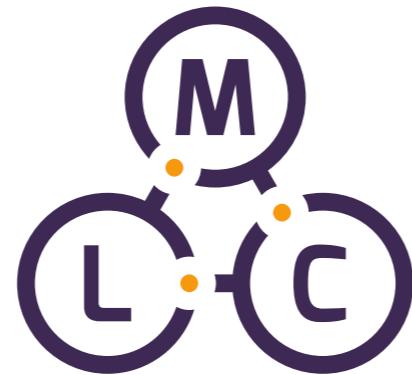


Deep Learning and Image Processing for Raiffeisenbank International

Jiří Materna



Machine
Learning
College

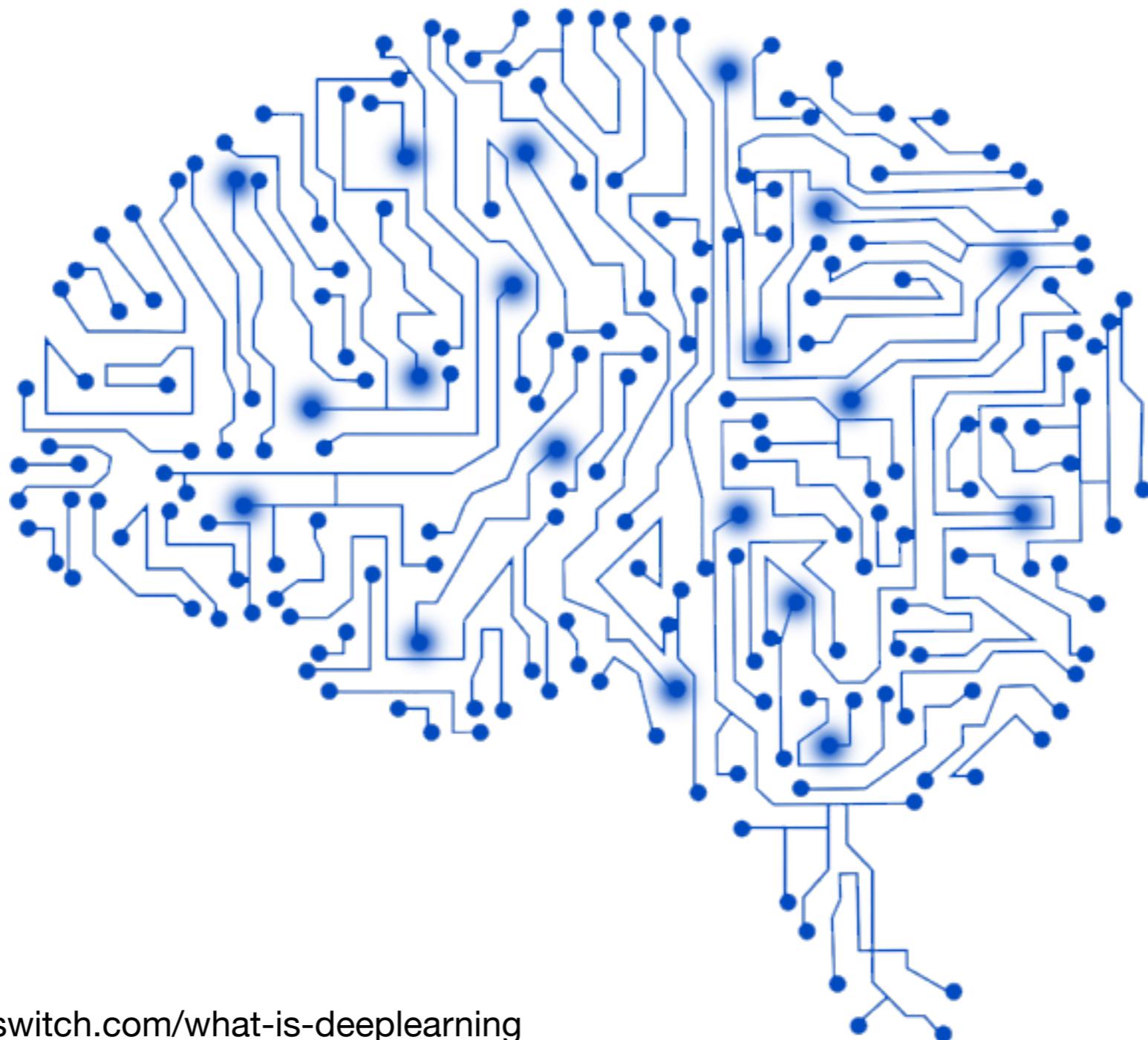
About me

- 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
- ML Freelacer and consultant

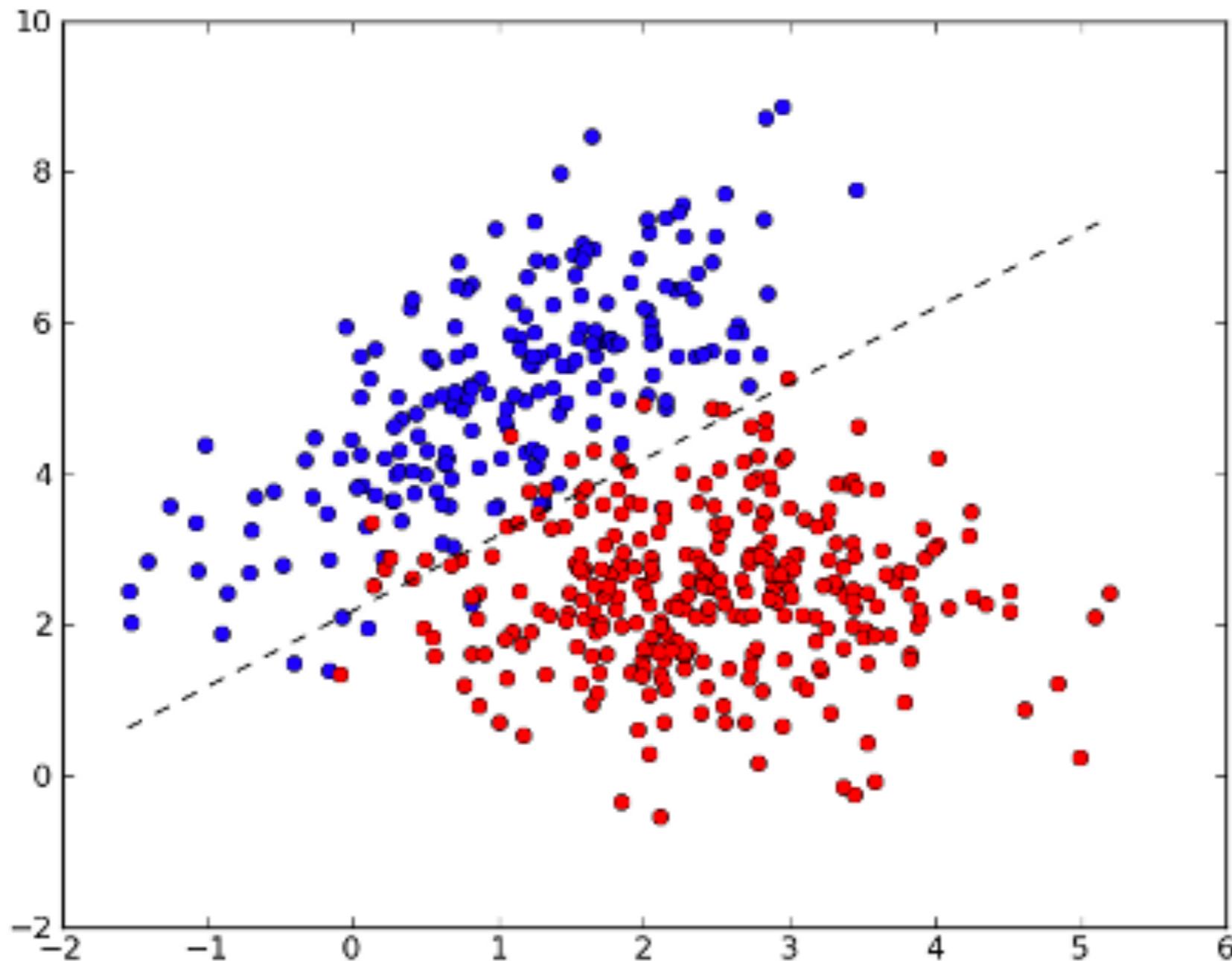
Image processing

- 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

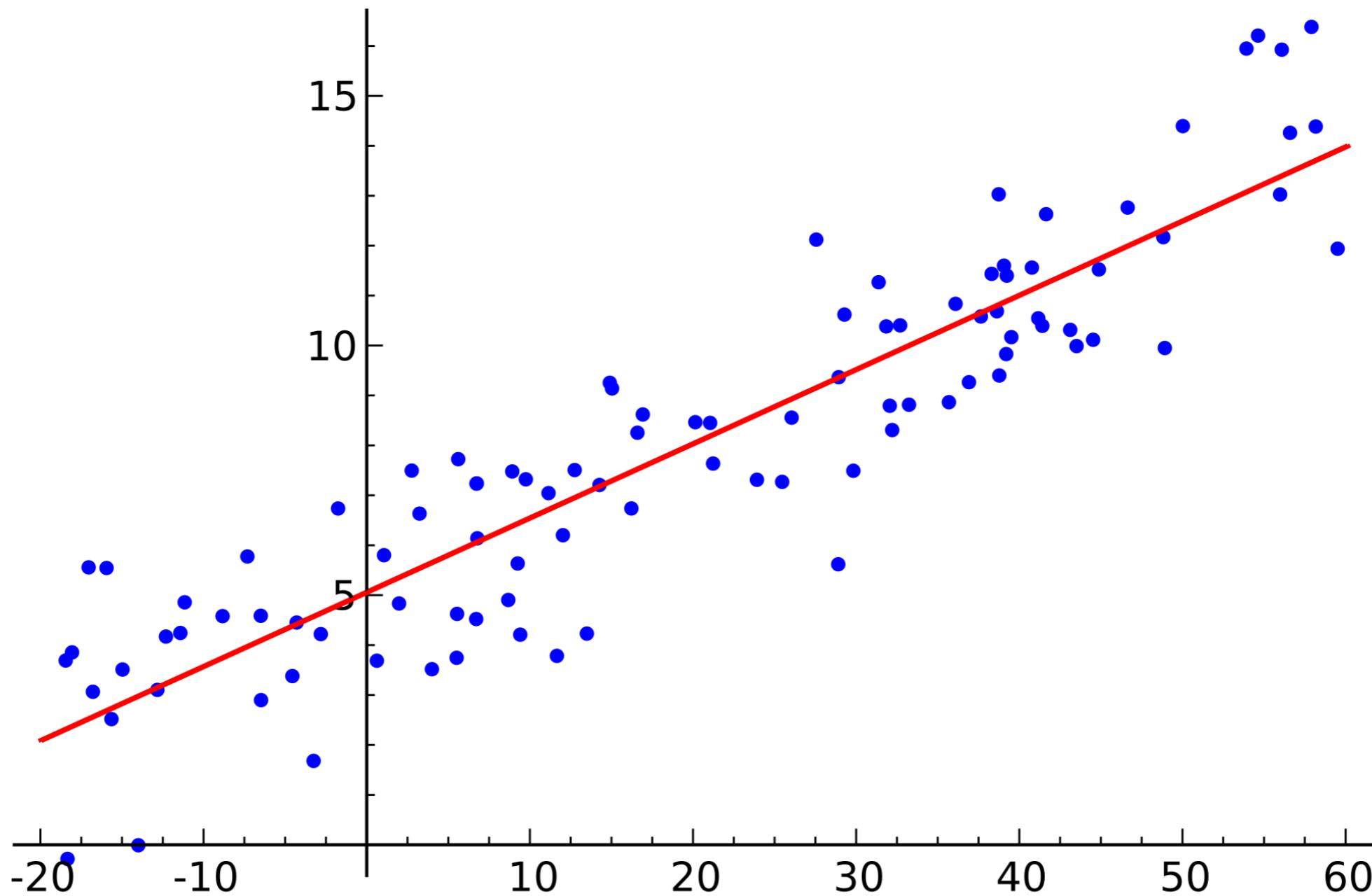
Neural networks and deep learning



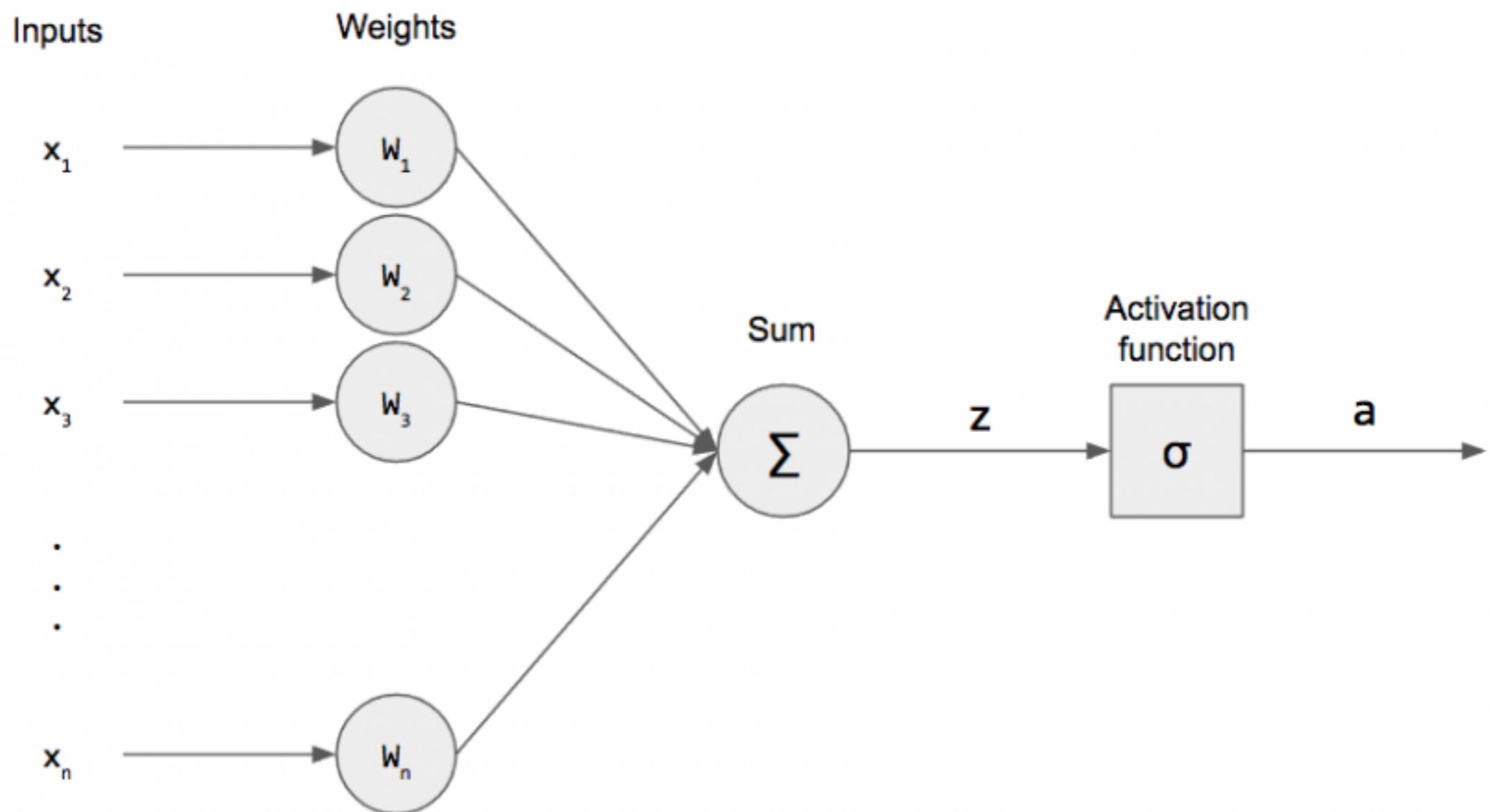
Classification



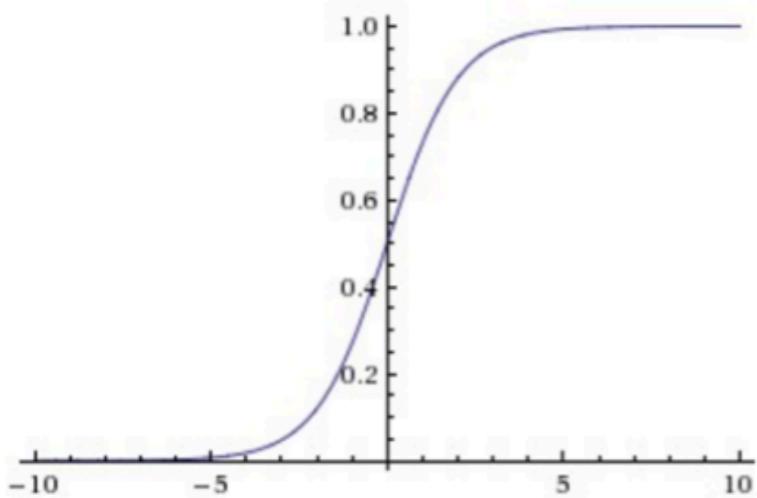
Regression



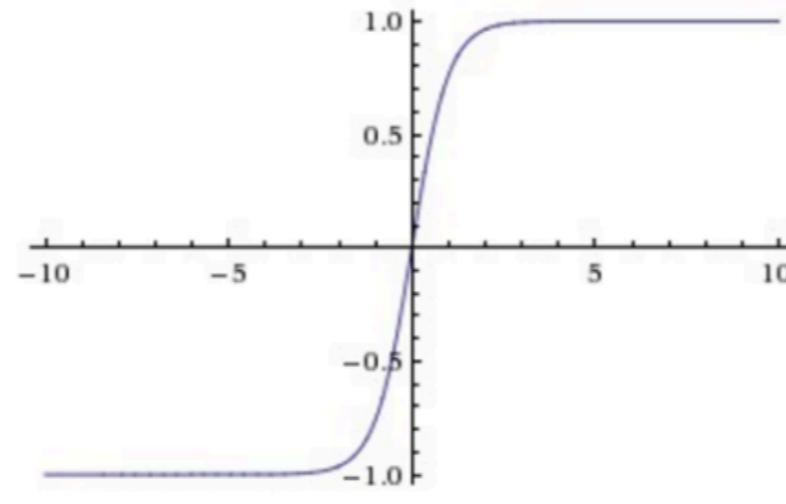
Perceptron



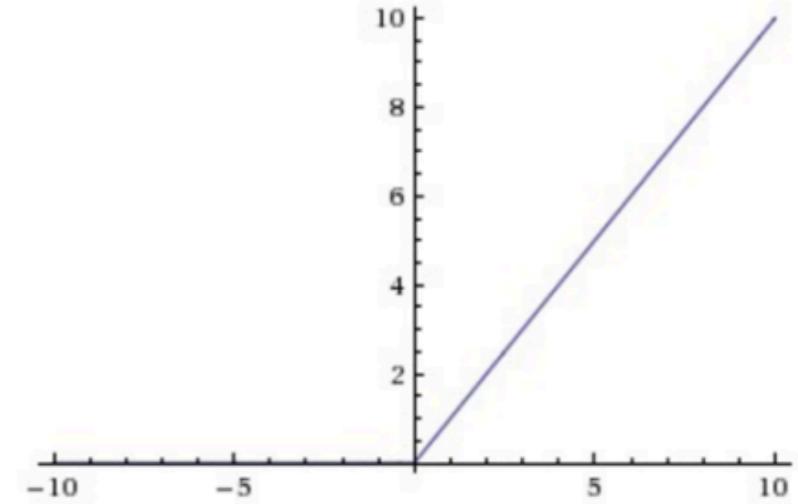
Activation functions



Sigmoid



tanh

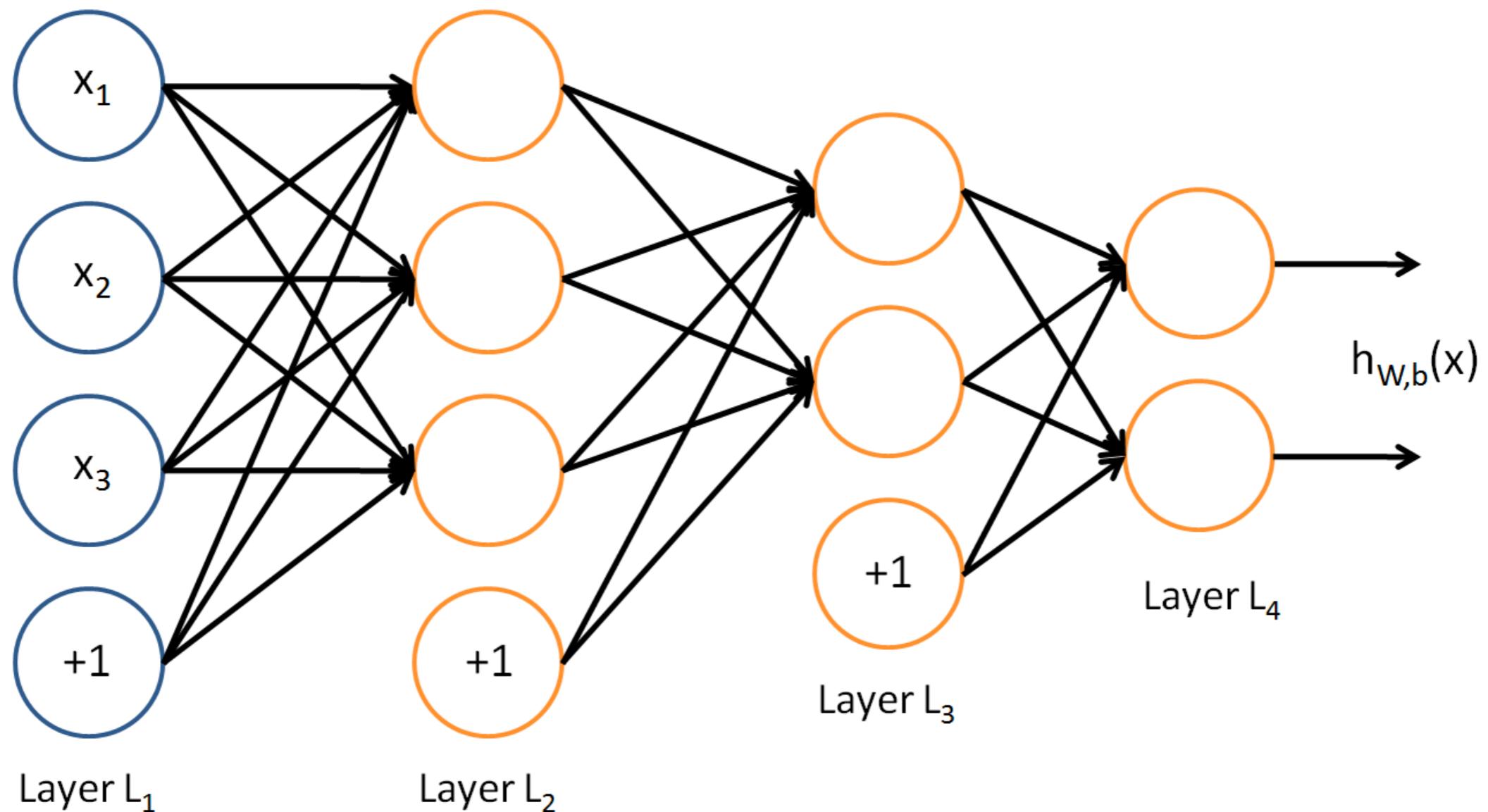


ReLU

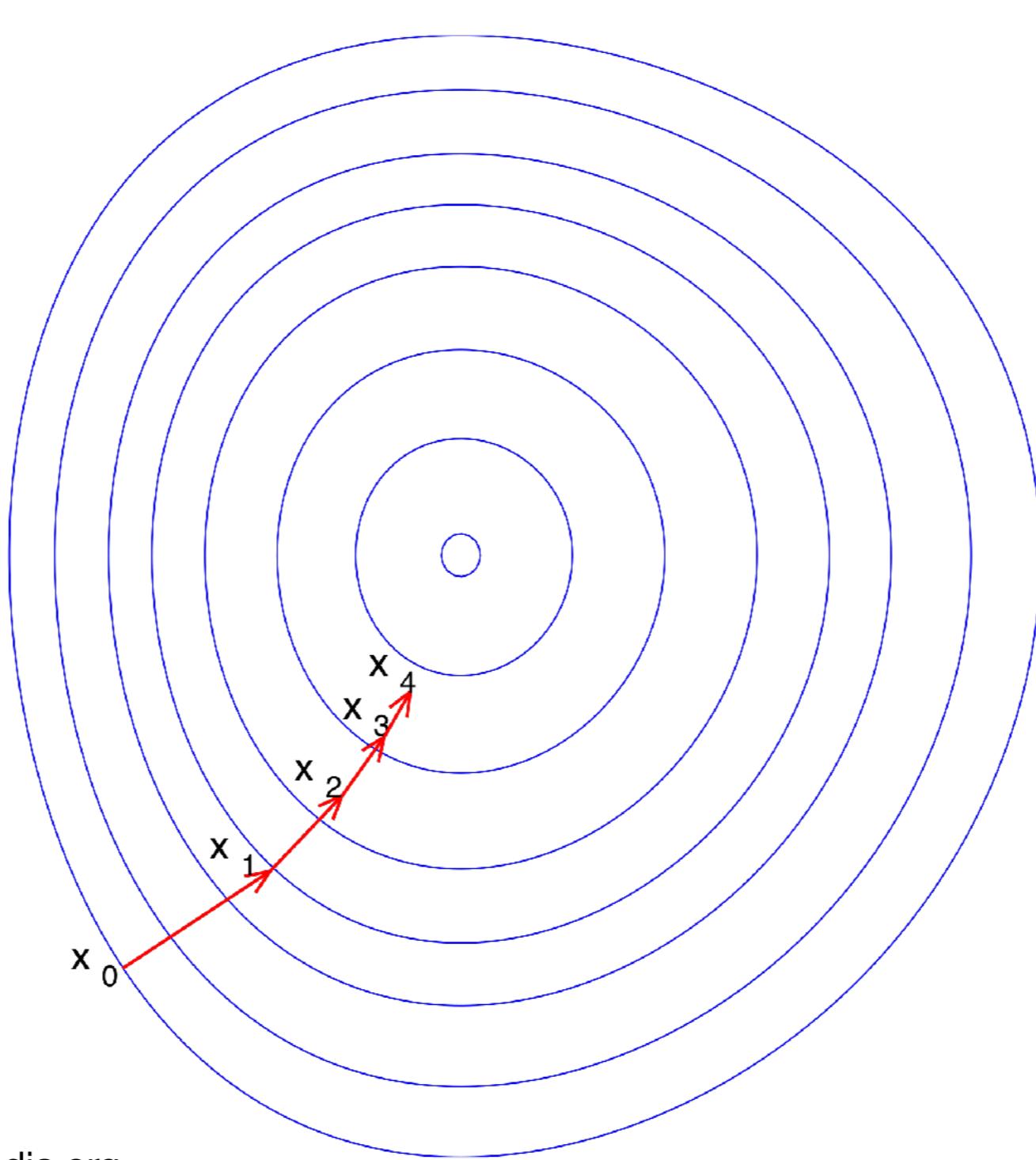
Softmax:

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

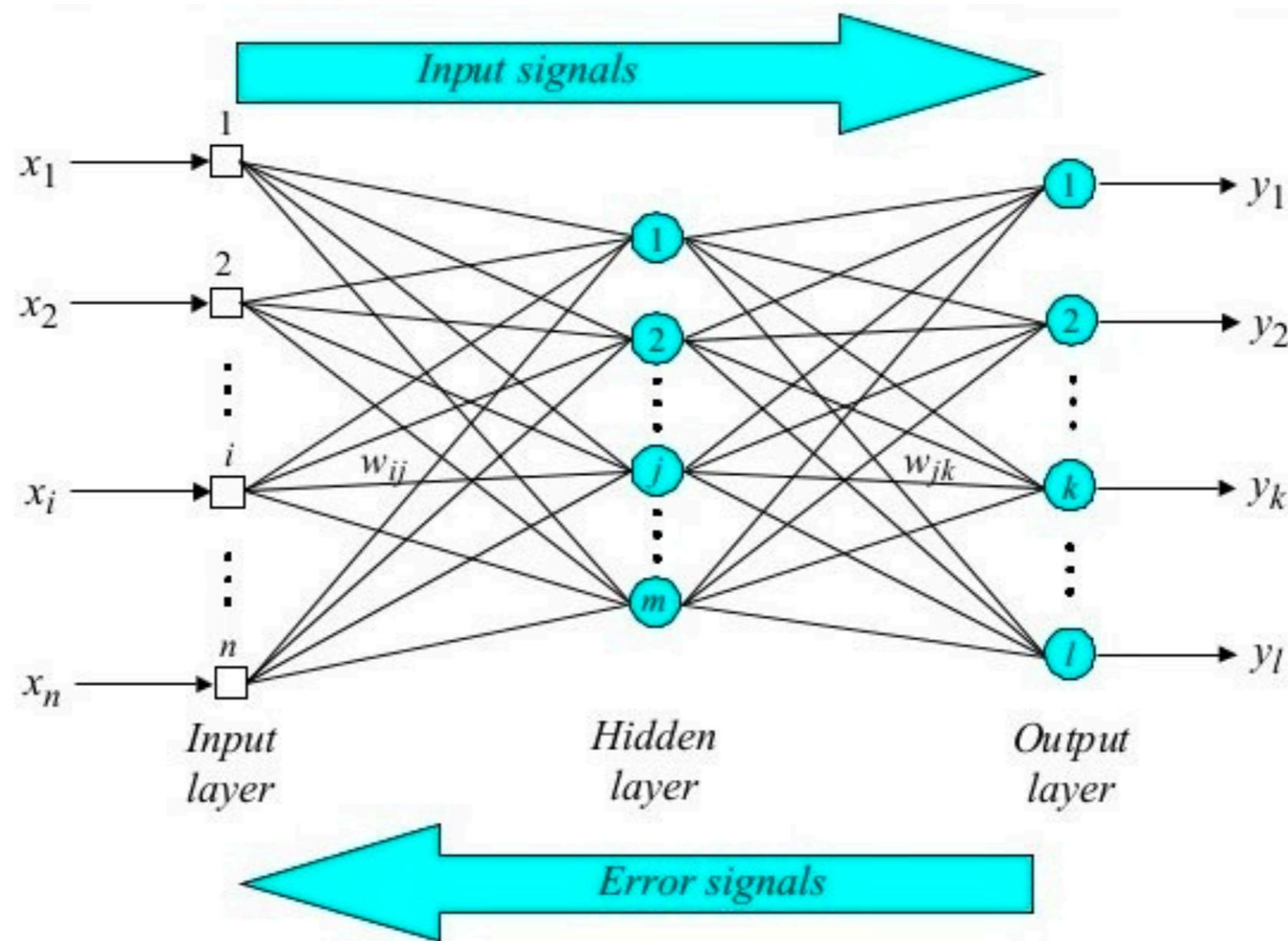
Multilayer Neural Networks



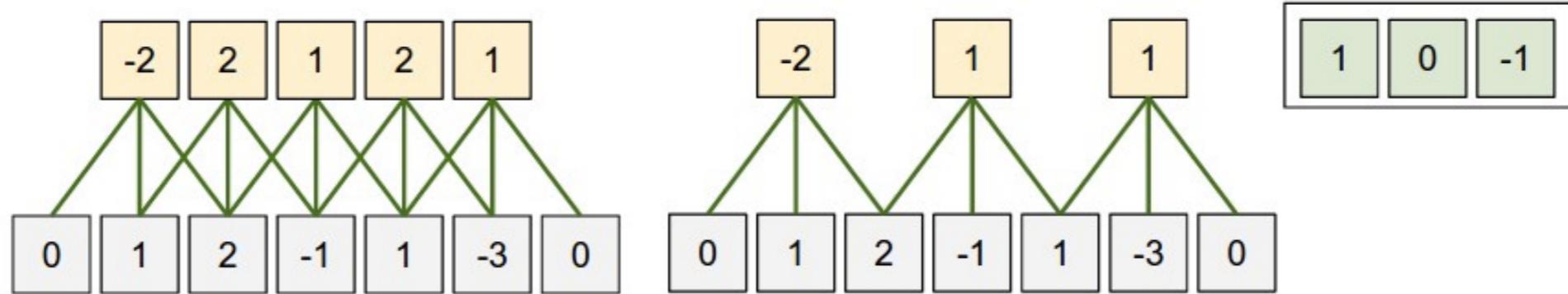
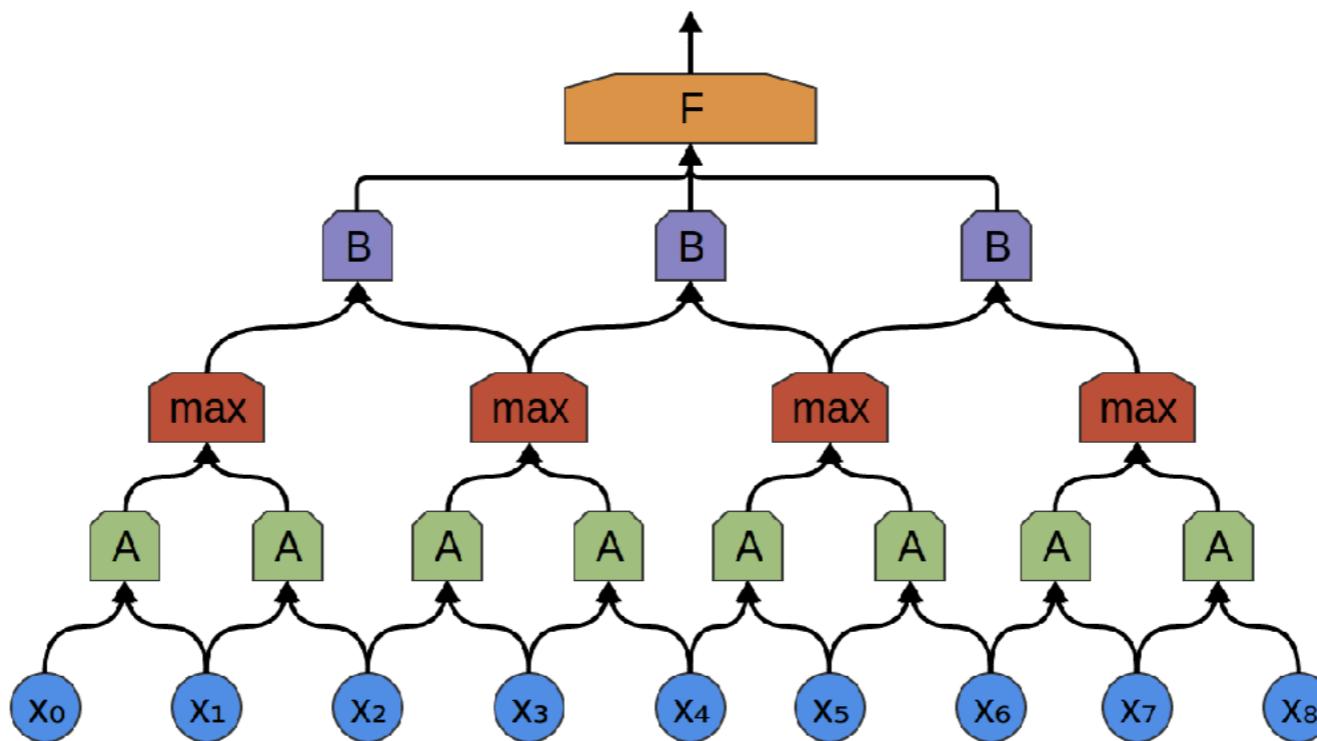
Steepest gradient descent



Back propagation

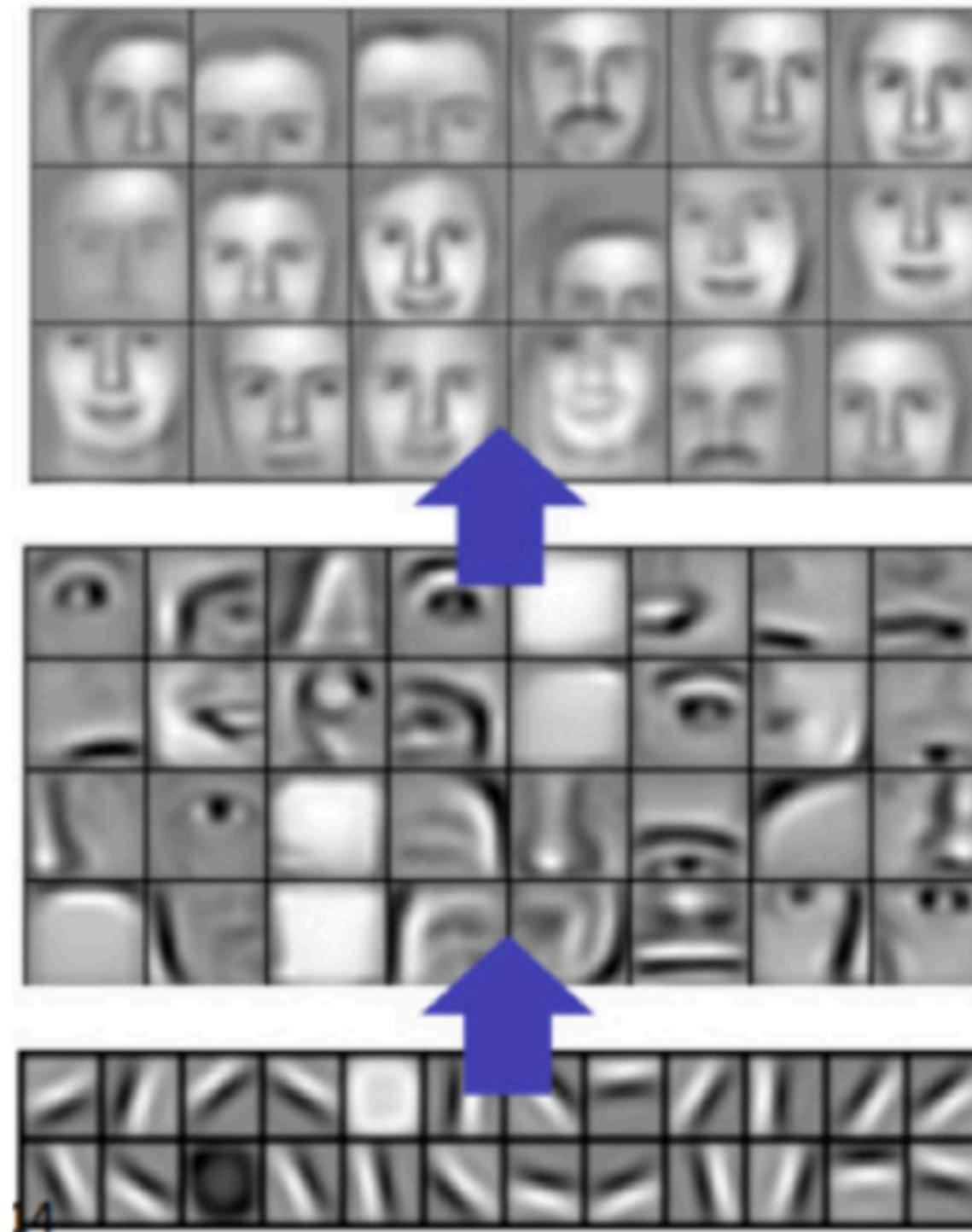


Convolution



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

Weights visualization



Layer 3

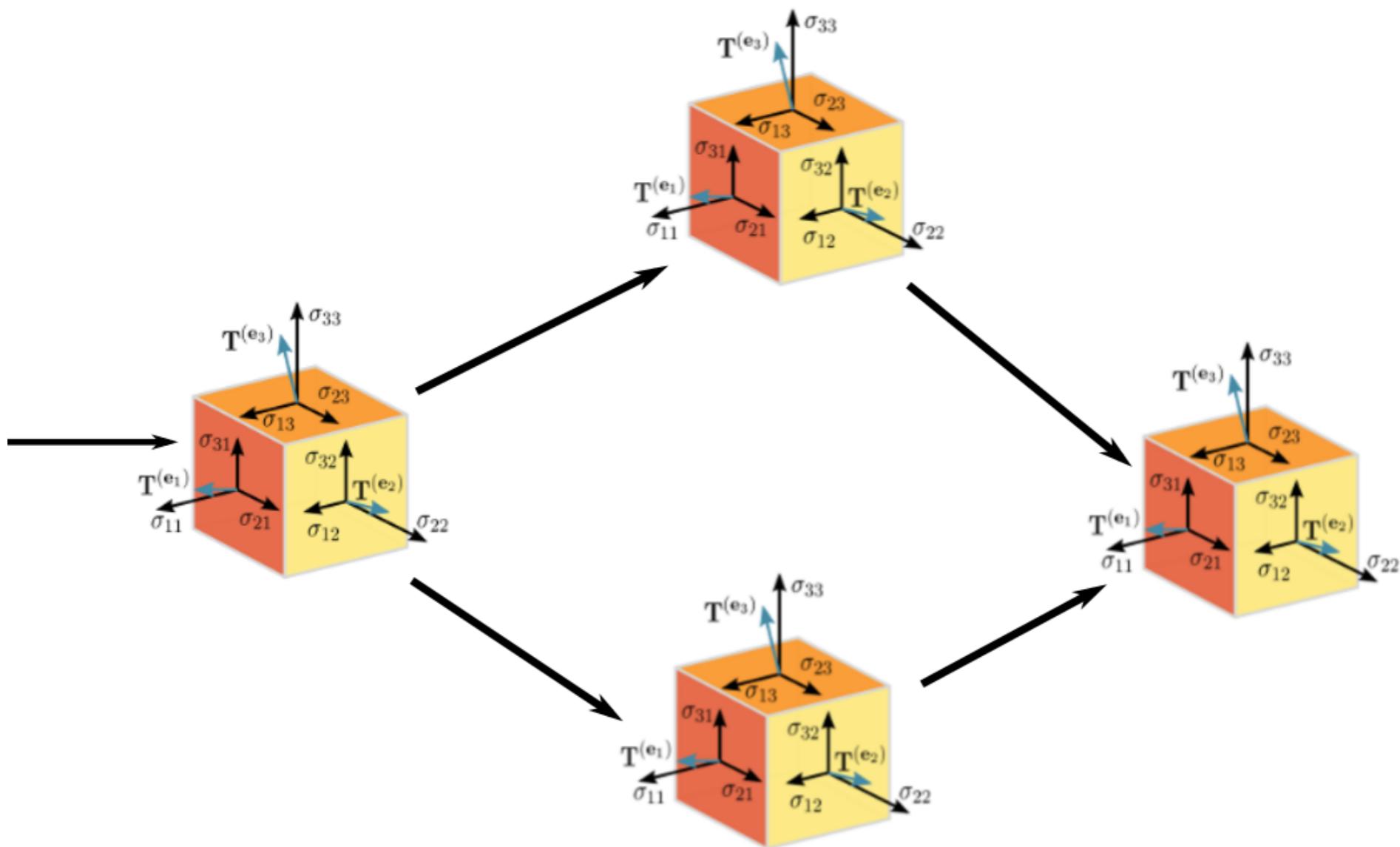
Layer 2

Layer 1

Important terms

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

What is TensorFlow?



Keras tutorial

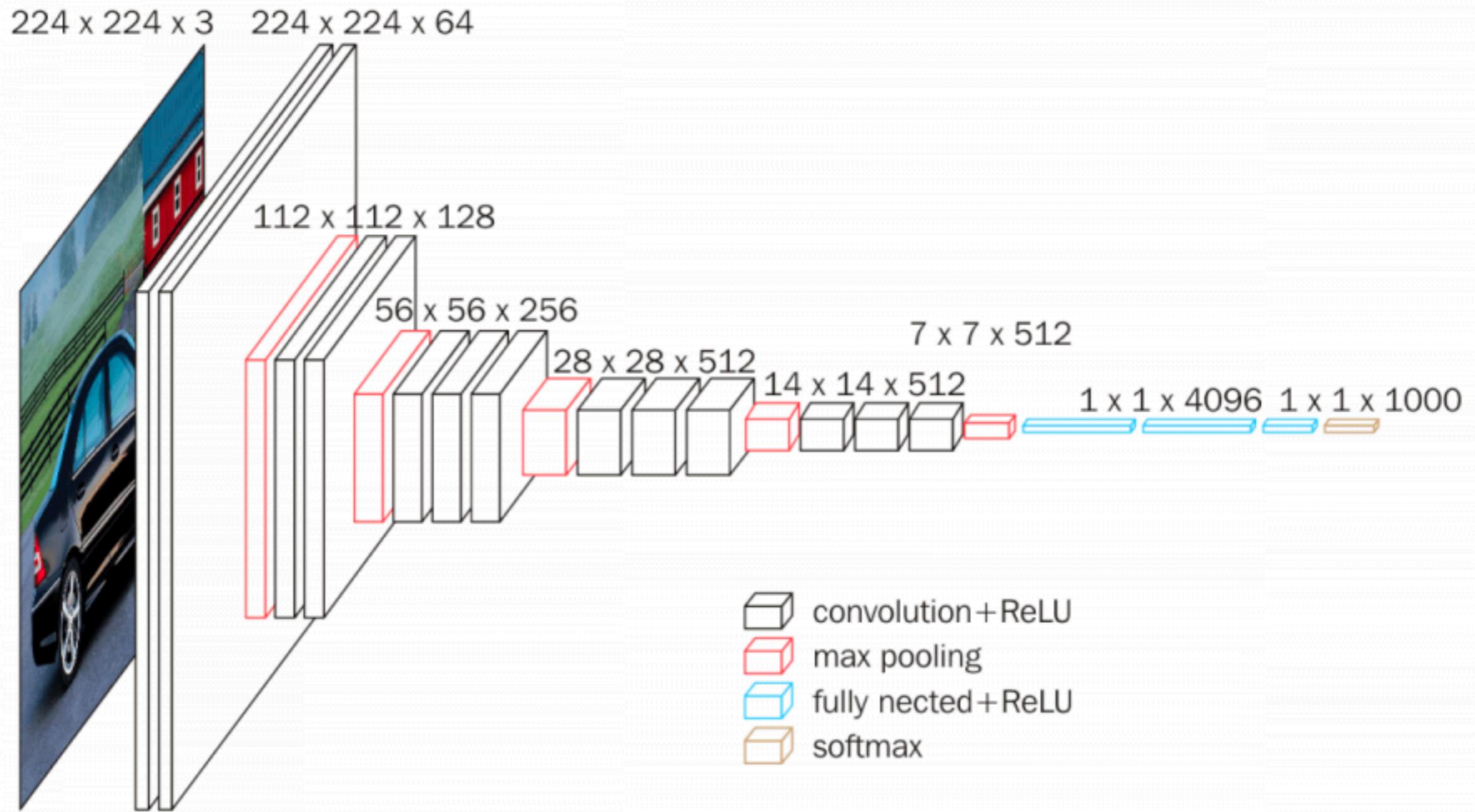
01-Keras-introduction.ipynb

Implementation of some classification and regression tasks using NN

02-Classification-nn-assignment.ipynb

03-Regression-nn-assignment.ipynb

VGG 16

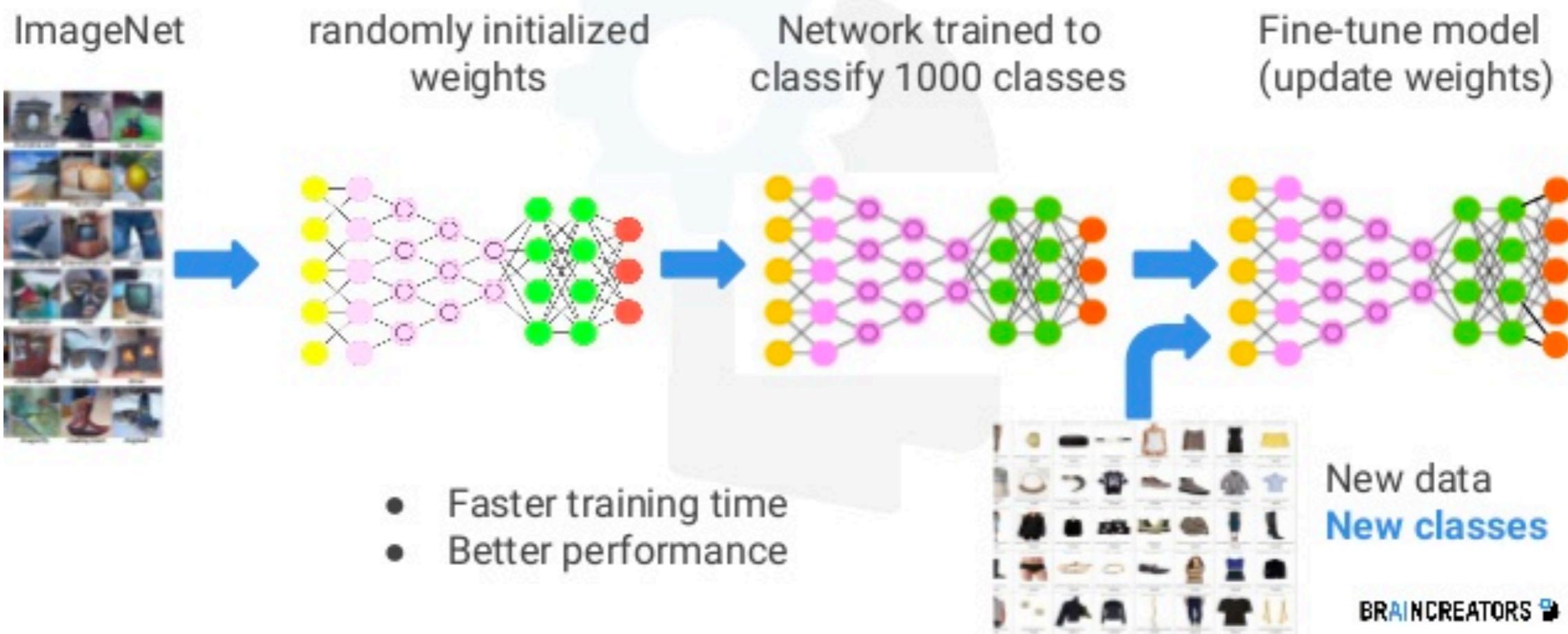


ResNet



Finetuning

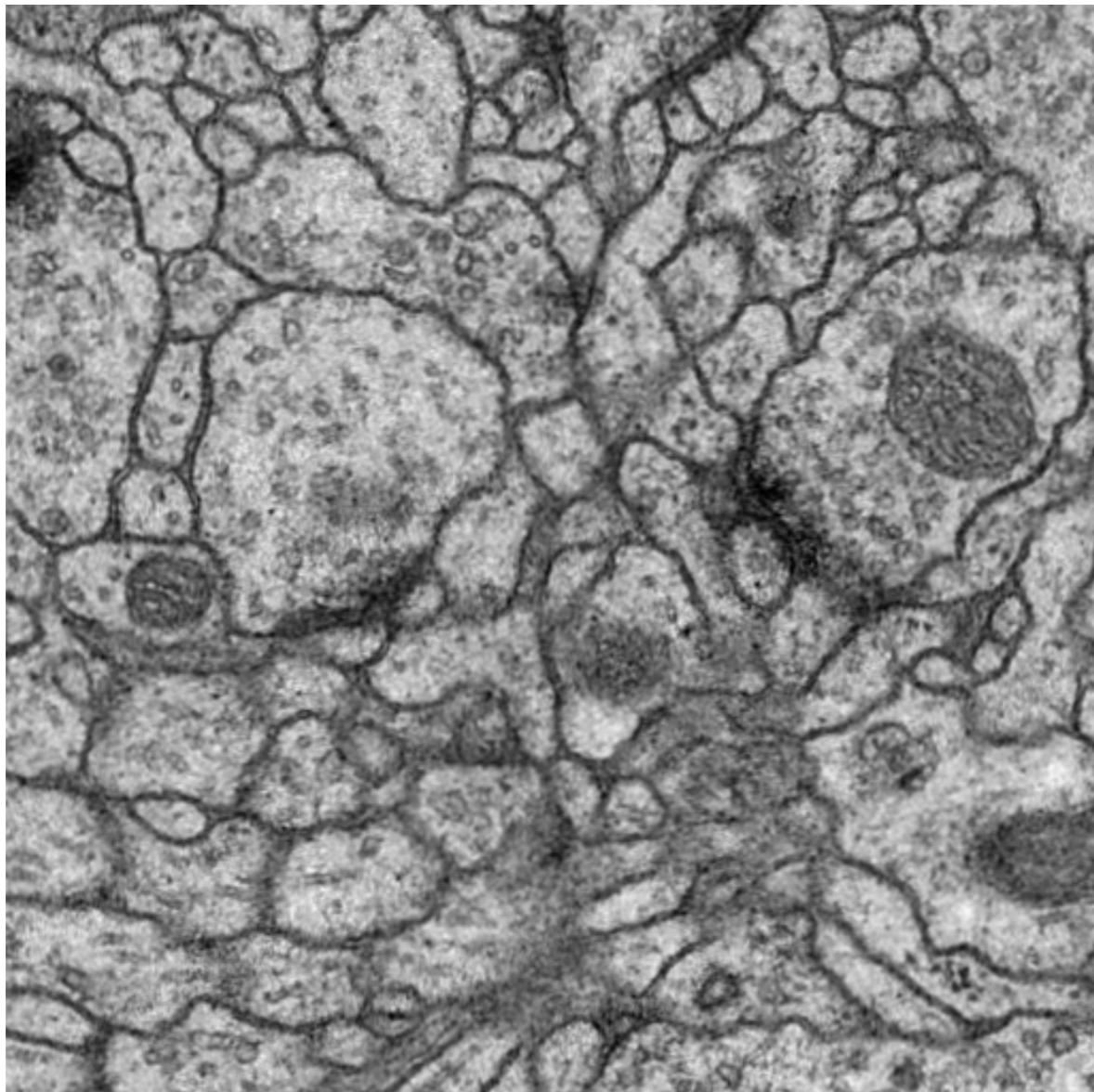
Transfer Learning



Transfer learning example

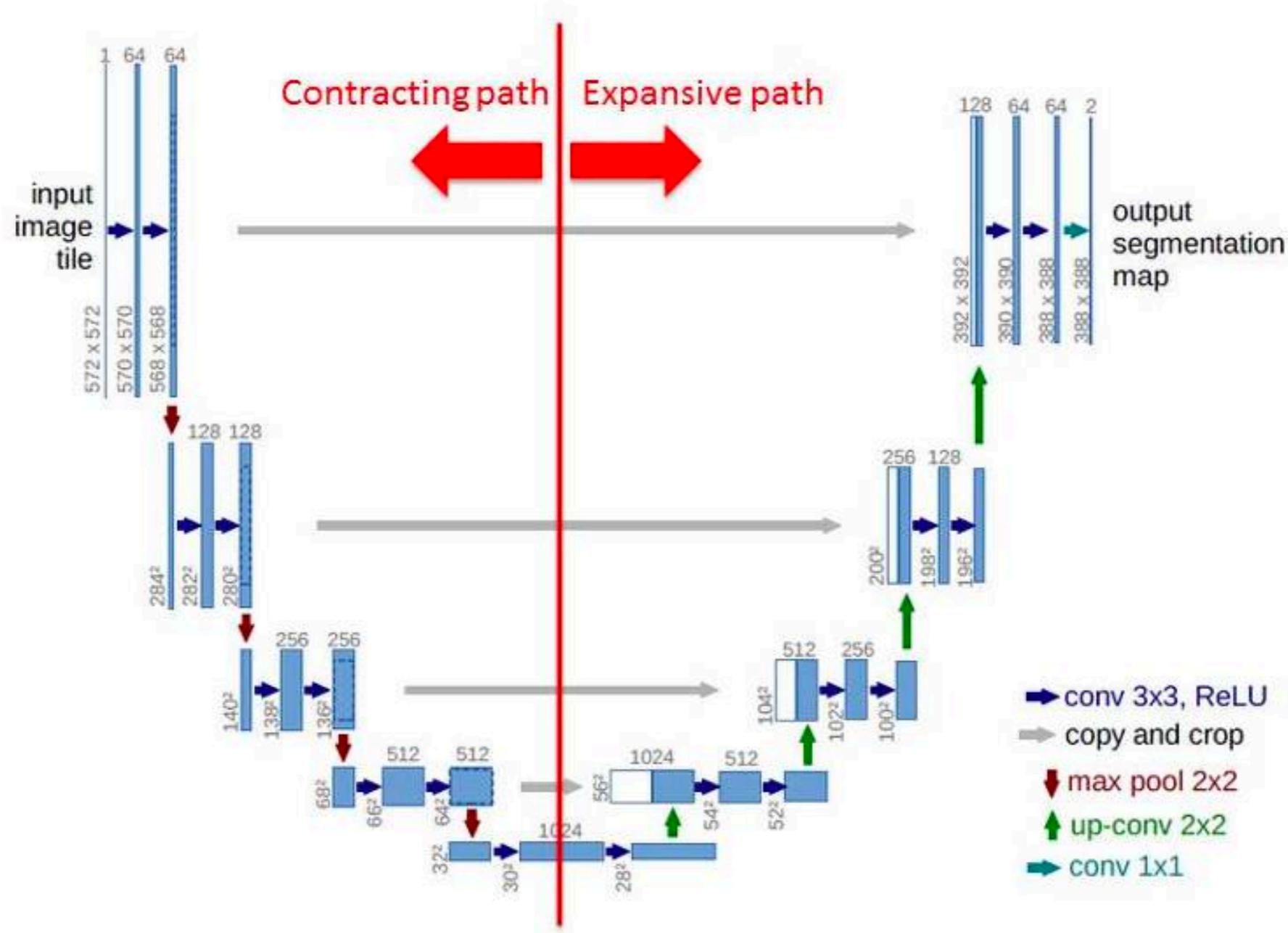
04-Transfer_learning.ipynb

Image segmentation



U-Net

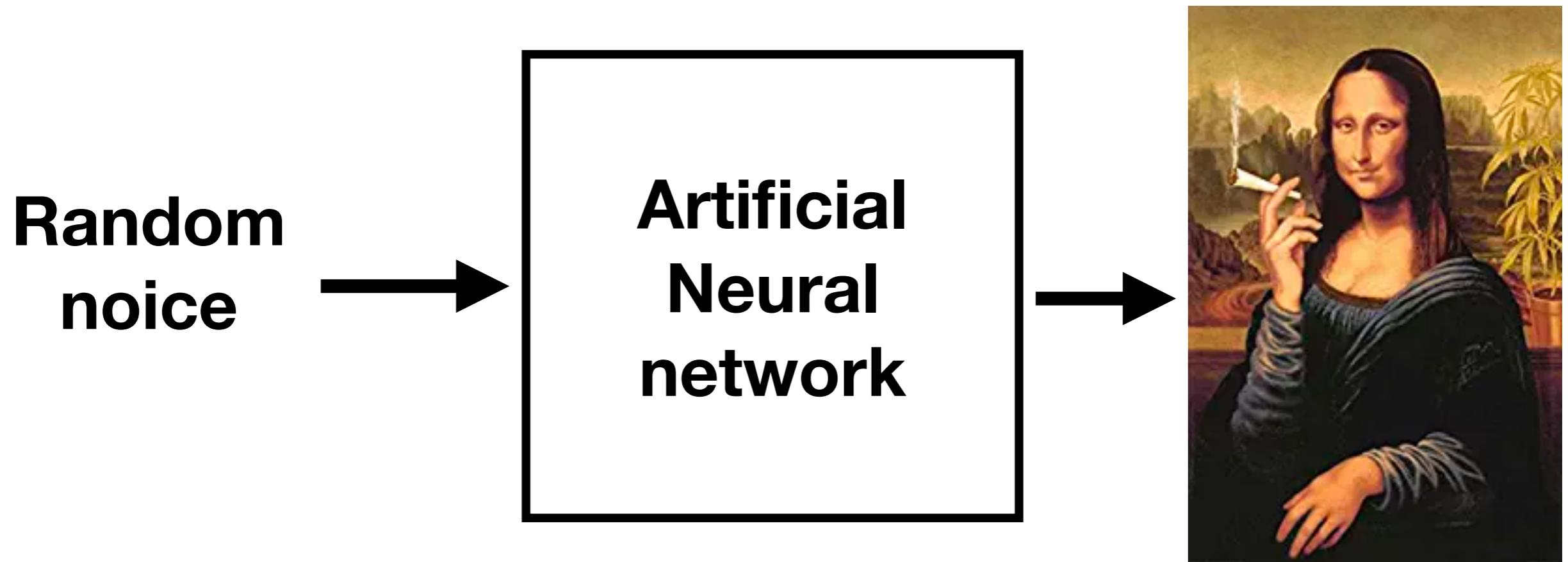
Network Architecture



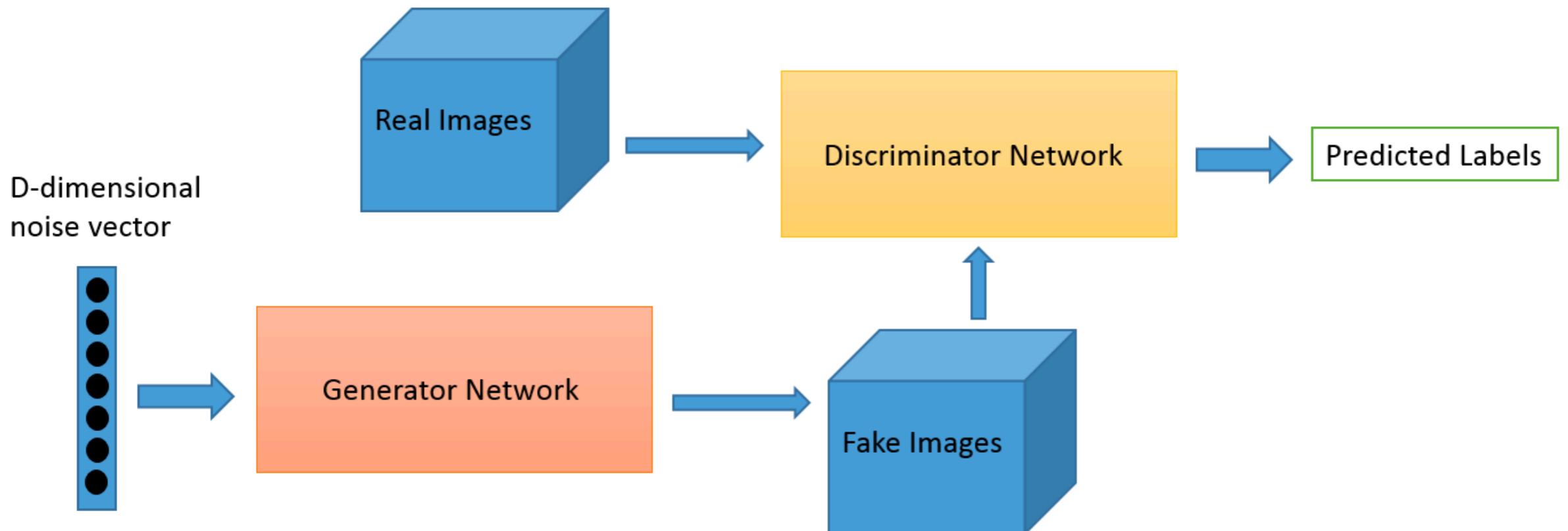
U-Net segmentation example

05-Segmentation.ipynb

Generative models with neural networks



Generative Adversarial Networks



Superresolution

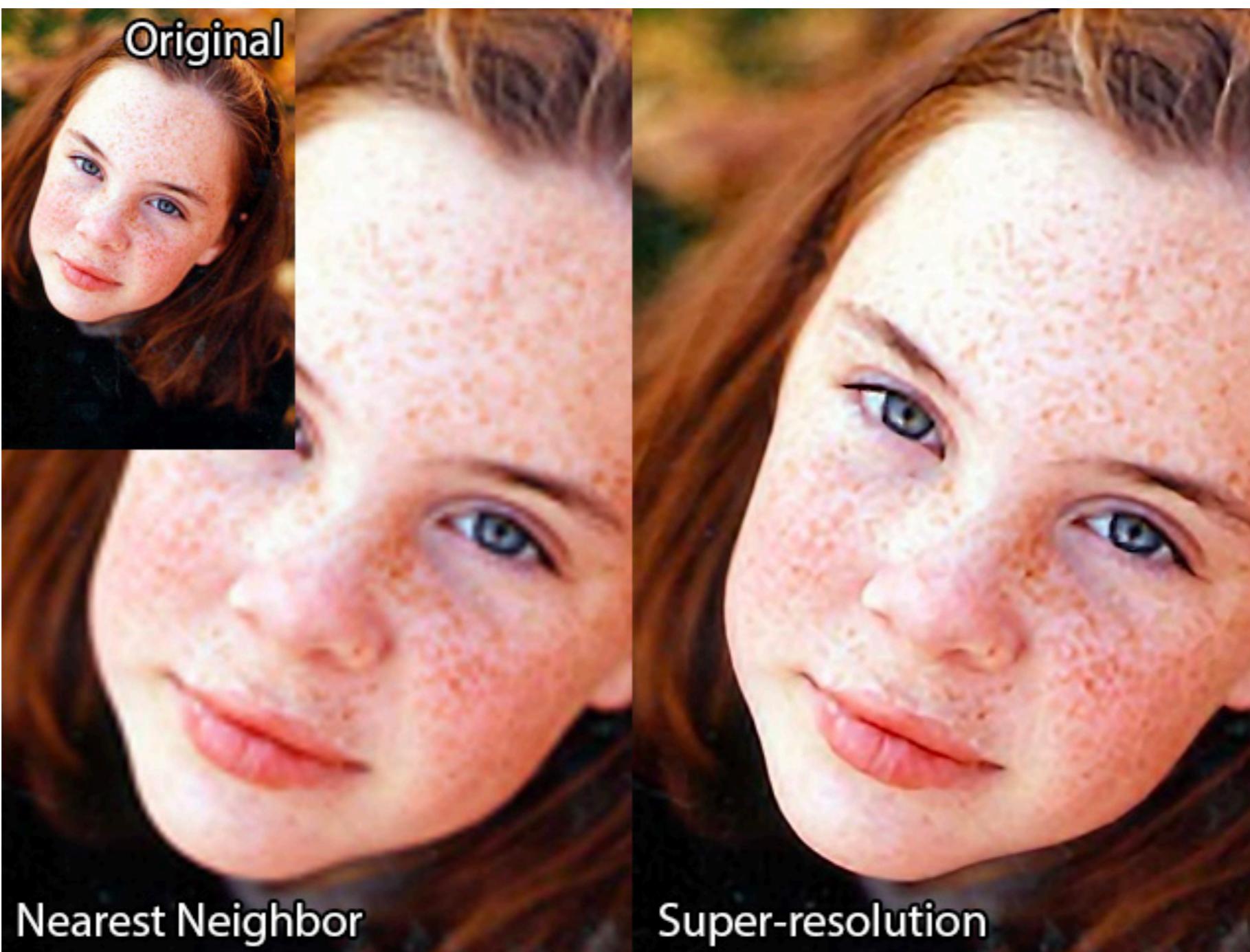
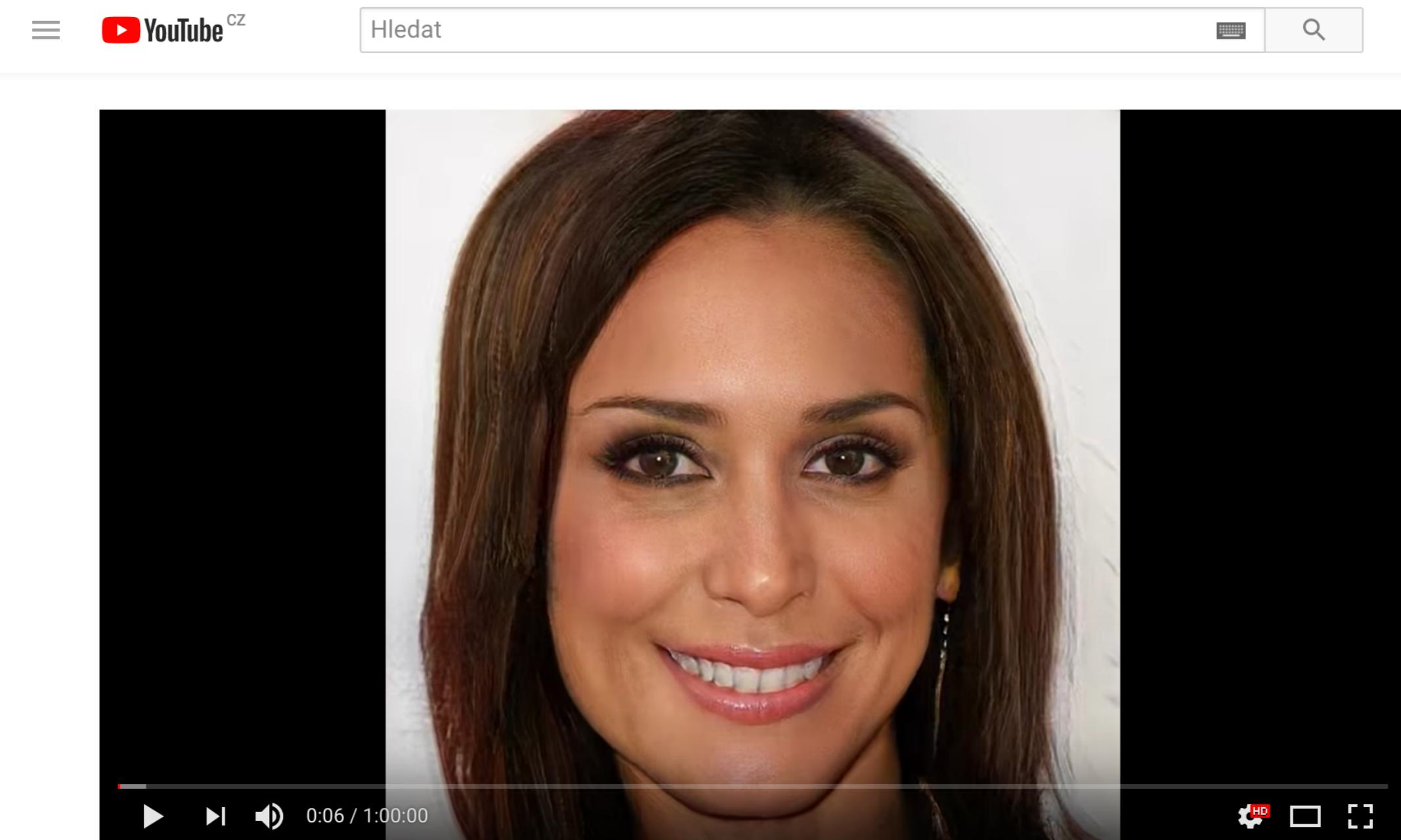


Image synthesis



One hour of imaginary celebrities

95 832 zhlédnutí



TO SE MI LÍBÍ



NELÍBÍ SE



SDÍLET



...

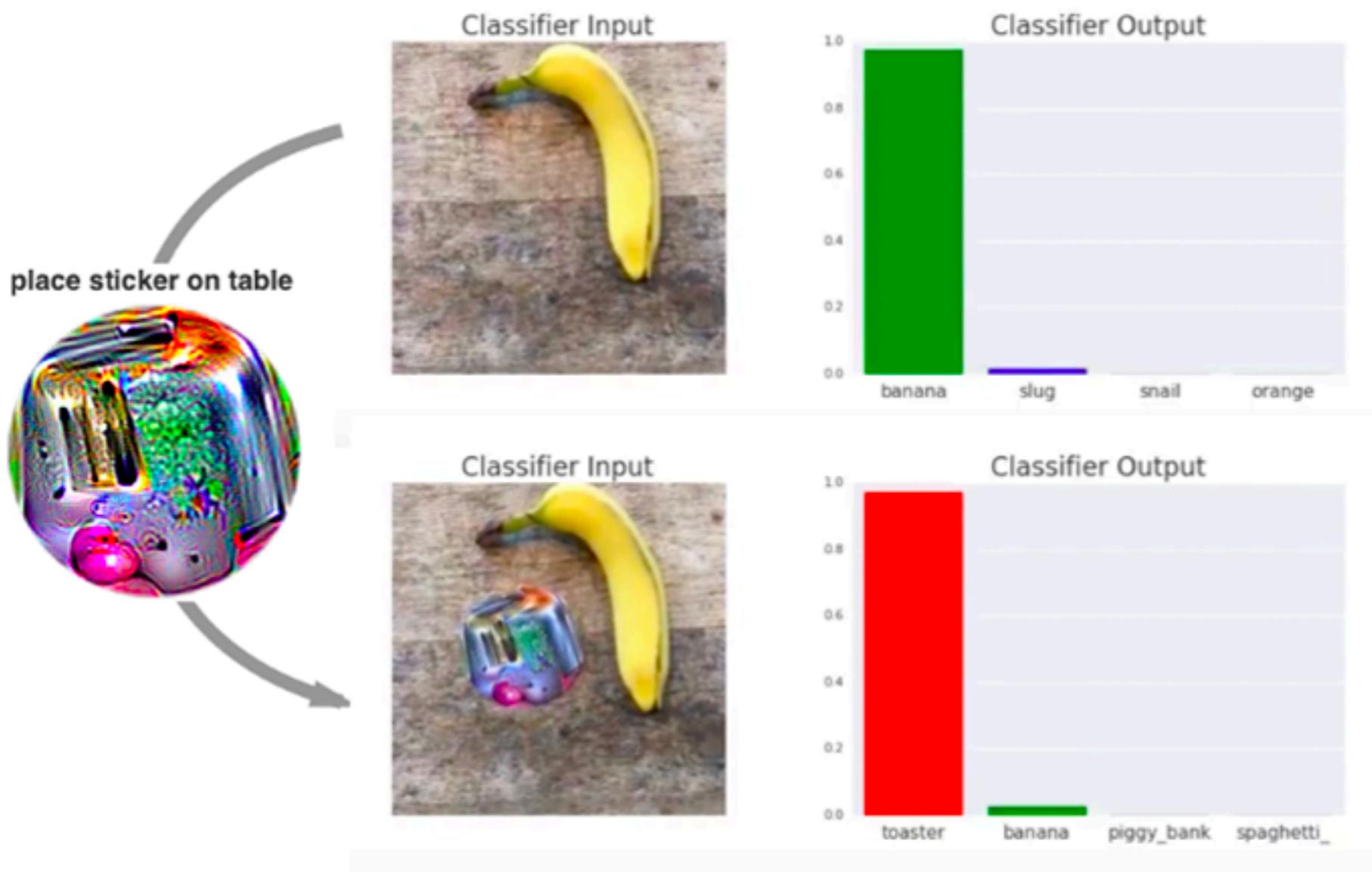
Which one is fake?



Generative Adversarial Networks

06_GANs.ipynb

Adversarial Patch



Thank you for your attention

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

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