Course Unit Descriptor

Study Programme: Ph.D. in Computer Science

Course Unit Title: Machine Learning

Course Unit Code: ID017

Name of Lecturer(s): Miloš Radovanović, Vladimir Kurbalija

Type and Level of Studies: Doctoral Academic Degree

Course Status (compulsory/elective): Elective

Semester (winter/summer): Summer

Language of instruction: Serbian (primary), English (secondary)

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

Number of ECTS Allocated: 7

Prerequisites: None

Course Aims:

Enabling students to master the principles of functioning of machine learning techniques, as well as their implementation and application to real-world problems.

Learning Outcomes:

Minimal: At the end of the course it is expected from a successful student to demonstrate basic understanding of the principles of machine learning techniques, and capability to apply the techniques on an illustrative example.

Desirable: At the end of the course it is expected from a successful student to demonstrate thorough understanding of the principles of machine learning techniques through critical analysis, selection, implementation, and application of the techniques to real-world problems, as well as to employ research mechods in machine learning

Syllabus:

Theory

Notions of machine learning and data mining. Intelligent agents, the action-perception cycle, applications. Supervised, semi-supervised and unsupervised learning. Classification: techniques, performance measures, overfitting. Dimensionality reduction, feature selection. Clustering: techniques, performance measures. Reinforcement learning. Numeric prediction, regression, neural networks. Association learning. Data transformation and preparation. Applications of machine learning techniques.

Practice

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Required Reading:

1. I. H. Witten, E. Frank, M. A. Hall. Data Mining: Practical Machine Learning Tools and Techniques. Morgan Kaufmann Publishers, 2011

Weekly Contact Hours: 2	**Lectures:** 2	**Practical work:** 0

Teaching Methods:

Lectures are held using classical methods involving a projector. Principles of functioning of machine learning techniques are explained, and the explanations are augmented with illustrative examples. Implementations of machine learning techniques are presented and tested on the computer. Students' knowledge is checked through a written test, solution of problems, and preparation of a seminar paper that is defended at the end of the course, where they independently explore various research topics in machine learning.

Knowledge Assessment (maximum of 100 points):

Pre-exam obligations	Points	**Final exam**	Points
Test	20	Seminar paper	50
Problems	30		

The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.