

Krakowska Interdyscyplinarna Szkoła Doktorska

Opis przedmiotu/ course description

Przedmiot/ Course :	Uczenie Maszynowe/ Machine Learning
Moduł kształcenia/ Training module:	Moduł ogólny
Okres realizacji/ Implementation period :	preferowany semestr letni / summer semester preferred
Język wykładowy/ Language:	język angielski/ English
Prowadzący/ Lecturer:	dr hab. Marcin Wolter
Wymiar godzin przedmiotu/duration :	20 godzin / 20 hours
Forma prowadzenia zajęć/ Form of teaching :	Wykład z przykładowymi programami w języku python połączony z ćwiczeniami praktycznymi / lecture with examples in python joined with practical exercises
Opis przedmiotu/ course content:	<p>Lecture is a beginners course in Machine Learning, which is nowadays used in many branches of sciences. The aim of the course is to give a basic knowledge about the most popular Machine Learning methods, like Neural Networks and Boosted Decision Trees, and show how they are used in practice. An important part of the course is an introduction to Deep Learning, a novel machine learning approach developed in recent years and widely used in pattern recognition.</p> <p>Practical exercises are an important part of a lecture, so please bring your laptops. We will write some simple programs in the python programming language using the packages Scikit Learn https://scikit-learn.org/ (boosted decision trees, cluster analysis) and Keras https://keras.io/ (deep neural networks). For writing python programs we will use the Google Colab environment https://colab.research.google.com/ to run your programs, so please register with Google. Please also register on github https://github.com to store your codes.</p> <p>Course outline: 1. Machine learning: what does it mean? Software to work with and literature. A little bit of mathematics and examples of simple linear classifiers.</p>

	<ol style="list-style-type: none"> 2. Simple non-linear methods like k-nearest neighbors, Parzen kernel methods, independent component analysis ICA 3. Ensemble learning – Boosted Decision Trees BDT 4. Cluster analysis 5. Shallow neural networks 6. Deep neural networks 7. How to build a Deep Neural Network – Keras tutorial, Convolutional Deep Neural Networks 8. Training - cross-validation 9. Optimization of hyperparameters. 10. Generative Adversarial Networks (GANs)
Efekty uczenia się wg 8PRK zgodnie z Programem kształcenia KISD/ <i>learning outcomes at level 8 of the PRK according to the KISD Training Program:</i>	EU1, EU2, EU8, EU15
Forma weryfikacji efektów uczenia się/ <i>Method of verification of learning outcomes:</i>	Final evaluation will be based on a simple ML analysis and presentation of the results.
Wymagania wobec uczestników/ <i>Requirements for participants:</i>	Basic knowledge of python programming language and statistics. It's advised to attend a python course before.