**Machine Learning**

Contact person: Dr. Lívia Szedmina (slivia@vts.su.ac.rs)

Goal of the course

The basic goal of the course is the education and training of students in order to get theoretical and practical knowledge in the field of machine learning. The basic goal includes the achievement of a series of sub-goals:

- students have to be introduced to basic terms concerning data, to study how to extract important features from data;

- students will learn about regression analysis and how to classify data;

- after finishing the course students will be able to estimate of the data and to choose the appropriate model for the given data set.

Outcome of the course

After attending the course and successfully passing the exam:

- students will be able to analyze data using available software tools and standard databases,

- students will be able to write applications for solving problems concerning machine learning.

Theoretical lessons

Data types, feature value, data quality, similarity measures, classification, Bayes theorem, Naive Bayes classification, discretization, Regression, logistic regression, neural networks, clustering, principal component analysis. Decision trees, the random forest algorithm. Introduction to machine learning software. WEKA software package. Working with WEKA built-in functions. IRIS test data. Data visualization. Extraction of important features from data.

Practical lessons

Practicing the theoretical principles through examples. Data analysis and feature extraction. Determining similarity between data. Data clustering and clusters of data. K-means algorithm. Supervised and unsupervised training of neural networks. Backpropagation algorithm. Advantages and disadvantages of backpropagation. Kohonen network. Markov processes. Memoryless Markov decision processes. Markov decision processes. Reinforcement learning. Value iteration, policy iteration. Q-learning. Decision trees: solving simple examples. Using software tools for data analysis, solving simple programming problems for data processing.