GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00030018		
Field of study	Mathematics		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2023/2024
Education level	second-cycle studies	Subject group	Optional subject group
Mode of study	Full-time studies	Mode of delivery	blended-learning
Year of study	2	Language of instruction	Polish
Semester of study	3	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Theoretical Physics and Quantum Information -> Faculty of Applied Physics and Mathematics		
Name and surname of lecturer (lecturers)	Subject supervisor	Jakub Cieślak	
	Teachers	Jakub Cieślak	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	30.0	0.0	0.0	45

E-learning hours included: 15.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	45	5.0	0.0	50

Subject objectives

The aim of the course is to acquaint students with the principles of computer vision.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K7_U02	The student knows how to verify and evaluate the quality of machine learning models.	[SU2] Assessment of ability to analyse information
K7_W08	The student knows how to use sophisticated machine learning python libraries.	[SW1] Assessment of factual knowledge
K7_U11	The student knows how to build machine learning models.	[SU4] Assessment of ability to use methods and tools
K7_K02	The student is able to logically connect the area of computer vision with other related areas like image processing and data analysis (machine learning).	[SK4] Assessment of communication skills, including language correctness
K7_W12	The student is able to implement computer vision methods in Python environment.	[SW2] Assessment of knowledge contained in presentation

Subject contents

1. Image binarization.

2. Digital image categorization - clustering methods: kmeans, hierarchical.

3. Image classification: k-NN, CART, ensemble methods.

4. CBIR

Prerequisites and co-requisites

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Written test (10 points) and laboratory problems solution (15 points). These two parts are equivalent.</td><td>50.0%</td><td>100.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>A. Geron, "Hands-On Machine Learning with Scikit-Learn and TensorFlow", O'Reilly, 2017.

R. Szeliński, Computer Vision: Algorithms and Applications, Springer, 2010

G. Bradski, A. Kaehler, Learning OpenCV, O'Reilly Media, 2008

D.A. Forsyth, J. Ponce, Computer Vision: A Modern Approach, Prentice Hall, 2002</td></tr>
<tr><td>Supplementary literature</td><td>R. Hartley, A. Zisserman, Multiple View Geometry in Computer Vision, 2nd Edition, Cambridge University Press, 2004

R.O. Duda, P.E. Hart, D.G. Stork, Pattern Classification (2nd Edition), Wiley-Interscience, 2000</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:
Widzenie Komputerowe 2023/2024 semestr zimowy - Moodle ID: 33760
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=33760</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">Automatic image categorizations based on clustering algorithms.

Building CBIR system.</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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