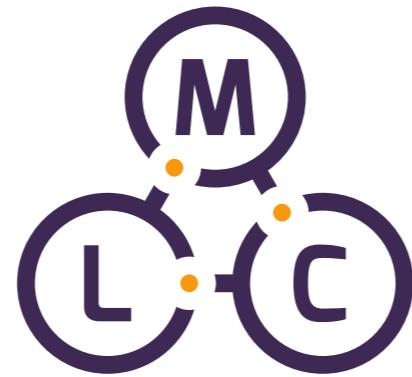


# Deep Learning and Image Processing for Raiffeisenbank International

Jiří Materna



Machine  
Learning  
College

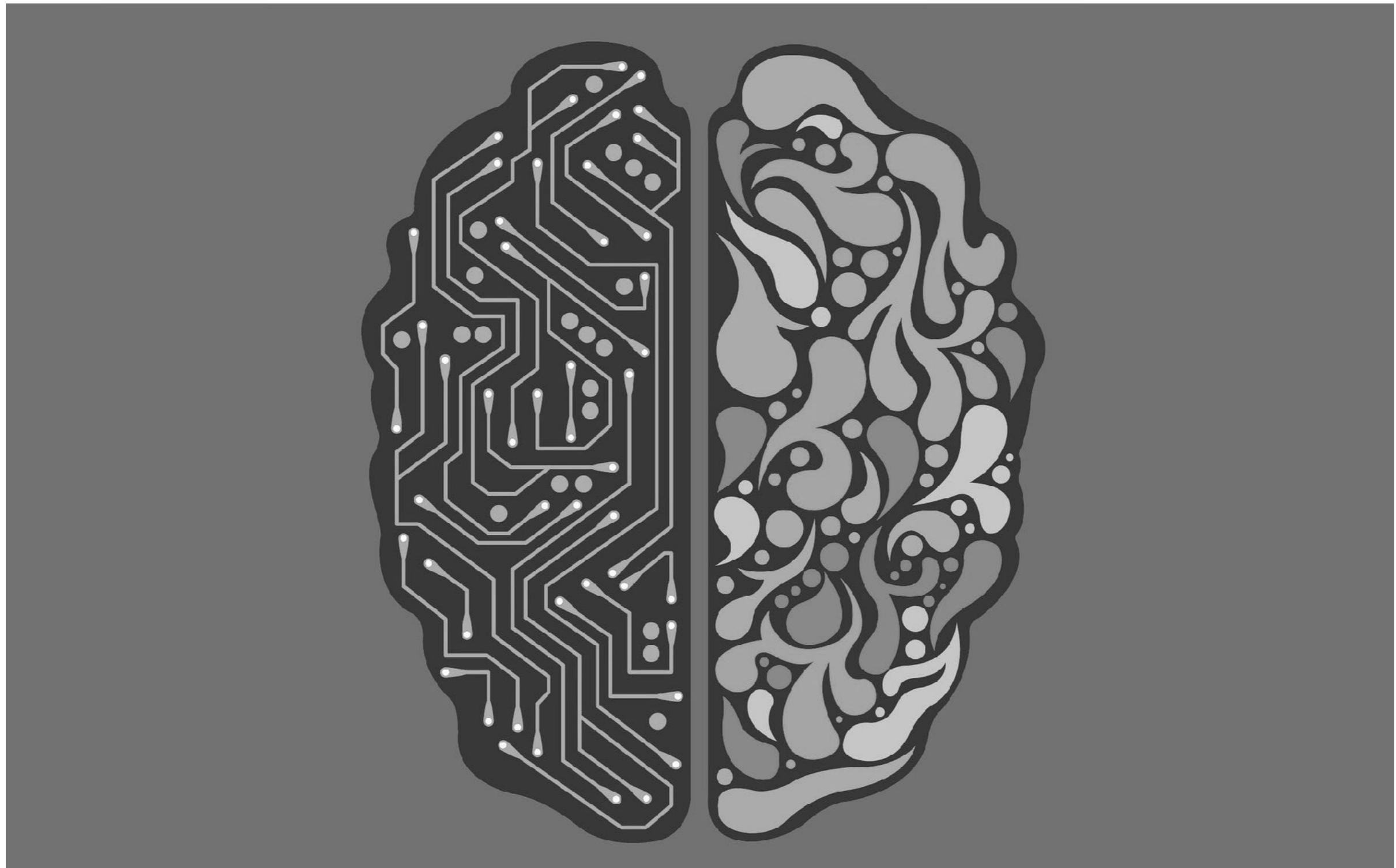
# About me

- 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

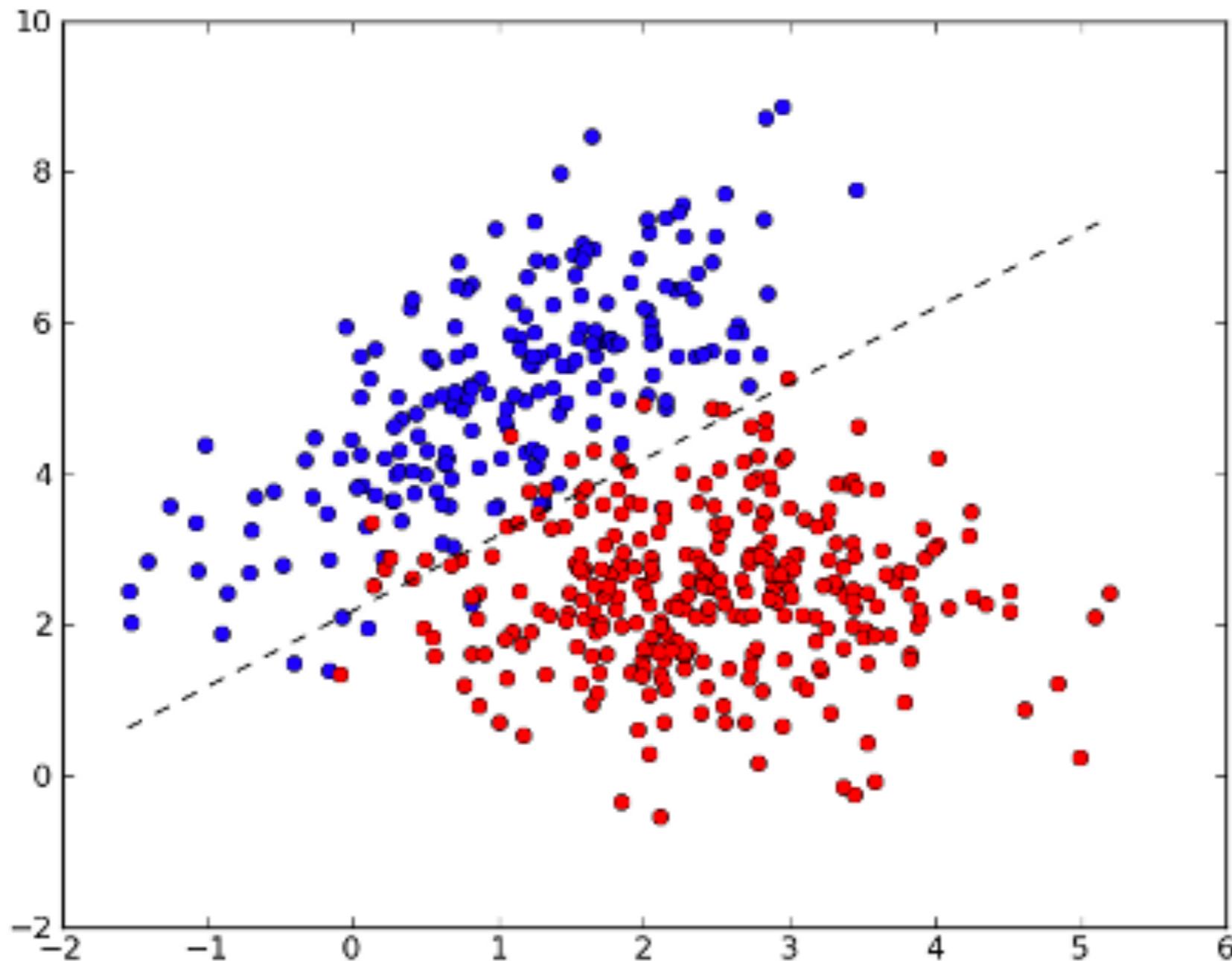
# Image processing

- 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

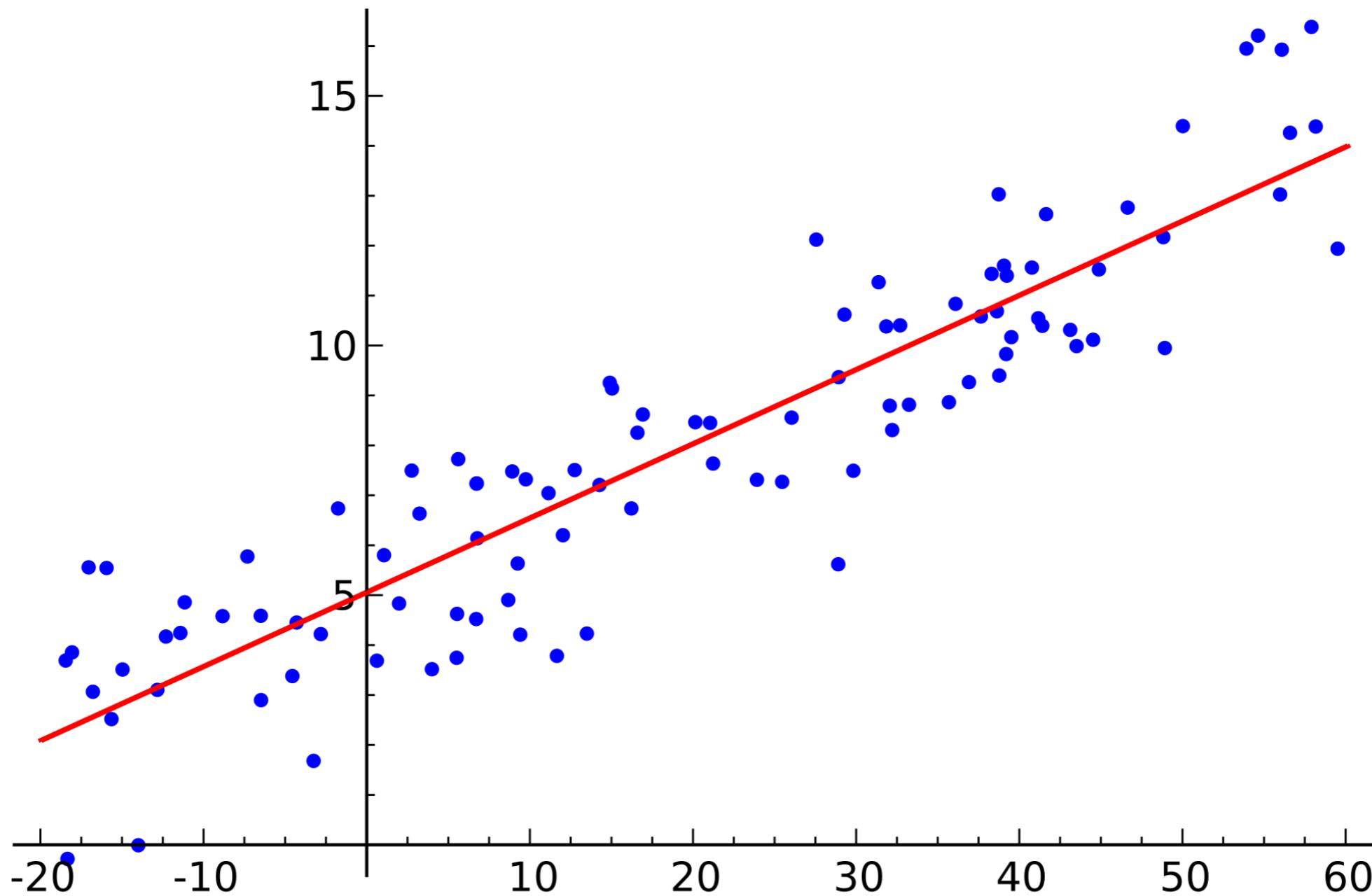
# What is (not) machine learning?



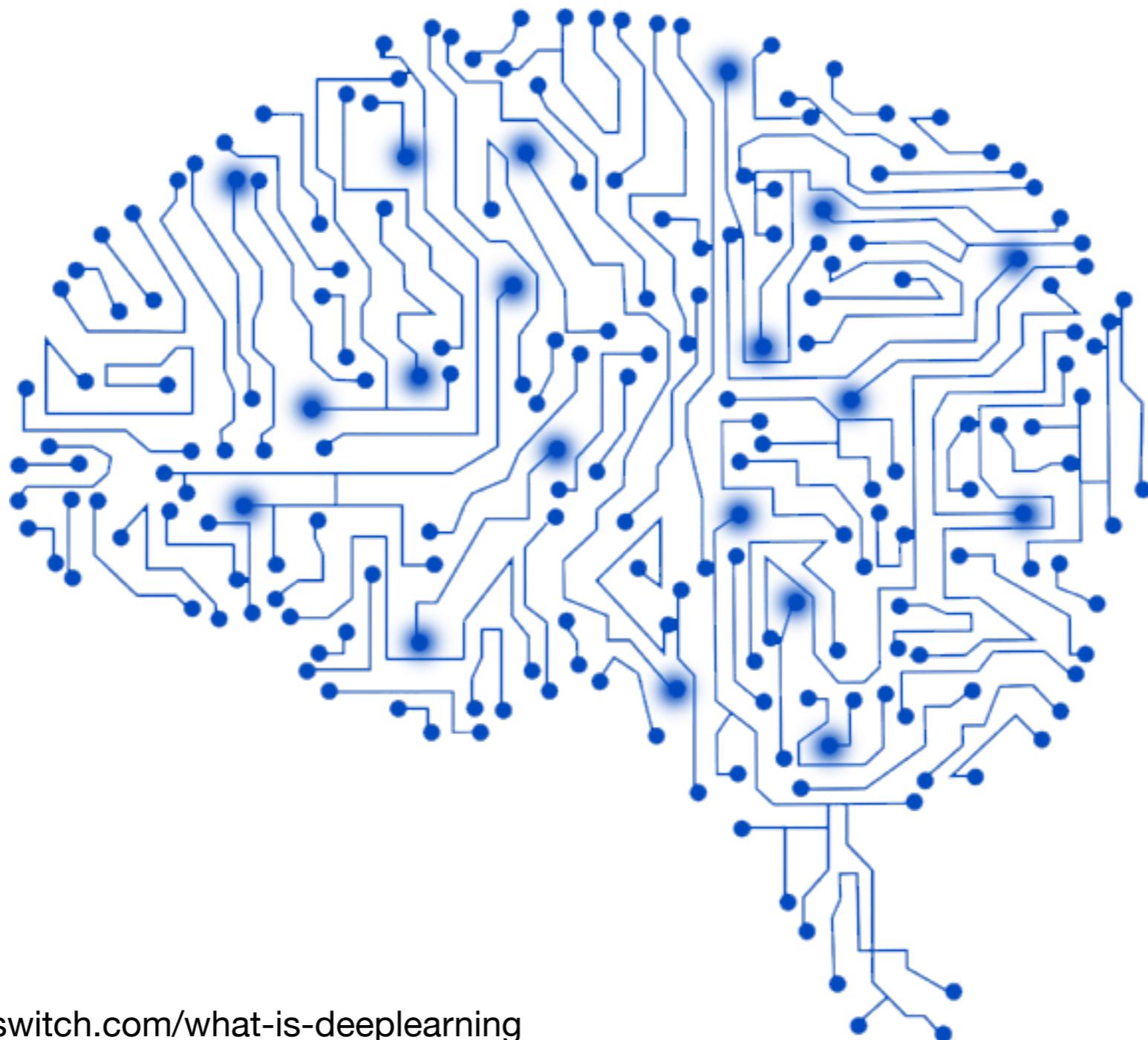
# Classification



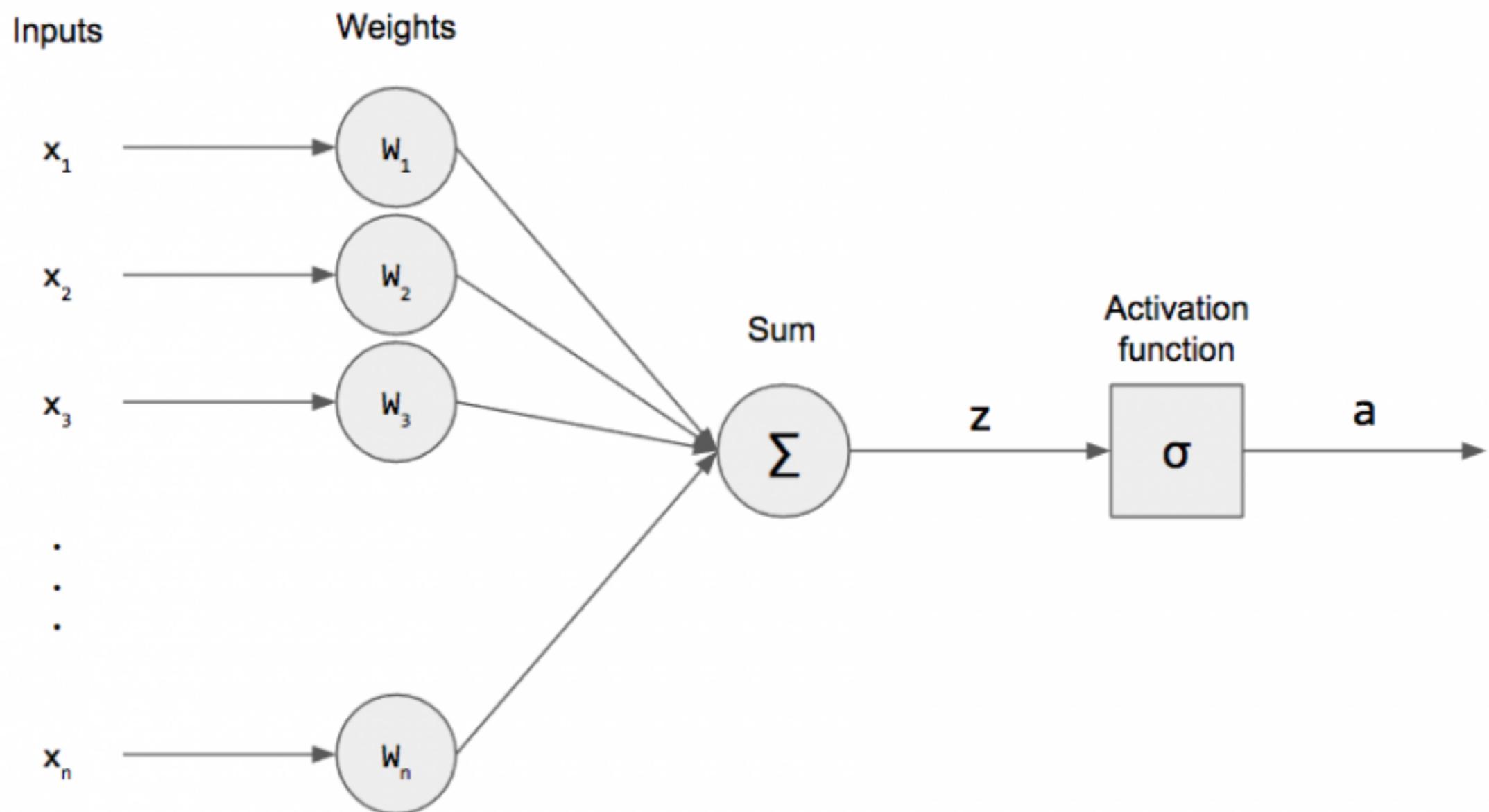
# Regression



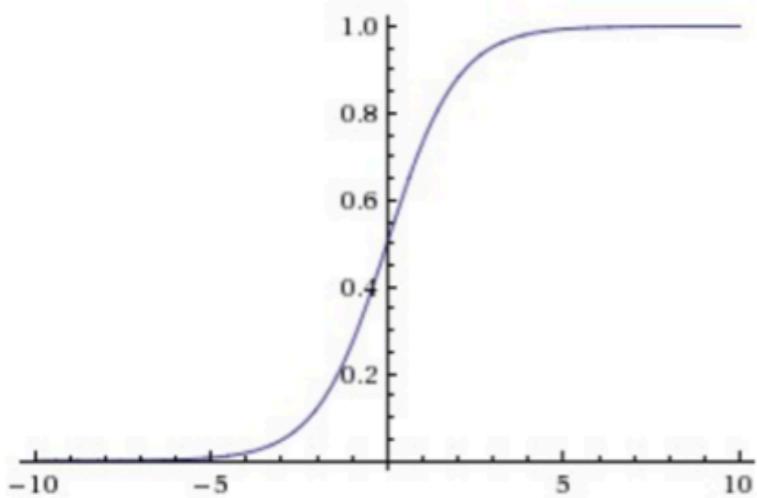
# Neural networks and deep learning



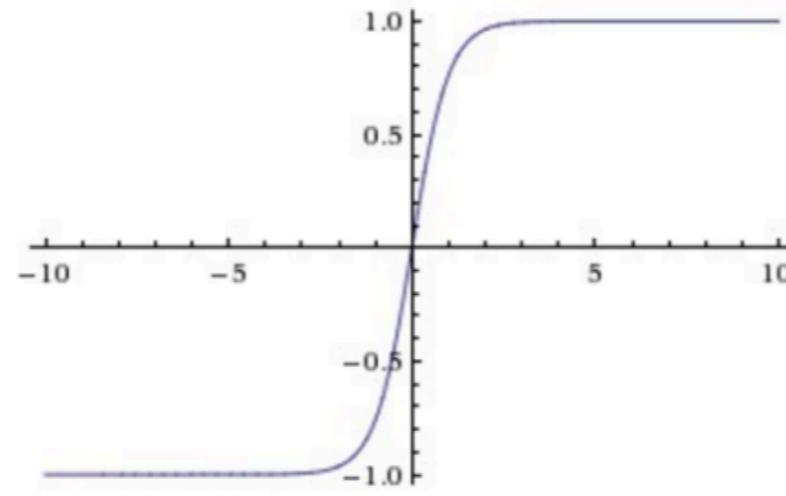
# Perceptron



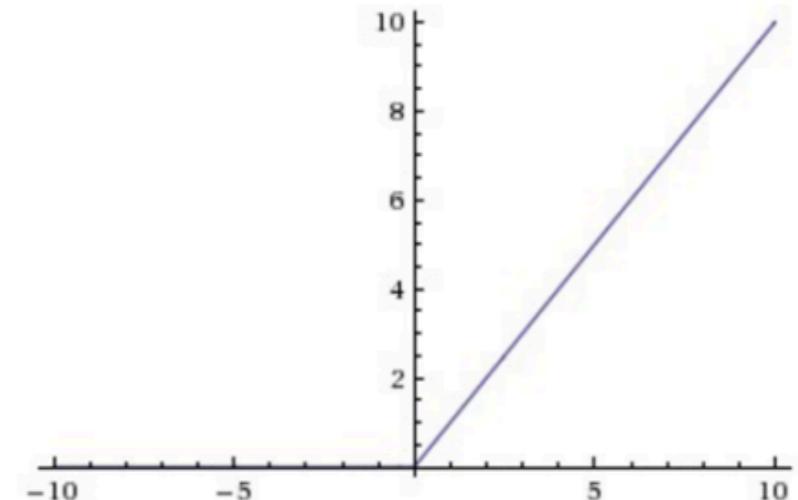
# Activation functions



Sigmoid



tanh

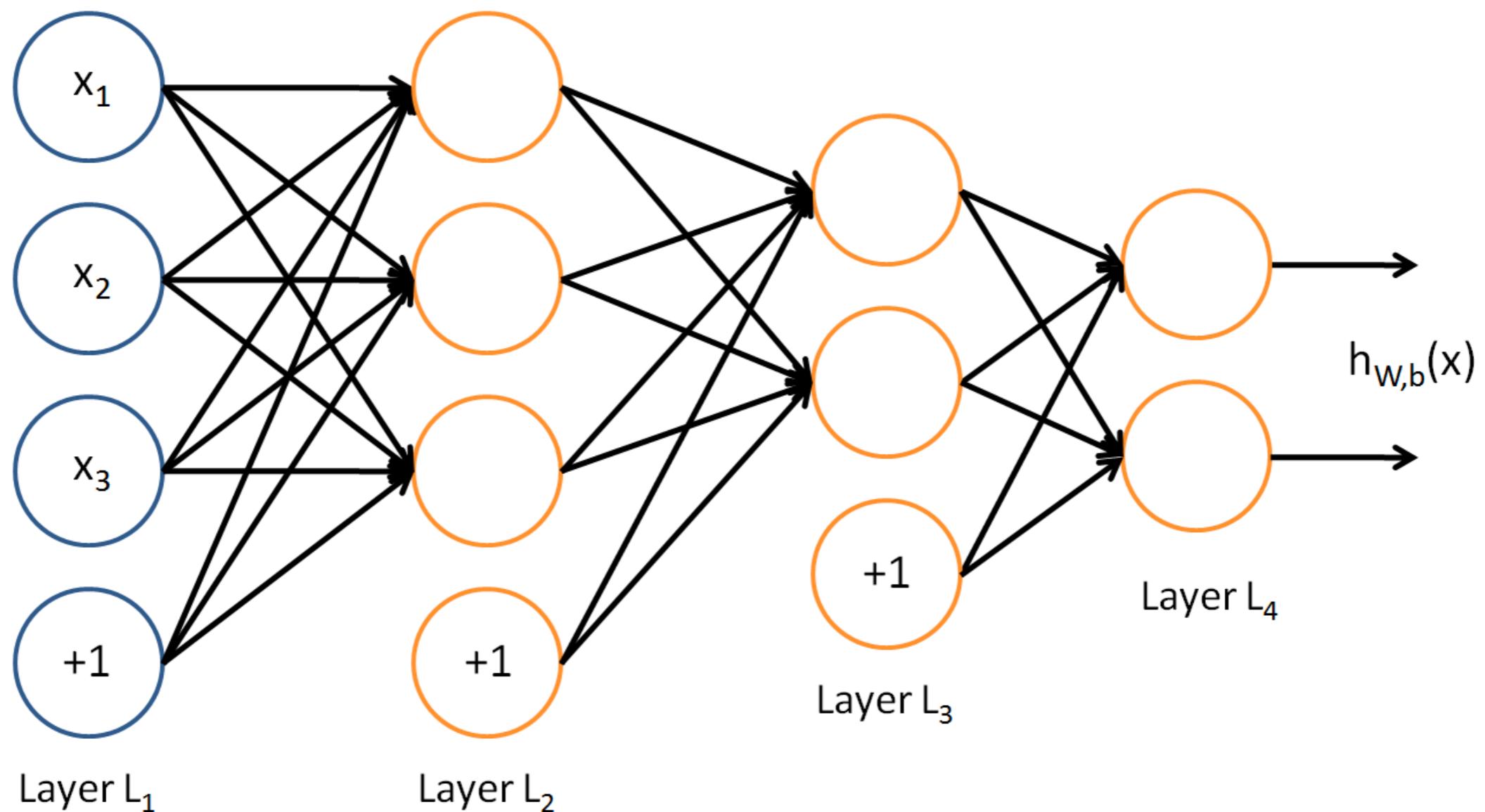


ReLU

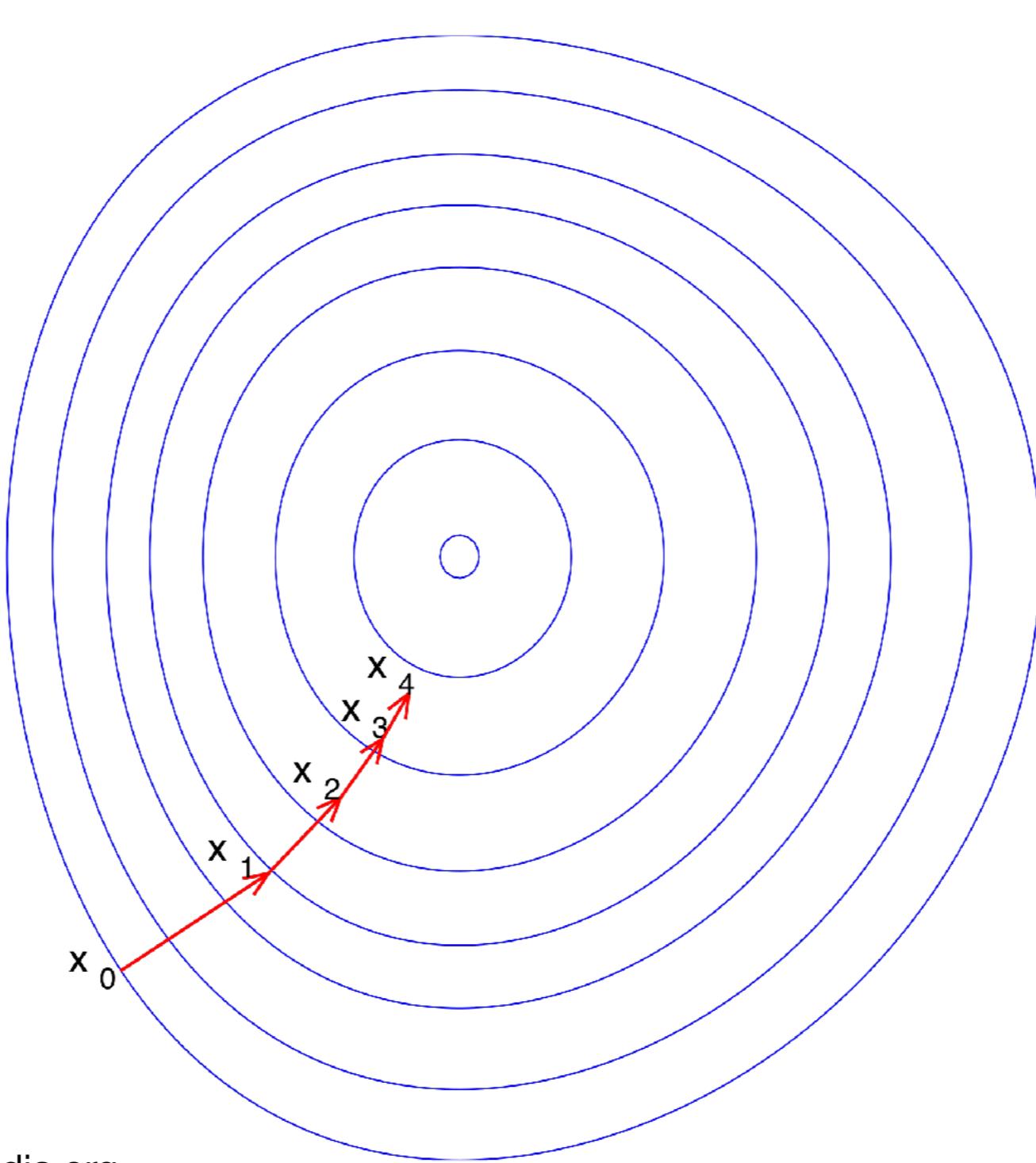
Softmax:

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

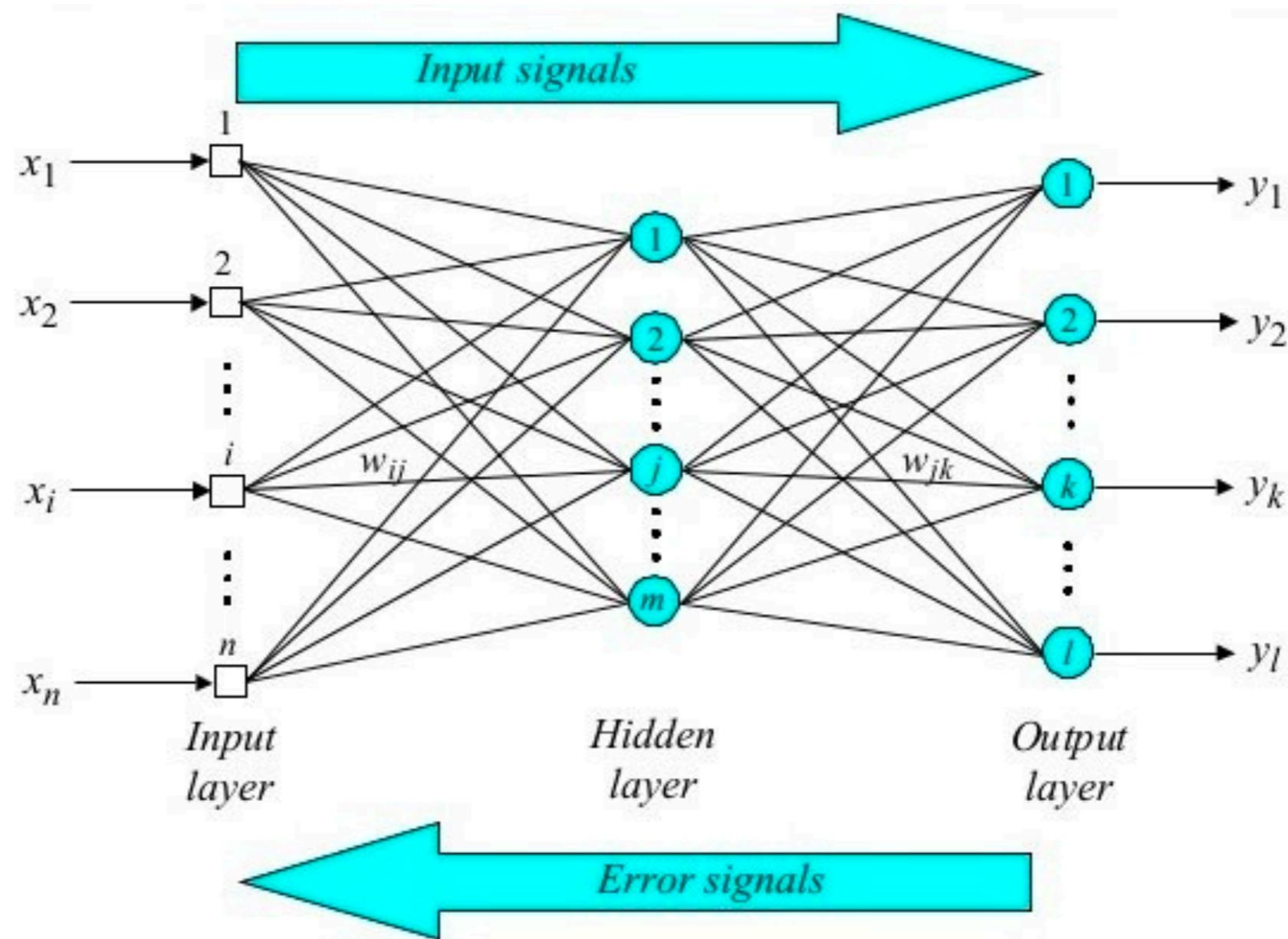
# Multilayer Neural Networks



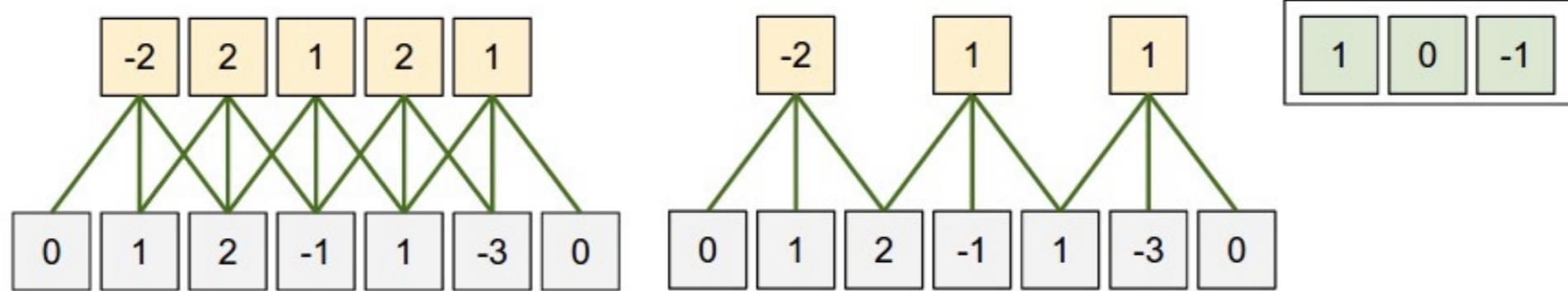
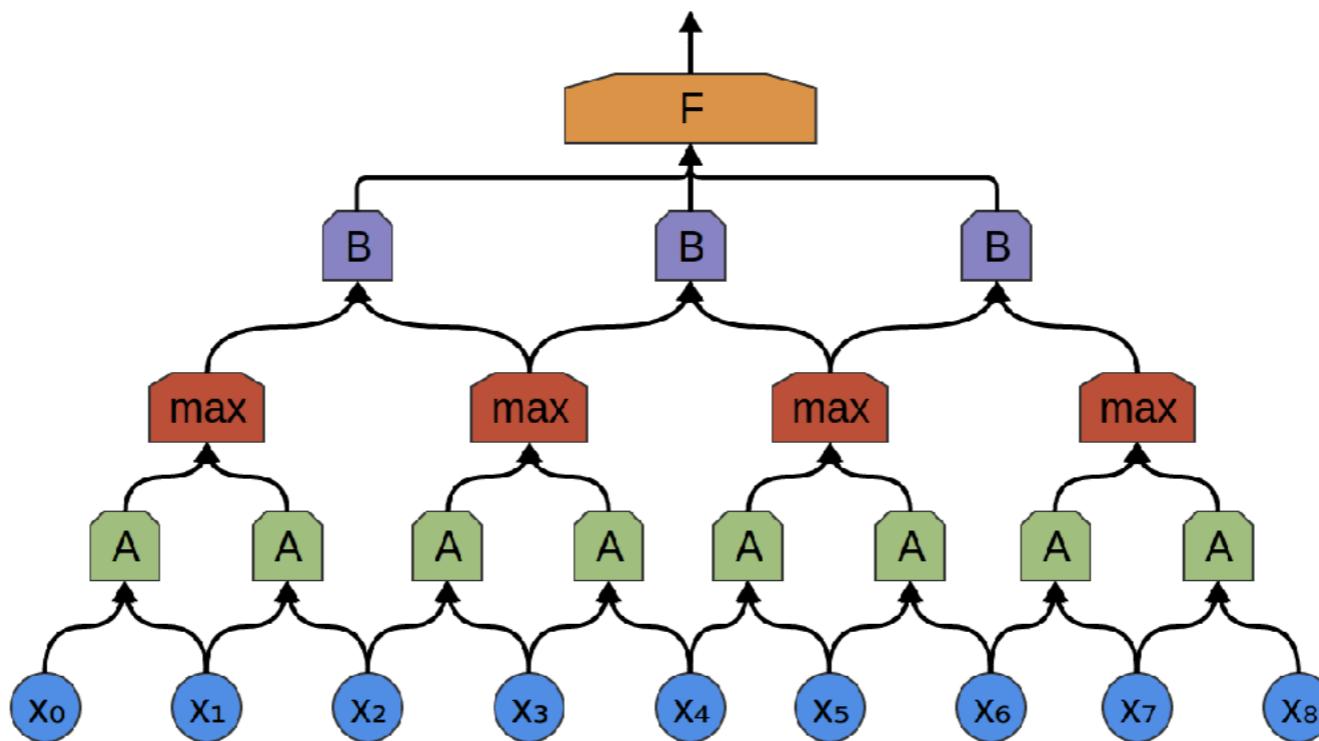
# Steepest gradient descent



# Back propagation

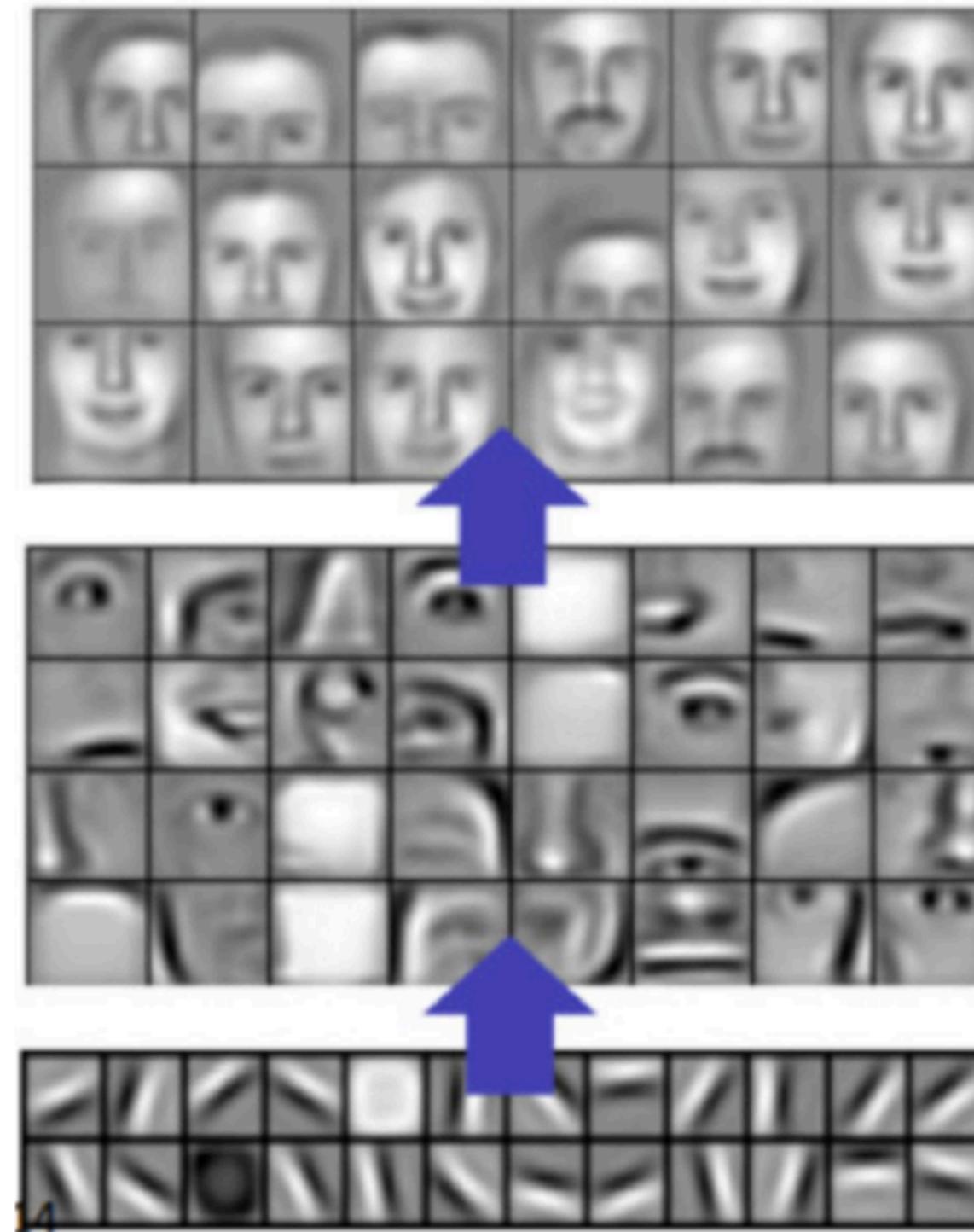


# Convolution



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

# Weights visualization



Layer 3

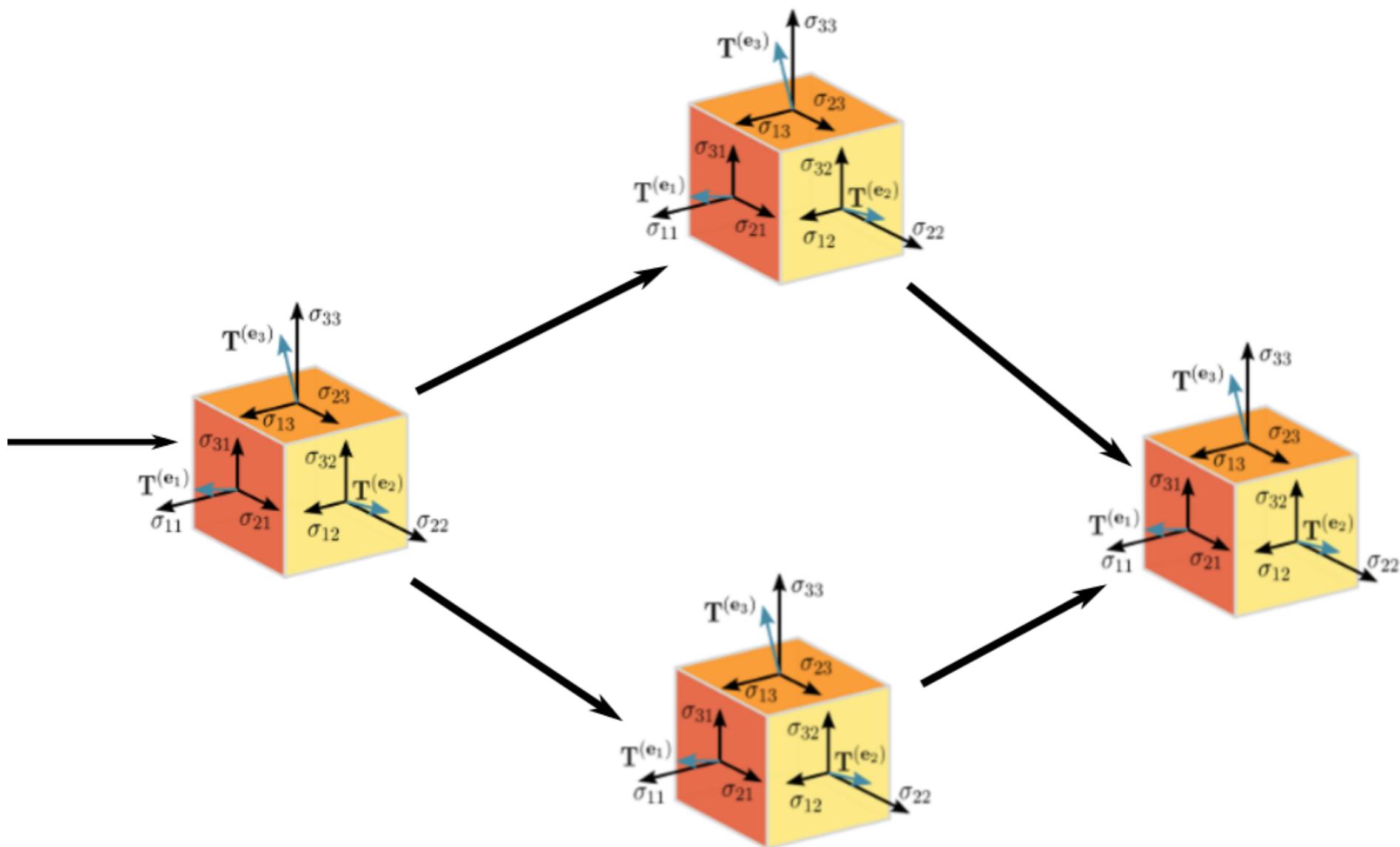
Layer 2

Layer 1

# Important terms

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

# What is TensorFlow?



# Keras tutorial

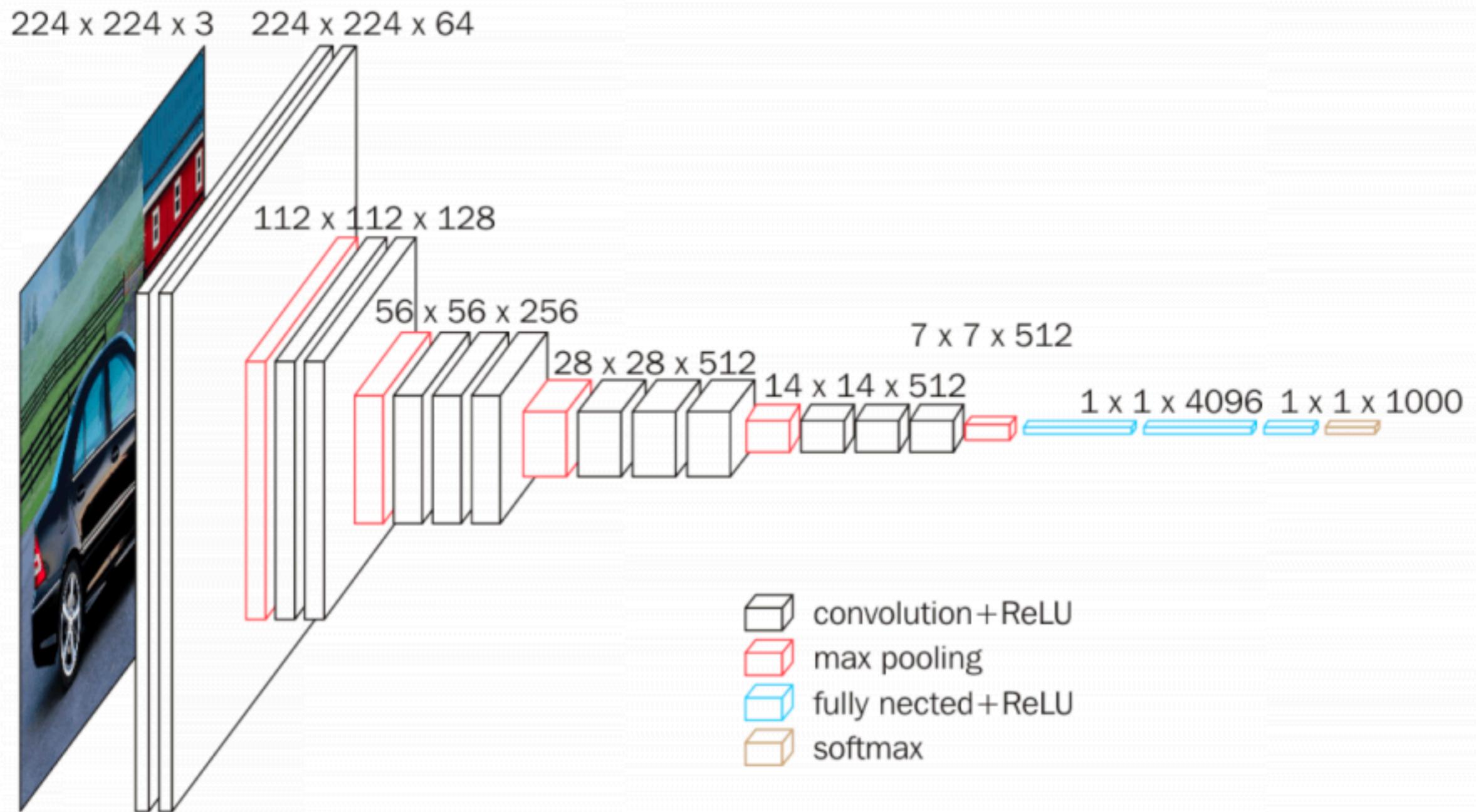
**01-Keras-introduction.ipynb**

# **Implementation of some classification and regression tasks using NN**

**02-Classification-nn-assignment.ipynb**

**03-Regression-nn-assignment.ipynb**

# VGG 16

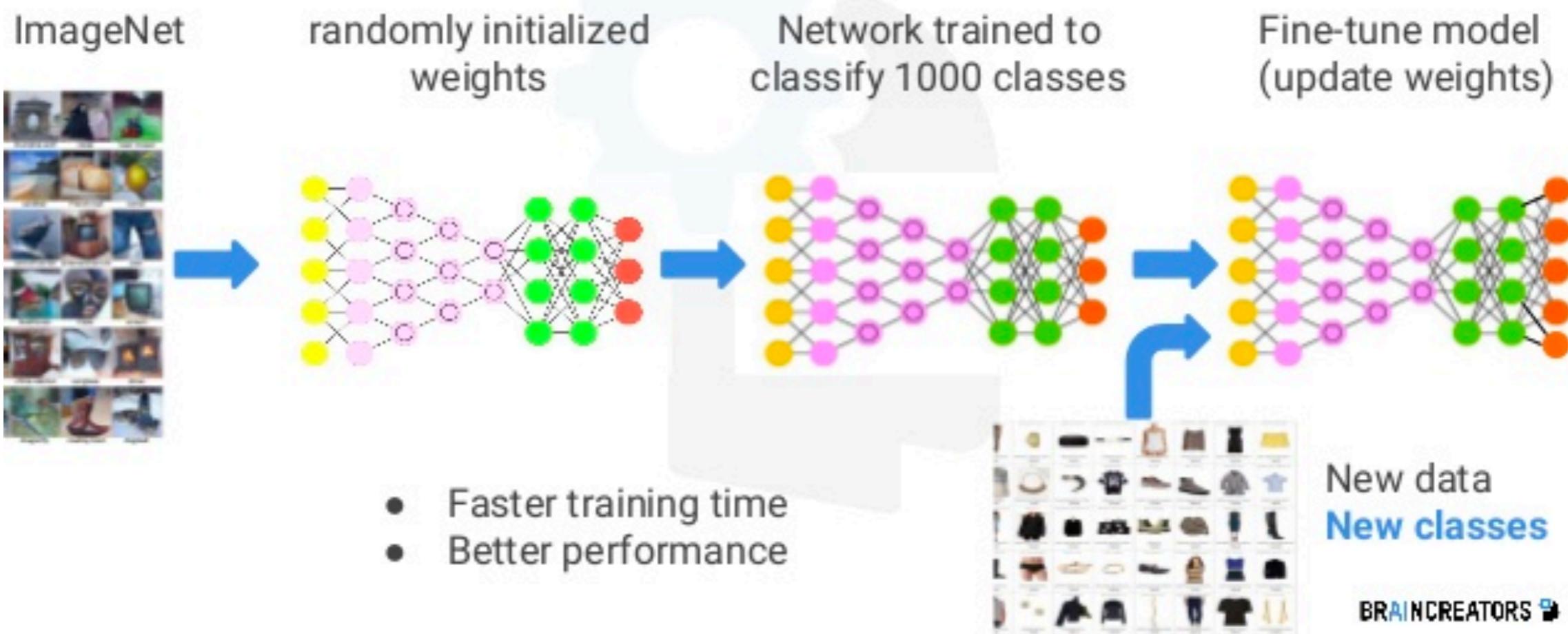


# ResNet



# Finetuning

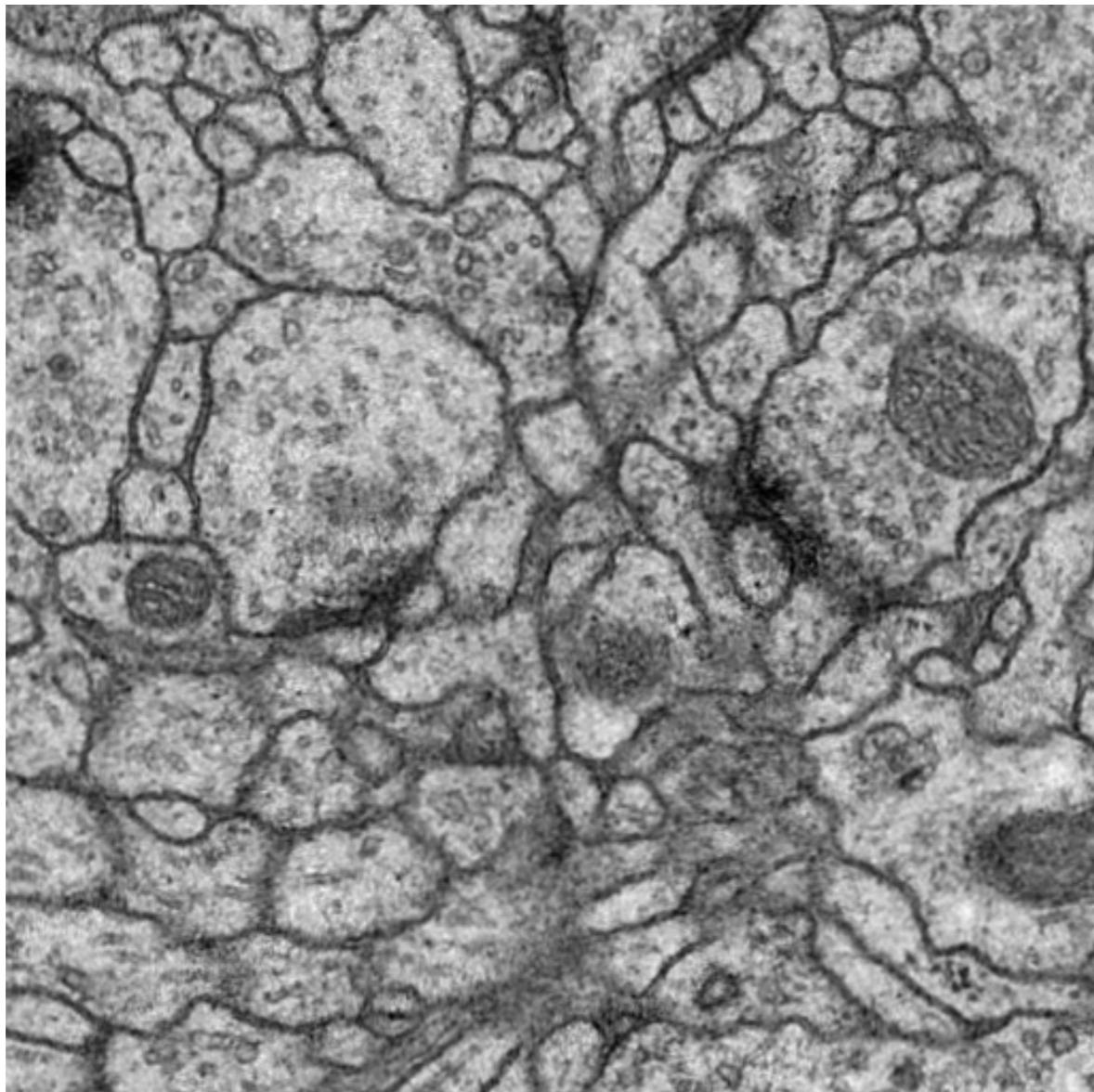
## Transfer Learning



# **Transfer learning example**

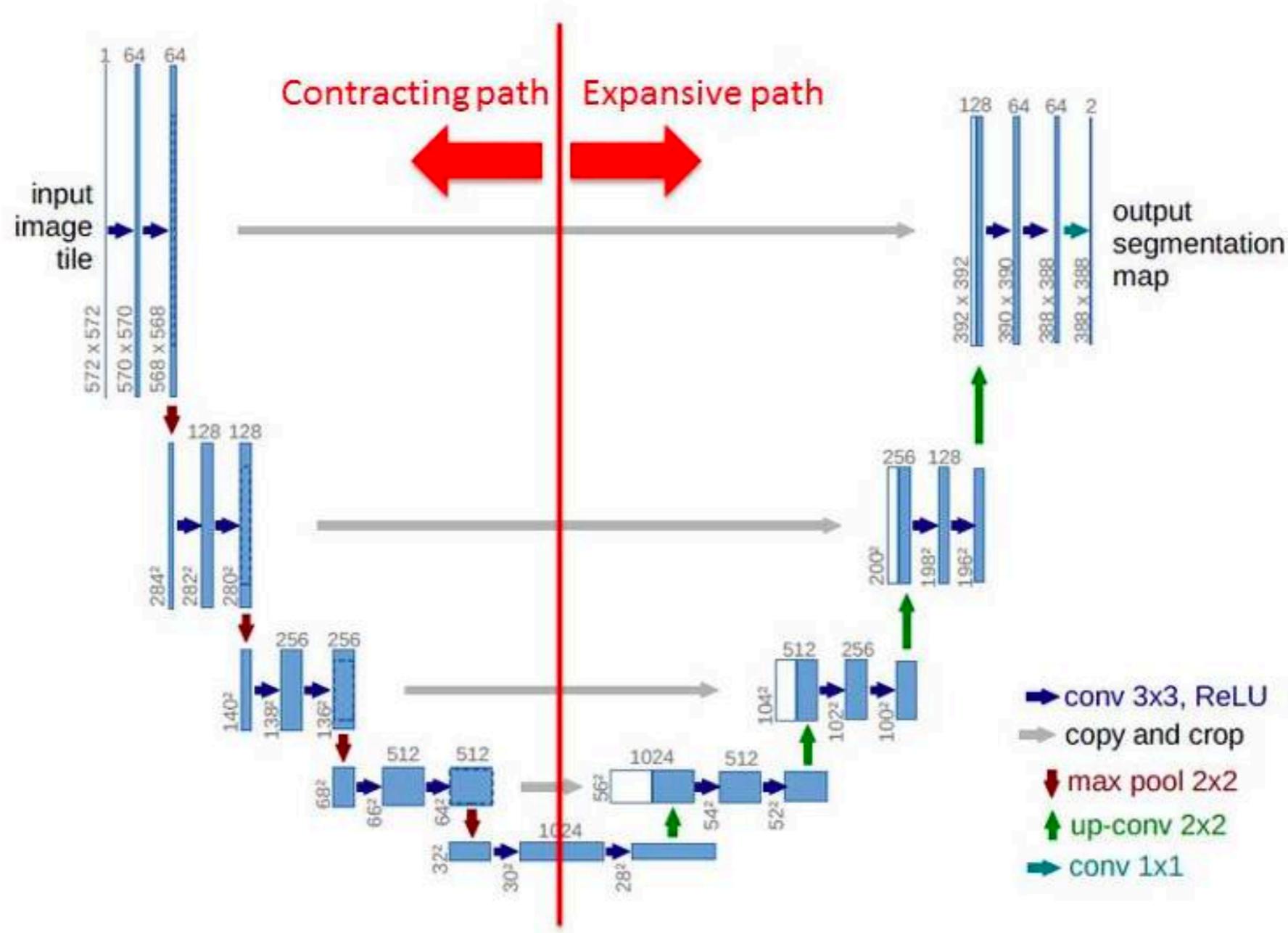
**04-Transfer\_learning.ipynb**

# Image segmentation



# U-Net

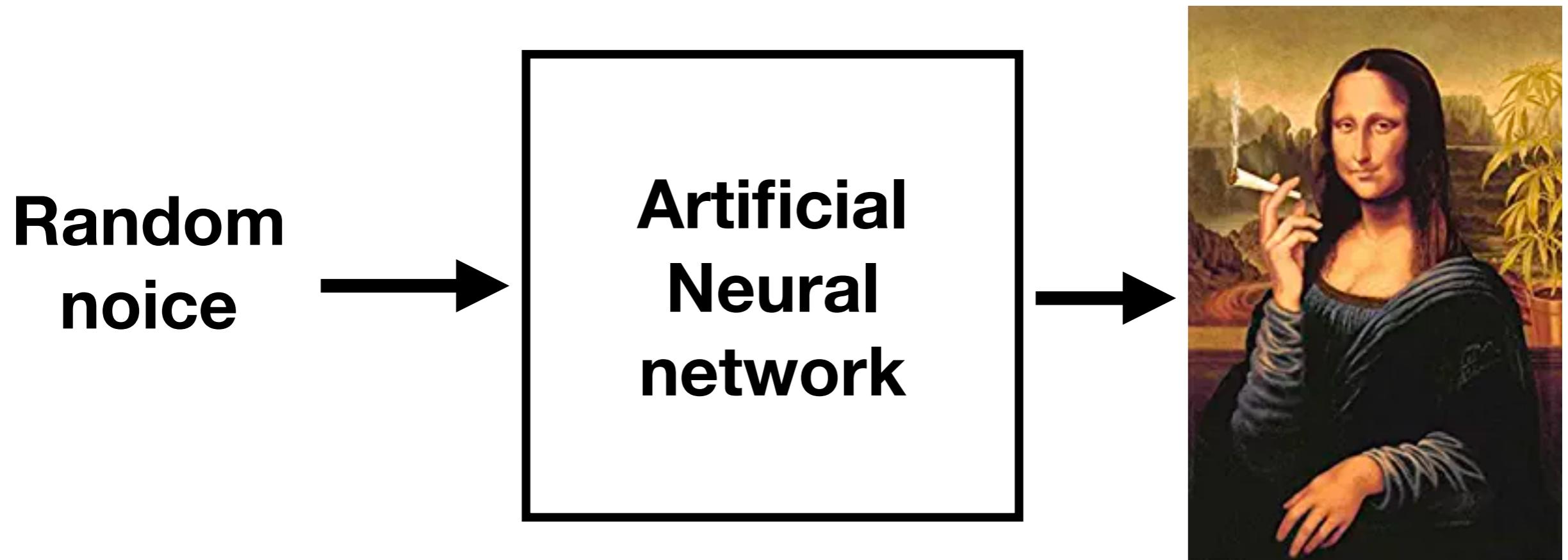
## Network Architecture



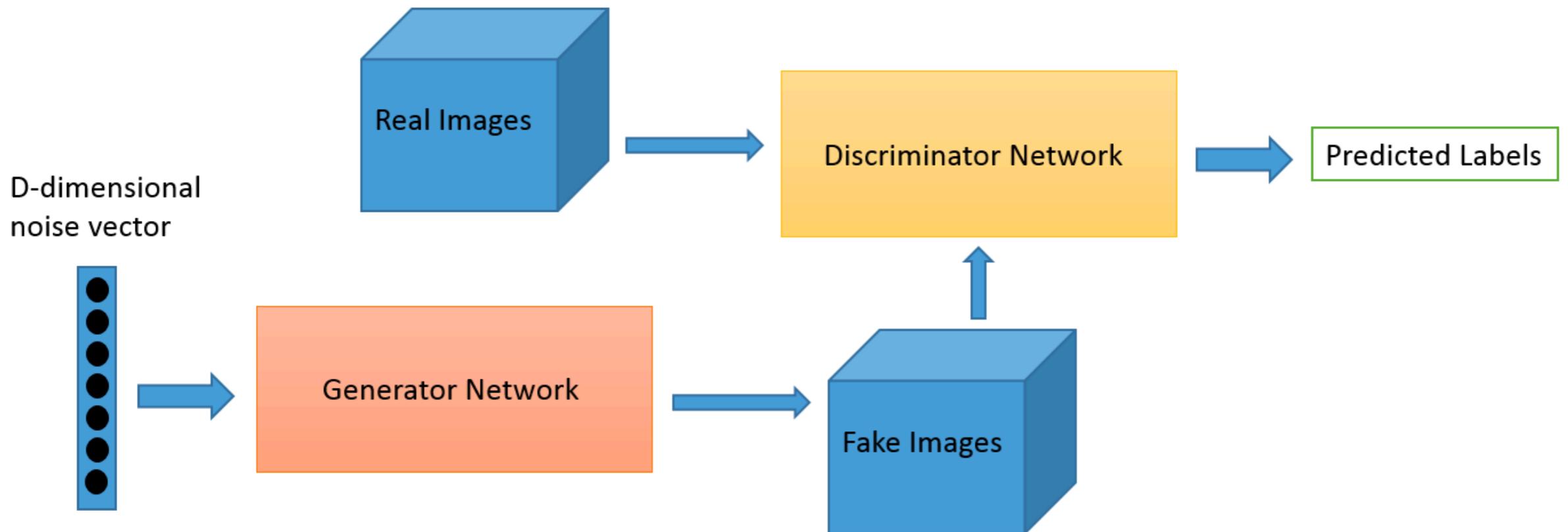
# **U-Net segmentation example**

**05-Segmentation.ipynb**

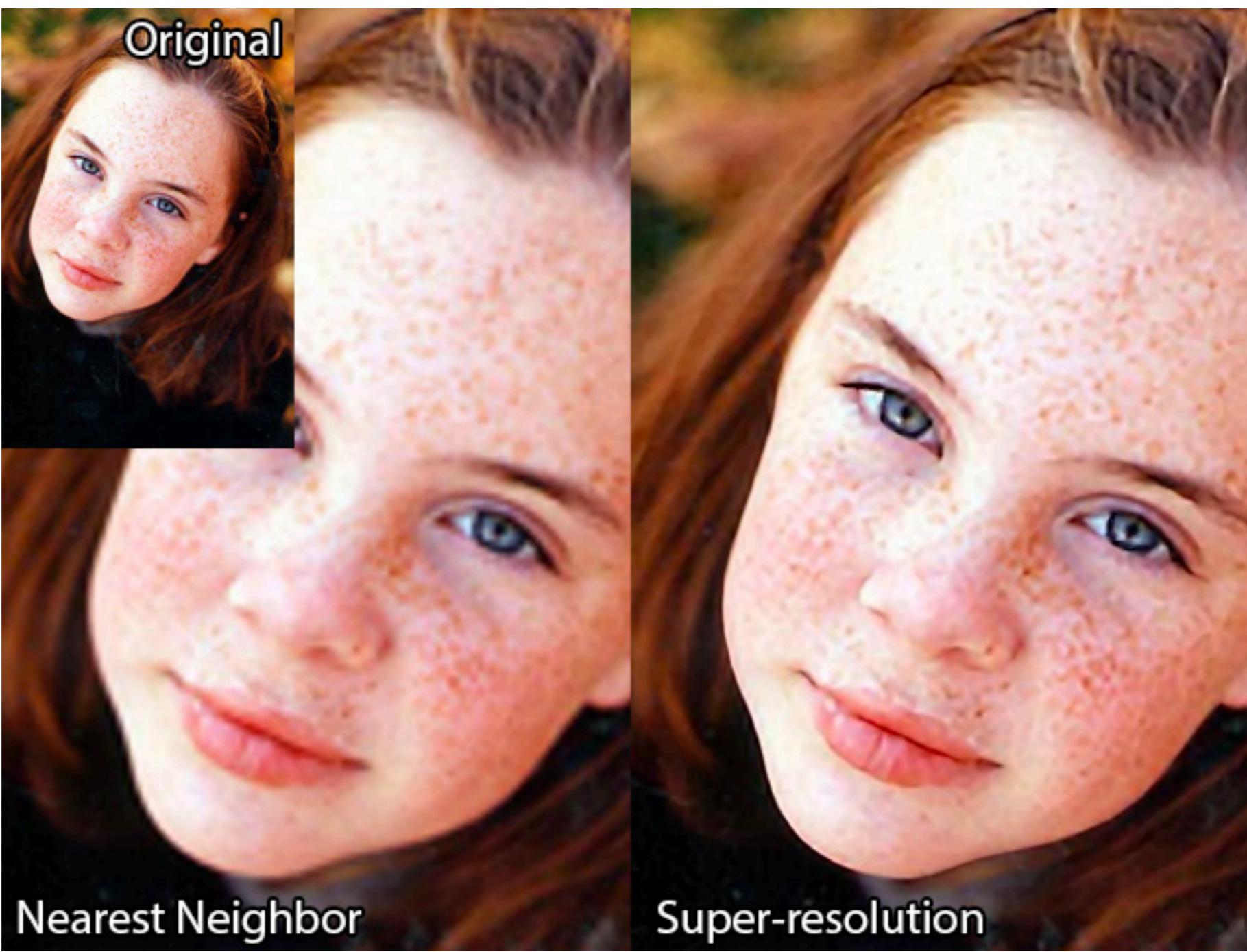
# Generative models with neural networks



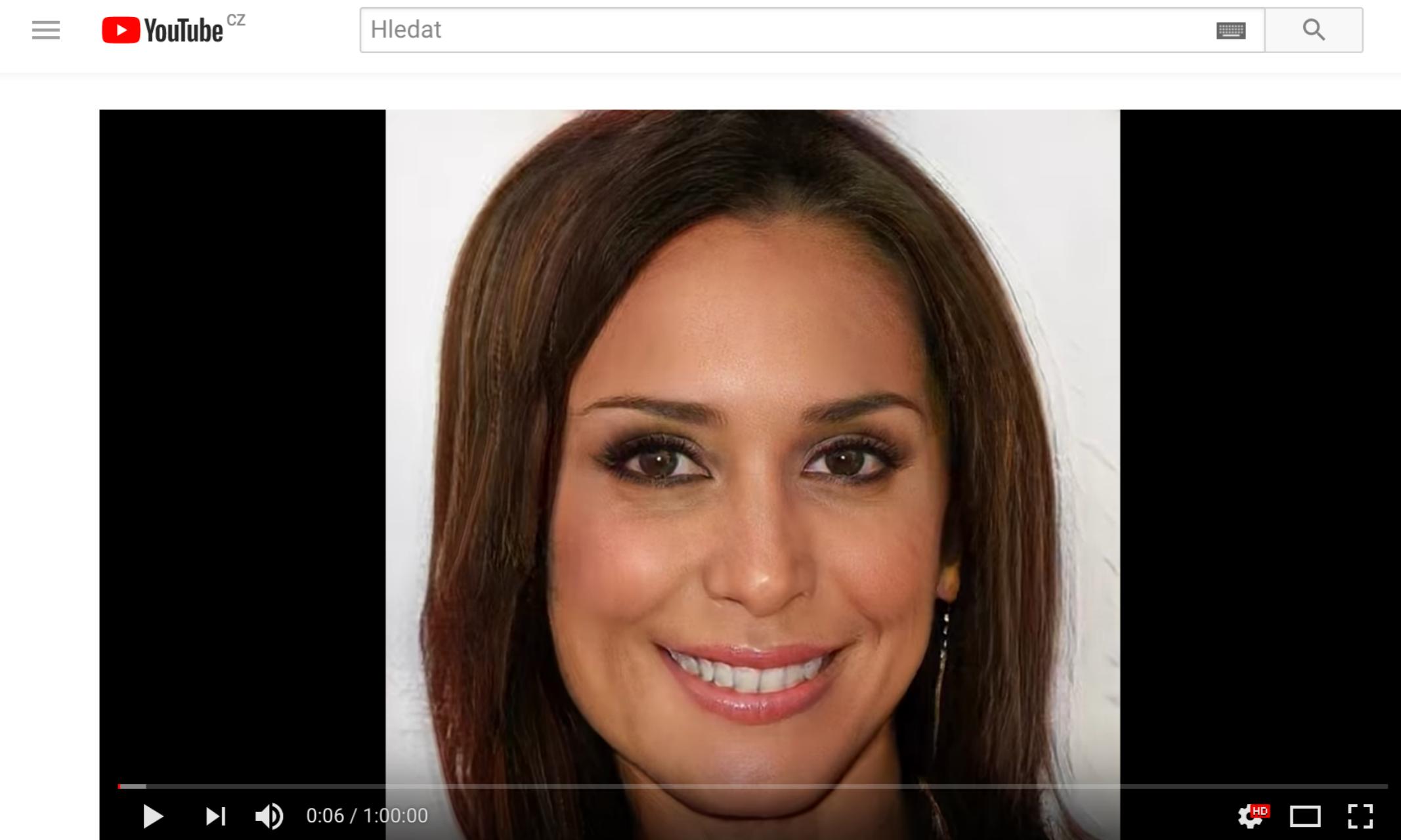
# Generative Adversarial Networks



# Superresolution



# Image synthesis



One hour of imaginary celebrities

95 832 zhlédnutí



TO SE MI LÍBÍ



NELÍBÍ SE



SDÍLET



...

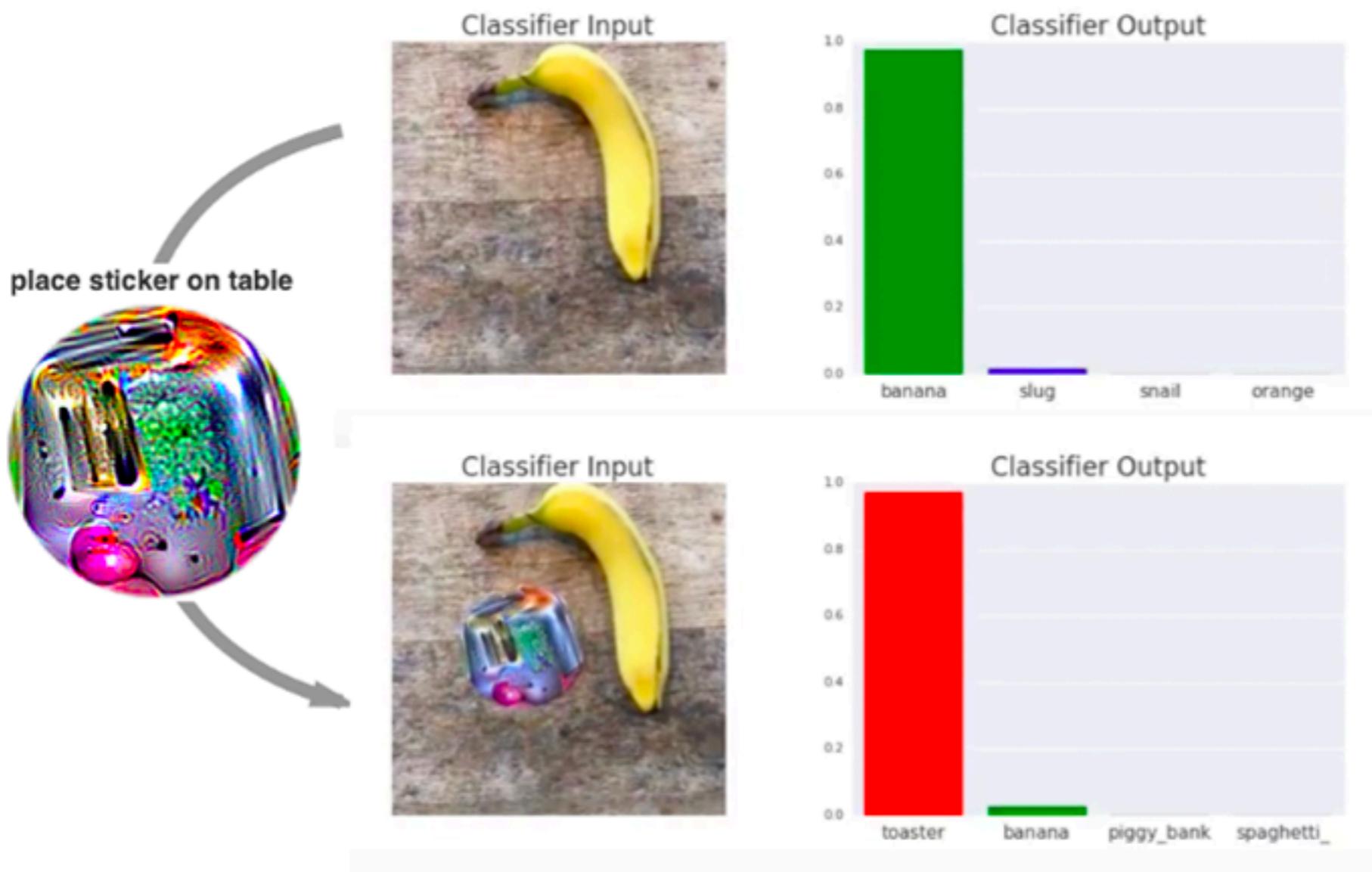
# Which one is fake?



# Generative Adversarial Networks

**06\_GANs.ipynb**

# Adversarial Patch



# Thank you for your attention

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