RTU Course "Machine learning"

33000 Faculty of Computer Science, Information Technology and Energy

General data

Code	DSP713
Course title	Machine learning
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Agris Ņikitenko
Volume of the course: parts and credits points	1 part, 4.5 credits
Language of instruction	LV
Annotation	The study course addresses the question of how to enable computers to learn from past experiences. The main theories of artificial intelligence, statistics, information, etc. are discussed. terms and techniques to the extent applicable to machine learning.
Goals and objectives of the course in terms of competences and skills	The aim of the study course is to provide knowledge of the most important algorithms and theories that form the basis of machine learning, as well as to provide appropriate practical skills. Tasks of the study course are to provide knowledge and skills: - to apply the machine learning techniques covered in the course using Python or an equivalent programming language; - to apply software tools and libraries appropriate to the methods; - to be able to identify the appropriate method and tool for a specific problem; - to be able to debug the code implementing the method, as well as to adjust the hyperparameters of specific methods; - to be able to interpret the obtained results and make decisions on the compliance of the applied method and hyperparameter values with the expected result.
Structure and tasks of independent studies	Within the framework of the study course, several individual practical works are planned, the positive assessment of which is a precondition for admission to the final examinations. Within the study course, 6 practical works on the following topics must be developed independently: - Clusterization; - Classification of decision trees; - Applications of artificial neural networks; - Text analysis; - Use of genetic algorithms in optimization; - Time series analysis and classification.
Recommended literature	Obligātā/Obligatory: 1) S.Russell, P.Norvig Artificial intelligence: a modern approach 4th edition, Pearson Education Inc., 2021. 2) T.Mitchell, M.Hill, Machine Learning, 1997. 3) SciKit Learn tehniskā dokumentācija / SciKit Learn technical documentation. 4) Deap un Scoop satvaru tehniskā dokumentācija / Deap and Scoop framework technical documentation.
Course prerequisites	Mathematics, probability theory.

Course contents

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
Introduction - learning paradigms.	4	0	0	0
Concept learning.	4	0	0	0
Clusterization.	6	10	0	0
Decision trees.	6	10	0	0
Artificial neural networks.	12	10	0	0
Genetic algorithms.	12	10	0	0
Text analysis.	8	10	0	0
Time series analysis and classification.	8	10	0	0
Total:	60	60	0	0

Learning outcomes and assessment

Learning outcomes	Assessment methods
Is able to describe the main principles, advantages and limitations of machine learning.	Appropriate questions in the exam.
Is able to apply and finetune clusterization.	Appropriate questions in the exam. Individual practical work.
Is able to apply and finetune classification methods.	Appropriate questions in the exam. Individual practical work.

Is able to apply and finetune artificial neural networks.	Appropriate questions in the exam. Individual practical work.
Is able to apply and finetune text analysis algorithms.	Appropriate questions in the exam. Individual practical work.
Is able to apply and finetune genetic optimization methods.	Appropriate questions in the exam. Individual practical work.
Is ably to apply time series analysis and classification methods.	Appropriate questions in the exam. Individual practical work.

Evaluation criteria of study results

Criterion	%
Individual practical work	50
Exam	50
Total:	100

Study subject structure

Part	CP	Hours			Tests		
		Lectures	Practical	Lab.	Test	Exam	Work
1.	4.5	2.0	1.0	0.0		*	