FACULTY OF ENGINEERING AND ARCHITECTURE

ARTIFICIAL INTELLIGENCE (E016330)
PROFESSOR: ALEKSANDRA PIZURICA
AY 2019/2020

NEURAL NETWORKS

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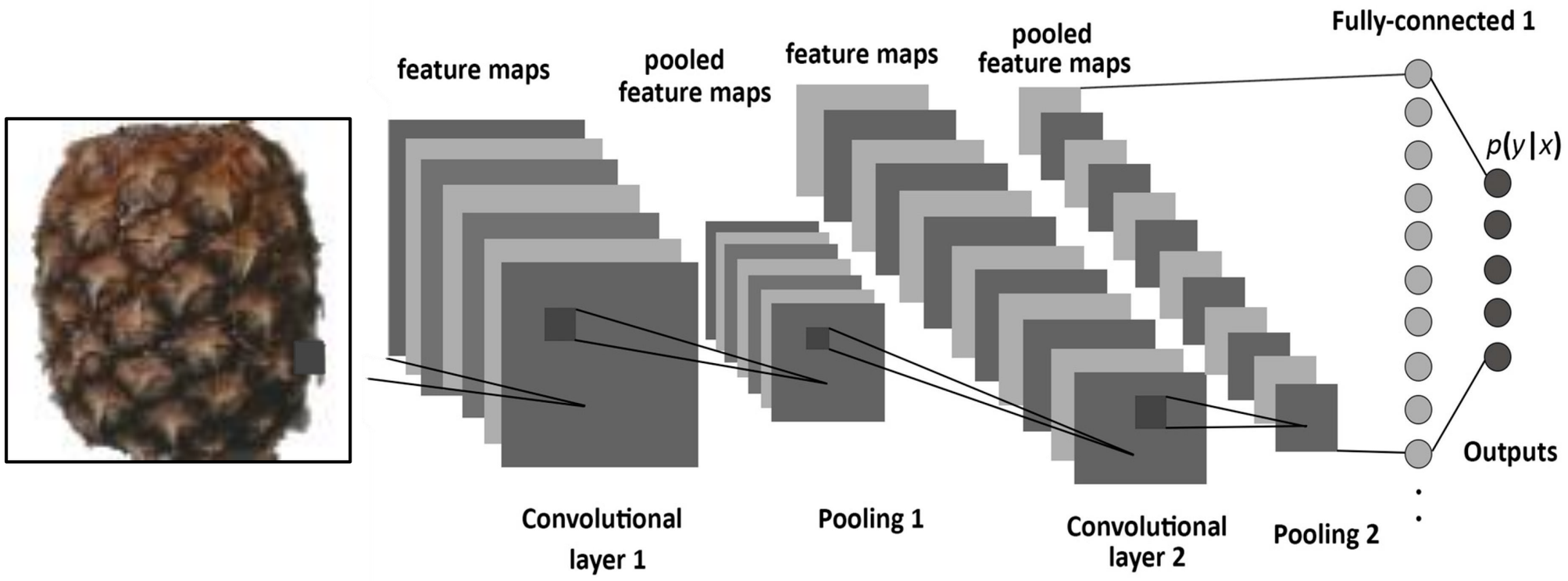
ROBOVISION
DEEP LEARNING APPLIED

CONVOLUTIONAL NEURAL NETWORK

$$y \approx f(x, w) = y^*$$

learnable, non-linear mapping



Pineapple: 88%

Kiwi: 7%

Apple: 3%

Banana: 1%

Pear: 1%

- Learnable linear transformations: convolving a kernel or weighted sum
- Non-linear activations: ReLU, Sigmoid, Softmax

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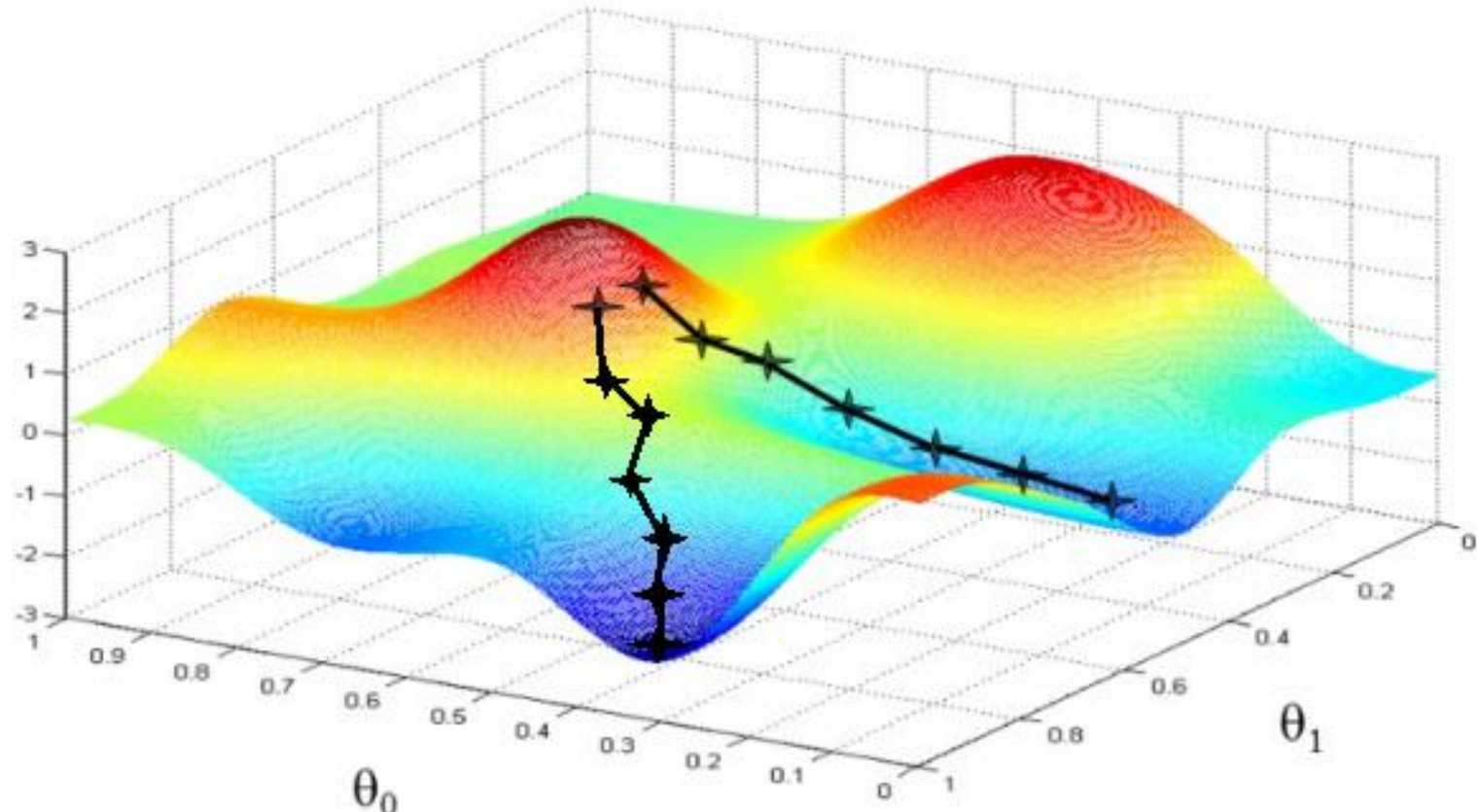
GRADIENT DESCENT

$y^* = f(x, w)$ prediction of the network f with weights w

$L = L(y, y^*)$ loss

$\Delta L \approx \nabla_w(L) \cdot \Delta w$ first order approximation of ΔL

$w_{n+1} = w_n - \gamma \nabla_w(L)$ Size update limited by learning rate γ



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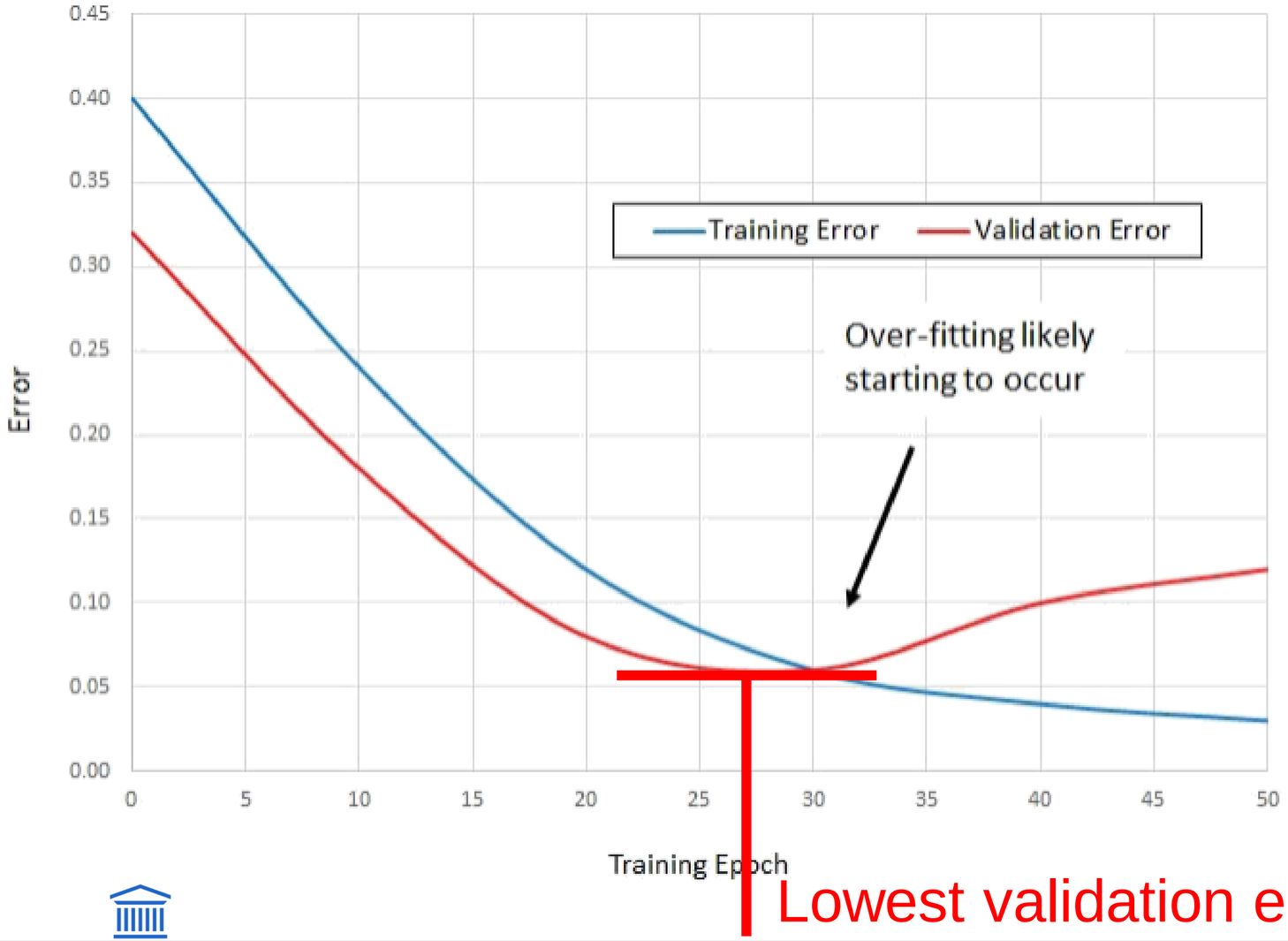
TRAIN, VALIDATION & TEST SET



Start of training (underfit)
Both losses decrease.

High training epoch (overfit)
Training error converges
Validation error stops improving or gets worse

Training set: Train the models

Validation set: Model and hyperparameter selection

Test set: Estimate generalisation error

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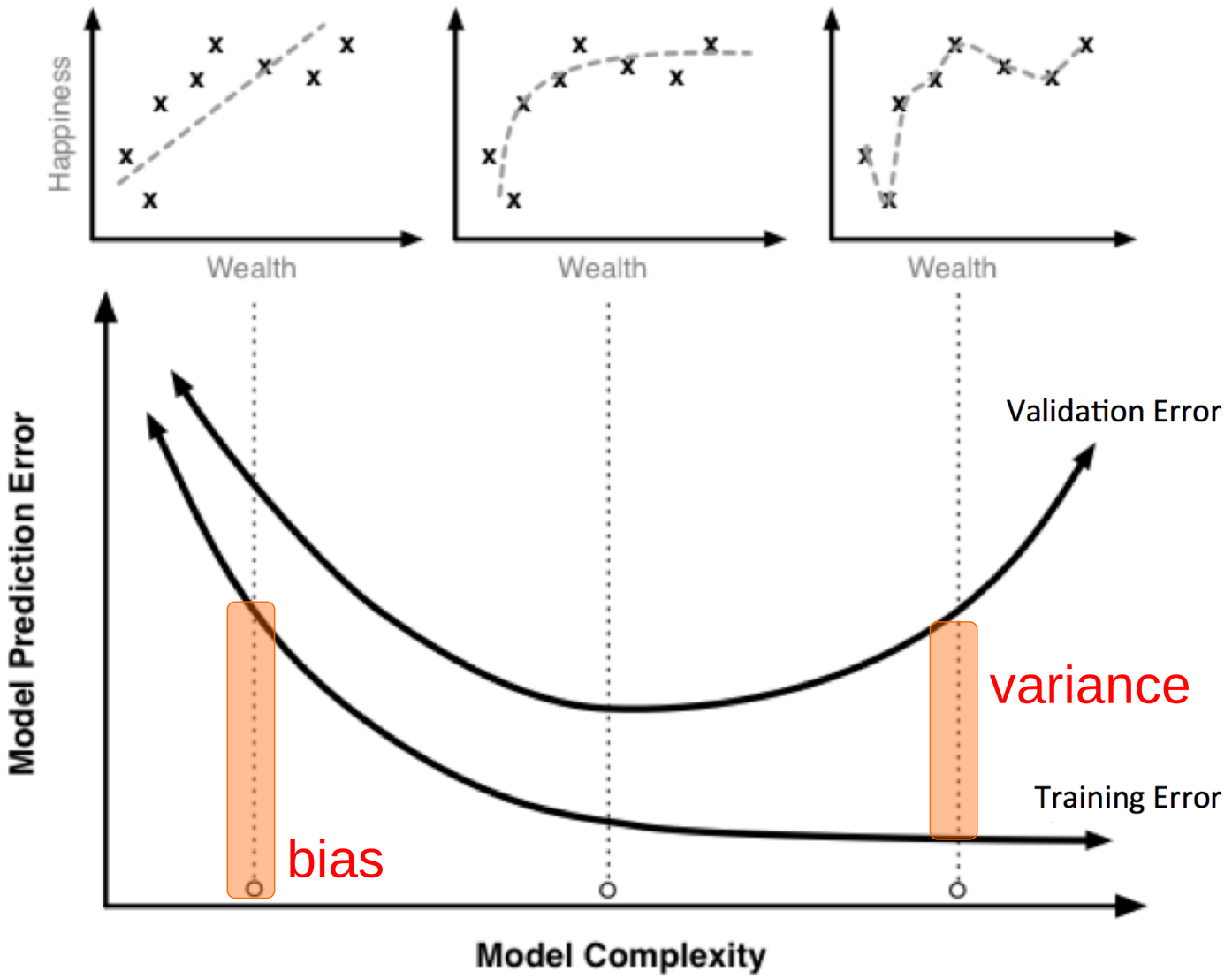
OPTIMIZING HYPER PARAMETERS

Underfit (Bias)

Training error will be high
Validation error ~ Training error

Overfit (Variance)

Training error will be low
Validation error >> Training error



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OVERVIEW ASSIGNMENT

Train neural networks using Keras and Google Colab

https://keras.io/

https://colab.research.google.com/

Get acquainted with the properties and variables in a neural network

- Picking the right performance metric
- Optimal hyperparameters search
- Running model on real life data

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ASSIGNMENT

Ufora: B. Practicals/Practicals 3

In groups of 2

- groups on Minerva

Send questions to

- ai@lists.ugent.be

Deadline

- December 13th, 2019 (23:59)

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