University of Salford MANCHESTER

SCHOOL OF SCIENCE, ENGINEERING & ENVIRONMENT

Machine Learning and Data Mining

for

MSc Data Science, MSc IoT with Data Science and MSc in AI

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Intended Learning Outcomes

1) Demonstrate a solid grasp of fundamental concepts in machine learning and data mining, including various types of learning algorithms, data pre-processing techniques, and their applications in solving real-world problems.

2) Show proficiency in designing, implementing, and evaluating machine learning models, and apply data mining methods to extract valuable insights from data.

3) Acquire hands-on experience with industry-standard tools and programming languages, such as Python and Azure, to implement machine learning and data mining techniques effectively.

4) Utilize both theoretical knowledge and practical skills to address complex data-driven challenges, enhancing your ability to tackle real-world problems

Lecture & Workshop Schedule

Lectures (online): Mondays 9 to 11 am

Workshops (in person): Mondays (1 to 4 pm or 4 to 7 pm based on your groups)

Assessment

Assessment: Coursework 100%

The MLDM module assignment comprises a practical project. Detailed information, including the assignment brief, criteria, and writing framework, will be available in the Assessment folder on Blackboard.

Support: We have arranged drop-in sessions as support for the assignment. These sessions will be held in person on **Fridays** form 1 to 2 pm, **starting from week 3** (Venue:2.18)

Attendance is optional but encouraged if you have any questions regarding the assignment.

Resources

- Data Mining: Concepts and Techniques (2023). 4th ed. By Jiawei Han, Micheline Kamber, and Jian Pei. Cambridge: Morgan Kaufmann.

- Data Mining and Predictive Analytics (2022). 2nd ed. By Daniel T. Larose and Chantal D. Larose. Hoboken: Wiley.

- Introduction to Data Mining (2021). 3rd ed. By Pang-Ning Tan, Michael Steinbach, and Vipin Kumar. Boston: Pearson

- Mining of Massive Datasets (2014). 2nd ed. By J. Leskovec, A. Rajaraman, and J.D. Ullman. Cambridge: Cambridge University Press.

- Machine Learning With Python: Theory and Implementation (2023). By A. Zollanvari. Cham: Springer International Publishing.

- Python Machine Learning (2019). By W.-M. Lee. Newark: John Wiley & Sons, Incorporated

Session specification

Week	Session specification
Week1	Introduction & Fundamental concepts
Week2	Data Mining Methodology and Preprocessing
Week3	Association Rules Mining (Basic Concepts, Apriori Algorithm)
Week4	Clustering (Basic Concepts, Partitioning Methods, Hierarchical Methods, Evaluation)
Week5	Classification 1 (Basic Concepts, KNN, Decision Tree, Evaluation)
Week6	Classification 2 (Artificial neural networks, Learning algorithms, Applications)
Week7	Feature Selection methods, class imbalance
Week8	Deep Learning (Feed Forward Networks, Convolutional Neural Networks)
Week9	Ensemble Methods (Voting, Boosting, Bagging, ...)
Week10	Text Mining and Sentiment Analysis

Ground rules

1. Please choose a quiet place to attend the class and concentrate during the lecture
2. **Turn off your mic and camera during the lecture**
3. You can add your question to Padlet (The Padlet link is available on Blackboard in the Lecture folder for each week. Please add one question per column and refer to the relevant slide number.
4. We will have 5 mins break after the first hour of the lecture
5. The Jisc code will be shared at the beginning of each session (both lectures and workshops) and will also be posted in the chatbox during online lectures. Please make sure to enter the code before it expires. To avoid disruptions, we kindly ask that you do not request the Jisc code in the chatbox.
6. Please check the 'Module Information' folder and the 'References' section on Blackboard, where you can find the course specification and links to resources.

Ground rules

7. Please make sure to read the shared materials, including this file, weekly contents and the assignment brief carefully, as they may already address many of your questions. Also, kindly keep an eye on the announcements for important updates

8. **Dr. Azadeh Mohammadi** will be the main point of contact for any queries or questions you may have in this module. (But **if your question is related to a specific session, please email the lecturer who delivered that session directly.**) For all communications, please **use email exclusively** and **refrain from sending your questions through Blackboard or Teams**

9. In line with university regulations, a reasonable turnaround time is **within three working days**. If no reply is received after this period, you may send a reminder email.