Course Unit Descriptor

Study Programme: Information Technology - Software Engineering

Course Unit Title: Machine Learning

Course Unit Code: OAS289

Name of Lecturer(s): Associate Professor Vladimir Brtka, PhD

Type and Level of Studies: Bachelor Academic Degree

Course Status (compulsory/elective): Compulsory

Semester (winter/summer): Summer

Language of instruction: English

Mode of course unit delivery (face-to-face/distance learning): Face-to-face

Number of ECTS Allocated: 7

Prerequisites: None

Course Aims:

Course aims are introduction to machine Learning concepts as modern trends of development of artificial neural networks, regressions, rough sets and other techniques. This will expand and complement the knowledge gained by studying the subjects of logic and artificial intelligence. Machine Learning as a domain of Computational Intelligence is of great importance for software engineers who need to learn through practice in an adequate theoretical and conceptual framework.

Learning Outcomes:

Students are trained in development and implementation of artificial neural networks and their applications, as well as some other techniques such as rough sets and genetic algorithms.

Syllabus:

Theory

Motivation. Domains of applications. Linear regression. Logistic regression. Classification. Single-layer artificial neural networks. Training of single-layer artificial neural networks. Multilayered artificial neural networks. Training multilayer artificial neural networks. Vector machines. Regularization, bias and variance. Clustering. Principal Component Analysis. Recommender Systems. A probabilistic approach to machine learning. The theory of rough sets. Algorithms and implementation.

Practice

Implementation of artificial neural networks in Java or C#. Matlab or GNU Octave applications in domain of machine learning. Python numpy, pandas, matplotlib and scikit-learn libraries and their capabilities. Google Tensorflow and Jupyter lab. Rough sets Rosetta and RSES software applications.

Required Reading:

1. Vladimir Brtka, "Machine Learning Part I", Technical faculty "Mihajlo Pupin", Zrenjanin, 2018.
2. Vladimir Brtka, "Soft Computing", Technical faculty "Mihajlo Pupin", Zrenjanin, 2013.
3. Engelbrecht Andreas, "Computational Intelligence, An Introduction", John Wiley & Sons, Ltd, England 2002.

Weekly Contact Hours: 4	**Lectures:** 2	**Practical work:**2

Teaching Methods:

Lectures and students group work

Knowledge Assessment (maximum of 100 points): 100

Pre-exam obligations	points	**Final exam**	points
Active class participation	20	written exam	30
Test I and Test II	50	oral exam	