

Tárgyleírás

Tárgy neve: Deep Network Developments

Tárgyfelelős neve: Kristian Fenech

Tárgyfelelős tudományos fokozata: PhD

Tárgyfelelős MAB szerinti akkreditációs státusza: AT

Az oktatás célja angolul / Aim of the subject:

Knowledge

- They have comprehensive and up-to-date knowledge of general mathematical and computing principles
- Possess the knowledge of specific tools and methods of Artificial Intelligence

Abilities:

- They are able to apply their mathematical, computer science and informatics skills in a novel way in order to solve tasks in IT research and development.
- They are able to formalize complex IT tasks, to identify and study their theoretical and practical background and then to solve them.

Attitude:

- They follow professional and technological developments in their IT field.
- They are committed to lifelong learning and are open to acquiring new IT competencies.

Autonomy, responsibility:

- They take responsibility for their professional decisions made in their IT-related activities.
- They undertake to meet deadlines and to have deadlines met.
- They bear responsibility for their own work as well as for the work of their colleagues they work together with in a project.
- Regarding mission critical IT systems, they can be entrusted with developing and operational responsibilities that are in accordance with their professional competencies.

Az oktatás tartalma angolul / Major topics:

- Introduction to Deep Learning
 - Syllabus, AI overview, Deep Learning overview, Python and NumPy basics
- Introduction to PyTorch with Linear Regression
 - Linear Regression, Activation functions & Losses, Backpropagation, PyTorch basics, PyTorch with Linear Regression

- Classification
 - Binary Classification, Activation functions & Losses, Backpropagation, Convolutional Neural Networks
- Classification & Transfer Learning
 - Multiclass Classification, Activation functions & Losses, CNN architectures, Transfer Learning
- Autoencoders
 - Autoencoders basics, Types, Tasks (Pre-training for classification)
- Semantic Segmentation
 - Basics, FCN, U-Net, Applications
- Object Detection part 1
 - Basics, Two Stage Detectors (Region based) – RCNN family, Applications
- Object Detection part 2 + Instance Segmentation
 - Metrics, One Stage Detectors – YOLO and SSD, Instance Segmentation Basics, Mask-RCNN
- Video + Depth + Optical Flow
 - Processing videos, Depth Estimation, Optical Flow
- Recurrent Neural Networks
 - Basics, Types, Vanilla RNNs, Architectures (LSTMs, GRUs), Applications
- Transformers
 - Attention, Self-Attention, Multi-Head Attention, Beam search, BLEU score
- Generative Adversarial Networks part 1
 - Basics, Types
- Generative Adversarial Networks part 2
 - Architectures, Applications
- Miscellaneous

A számonkérés és értékelés rendszere angolul / Requirements and evaluation:

Mixed assessment, exam

Irodalom / Literature:

Courville, Goodfellow, Bengio: Deep Learning. Available at:
<https://www.deeplearningbook.org/>
