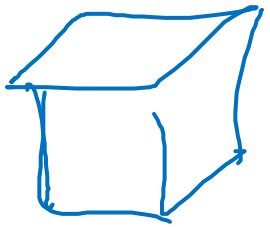
deeplearning.ai

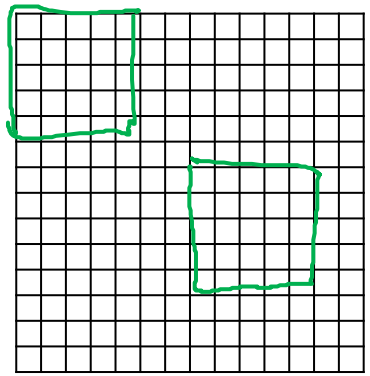
Convolutional Networks in 1D or 3D

1D and 3D generalizations of models

Convolutions in 2D and 1D



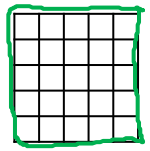
Instead of having a 1d list of numbers or to the 2d matrix of numbers, you now have a 3d block, a three-dimensional input volume of numbers.



2D input image

14×14

*



2D filter

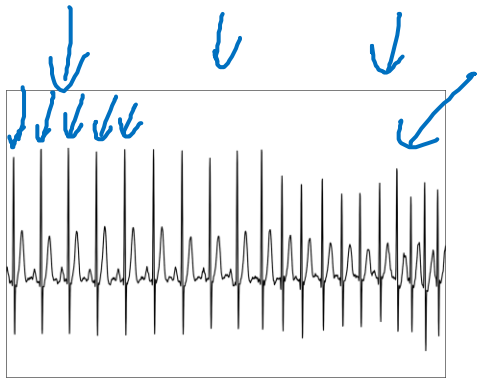
5×5

$14 \times 14 \times 3 \quad * \quad 5 \times 5 \times 3$

$\rightarrow 10 \times 10 \times 16$

$10 \times 10 \times 16 \quad * \quad 5 \times 5 \times 16$

$\rightarrow 6 \times 6 \times 32$



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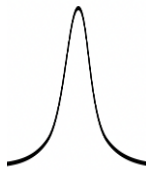

1	20	15	3	18	12	4	17

14

1	3	10	3	1

5

$14 \times 1 \quad * \quad 5 \times 1$

And this could be one layer of your ConvNet.

$\rightarrow 10 \times 16$

$10 \times 16 \quad * \quad 5 \times 16$

$\rightarrow 6 \times 32$

ECG, also called an electrocardiogram

And ConvNets can be used even on 1d data.
For a lot of 1D data applications, you actually use a recurrent neural network which you learn about in the next course.

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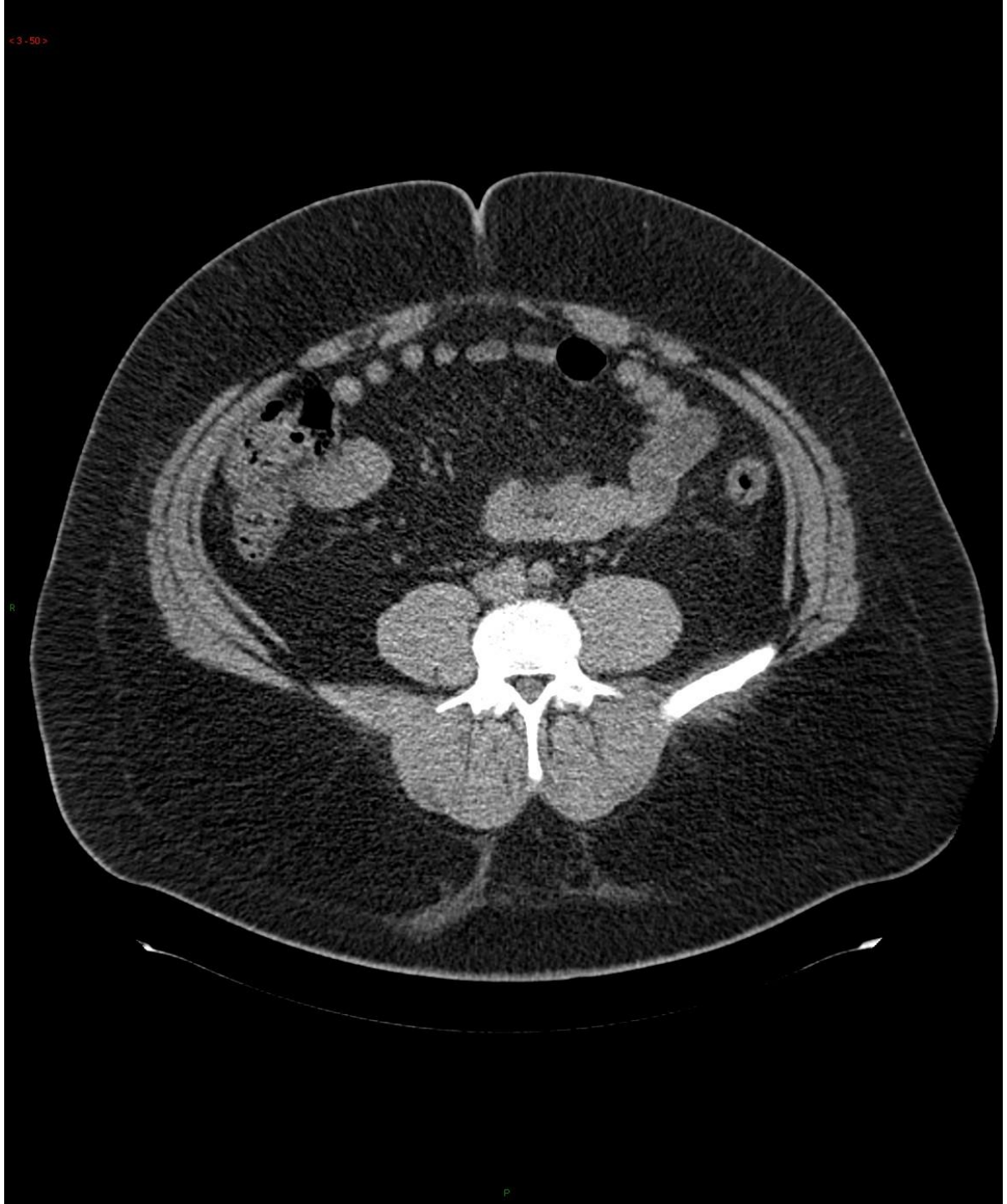
3D data



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3D data

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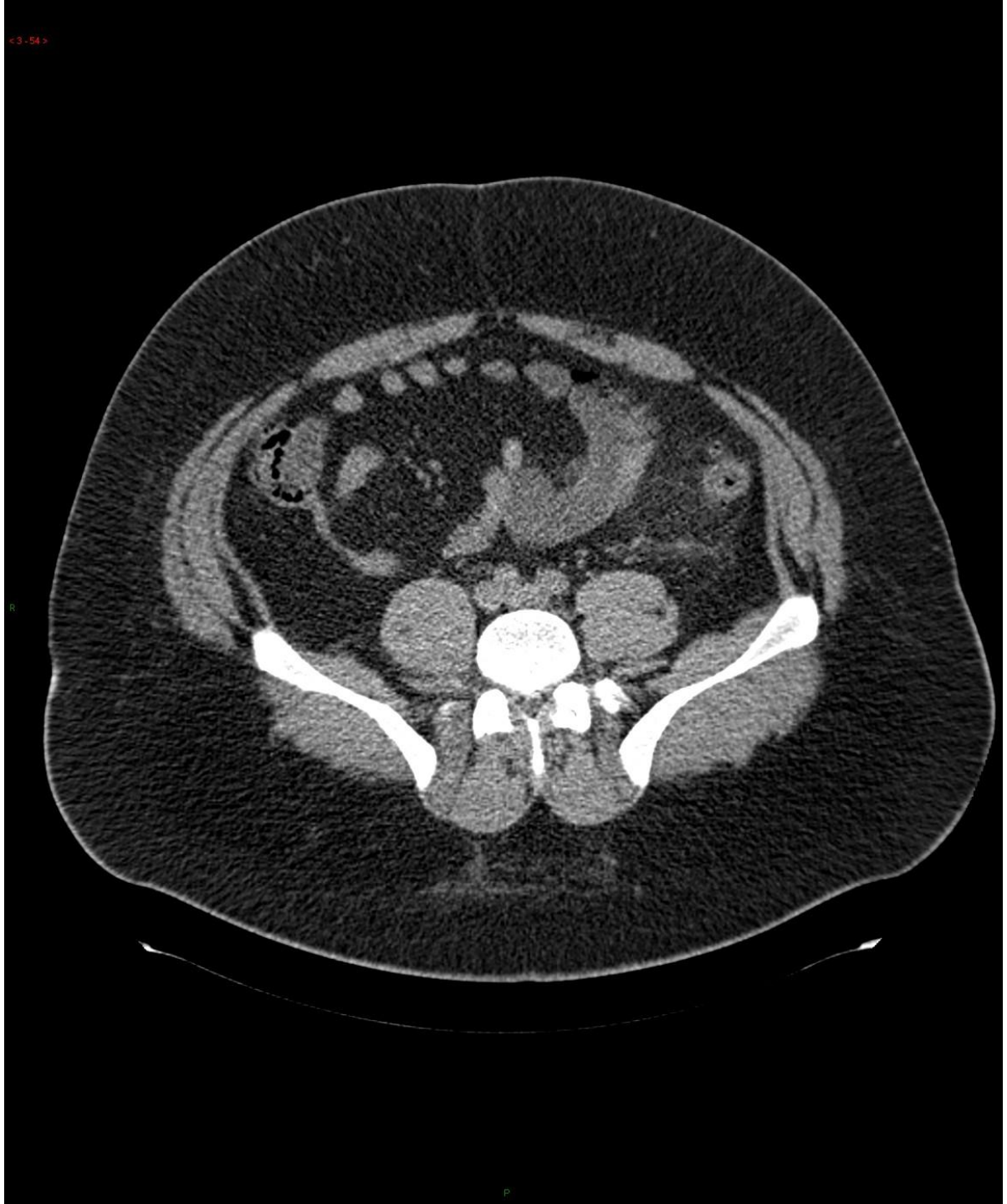
3D data



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3D data

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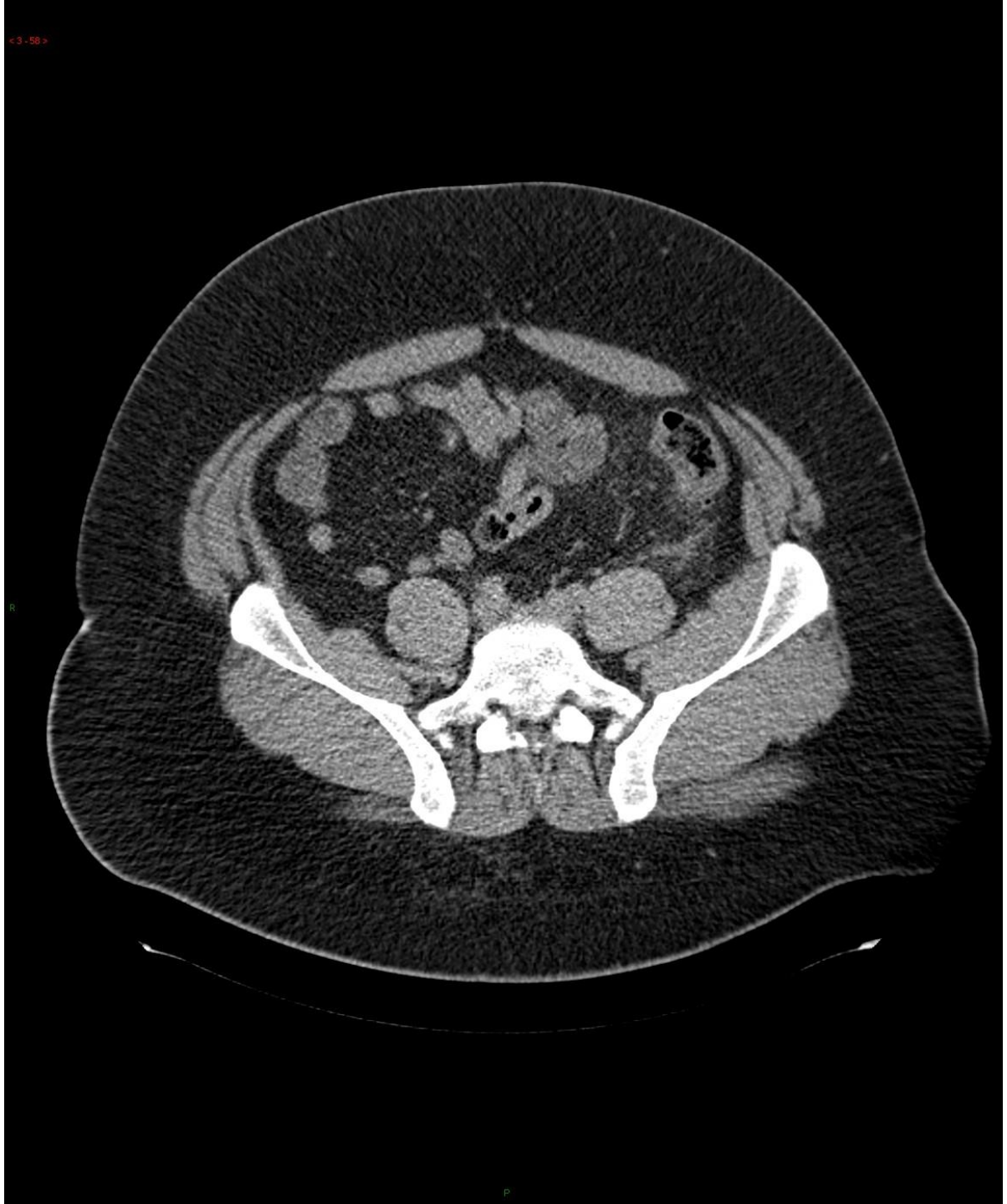
3D data



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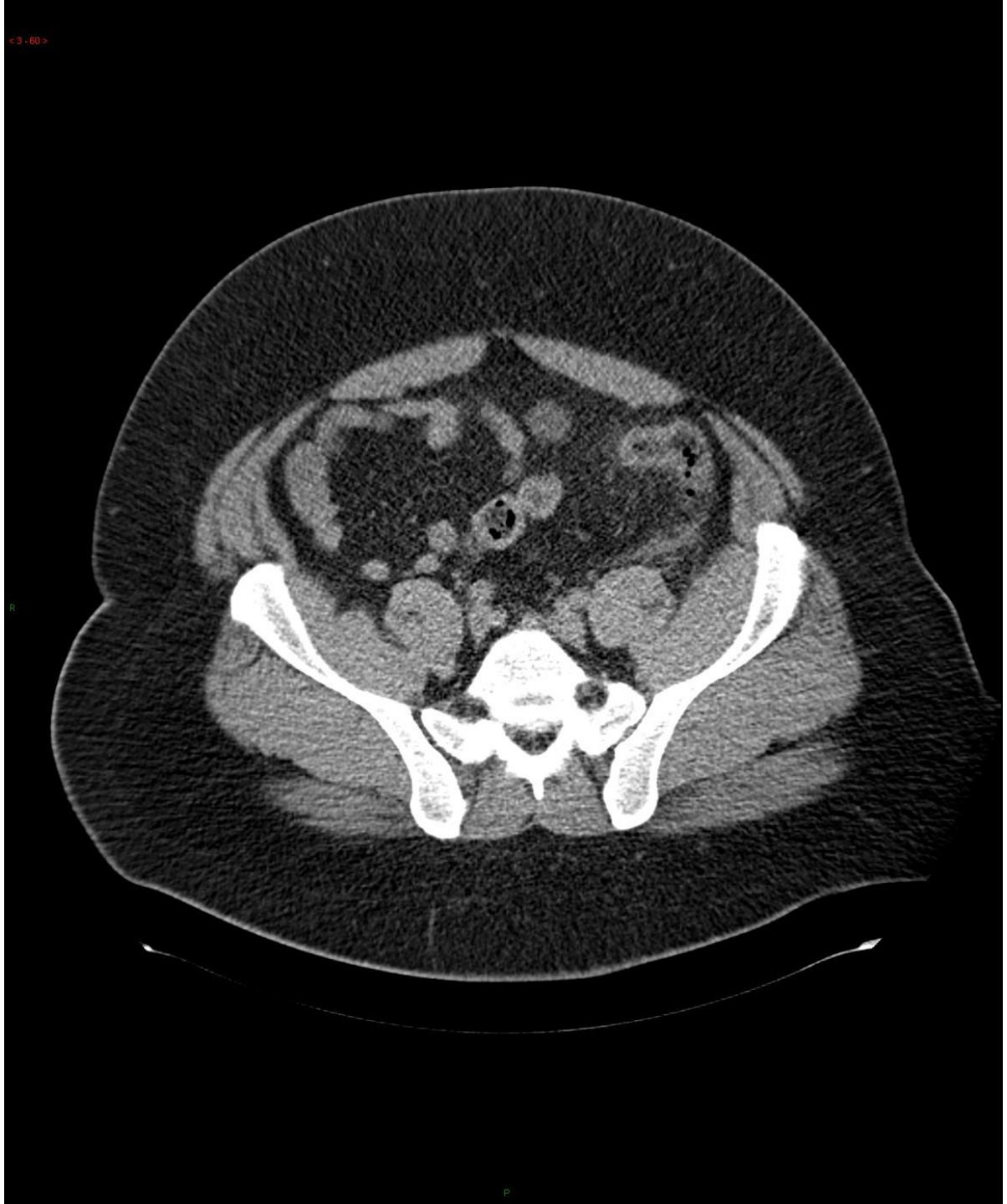
3D data



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3D data

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3D data

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3D data

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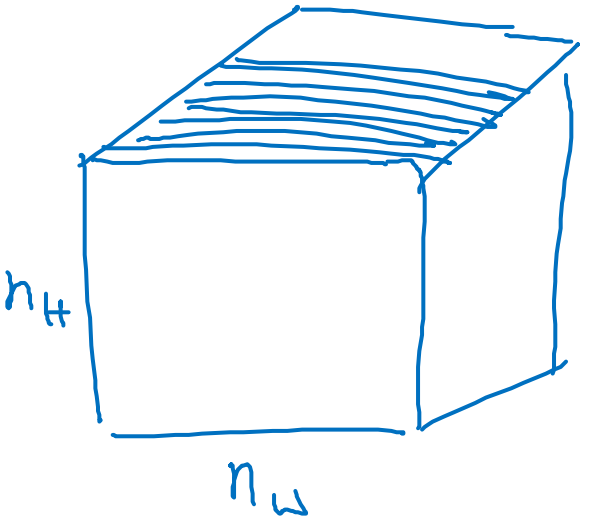
3D data



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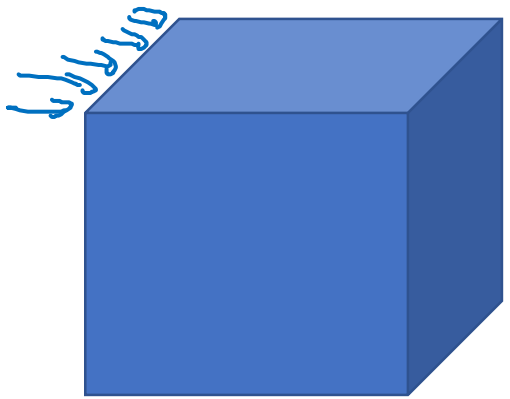
3D convolution



3D volume

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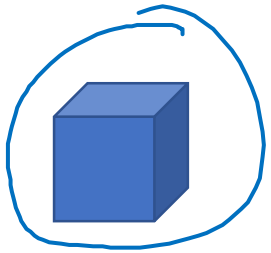

3D filter

n_c

$14 \times 14 \times 14 \times 1$

$* \quad 5 \times 5 \times 5 \times 1$

16 filters.

$\rightarrow 10 \times 10 \times 10 \times 16$

$* \; 5 \times 5 \times 5 \times 16$

32 filters

$\rightarrow \quad 6 \times 6 \times 6 \times 32$

Cat-scans, medical scans in one example of 3d volumes,
but another example of data you could treat as a 3d volume would be movie data, where the different slices could be different slices in time through a movie. And you could use this to detect motion or people taking actions in movies.