Lecture 25: Deep neural networks continued
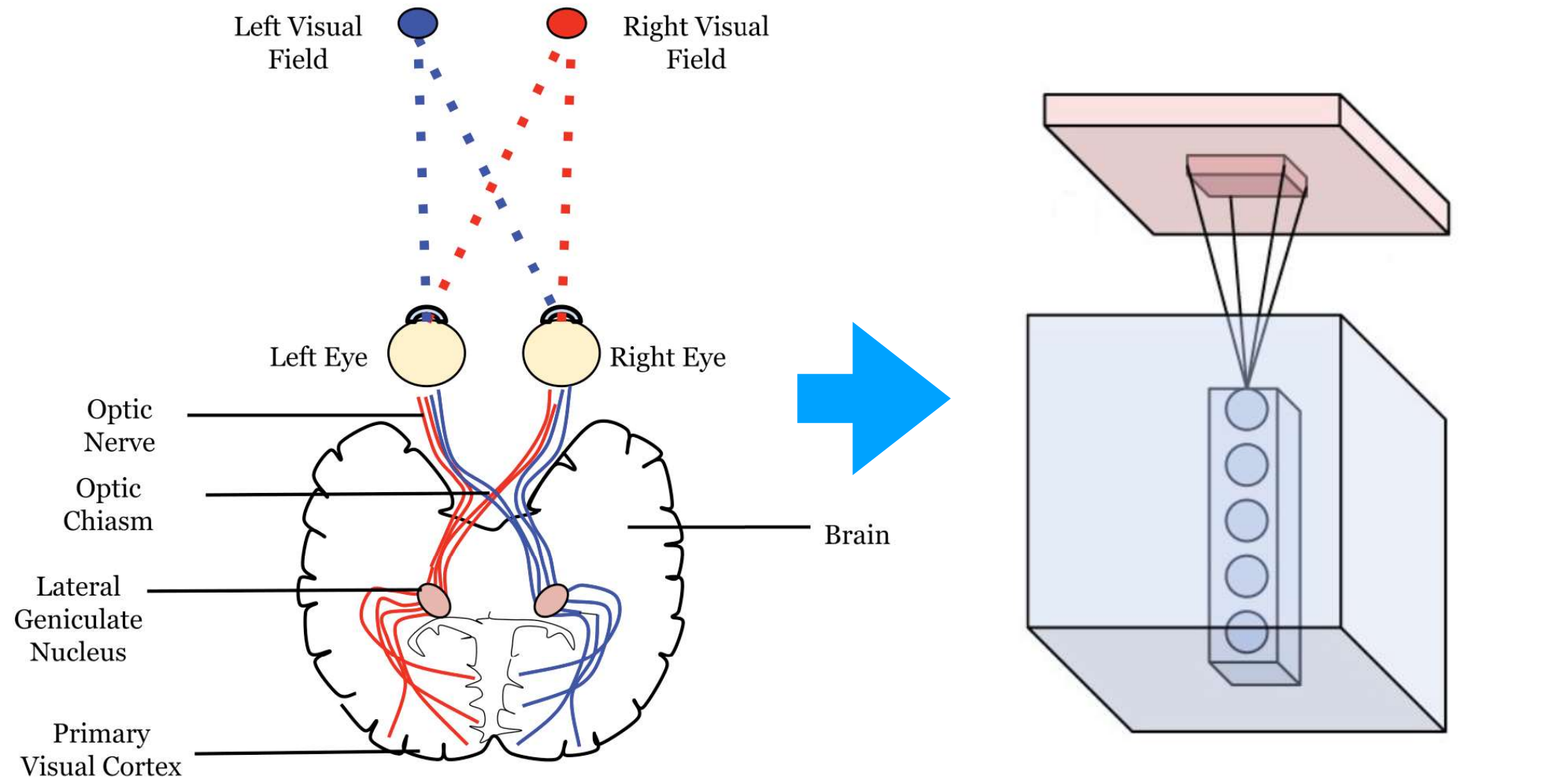
Professor Ilias Bilionis
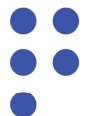
Image classification using convolutional neural networks

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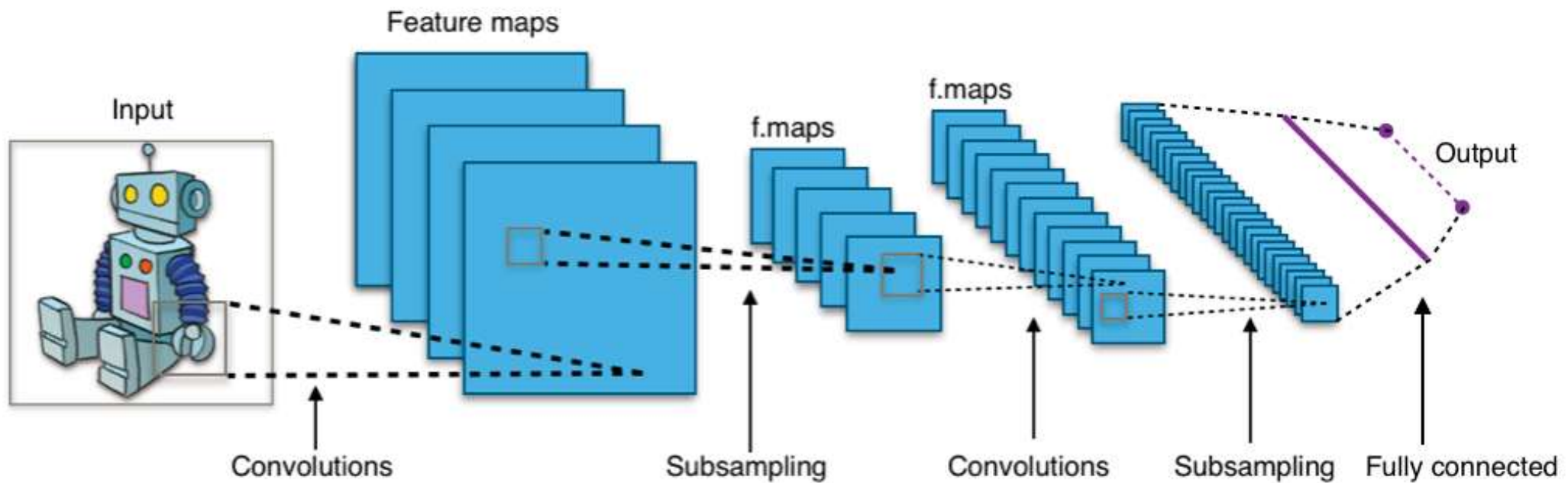SCIENCE LABORATORY**

Animal visual cortex

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5

A typical CNN architecture

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Why do they work well for image recognition?

- Translation invariant.

- Shared parameters -> Less prone to overfitting.
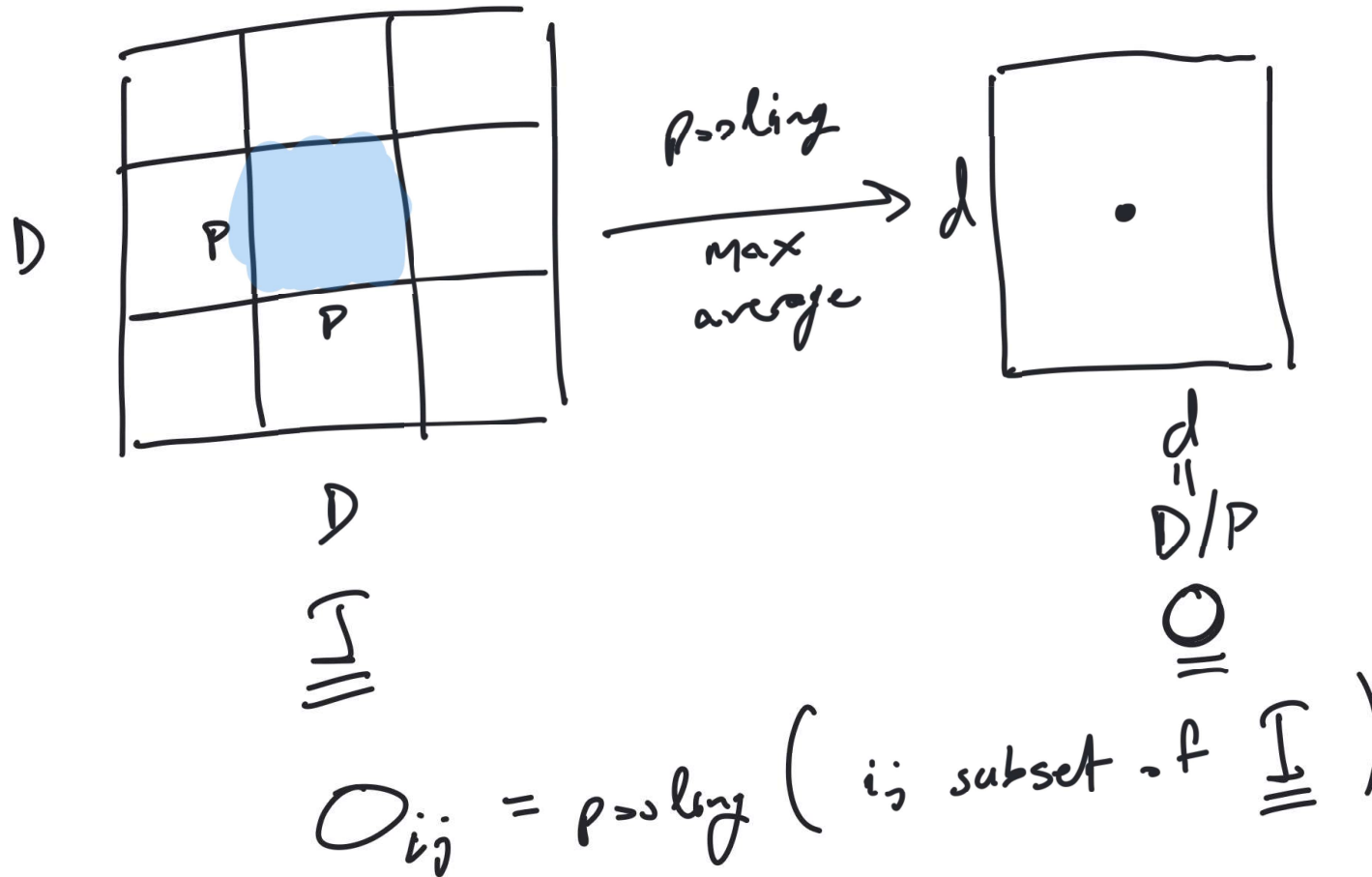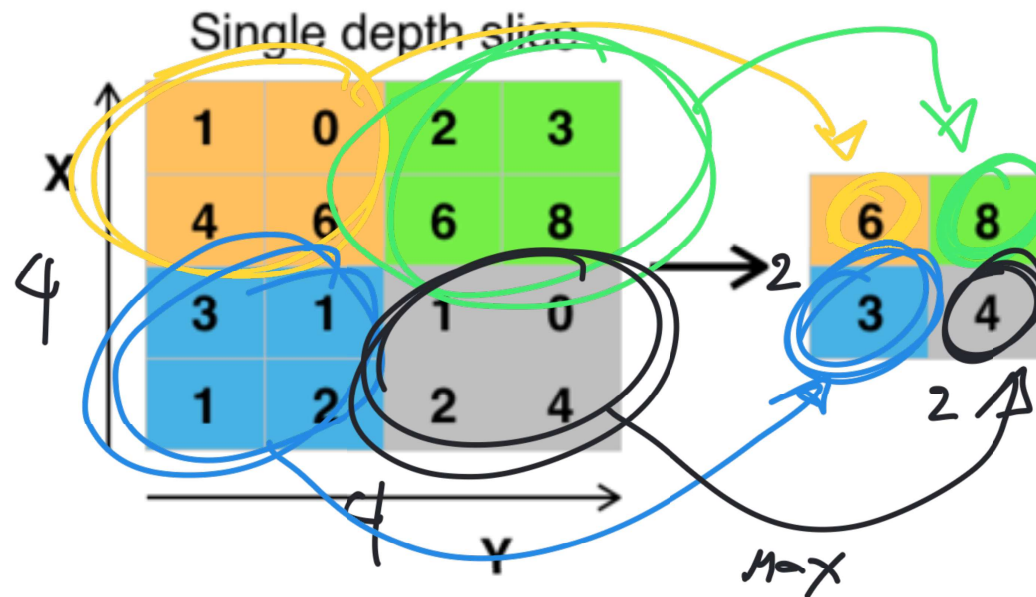
- Hierarchical pattern recognition.

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The convolutional layer

$$S_{ij} = \sum_{m,n=1}^{M} I_{i+m,j+n} K_{mn}$$

kernel parameters

The pooling layer (max)

$$\underline{\underline{O}} = O_{ij} = pooling\left(ij\; subset\; of\; \underline{\underline{I}}\right)$$
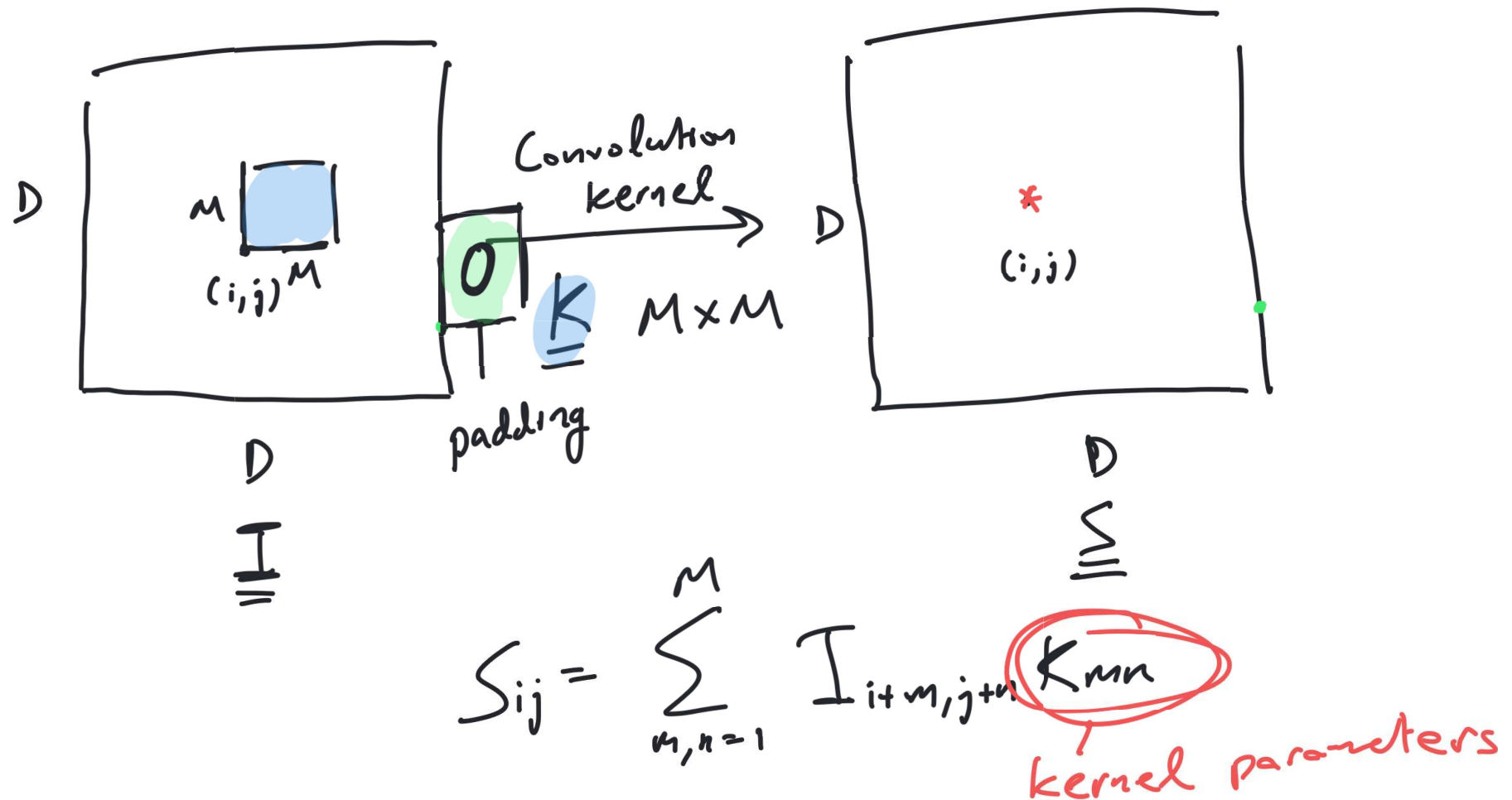
Example of pooling

Max Pooling

$D = 4$ $P = 2$ $\Rightarrow$ $d = \frac{D}{P} = 2$

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