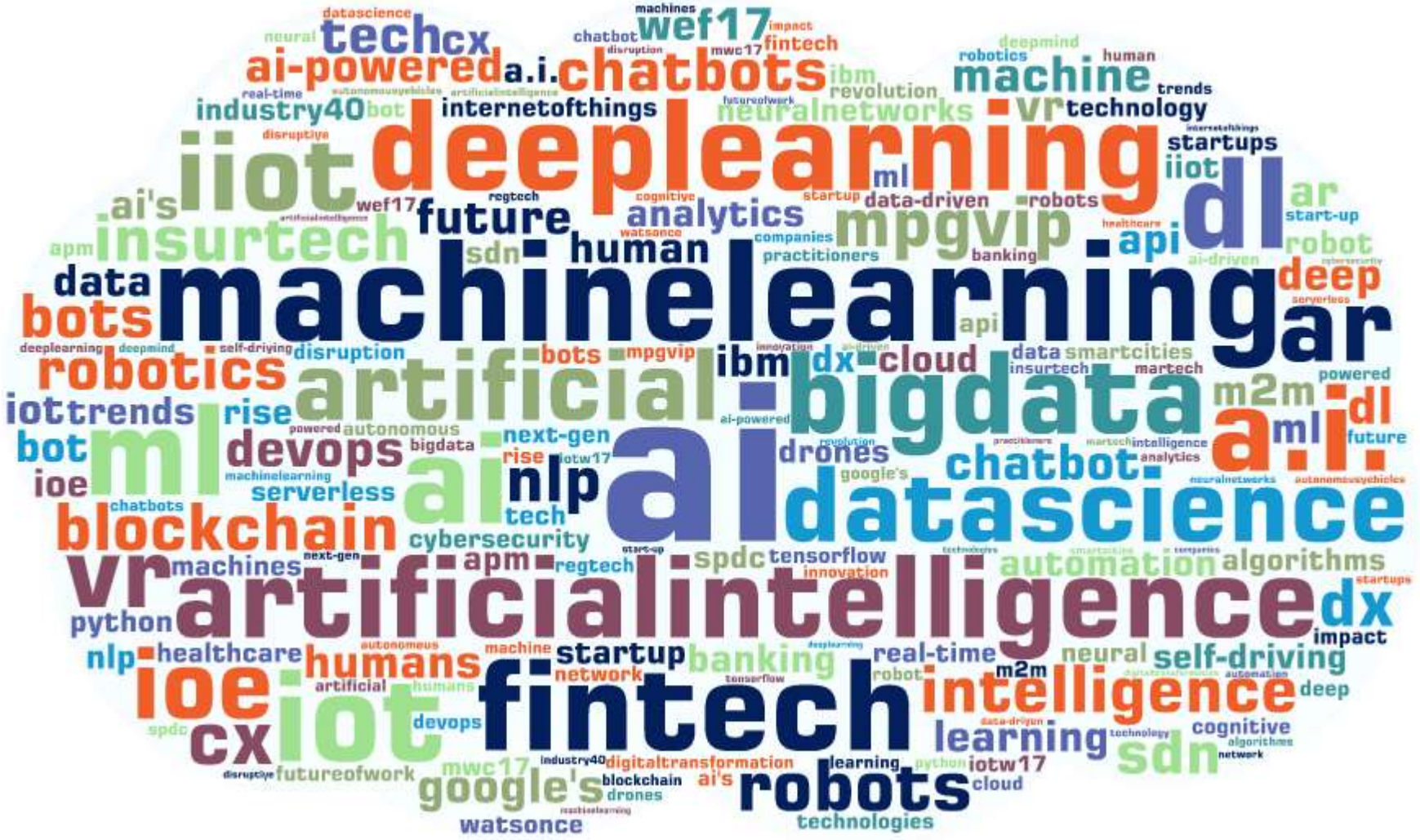

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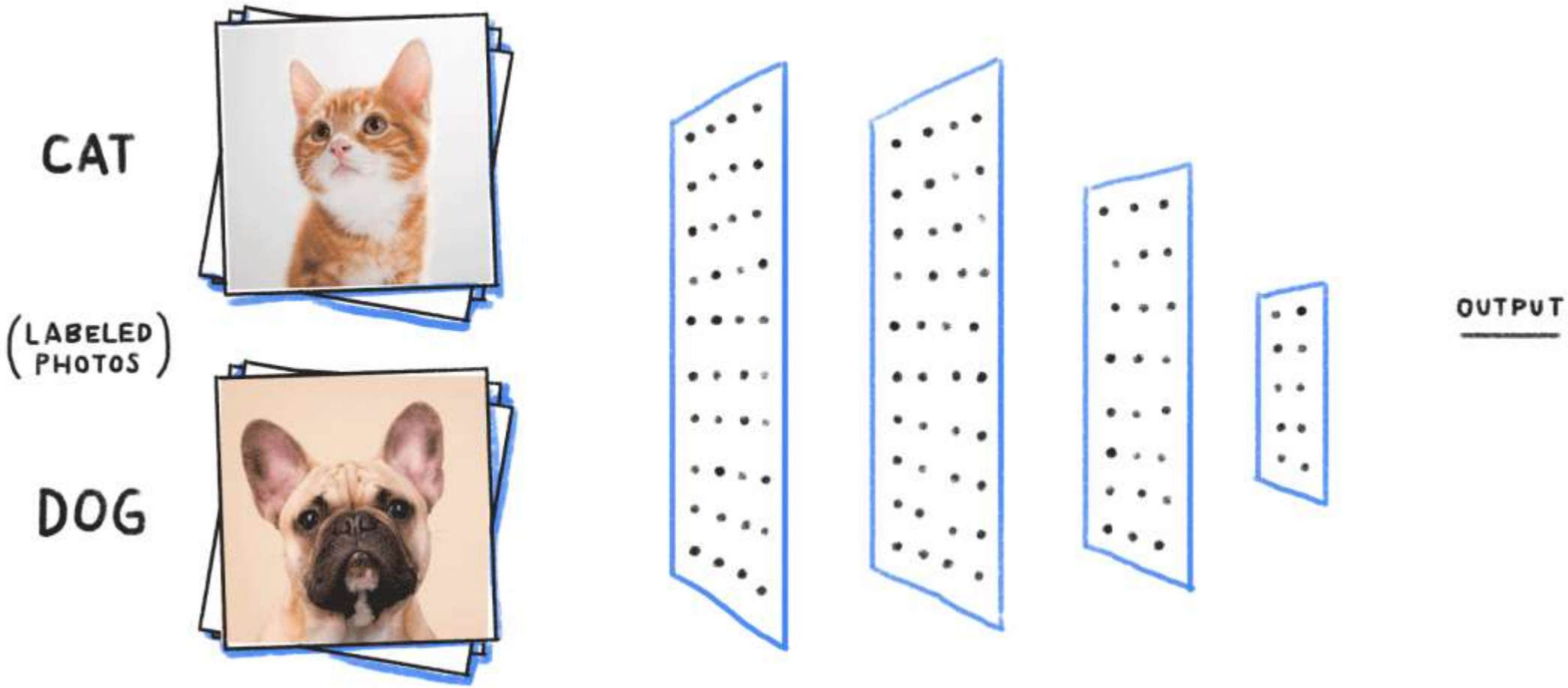

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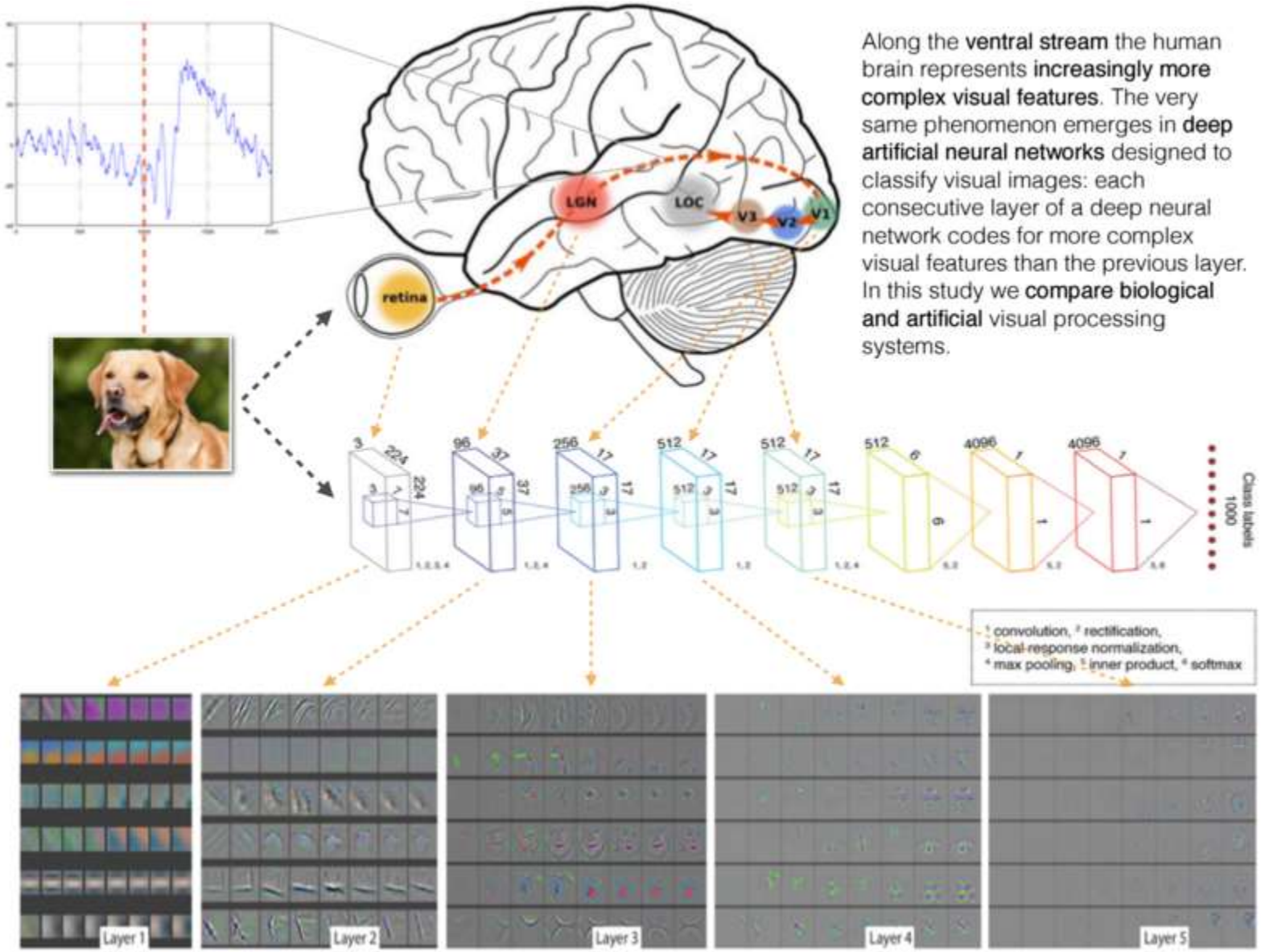
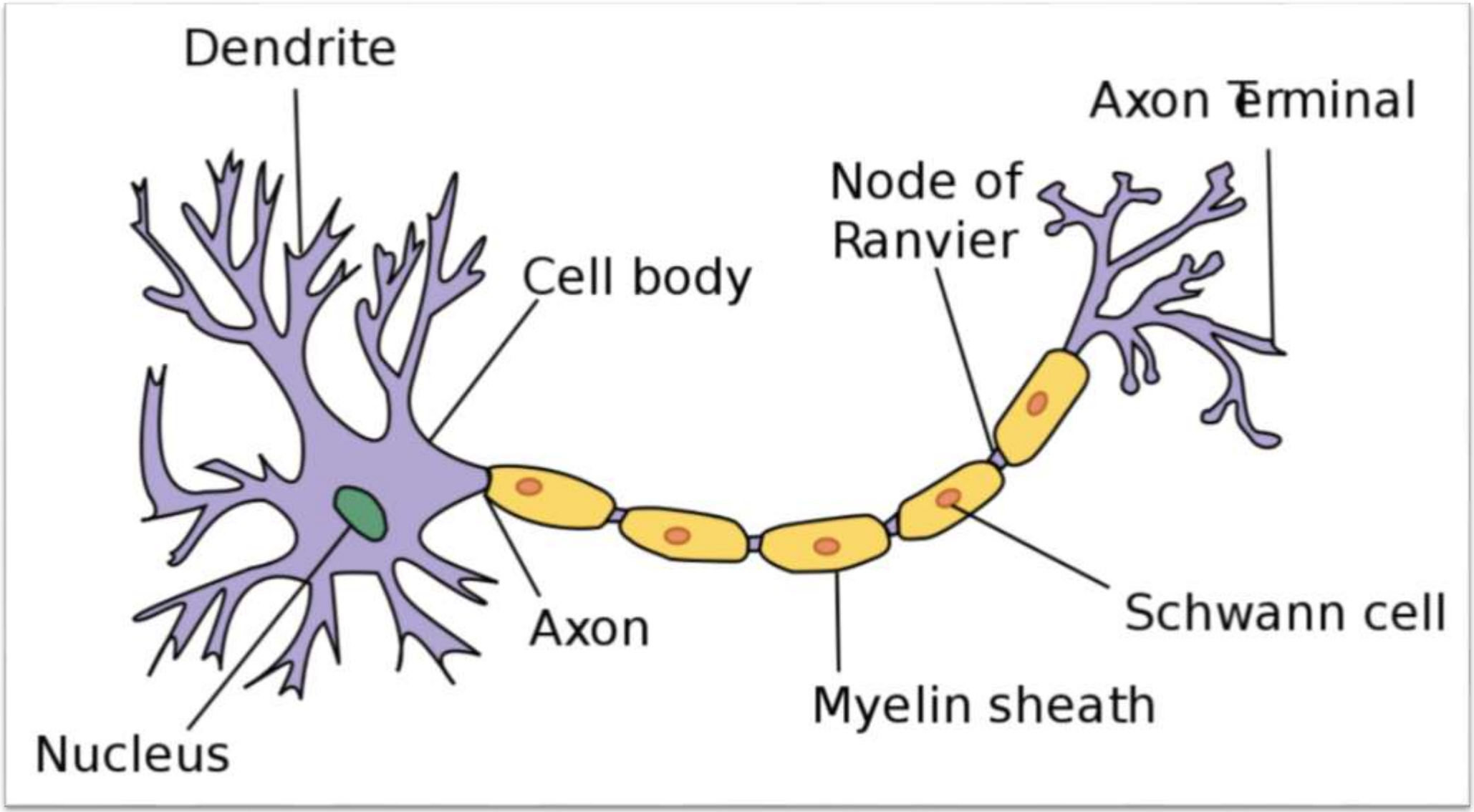
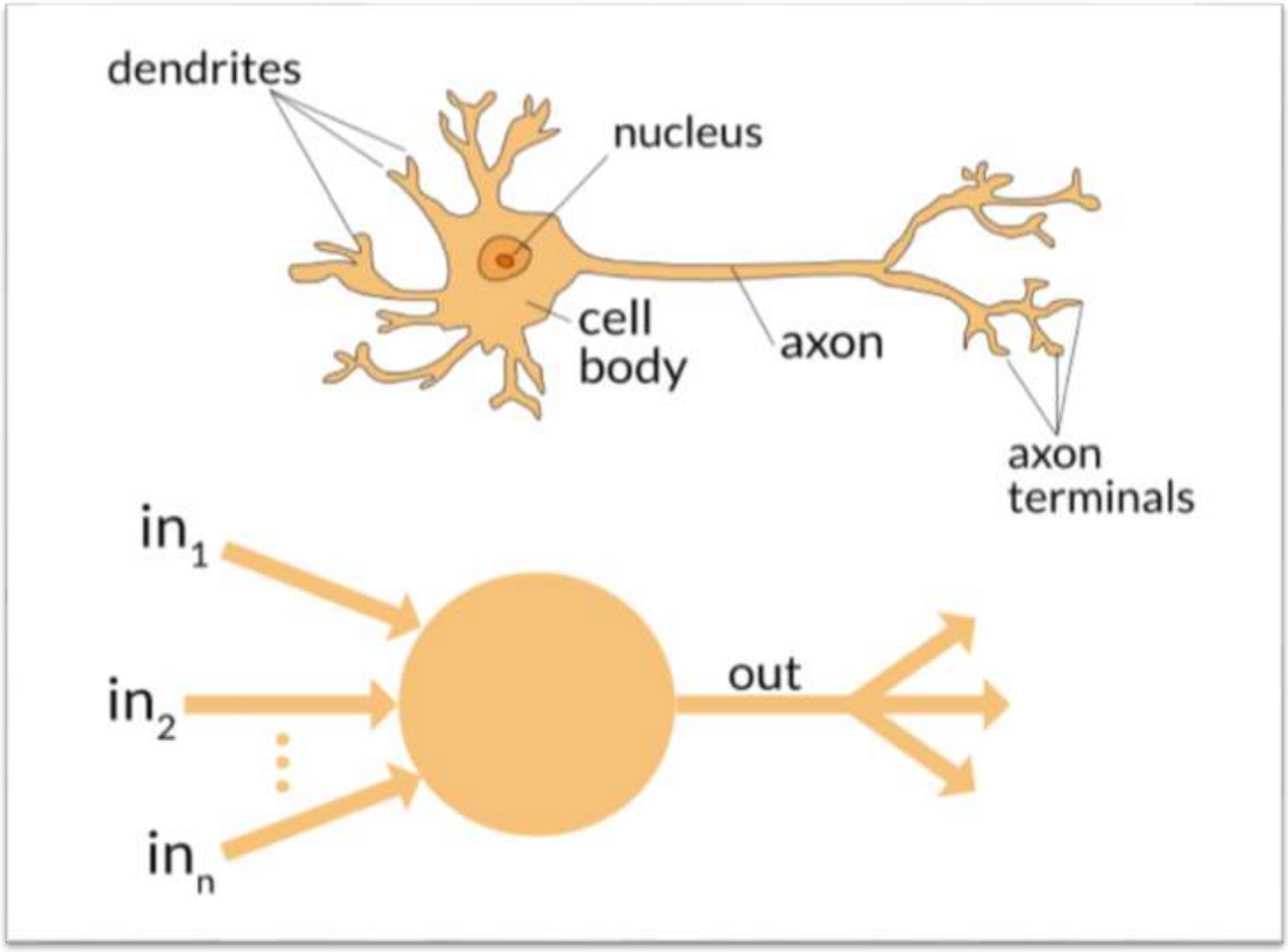
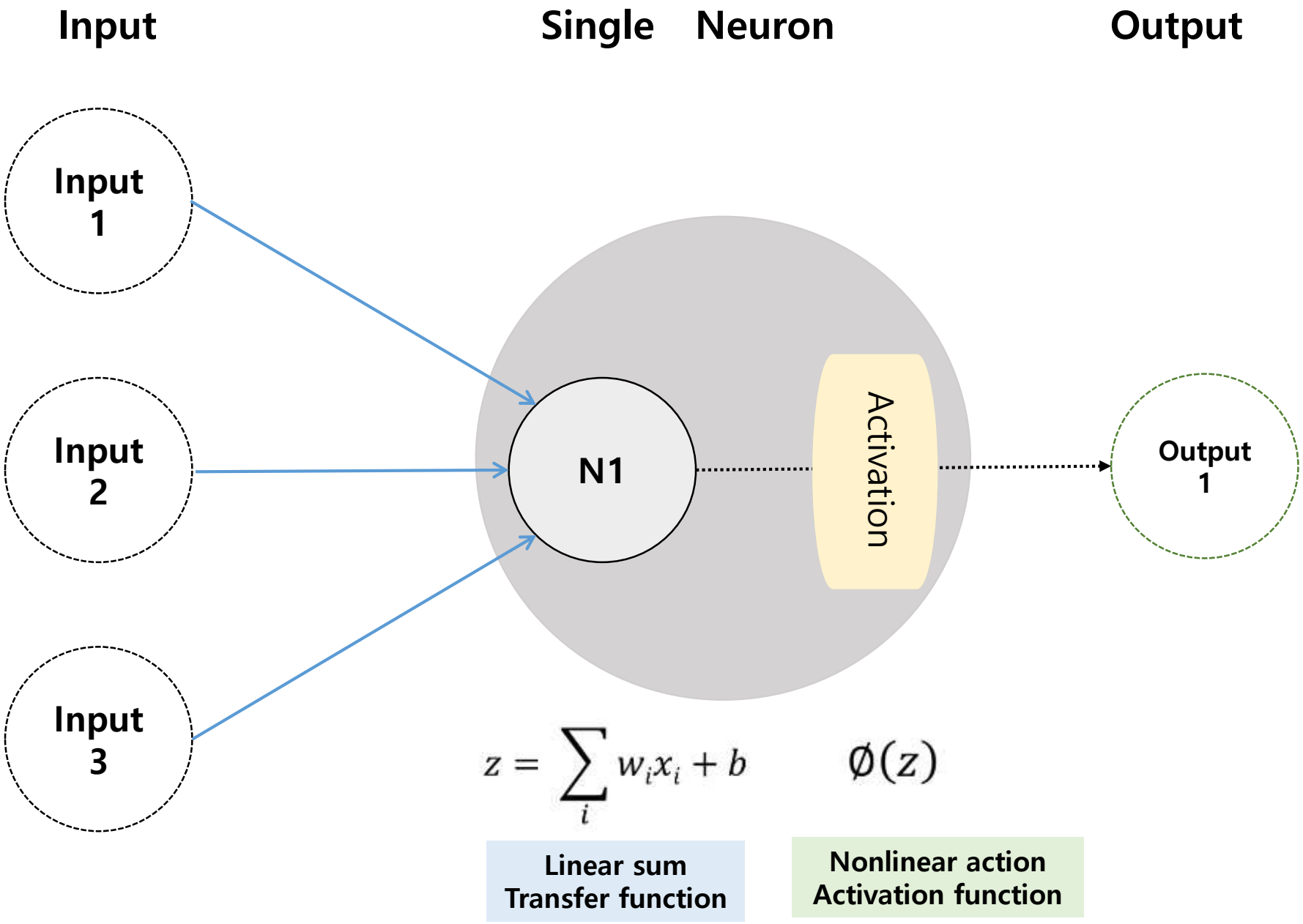

Along the ventral stream the human brain represents increasingly more complex visual features. The very same phenomenon emerges in deep artificial neural networks designed to classify visual images: each consecutive layer of a deep neural network codes for more complex visual features than the previous layer. In this study we compare biological and artificial visual processing systems.
LGN
LOC
V3
V2
V1
retina
Class labels
1000
convolution, rectification,
local response normalization,
max pooling, inner product, softmax
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

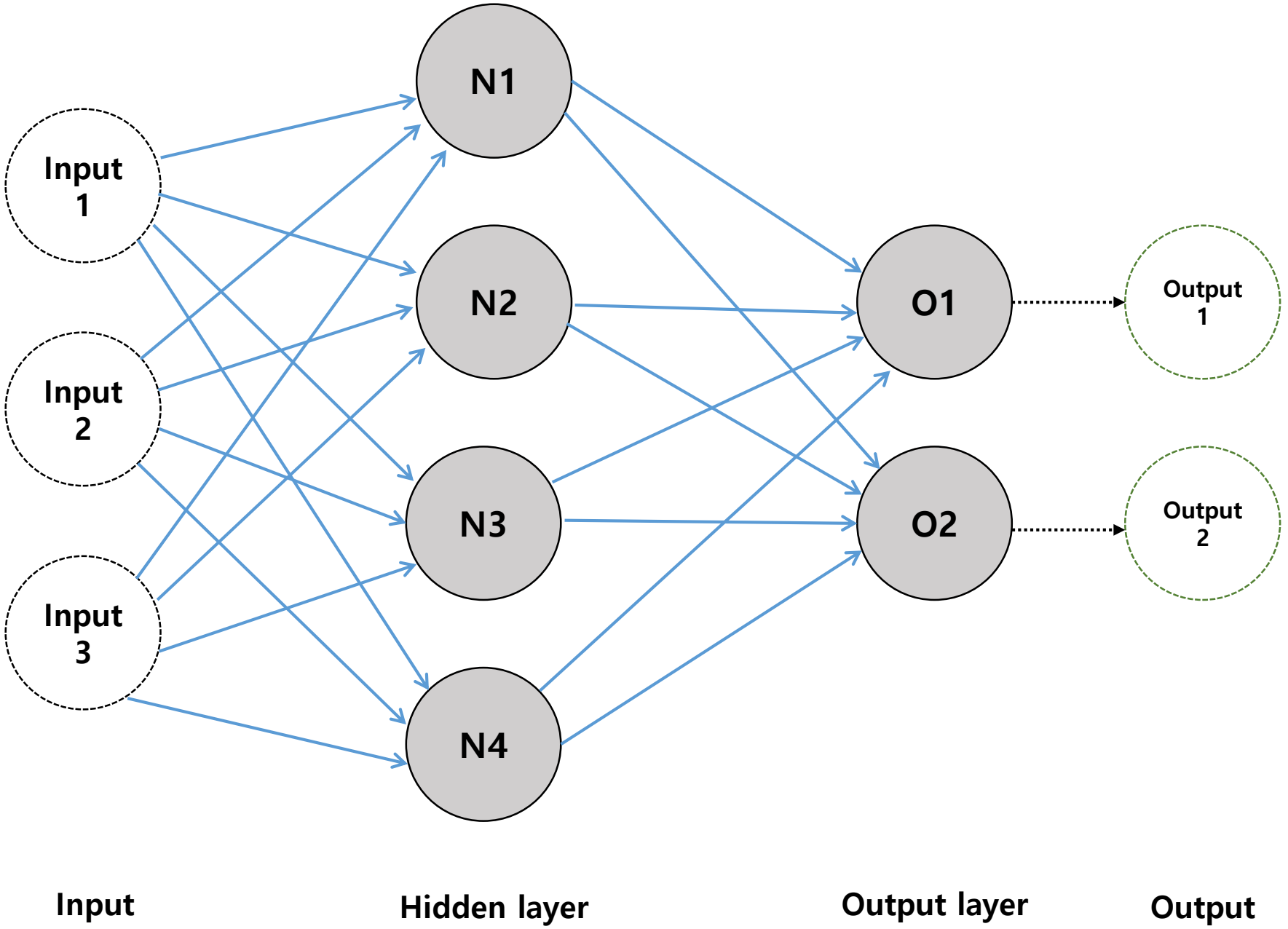
source

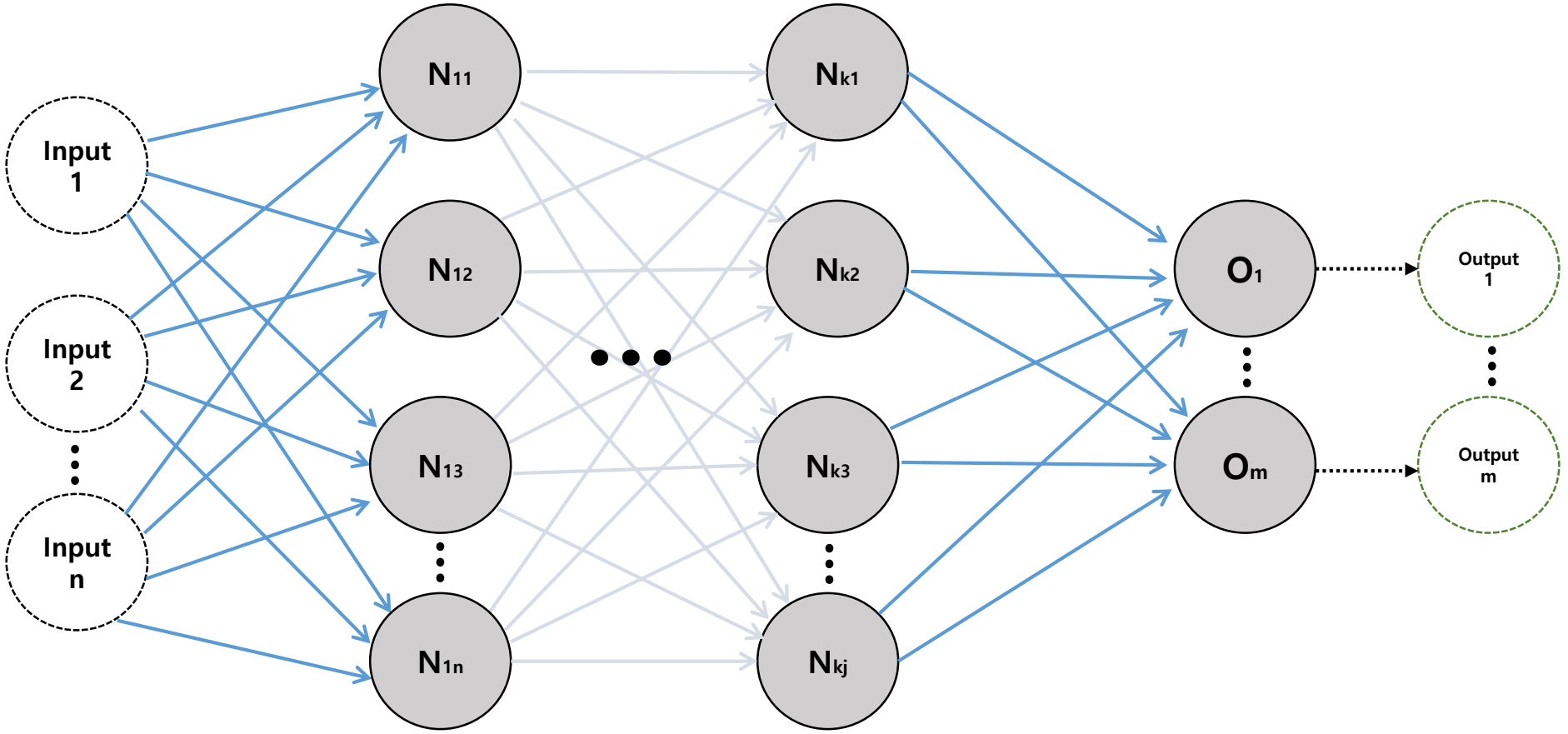

Dendrite
Axon Terminal
Node of Ranvier
Cell body
Axon
Schwann cell
Myelin sheath
Nucleus

Biological neuron vs. ANN




Input
Single Neuron
Output
Input 1
Input 2
Input 3
N1
Activation
Output 1
$z = \sum_i w_i x_i + b$
$\emptyset(z)$
Linear sum
Transfer function
Nonlinear action
Activation function

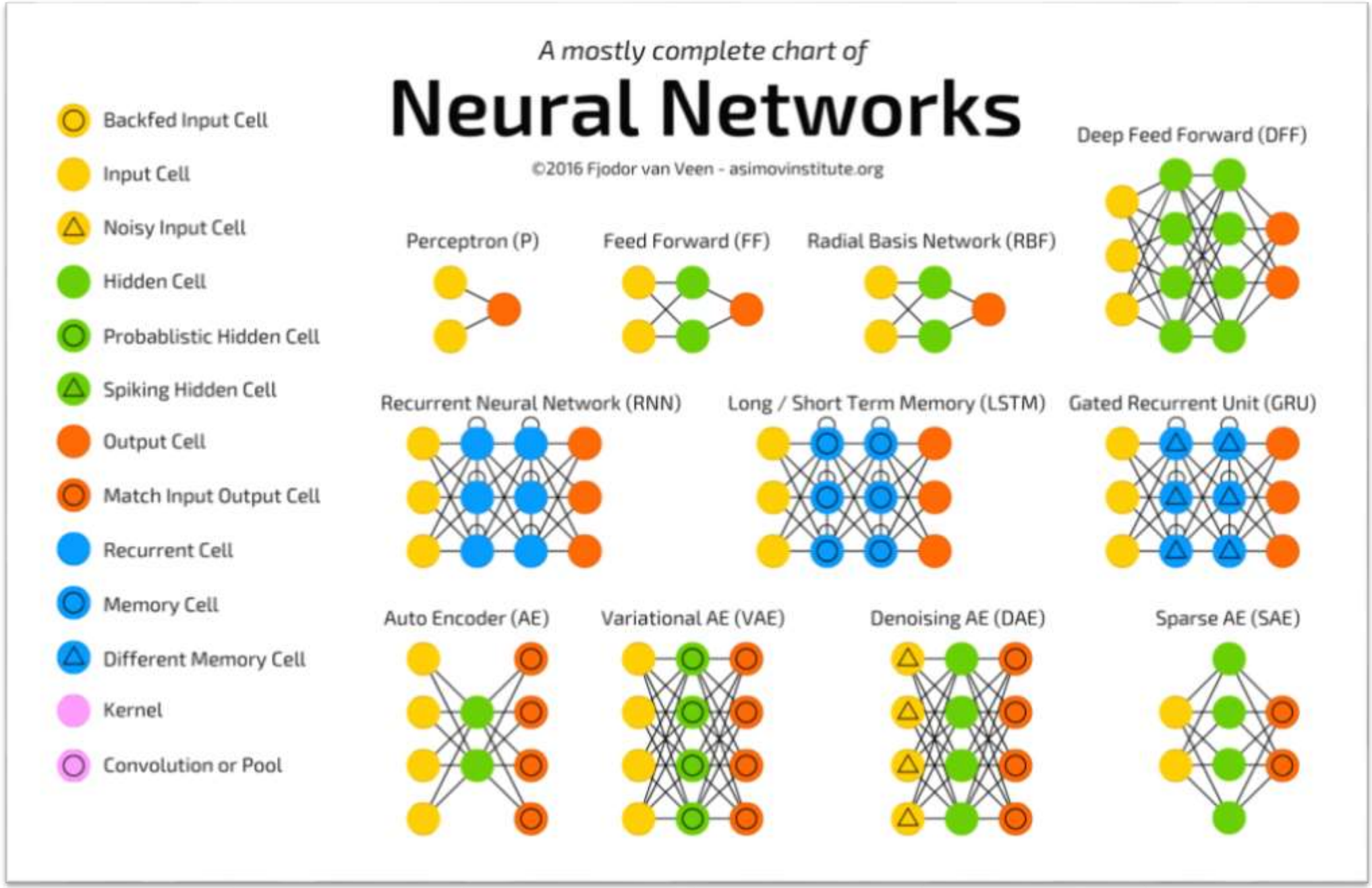

Input 1
Input 2
Input 3
N1
N2
N3
N4
O1
O2
Output 1
Output 2
Input
Hidden layer
Output layer
Output



n-Input

k-Hidden layers → deep layer

m-Output layer

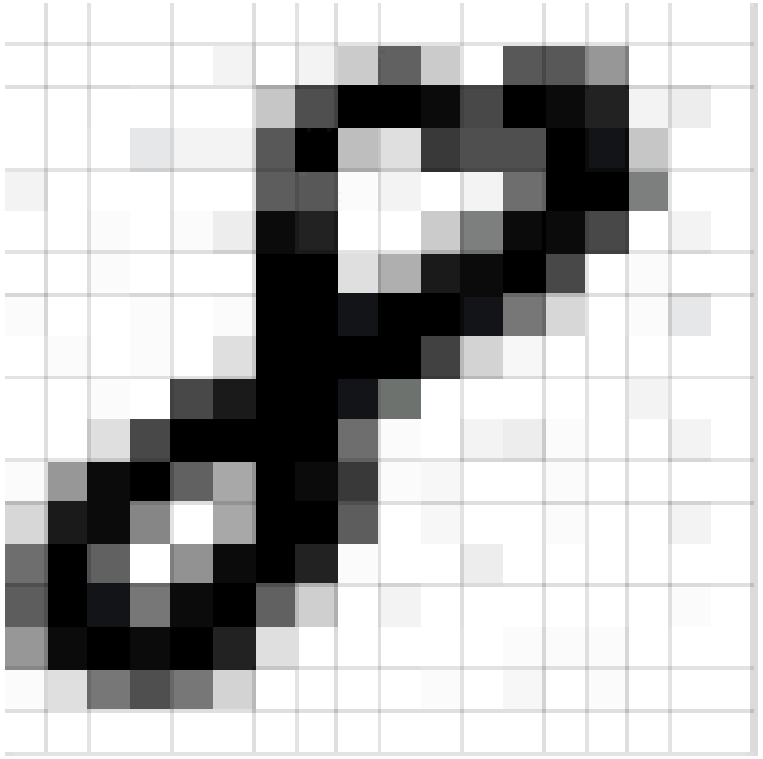


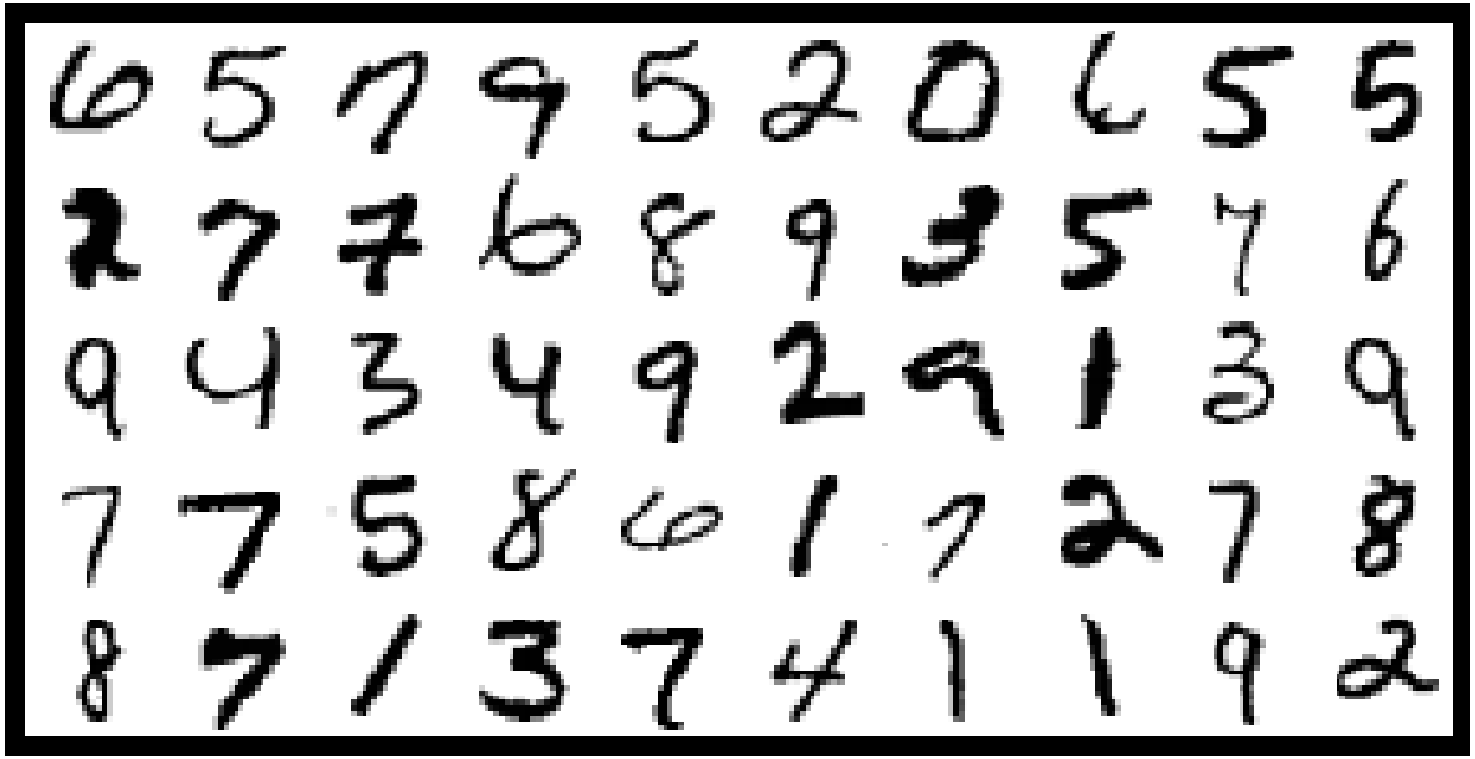
https://leonardoaraujosantos.gitbooks.io/artificial-inteligence/content/neural_networks.html

Deep Learning of Images

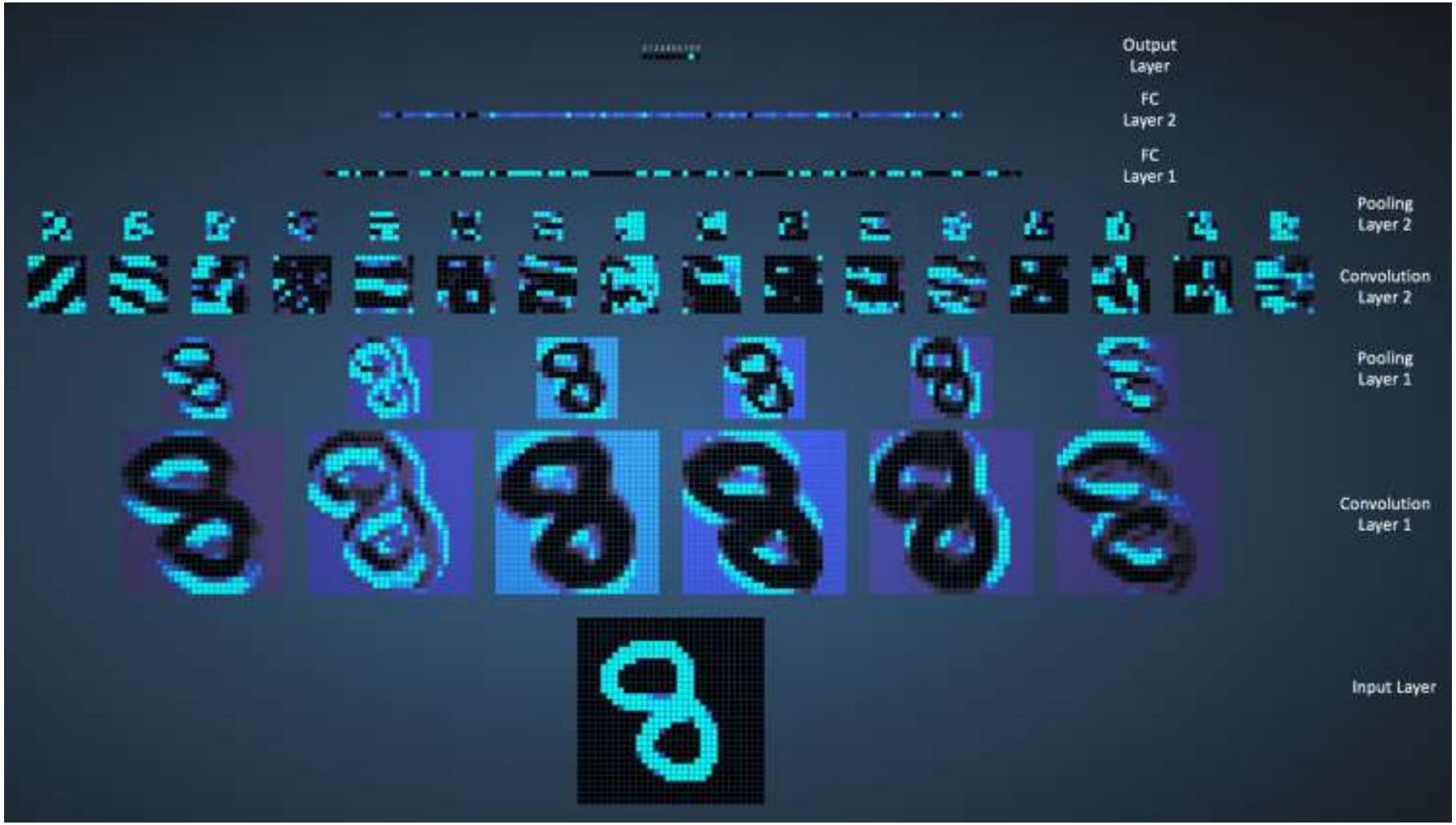
→ Conv2D

MNIST



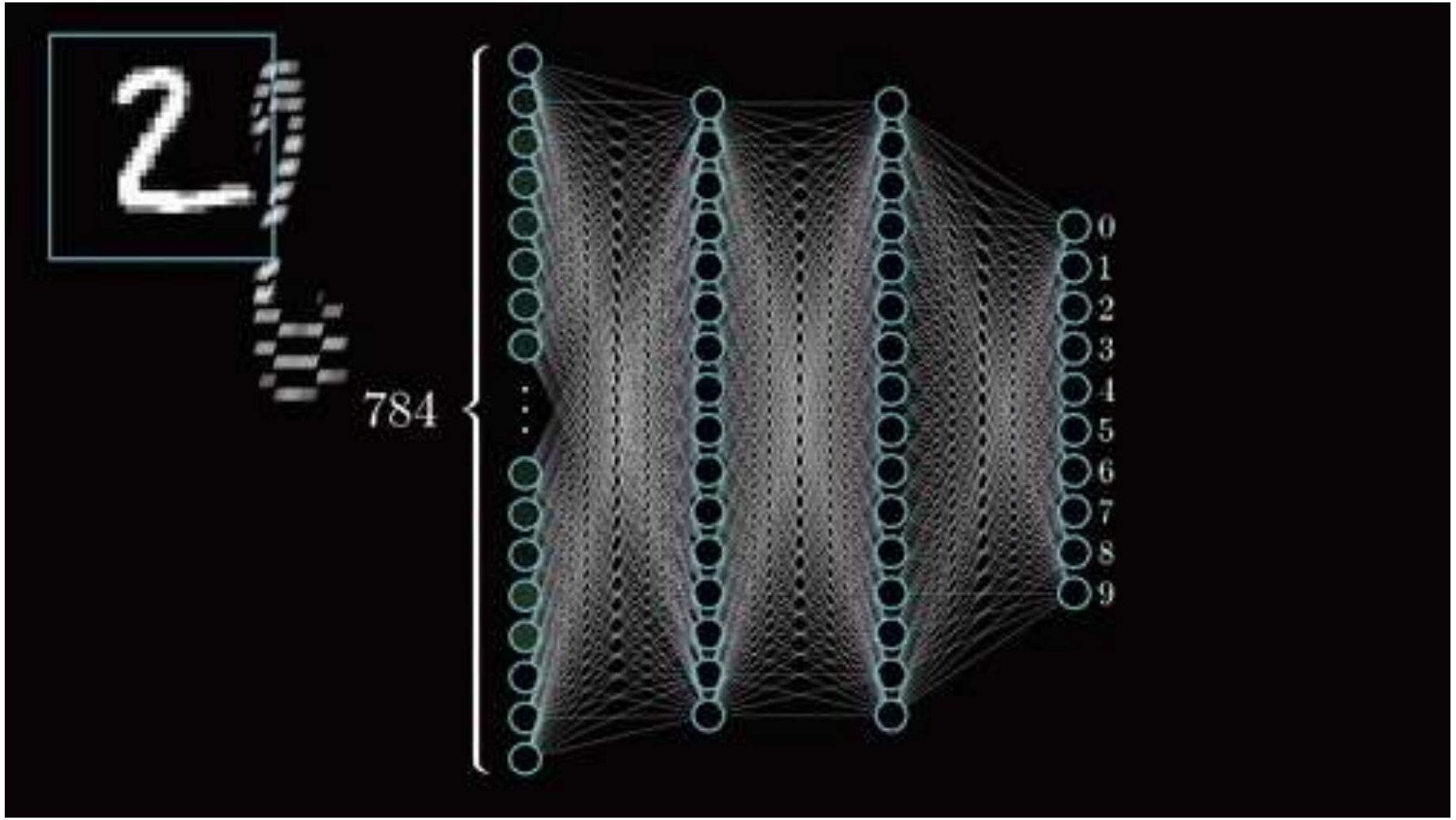


Convolution & Pooling



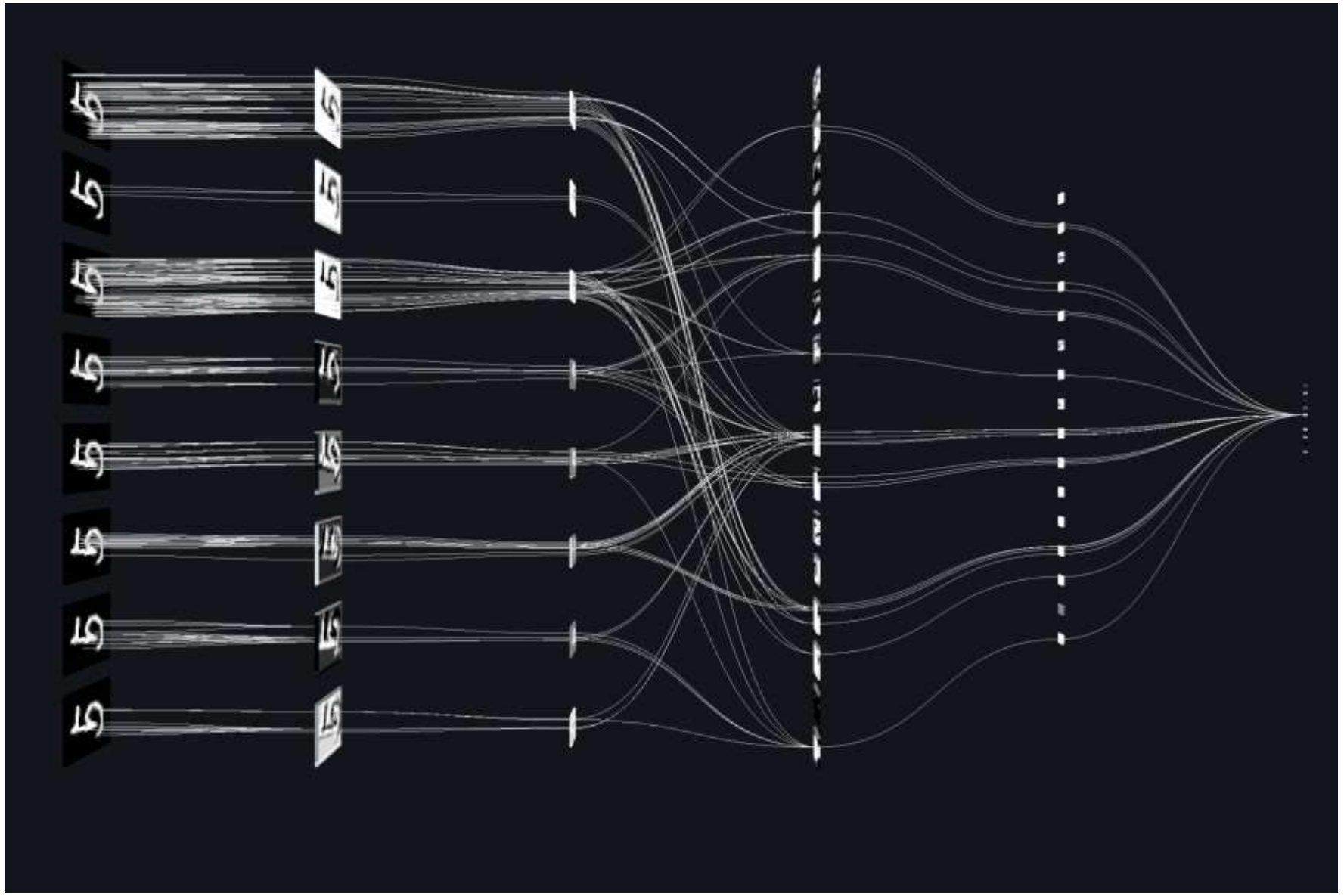
https://link.springer.com/chapter/10.1007%2F978-3-319-27857-5_77

Convolution & Pooling



source

Convolution & Pooling



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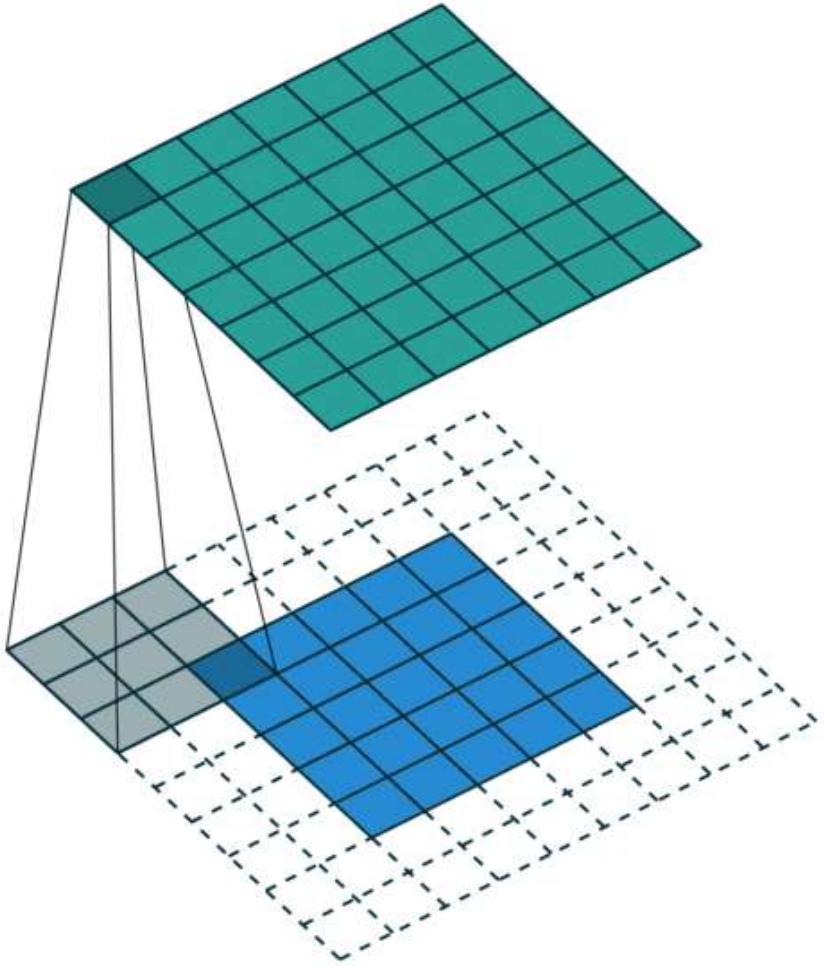
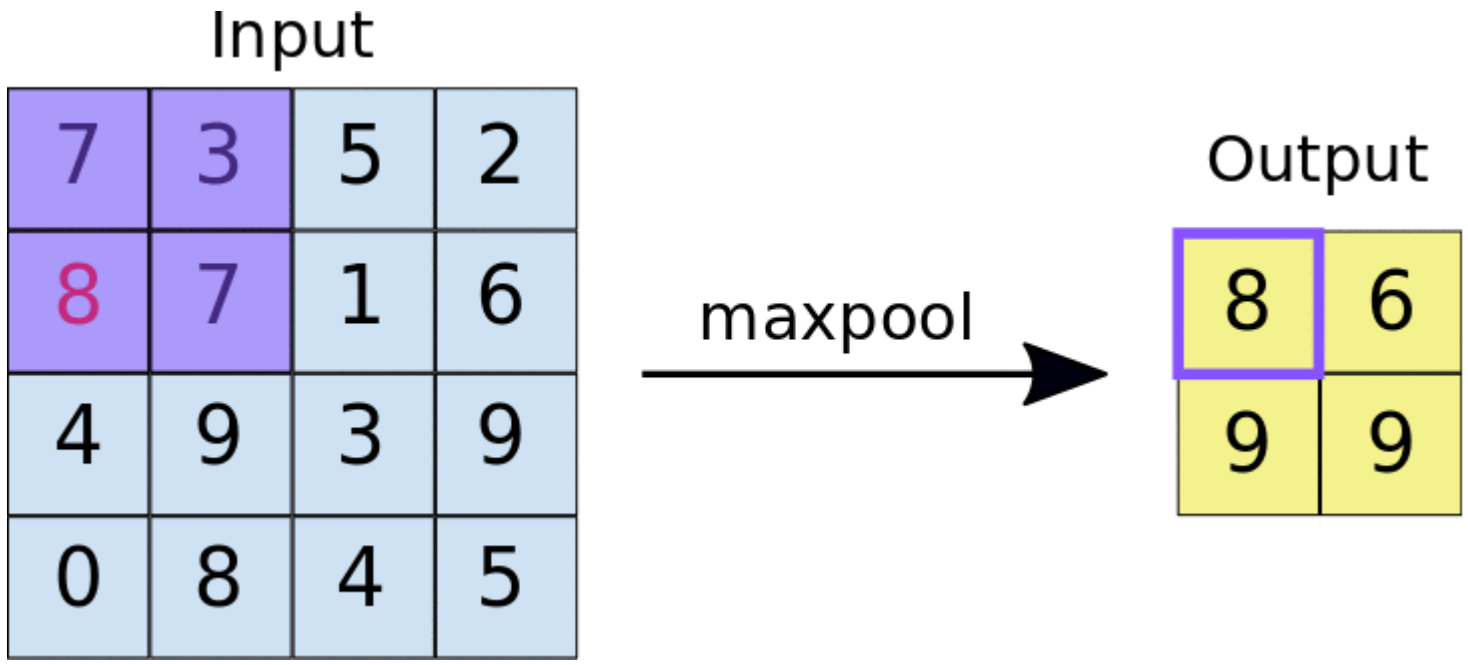
Conv2D

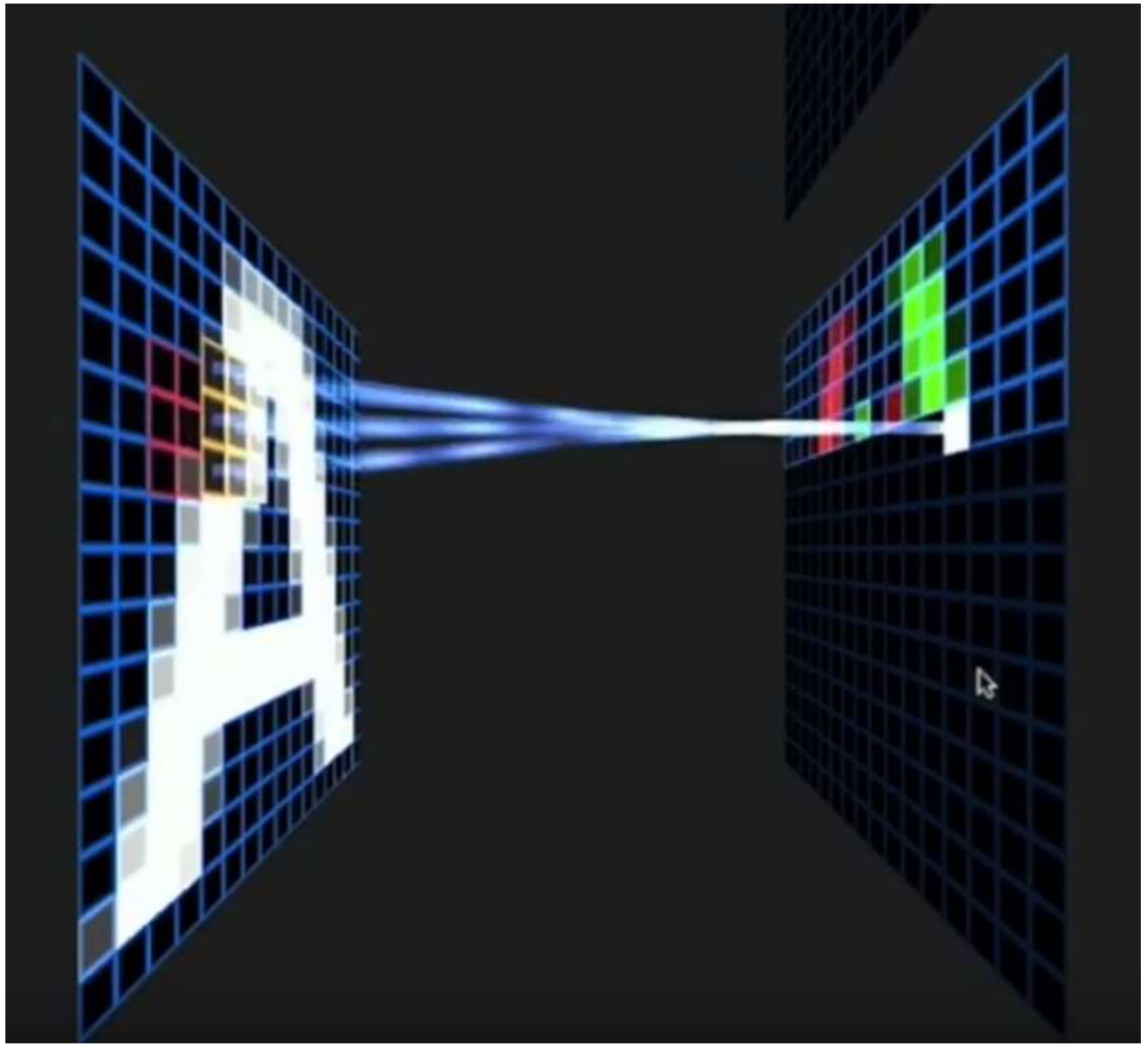


Max-Pooling



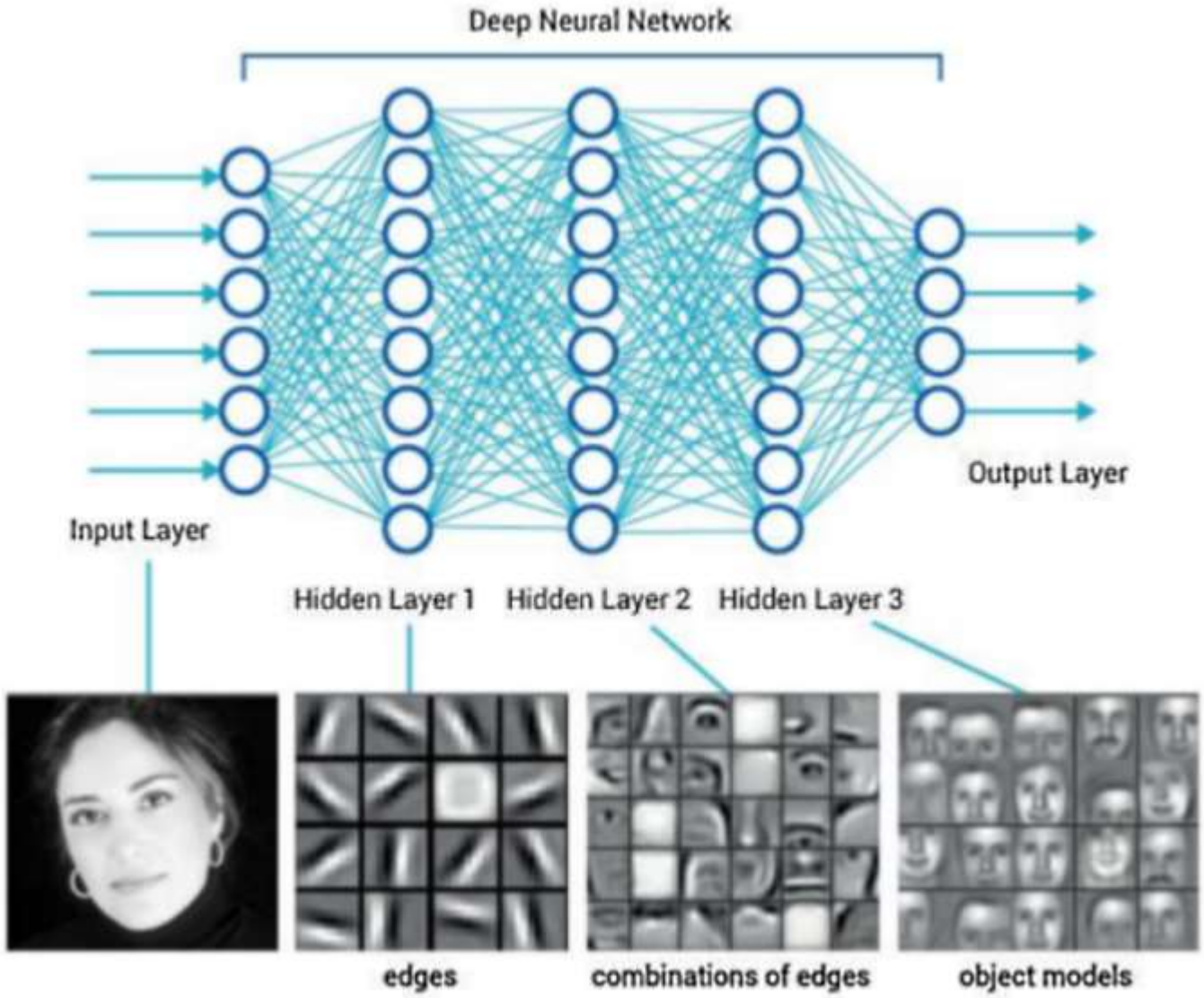
https://developers.google.com/machine-learning/practica/image-classification/convolutional-neural-networks

Convolution & Pooling



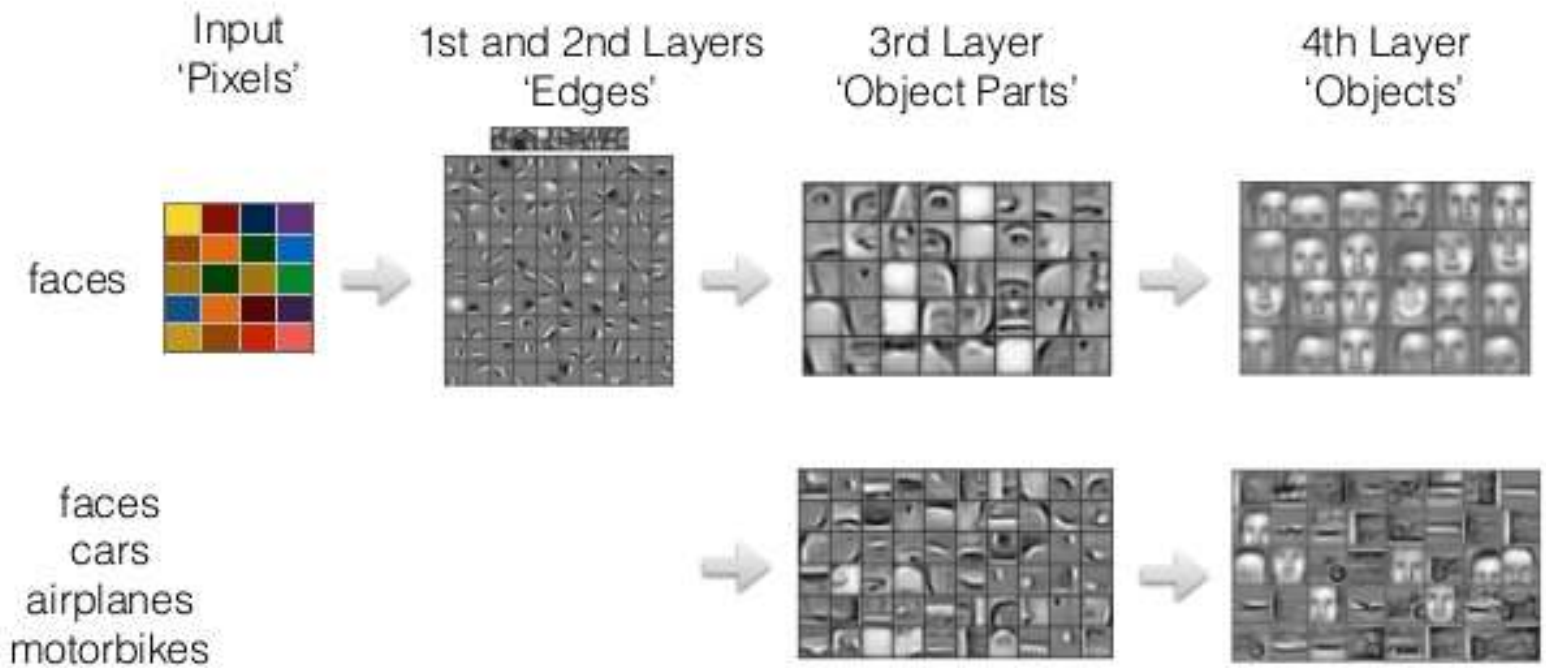
https://www.youtube.com/watch?v=f0t-OCG79-U

How does DL work on images?

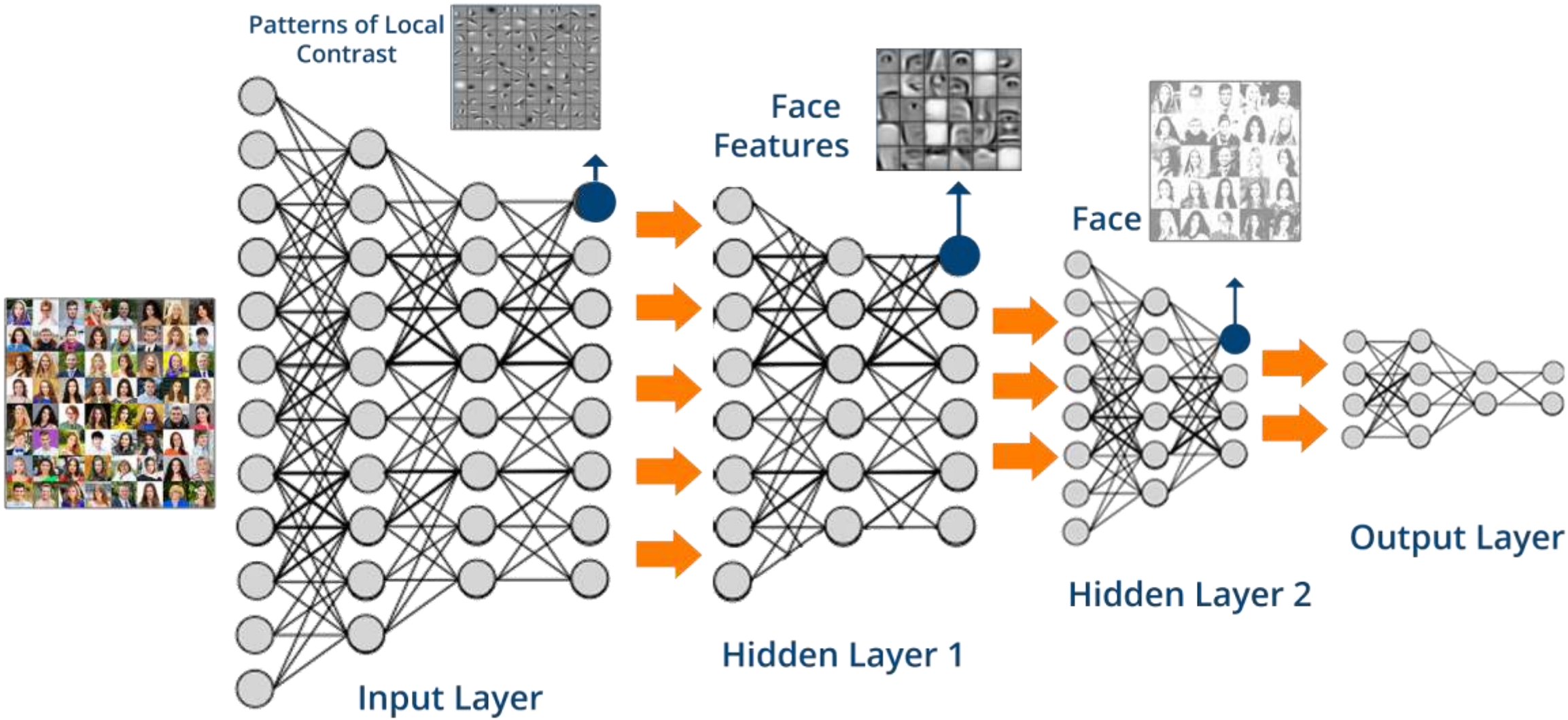


https://miro.medium.com/max/616/1*Uhr-4VDJD0-gnteUNFzZTw.jpeg

Going deeper in the network

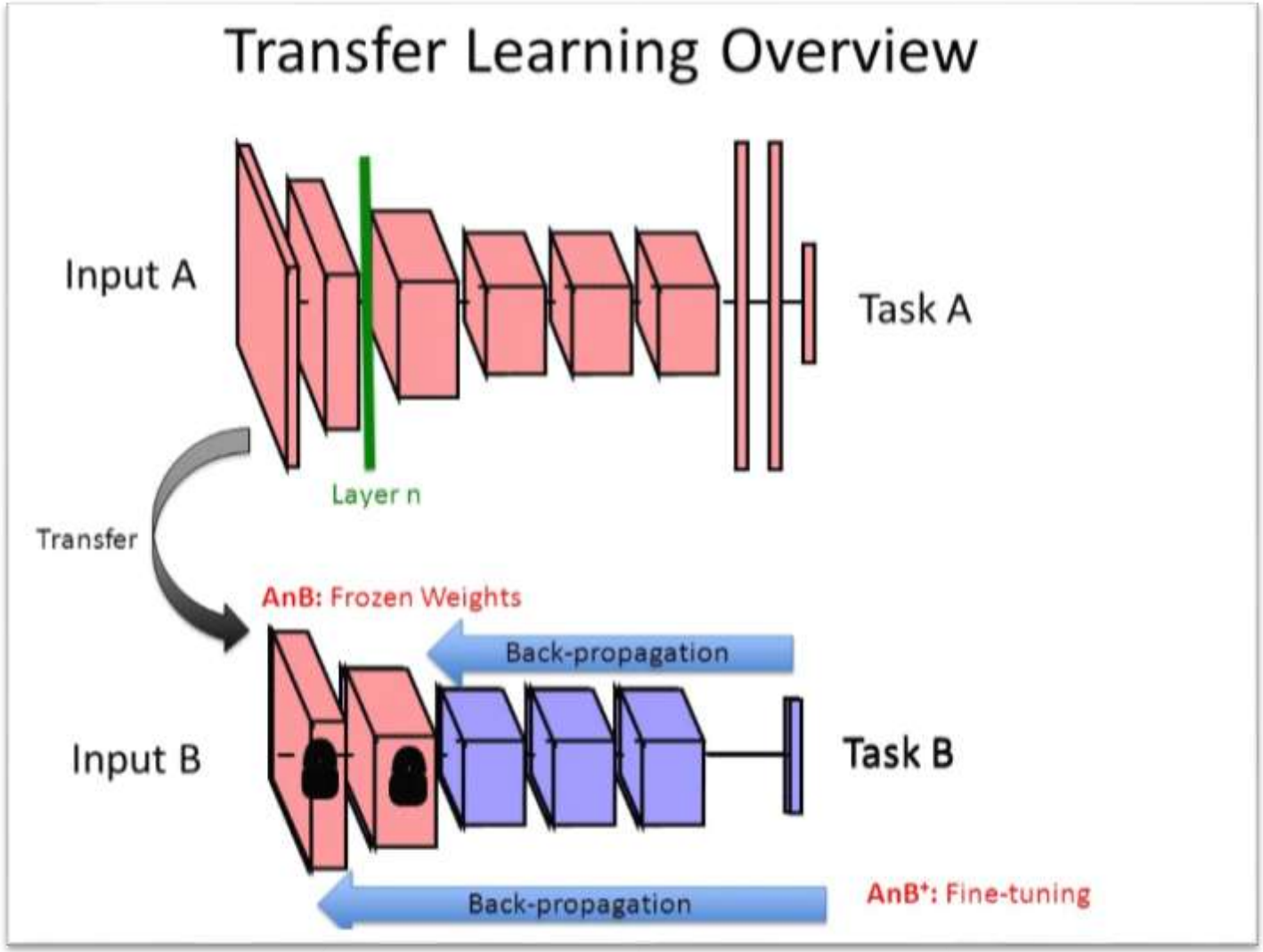


https://image.slidesharecdn.com/deeplearningincomputervision2-150711091158-lva1-app6891/95/deep-learning-in-computer-vision-9-638.jpg?cb=1436605943



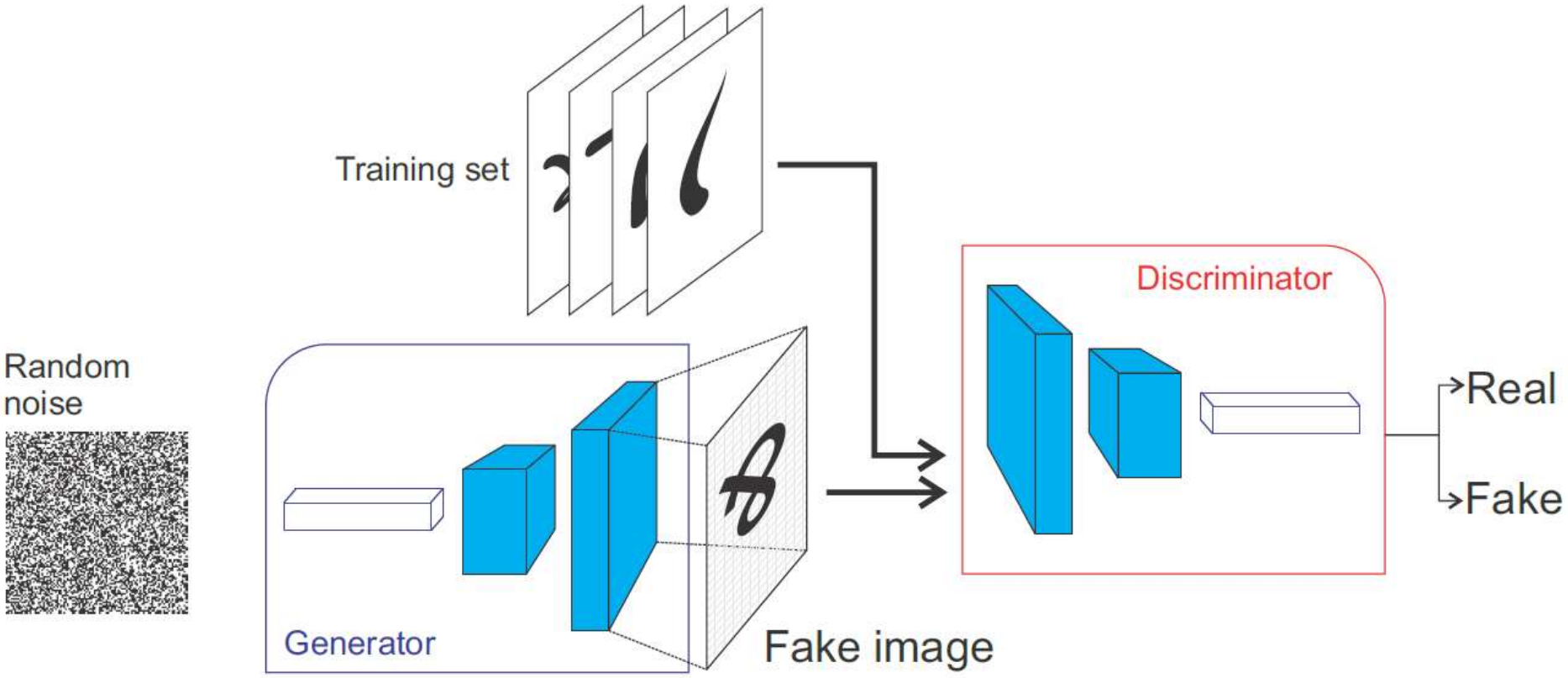
https://cdn.edureka.co/blog/wp-content/uploads/2017/05/Deep-Neural-Network-What-is-Deep-Learning-Edureka.png

Transfer Learning



https://lisaong.github.io/mldds-courseware/03_TextImage/assets/transfer/Transfer+Learning+Overview.jpg

GAN



Source: Hands-On Deep Learning for IoT - Packt