COURSE DESCRIPTION CARD - SYLLABUS

Course name
Data science and machine learning for e-commerce [S2SI1E>NDUM]

Course

Field of study
Artificial Intelligence

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
second-cycle

Course offered in
English

Form of study
full-time

Requirements
elective

Number of hours

Lecture
20

Laboratory classes
20

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

dr inż. Andrzej Szwabe
andrzej.szwabe@put.poznan.pl

Lecturers

Prerequisites

A person starting this course should have basic knowledge of statistics, data science and machine learning as well as Python programming skills.

Course objective

The aim of the course is to familiarize the student with selected problems of e-commerce - in particular those solvable by means of data science and supervised machine learning methods - and to provide basic skills of practical application of selected methods to solve examplary problems.

Course-related learning outcomes

Knowledge K2st_W2: The student has a structured and theoretically founded general knowledge related to key issues in the field of data science and machine learning for e-commerce with the emphasis on the artificial intelligence solutions effectively applicable to selected important problems of e-commerce
K2st_W3: The student has advanced detailed knowledge regarding selected issues in artificial intelligence for e-commerce
K2st_W5: The student has advanced and detailed knowledge of the processes occurring in the life cycle of artificial intelligence systems for e-commerce

K2st_W6: The student knows advanced methods, techniques and tools used to solve complex engineering tasks and conduct research in the field of artificial intelligence for e-commerce
Skills K2st_U6: The student is able to assess the suitability and the possibility of using new achievements (methods and tools) and new IT products, in particular in the field of artificial intelligence for e-commerce
K2st_U8: The student can carry out a critical analysis of existing solutions in the field of artificial intelligence for e-commerce and propose their improvements
K2st_U9: The student is able to assess the usefulness of methods and tools for solving an engineering task, consisting in the construction or evaluation of an artificial intelligence for e-commerce system or its components, including the limitations of these methods and tools
K2st_U10: The student is able - using conceptually new methods - to complete complex artificial intelligence for e-commerce tasks, including atypical tasks and tasks containing a research component
K2st_U11: The student is able - in accordance with a given specification, taking into account non-technical aspects - to design a complex predictive system for e-commerce and implement it - at least in part - using appropriate methods, techniques and tools, including adapting to this purpose existing tools or developing new ones
Social competences K2st_K1: The student understands that in the field of artificial intelligence for e-commerce, some elements of the knowledge and skills quickly become obsolete
K2st_K2: The student understands the importance of using the latest knowledge in the field of artificial intelligence in solving research and practical problems of data science and machine learning for e-commerce
K2st_K4: The student is aware of the need to develop professional achievements in the field of data science and machine learning for e-commerce and comply with the rules of professional ethics

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Summative assessment:
a) lectures: assessment of the knowledge and skills demonstrated during the test consisting of several test questions or short tasks. Exceeding 50% of the points allows to obtain a postitive grade.
b) laboratories: assessment of the results of laboratory exercises, written responses (saved as comments in Jupyter Notebook files) and reports prepared partly during the course, and partly after their completion (as the homework)

Programme content

Basics of data science, data analytics and actionable machine learning predictions for e-commerce. Key Performance Indicators (KPIs) in e-commerce. Performance evaluation of KPI-targeting active algorithms based on traditional, passive machine learning predictions. A/B testing methodology in e-commerce. E-commerce KPI modelling for machine learning regression and direct KPI optimization. E-commerce analytics platforms (e.g., Google Analytics). E-commerce advertisement services (e.g., Google Ads, Google Shopping). E-commerce product data representation including Google Shopping product feed data format and Google Product Taxonomy. E-commerce advertisement platforms (e.g. Google Merchant Center). Integration of data from e-commerce analytics platforms and e-commerce advertisement platforms (e.g. Google Merchant Center). Application of machine learning (including deep learning) for prediction of the metrics and the Key Performance Indicators (KPIs) for e-ccomerce: Clickthrough Rate (CTR), Conversion Rate (CR), Return On Advertising Spend (ROAS). Machine learning e-commerce Customer Lifetime Value (CLV) prediction. Optimization of parameters of bidding-based e-commerce advertisment (e.g., bid optimisation). Machine learning pipelines for predictive e-commerce systems. Horizontal decomposition of predictive systems for Docker-based deployment in cloud environments. Algorithms for automation of machine learning pipelines optimisation for predictive e-commerce systems.

Course topics

none

Teaching methods

Lectures: multimedia presentation, illustrated with examples given on the blackboard.
Laboratory: presentation illustrated with examples given on the blackboard and carrying out the tasks given by the teacher - practical exercises.

Bibliography

Basic 1. Turban, E., Whiteside, J., King, D., & Outland, J. (2017). Introduction to electronic commerce and social commerce. Springer, https://eprints.ukh.ac.id/id/eprint/260/1/2017_Book_IntroductionToElectronicCommer.pdf
2. Chopra, P., Dixon, E., Enos, E., & Brodmerkle, S. (2013). Practical Web Analytics for User Experience: How Analytics Can Help You Understand. Exchange, https://www.academia.edu/download/44998812/Practical_Web_Analytics_for_Use_-_Michael_Beasley.pdf
3. Tallis, M., & Yadav, P. (2018, December). Reacting to variations in product demand: An application for conversion rate (cr) prediction in sponsored search. In 2018 IEEE International Conference on Big Data (Big Data) (pp. 1856-1864). IEEE, https://arxiv.org/pdf/1806.08211
Additional 1. Policarpo, L. M., da Silveira, D. E., da Rosa Righi, R., Stoffel, R. A., da Costa, C. A., Barbosa, J. L. V., ... & Arcot, T. (2021). Machine learning through the lens of e-commerce initiatives: An up-to-date systematic literature review. Computer Science Review, 41, 100414, https://www.sciencedirect.com/science/article/pii/S157401372100054X/pdfft
2. Hutter, F., Kotthoff, L., & Vanschoren, J. (2019). Automated machine learning: methods, systems, challenges (p. 219). Springer Nature, https://www.automl.org/wp-content/uploads/2019/05/AutoML_Book.pdf
3. Shah, C. (2020). A hands-on introduction to data science. Cambridge University Press, https://toc.library.ethz.ch/objects/pdf03/z01_1-108-47244-3_01.pdf
4. Laura, I., & Santi, S. (2017). Introduction to Data Science: A Python Approach to Concepts, Techniques and Applications

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	40	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	10	0,50