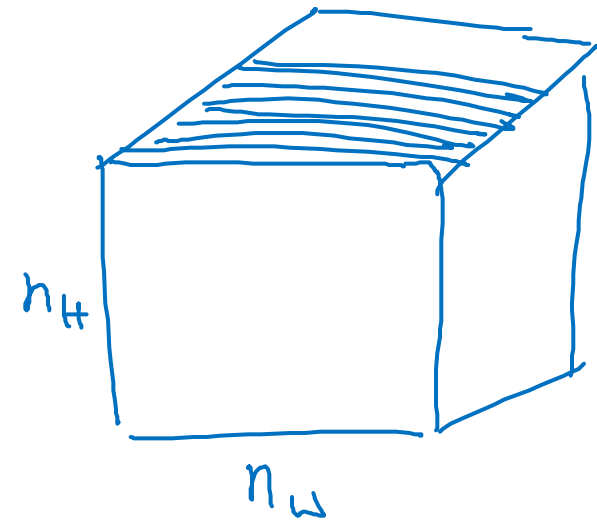


3D data



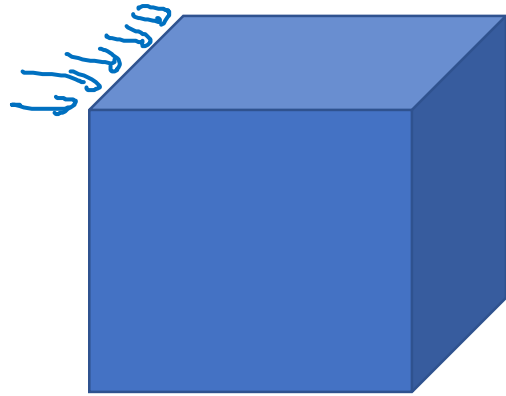


# 3D data

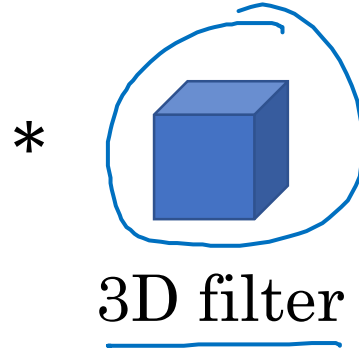




# 3D convolution



3D volume



$$\begin{array}{l}
 \begin{array}{cccc} \downarrow & \downarrow & \downarrow & \downarrow^{n_c} \end{array} \\
 \underline{14 \times 14 \times 14} \times \underline{1} \\
 * \underline{5 \times 5 \times 5} \times \underline{1} \qquad 16 \text{ filters} \\
 \rightarrow 10 \times 10 \times 10 \times \underline{16} \\
 * 5 \times 5 \times 5 \times \underline{16} \qquad 32 \text{ filters} \\
 \rightarrow 6 \times 6 \times 6 \times 32
 \end{array}$$