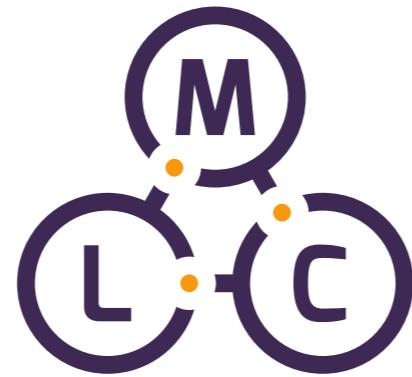


Deep Learning and Image Processing for Raiffeisenbank International

Jiří Materna



Machine
Learning
College

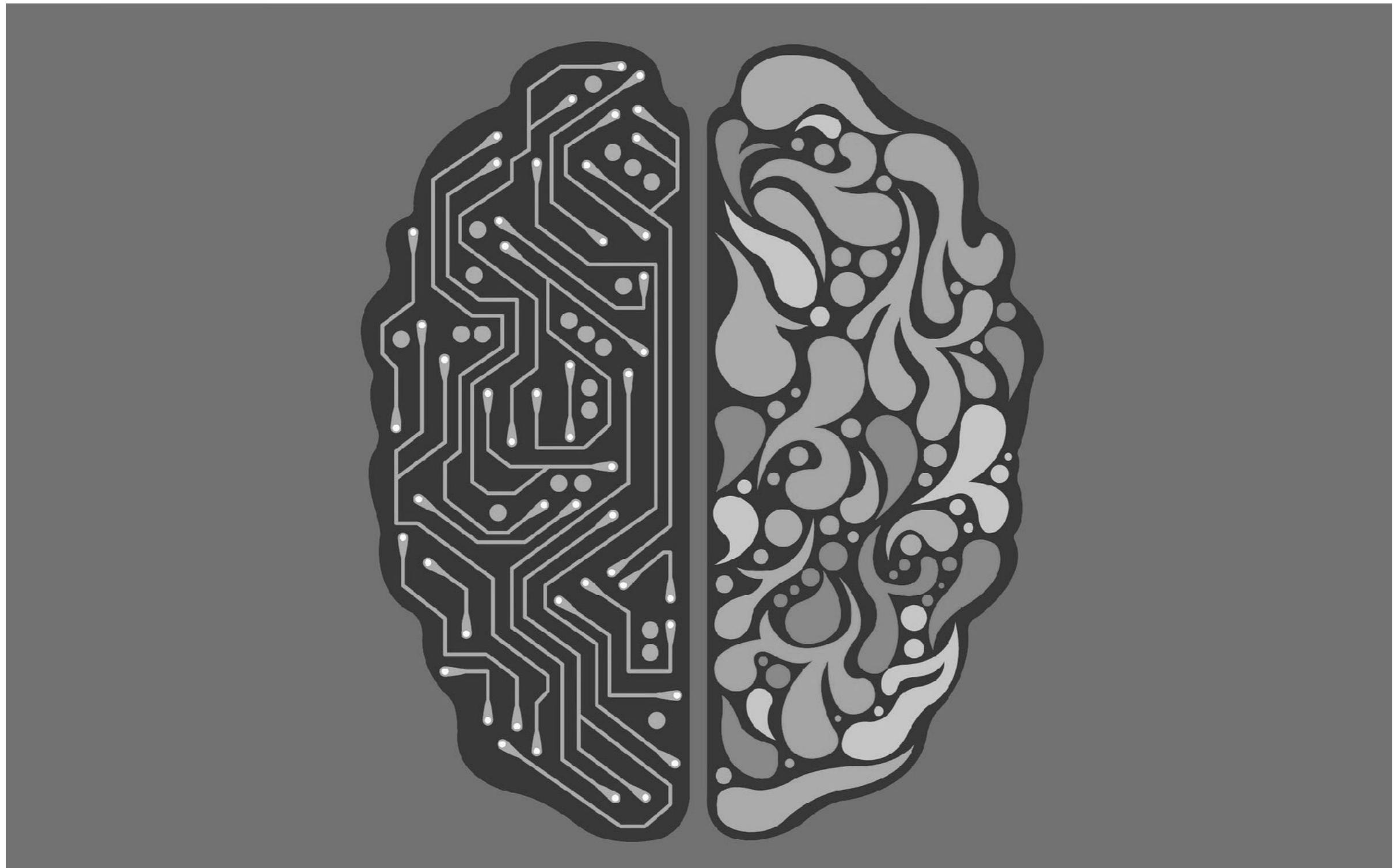
About me

- Ph.D. in Natural Language Processing and Artificial Intelligence at Masaryk University
- 10 years at Seznam.cz (last 8 years as Head Of Research)
- Founder and lecturer at ML College
- Founder and co-organiser of ML Prague
- Mentor at StartupYard and Startup AI Incubator
- ML Freelancer and consultant

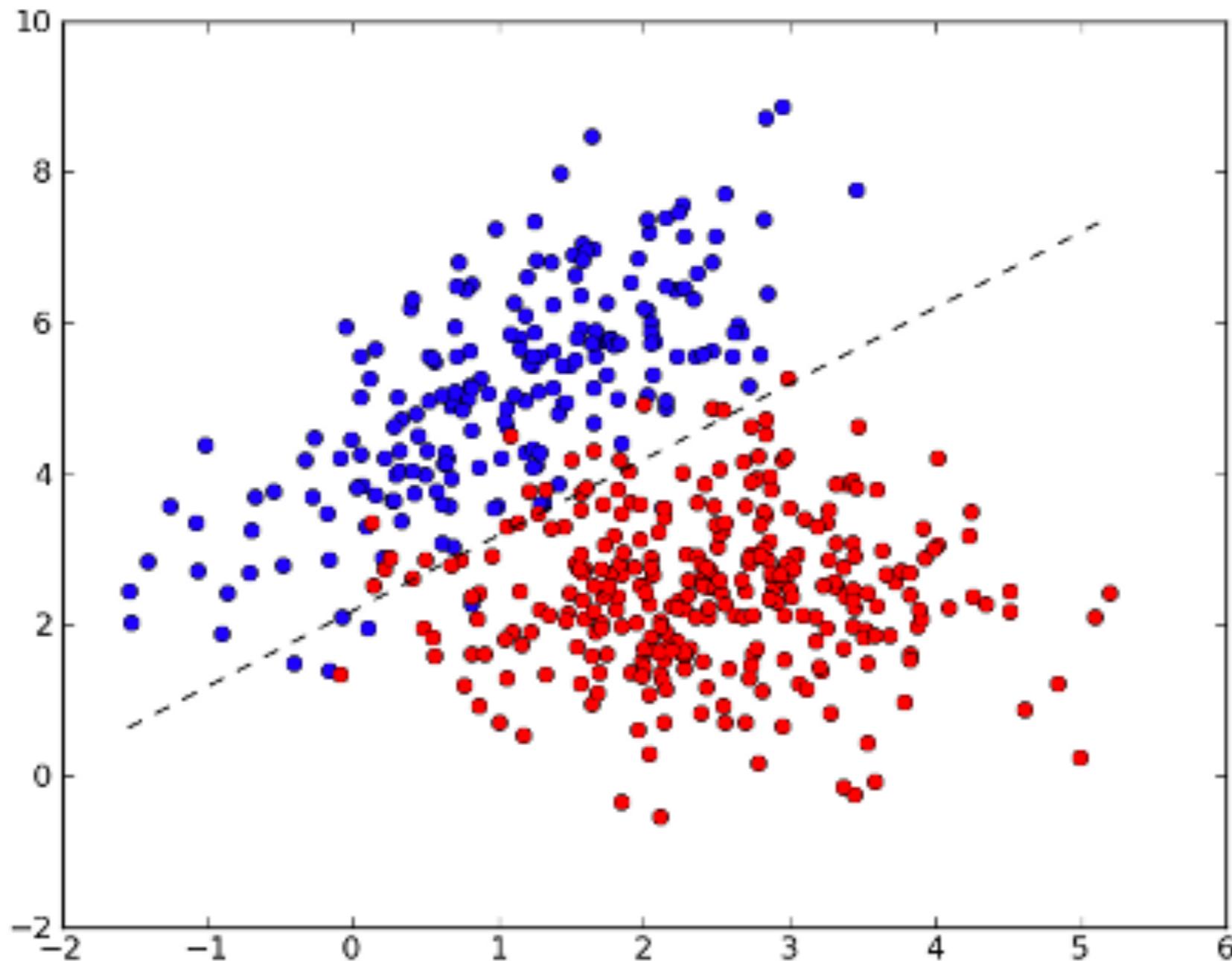
Image processing

- Introduction to neural networks
- Activation functions for neural networks
- Multilayered neural networks
- Methods for training neural networks
- Keras tutorial
- Practical classification and regression tasks solved using neural networks
- ResNet
- Transfer learning and fine-tuning
- Image classification
- Image segmentation
- GANs and superresolution

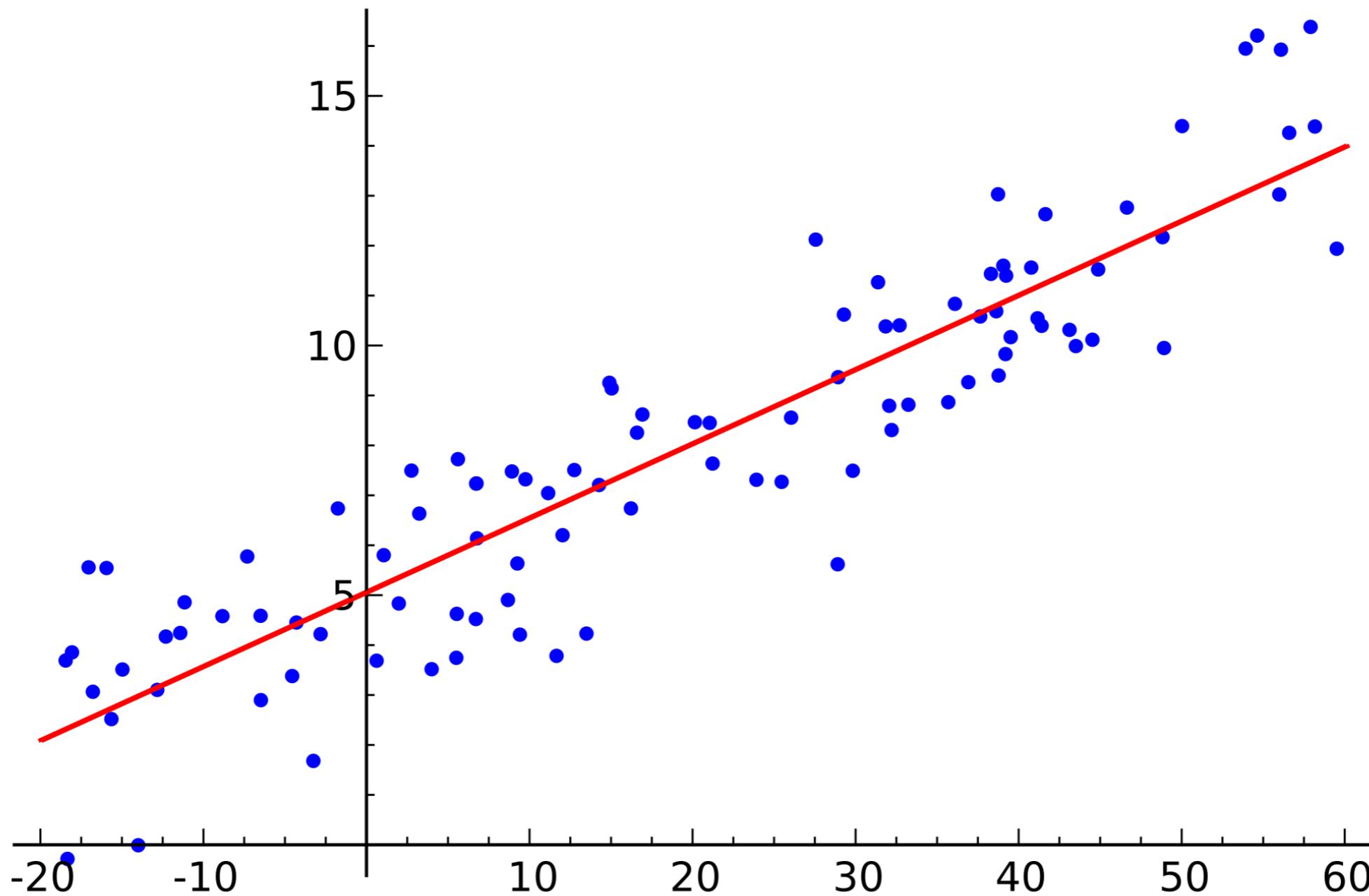
What is (not) machine learning?



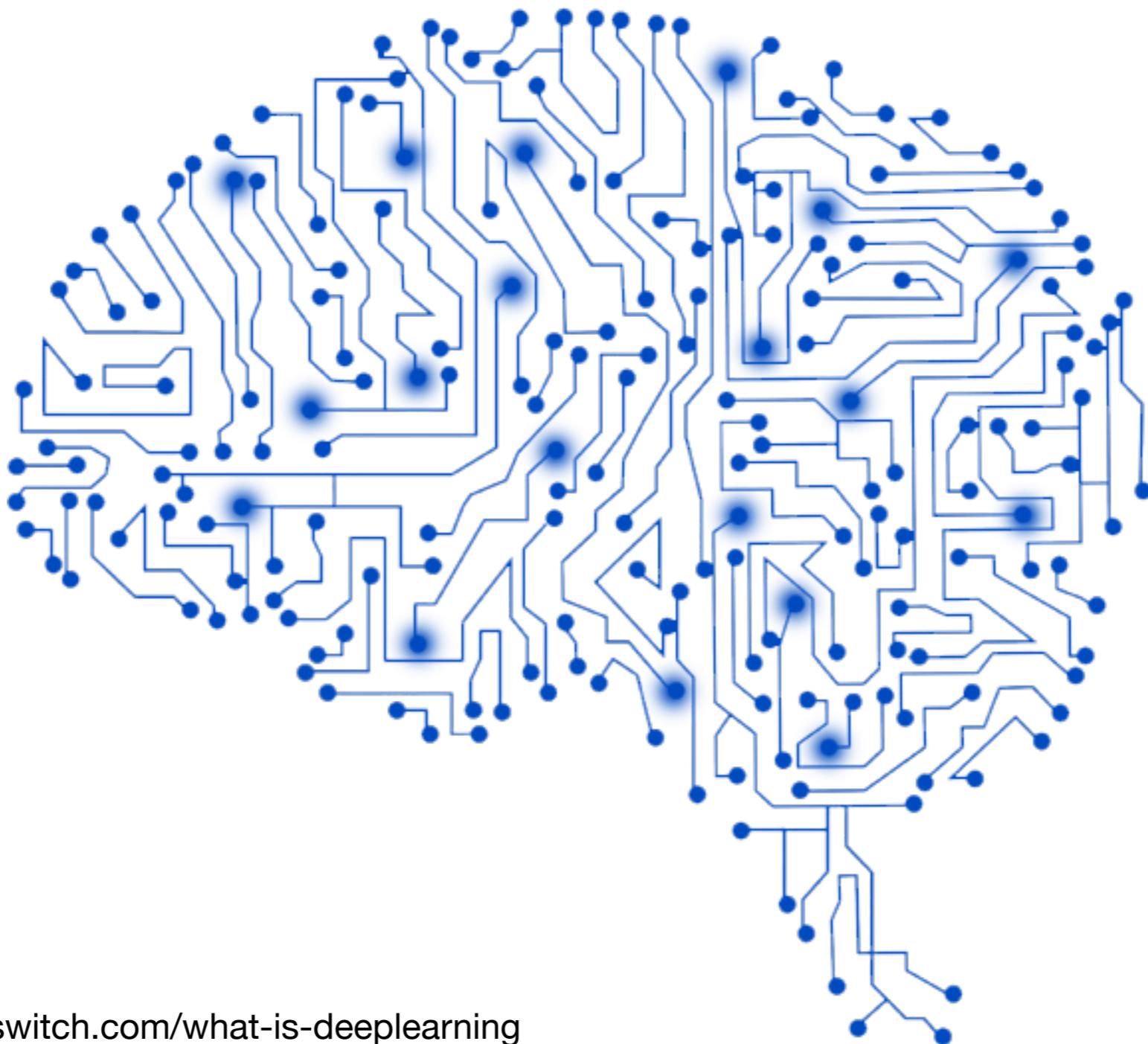
Classification



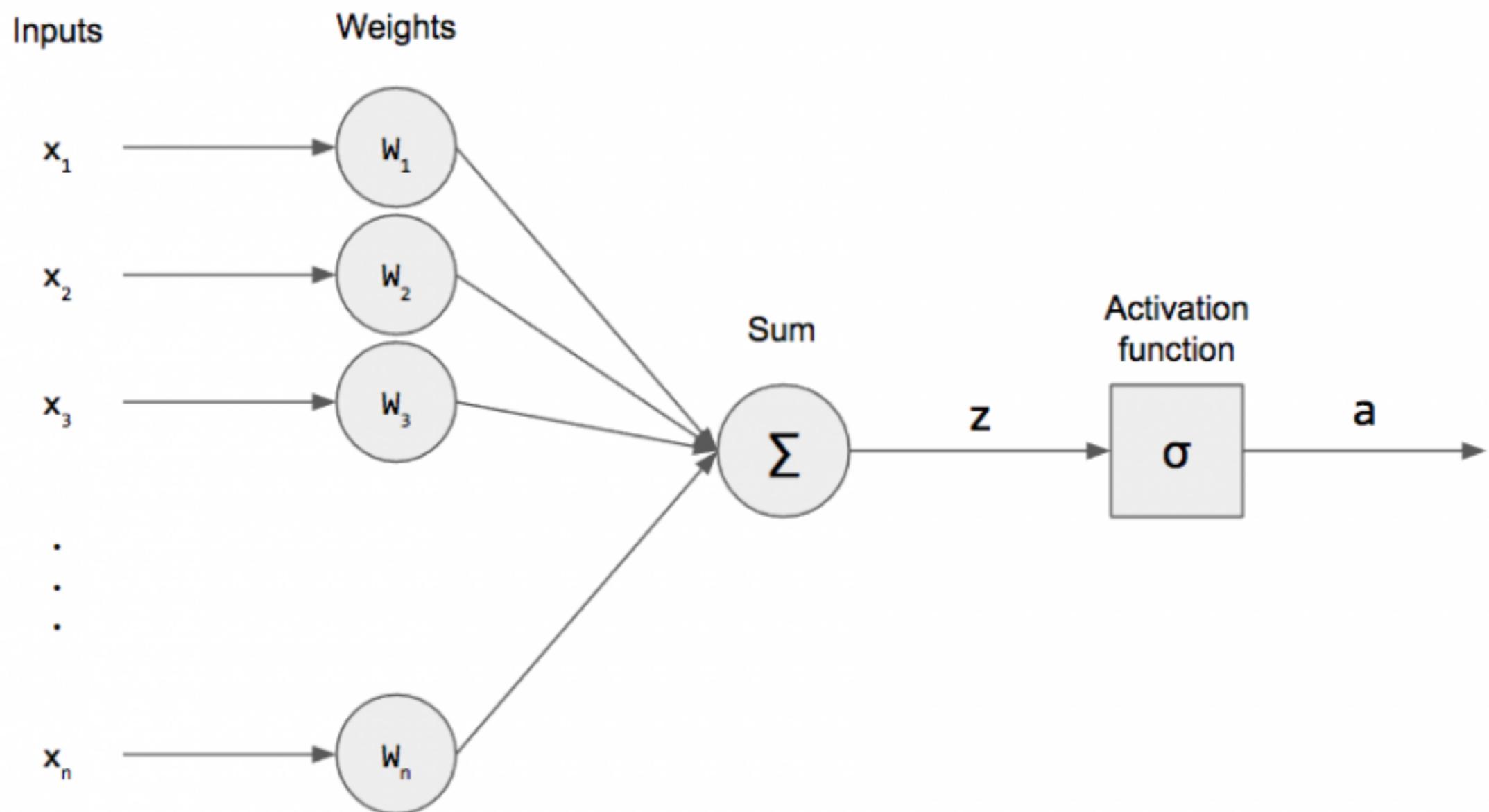
Regression



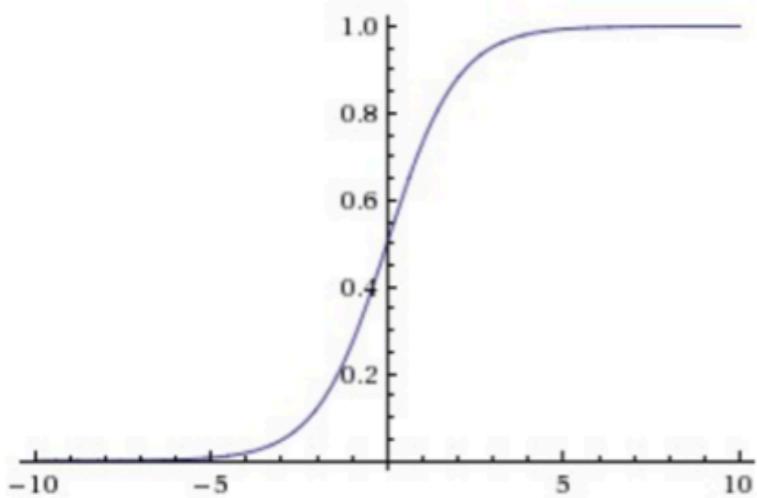
Neural networks and deep learning



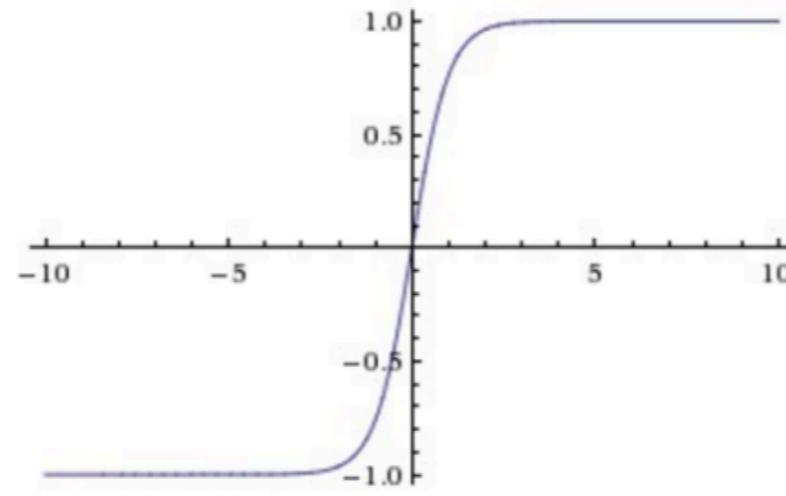
Perceptron



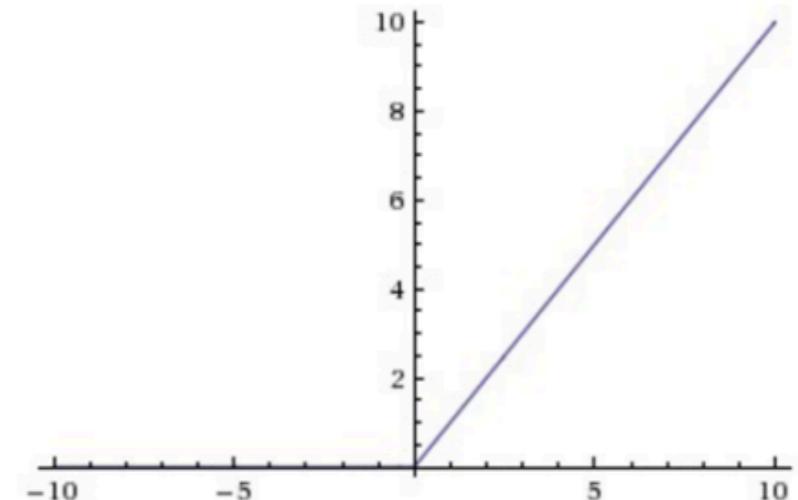
Activation functions



Sigmoid



tanh

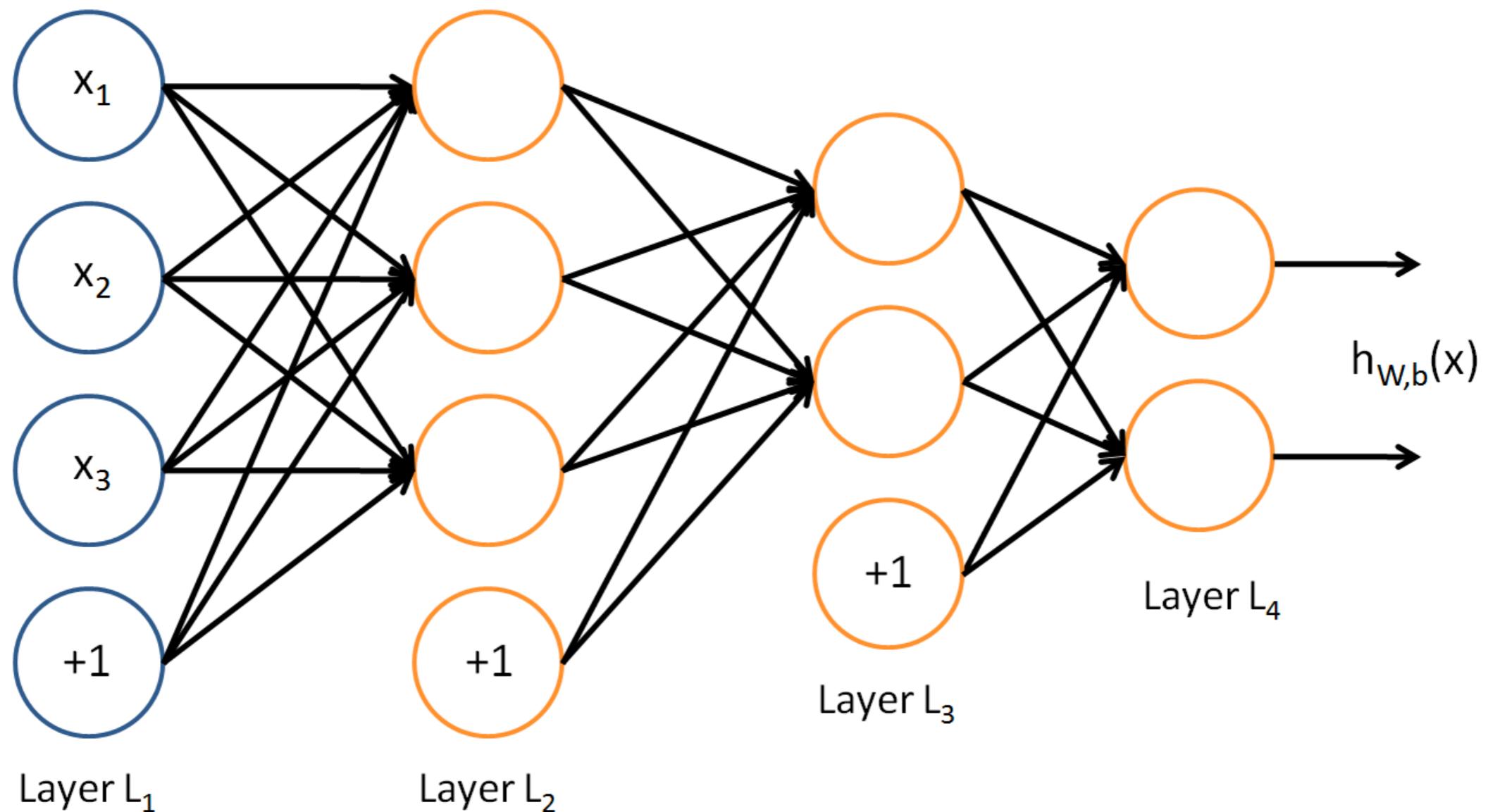


ReLU

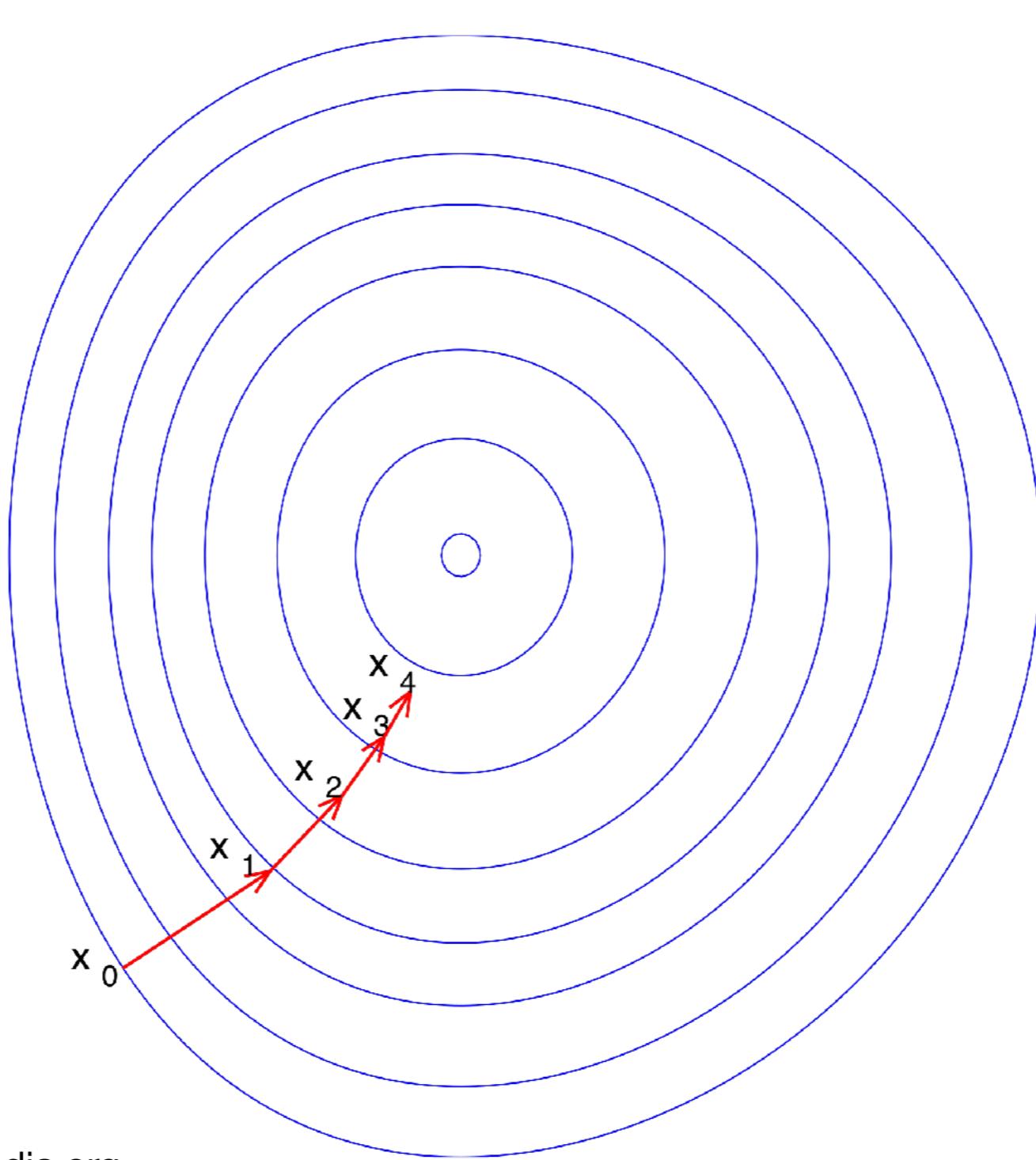
Softmax:

$$\sigma(\mathbf{z})_j = \frac{e^{z_j}}{\sum_{k=1}^K e^{z_k}}$$

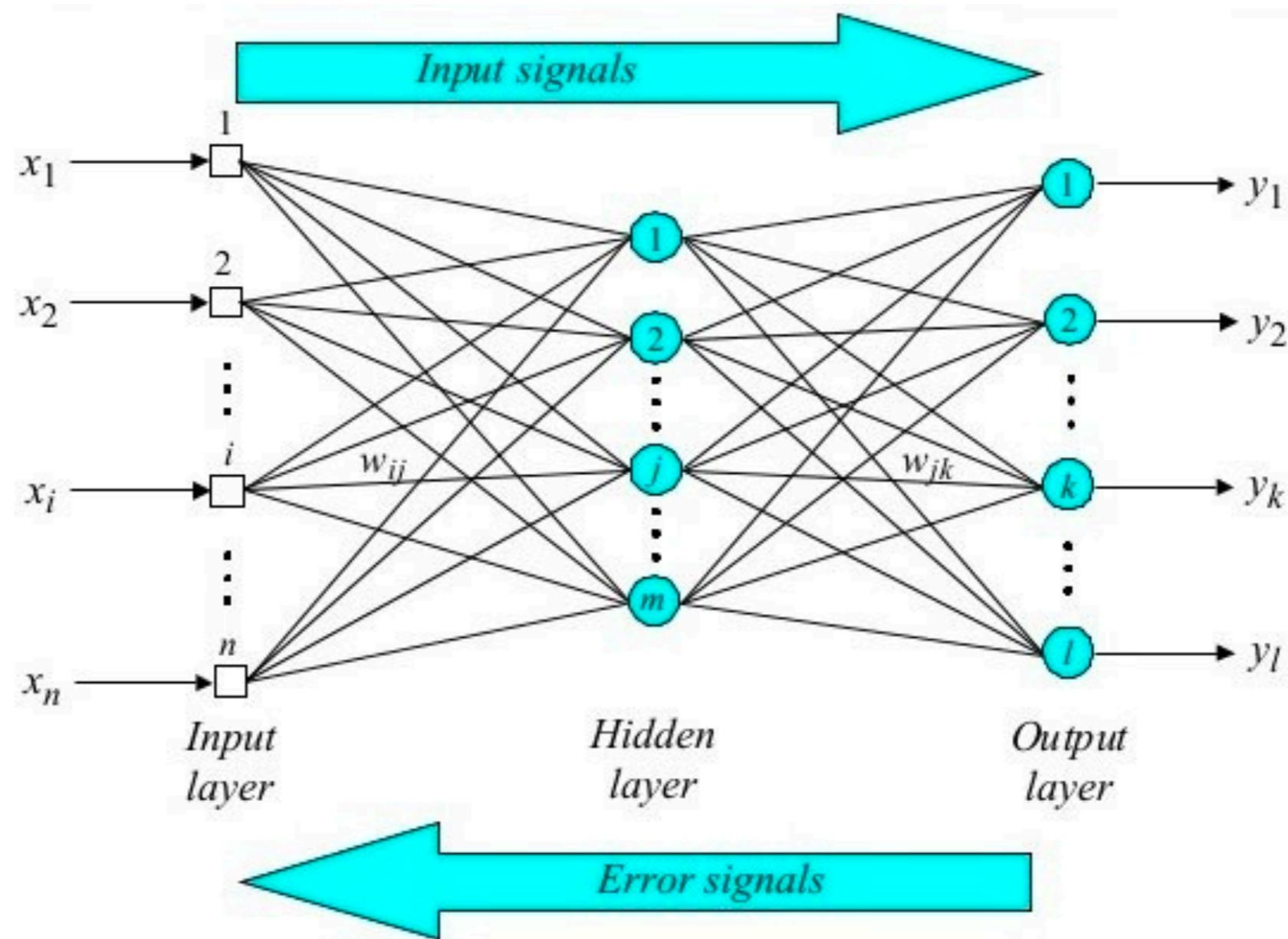
Multilayer Neural Networks



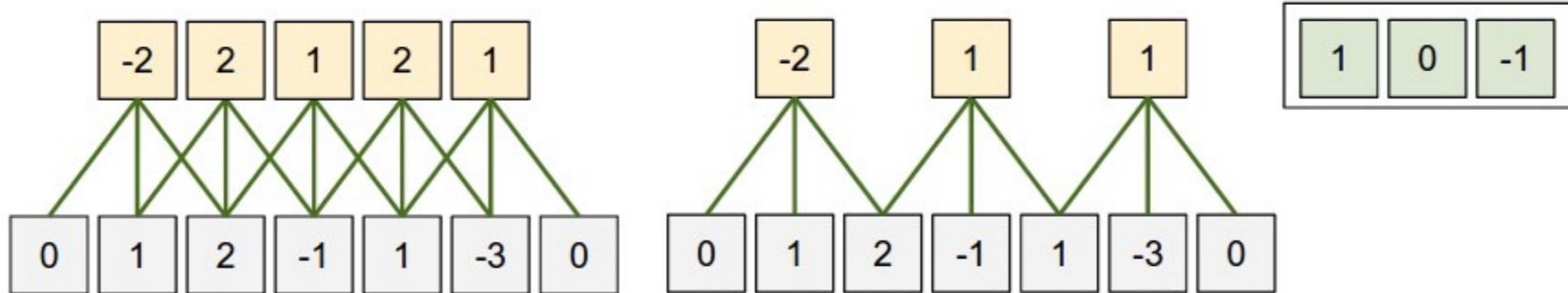
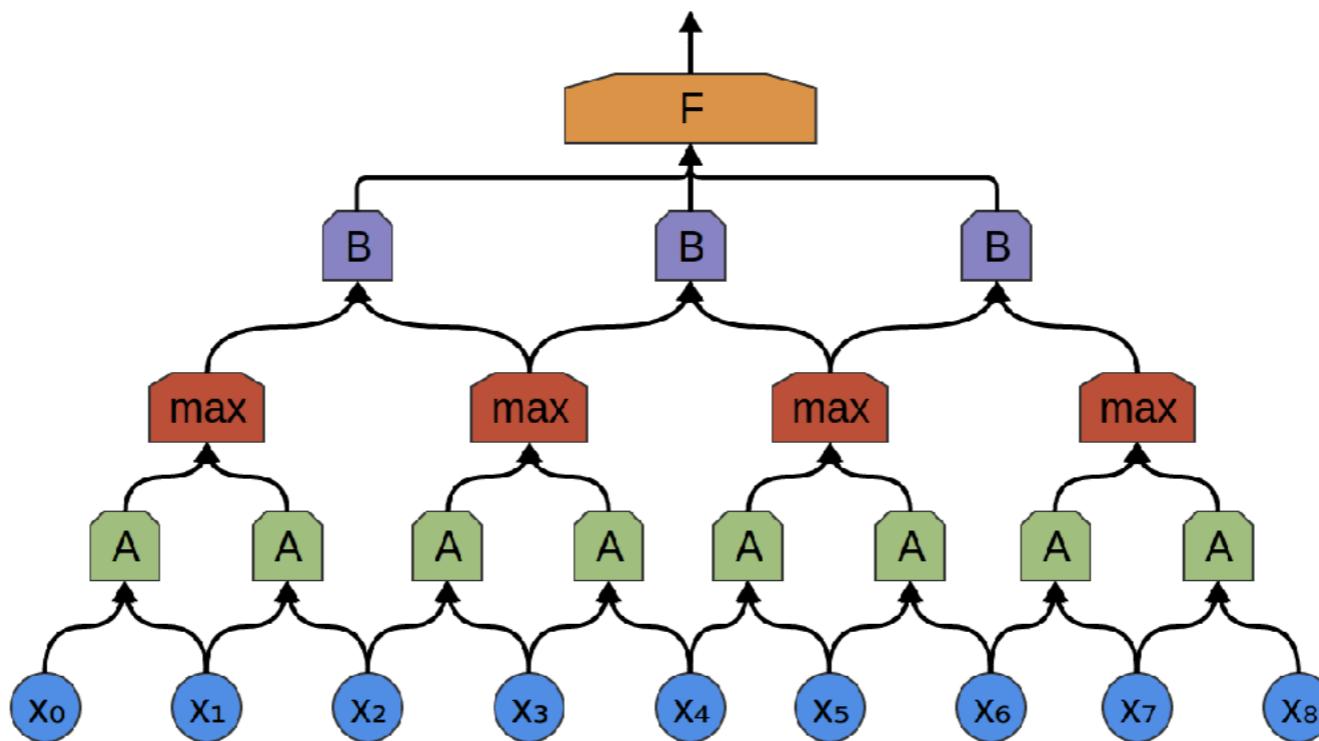
Steepest gradient descent



Back propagation

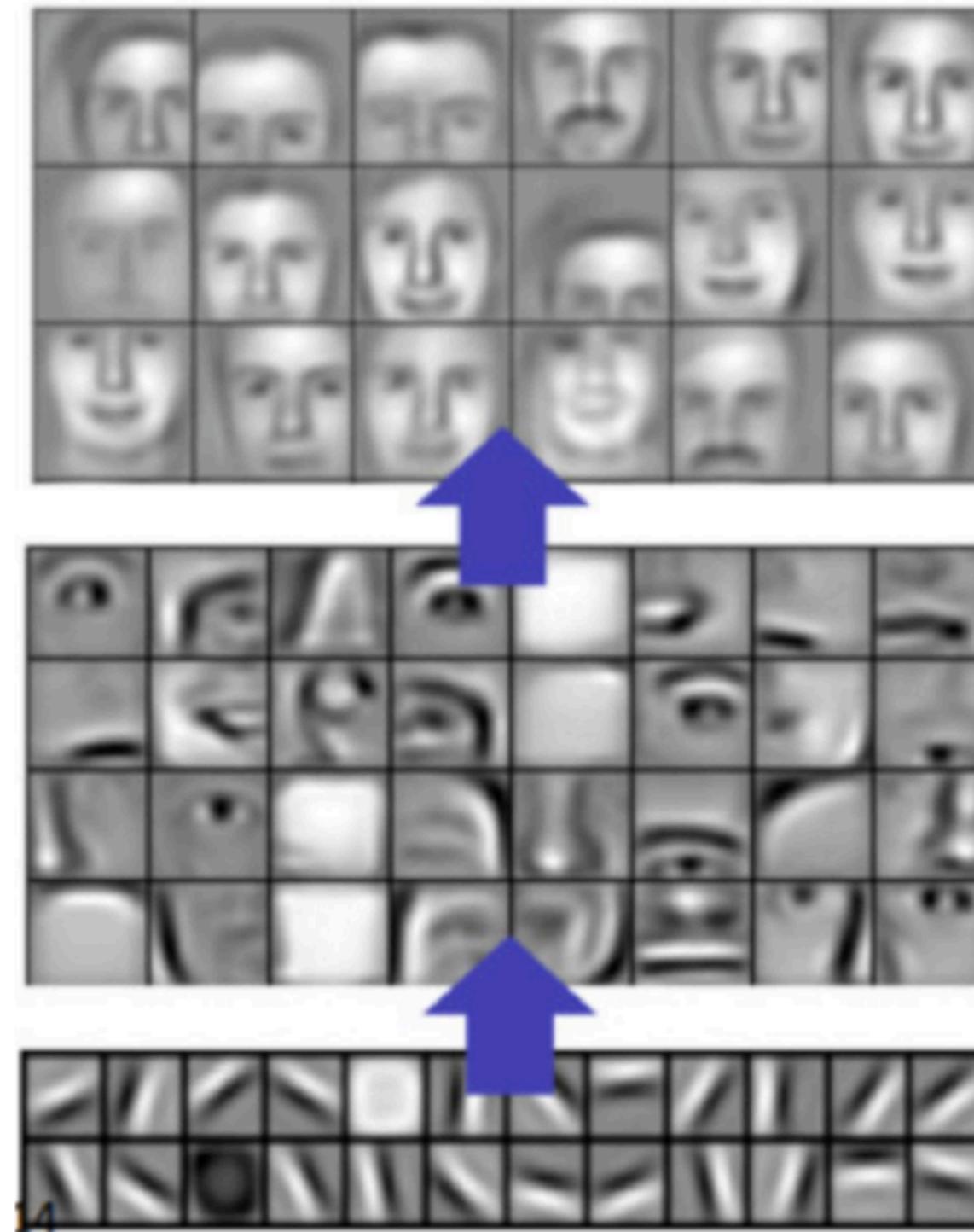


Convolution



Source: <https://www.tensorflow.org>

Weights visualization



Layer 3

Layer 2

Layer 1

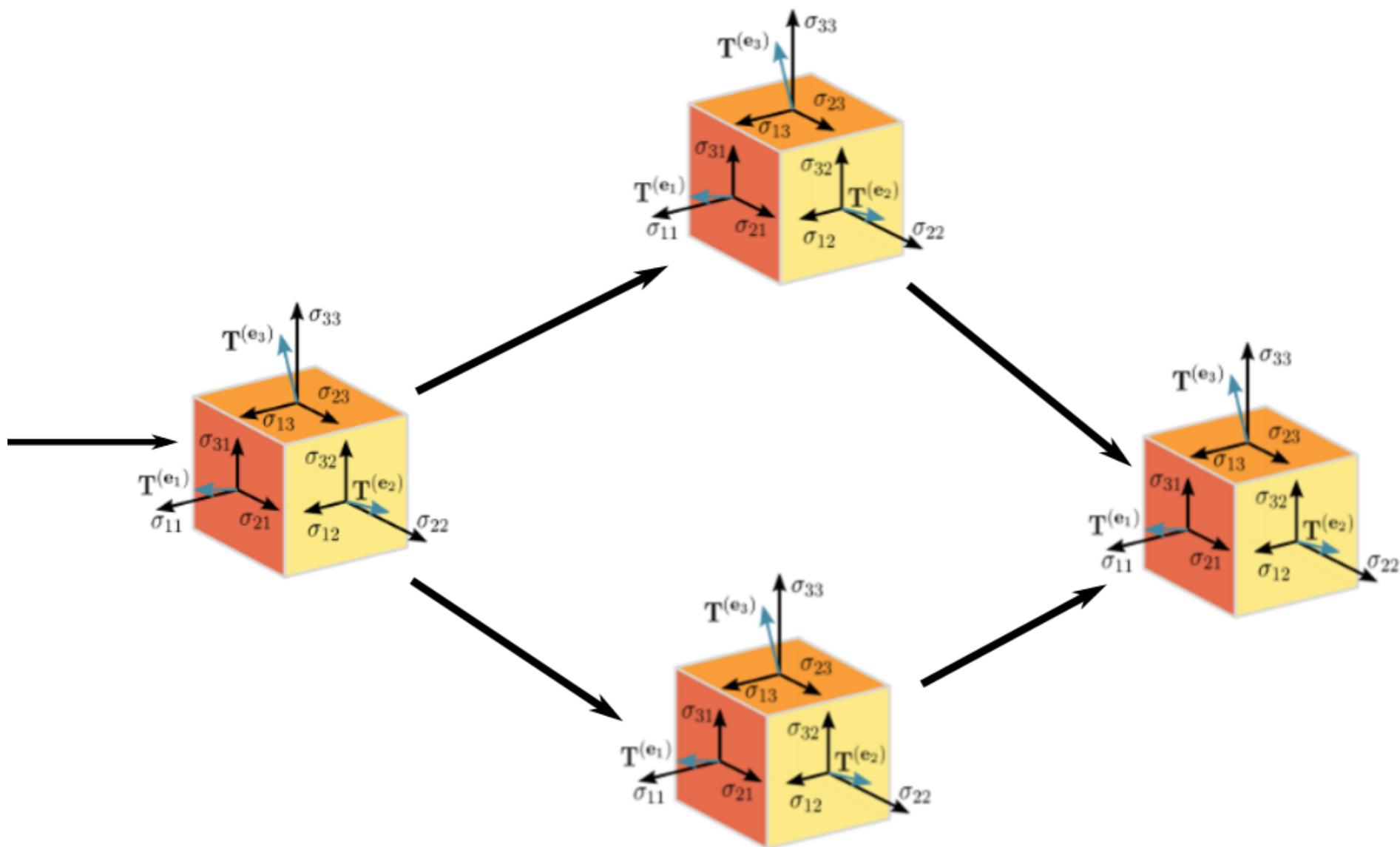
Important terms

- deep learning
- stochastic gradient descent
- batch and mini-batch learning
- epoch
- dropout

What is not TensorFlow



What is TensorFlow?



Keras tutorial

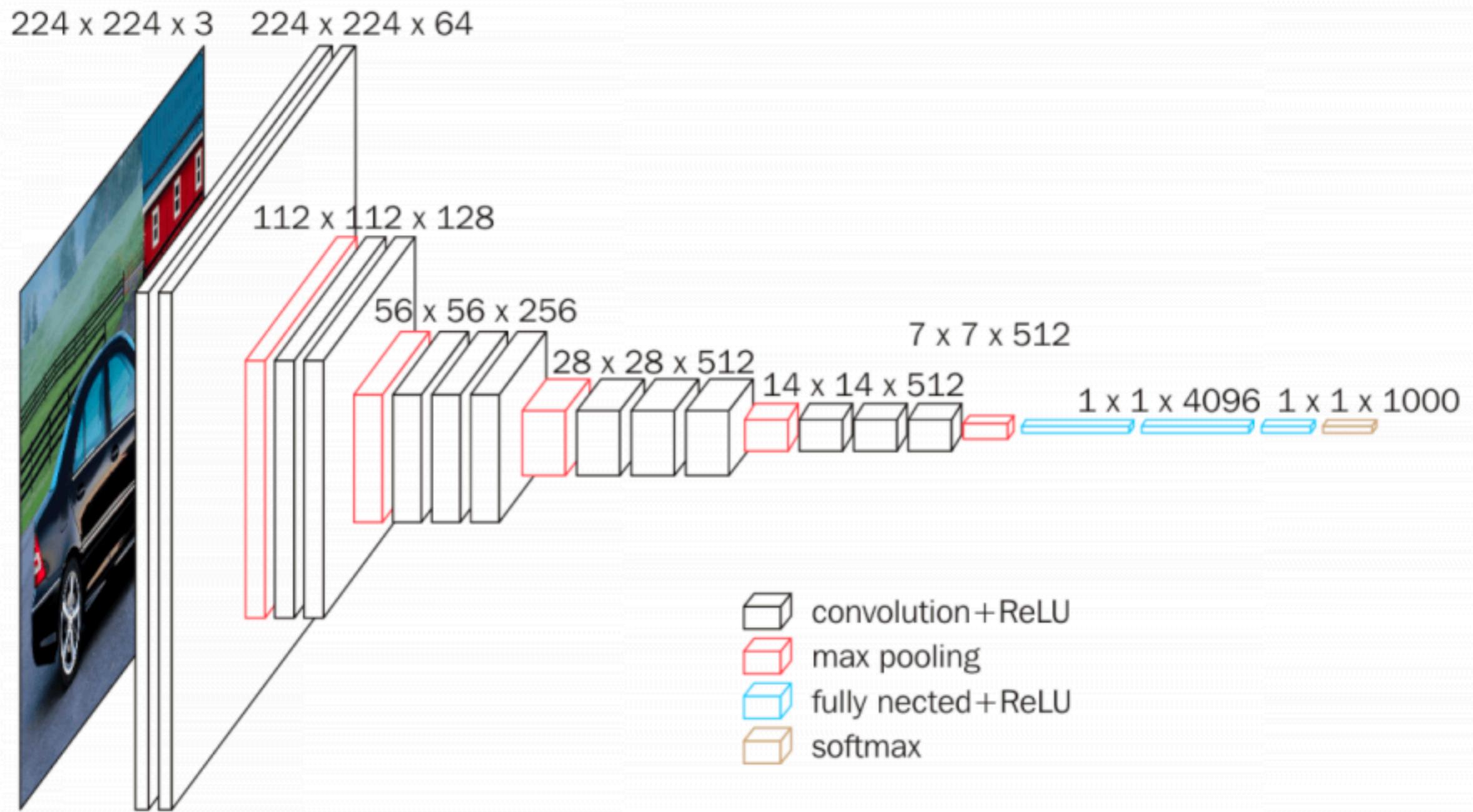
01-Keras-introduction.ipynb

Implementation of some classification and regression task using NN

02-Classification-nn-assignment.ipynb

03-Regression-nn-assignment.ipynb

VGG 16

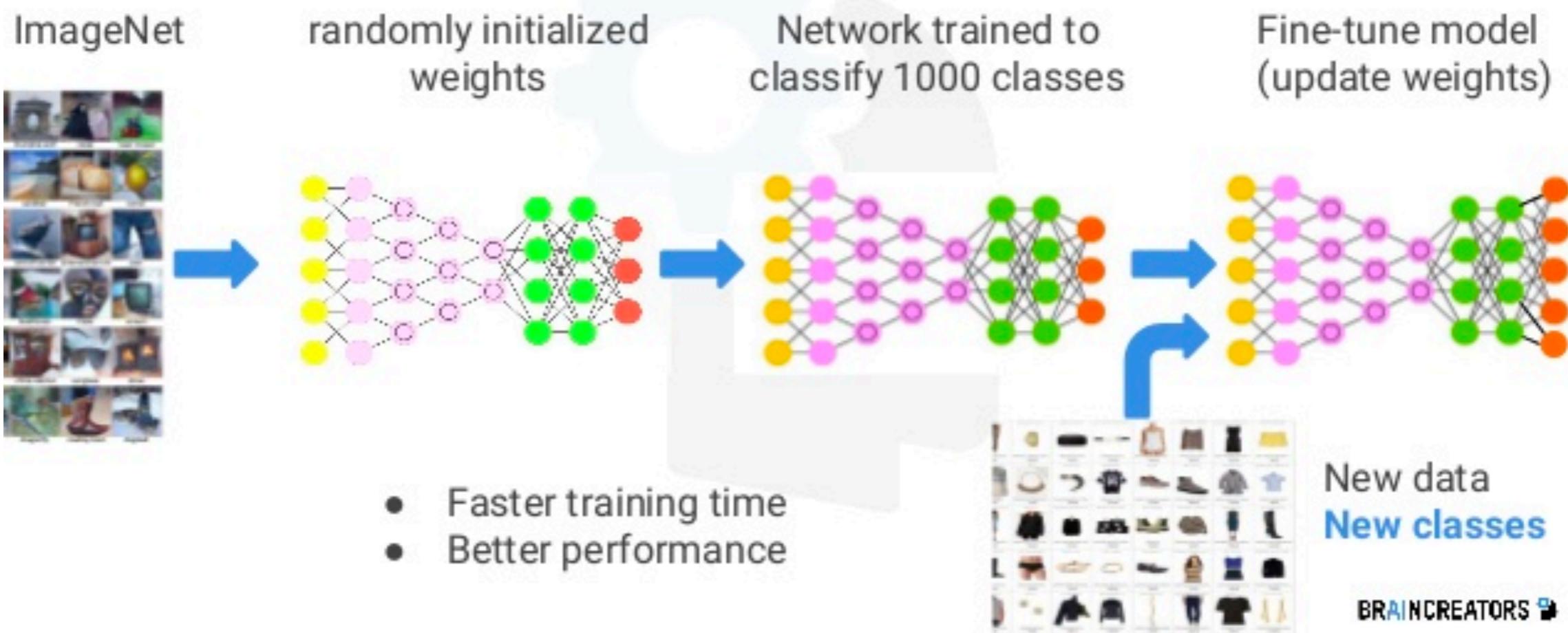


ResNet



Finetuning

Transfer Learning



Transfer learning example

04-Transfer_learning.ipynb

Adversarial Patch

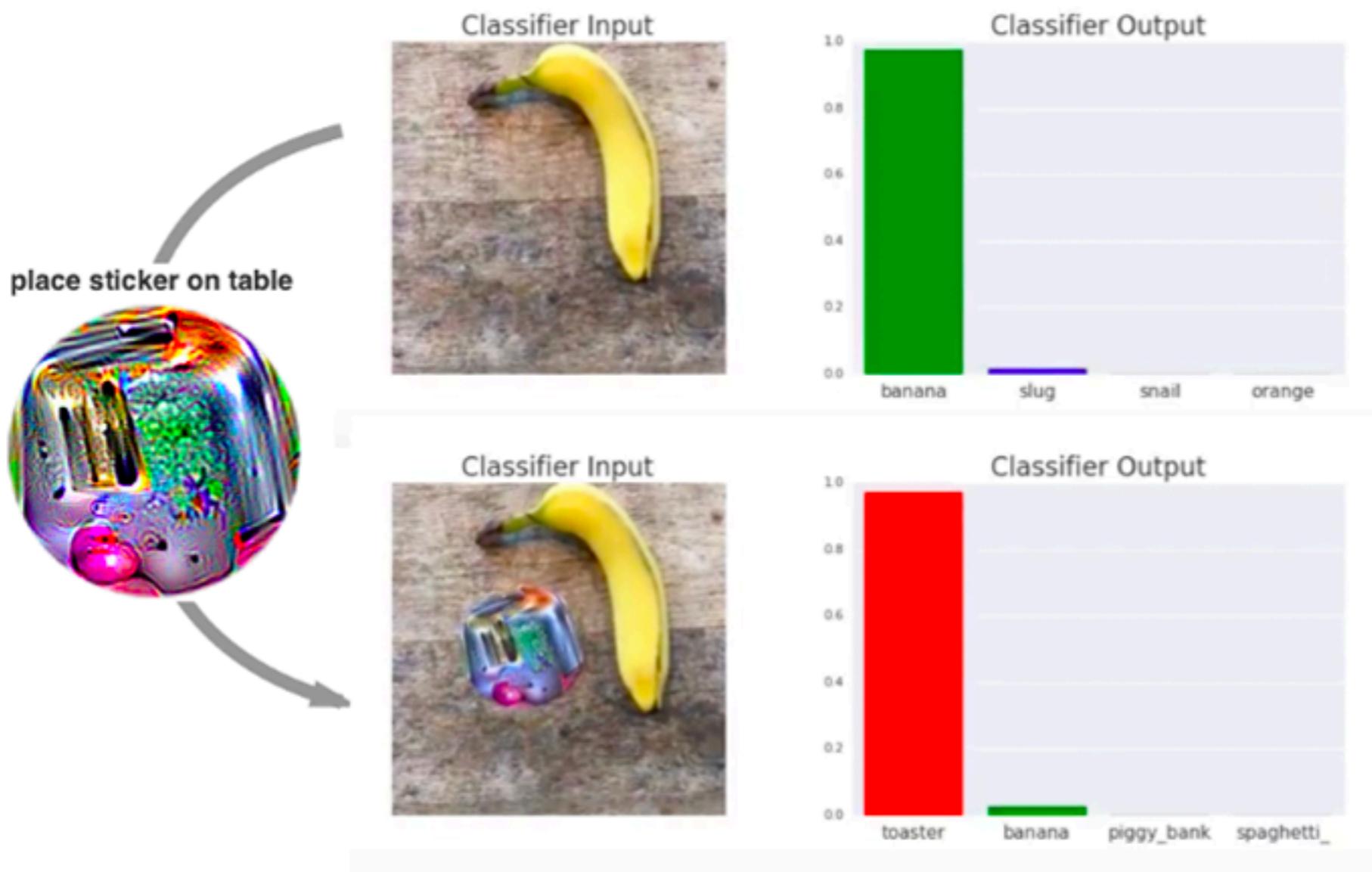
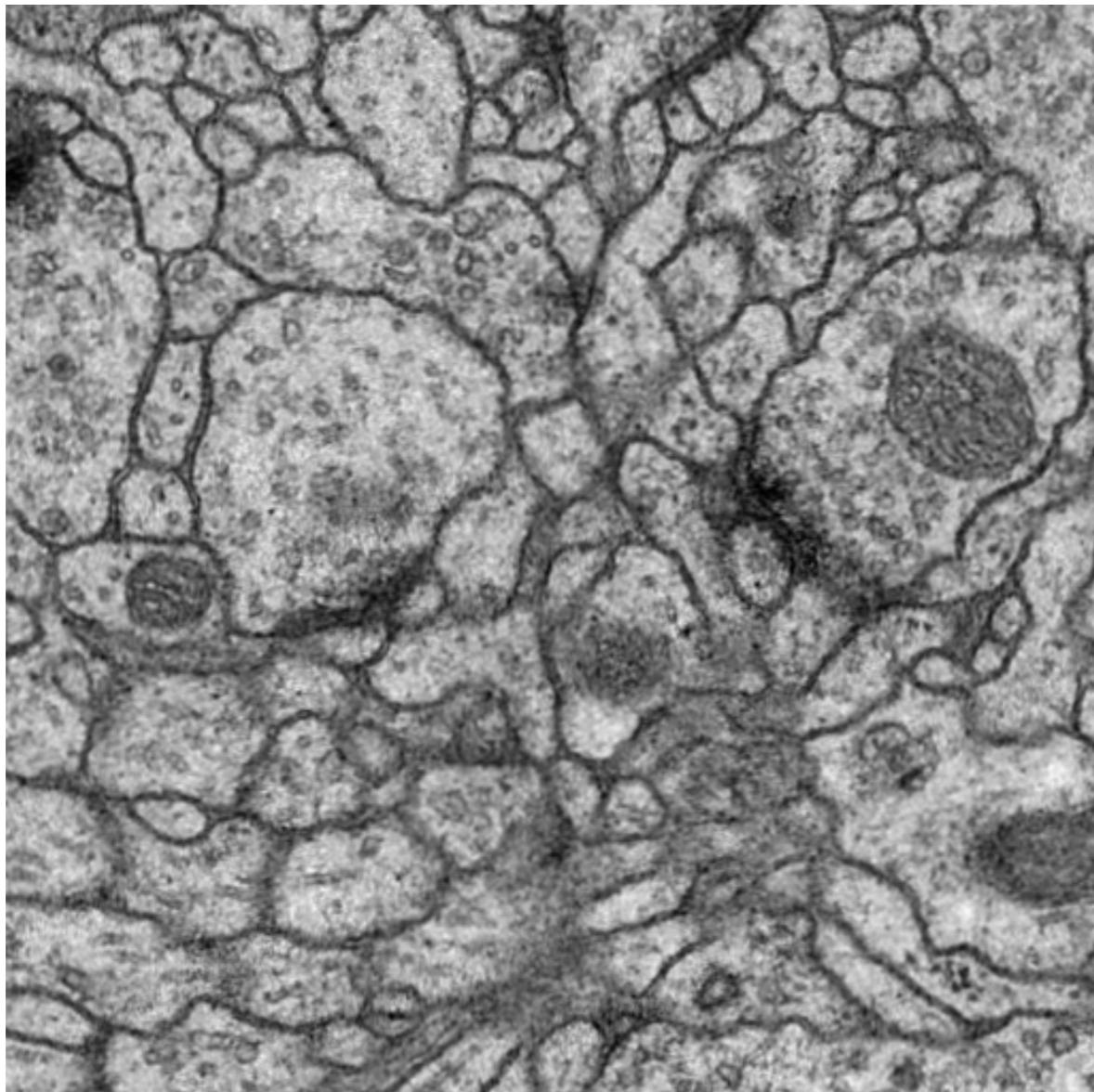
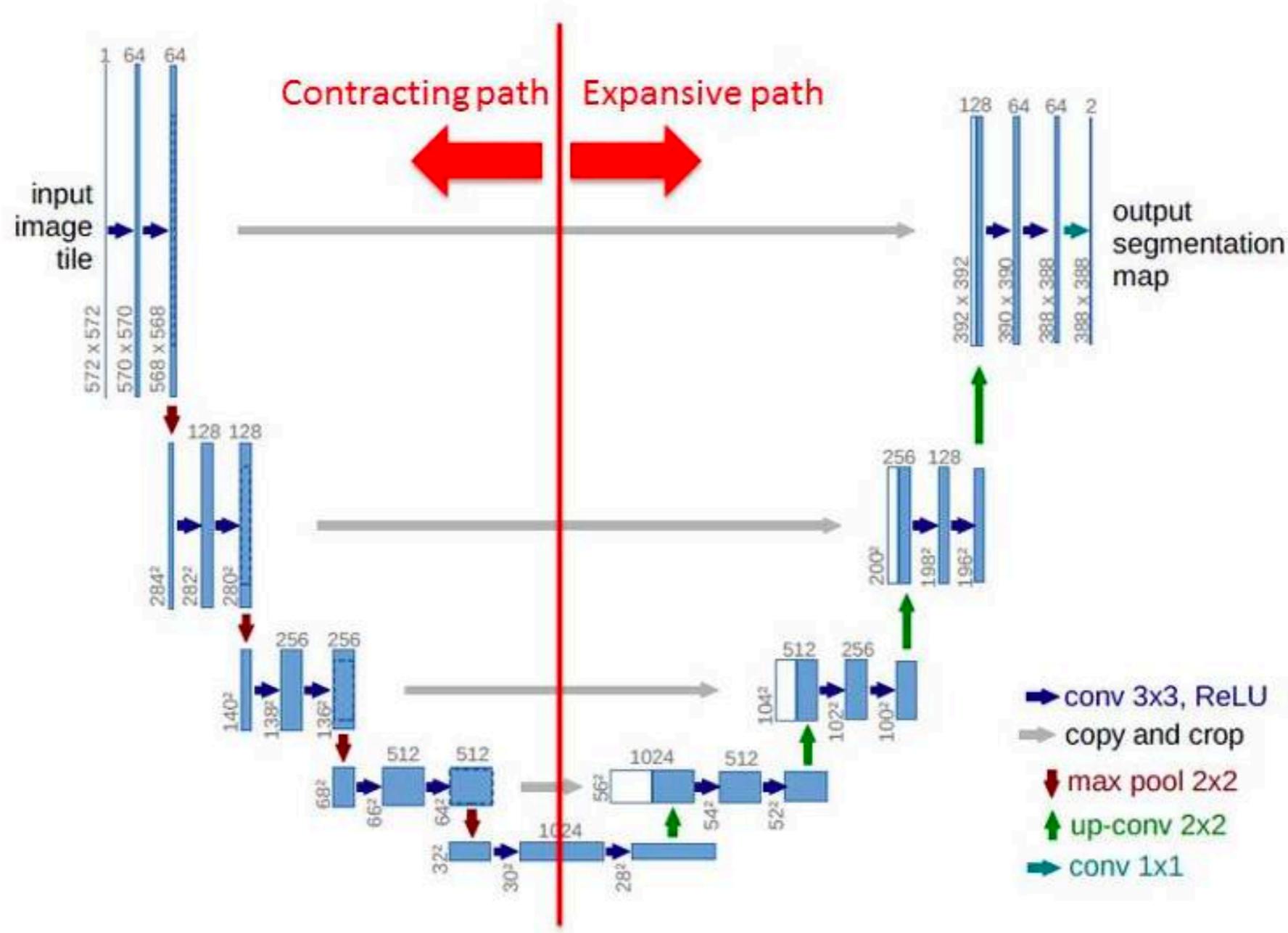


Image segmentation



U-Net

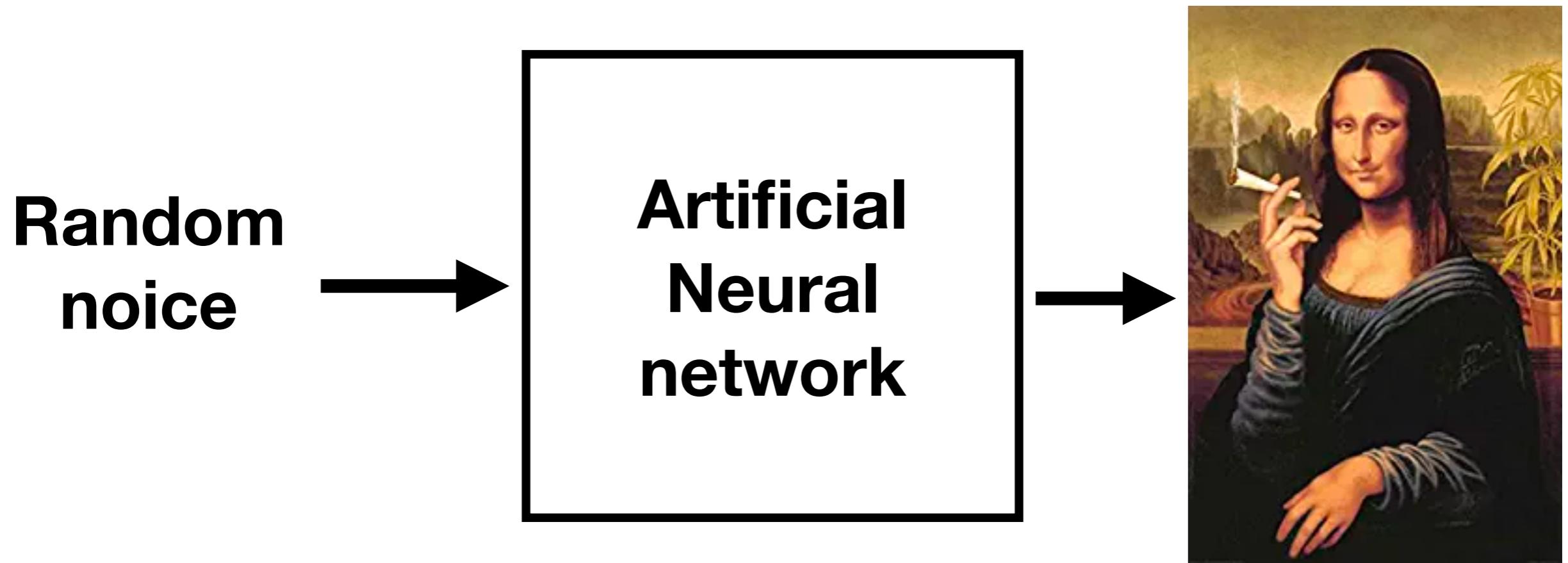
Network Architecture



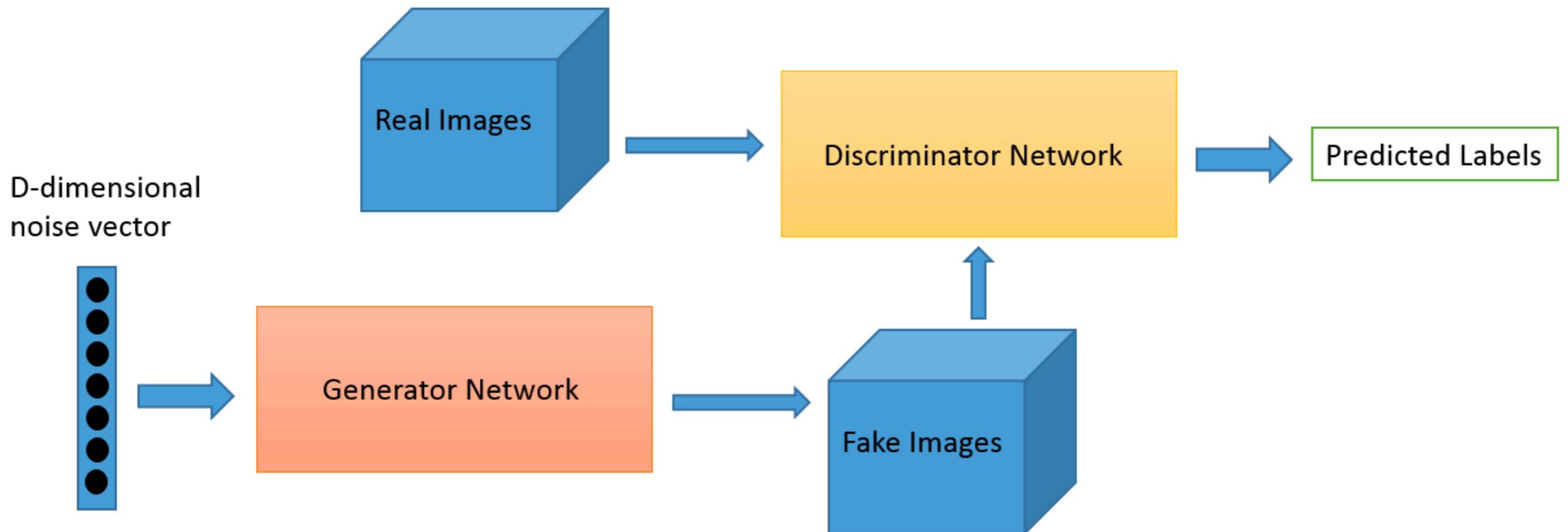
U-Net segmentation example

05-Segmentation.ipynb

Generative models with neural networks



Generative Adversarial Networks



Superresolution

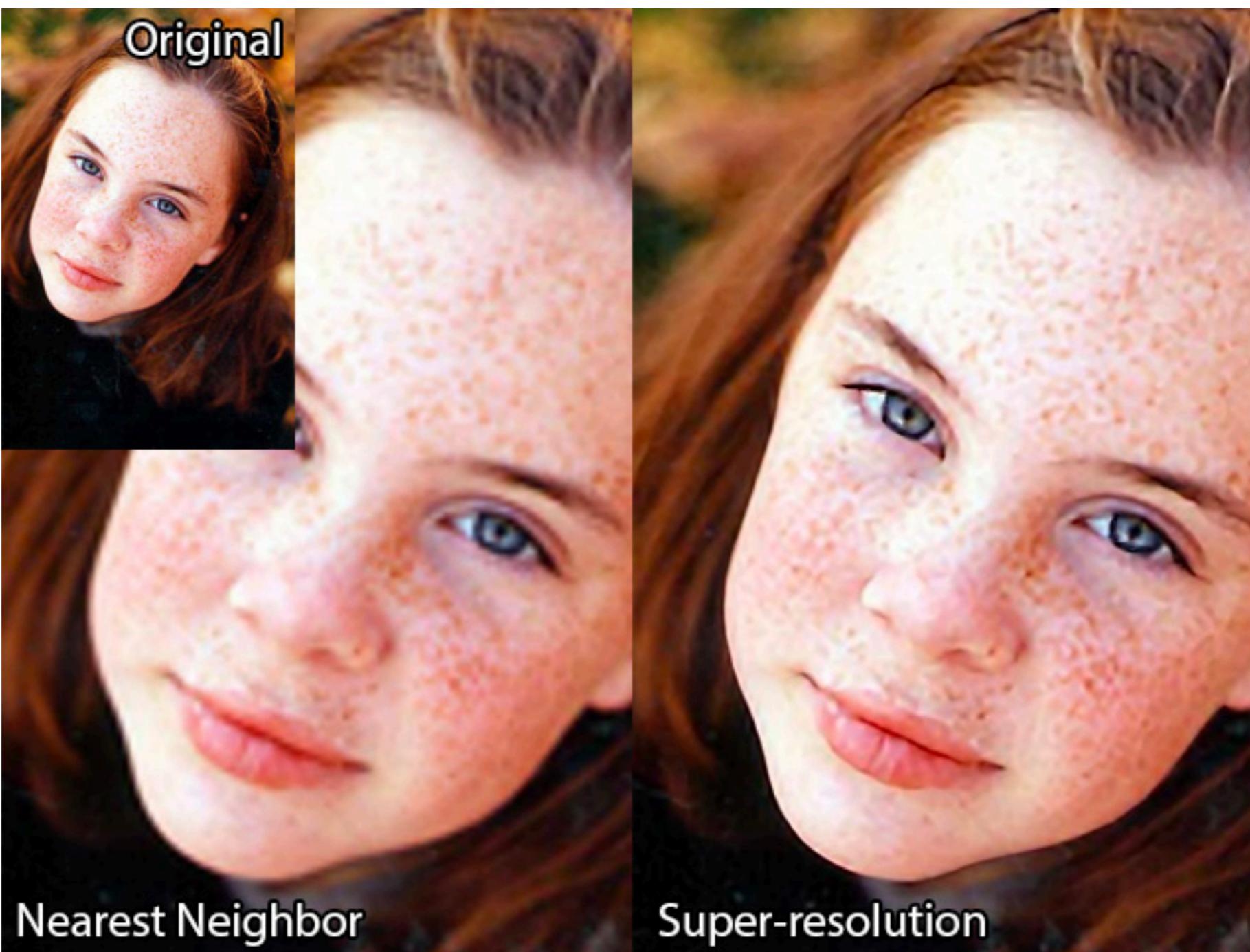
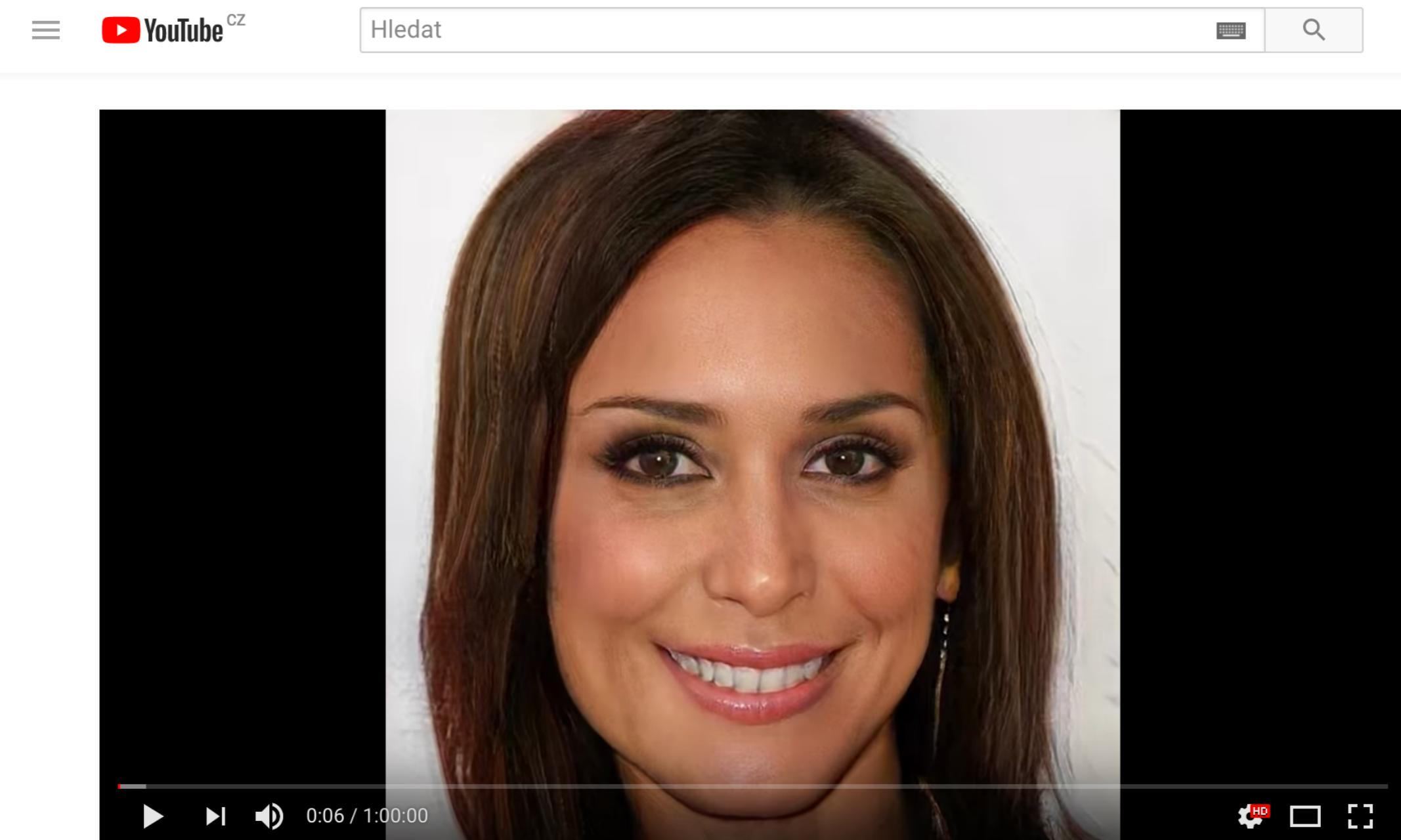


Image synthesis



One hour of imaginary celebrities

95 832 zhlédnutí

TO SE MI LÍBÍ NELÍBÍ SE SDÍLET ...

Which one is fake?



Generative Adversarial Networks

06_GANs.ipynb

Image manipulation



Thank you for your attention

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Twitter: @JiriMaterna

Facebook: <https://www.facebook.com/maternajiri>

LinkedIn: <https://www.linkedin.com/in/jirimaterna/>