Tárgyleírás

Tárgy neve: Methods and Tools for AI applications

Tárgyfelelős neve: Csató Lehel

Tárgyfelelős tudományos fokozata: PhD

Tárgyfelelős MAB szerinti akkreditációs státusza: V

Az oktatás célja angolul / Aim of the subject:

Knowledge

- They have comprehensive and up-to-date knowledge of general mathematical and computing principles
- Posess 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:

- Mathematical data models in artificial intelligence
- Linear algebra, generalized linear models, mathematical representations; elements of probability theory, the normal distribution and the Mahalanobis distance
- Likelihood estimations: from the maximum likelihood to MAP to Bayesian estimations. Their use in model optimization
- Likelihood approximations: from gradient to conjugate models

- Unsupervised methods, the expectation maximization and clustering
- Ensemble methods
- Autoencoder models

A számonkérés és értékelés rendszere angolul / Requirements and evaluation:

Mixed assessment, exam

Irodalom / Literature:

- C.M. Bishop: Pattern Recognition and Neural Networks, Springer Verlag, 2006
  https://www.microsoft.com/en-us/research/uploads/prod/2006/01/Bishop-Pattern-Recognition-and-Machine-Learning-2006.pdf
- Marc Peter Deisenroth, A. Aldo Faisal, and Cheng Soon Ong: Mathematics for Machine Learning, Cambridge University Press, 2020
  https://mml-book.github.io/
- Zhang A, Lipton Z.C, Li M, Smola A.J: Dive into Deep Learning, arXiv preprint arXiv:2106.11342, 2021
  https://d2l.ai/d2l-en.pdf