Advanced Deep Learning Techniques

Course code: MLC_ADV

The course is intended for people who are looking for a deeper understanding of artificial neural networks, especially so called deep learning. We will build on the basic knowledge of machine learning principles on the level of our course Introduction to machine learning. We will pay special attention to the topic of machine learning model interpretability and explainability.

Affiliate	Duration	Course price	ITB
Praha	1	4 990 Kč	0

The prices are without VAT.

Course terms

Date	Duration	Course price	Type	Course language	Location

The prices are without VAT.

Who is the course for

The course is intended for people who are looking for a deeper understanding of artificial neural networks, especially so called deep learning.

Required skills

- basic knowledge of programing in Python
- high school level of mathematics
- Basics of machine learning on the level of our course Introduction to machine Learning

Course outline

- Neural network architectures (feed-forward, recurrent, convolutional, generative, autoencoders, Unet, GAN, attention layer)
- Optimizers and their evolution (Steepest Gradient Descent, Stochastic Gradient Descent, Mini-Batch
- Gradient Descent, Nesterov Accelerated Gradient, Adagrad, AdaDelta, Adam, Learning rate tuning)
- Loss functions and their properties (Mean squared error, Mean absolute error, Negative, Log Likelihood – cross entropy)
- Regularization in Neural Networks (Dropout, Early stopping, Data augmentation, Batch and layer normalization)
- Initialization (Gradient vanishing problem, Zero initialization, He initialization, Xavier initialization)
- Semi-supervised learning (Pseudo Labeling, Mean-Teacher, PI-Model)
- Practical examples of semi-supervised techniques applications
- Confidence estimation (Logit analysis, Confidence networks)
- Practical examples of confidence estimation
- AutoML approaches (Hyper-parameter optimization, grid search, Bayesian optimization, Meta-Learning, Neural network search)
- Practical examples with the AutoKeras
- ML Explainability (Interpretable models, Partial Dependence Plot, Permutation feature importance, Surrogate models, Activation Maximization, Grad CAM)

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