UNIVERSITY of BRADFORD

Module Details	
Module Title	Machine Learning Methods and Models
Module Code	GAV4016-B
Academic Year	2022/3
Credits	20
School	Department of Media Design and Technology
FHEQ Level	FHEQ Level 4

Contact Hours	
Type	Hours
Lectures	10
Seminars	14
Laboratories	24
Directed Study	152

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Semester 2

Module Aims
* To provide students with an introduction to Machine Learning (ML). * To introduce ML methods and techniques for solving practical applied artificial intelligence problems. * To provide practical hands-on experience by implementing ML concepts using appropriate current programming languages.

Outline Syllabus

A typical syllabus will cover the following:

MACHINE LEARNING
What is ML, why has it become popular and what kind of practical problems can it solve? Overview of four types of ML methods: supervised learning, unsupervised learning, semi-supervised learning and reinforcement learning. Fundamental concepts of supervised and unsupervised learning: introducing a range of learning algorithms both from supervised and unsupervised categories to prompt discussion of how these algorithms can be applied for data analysis. Synthetic and real datasets will be used to illustrate the practical uses of the various ML approaches.

ENGINEERING FEATURES AND MODEL EVALUATION:
The importance of engineering new features, and the possibility of utilising expert knowledge in creating derived features from the data. Model evaluation methods such as cross-validation, and evaluation metrics, evaluating and improving ML algorithms.

LEARN TO CODE:
Introduction to the syntax of Matlab and current Python libraries.

Learning Outcomes

Outcome Number	Description
O1	Identify and describe principles and concepts of machine learning and differentiate between four types of machine learning methods: supervised, unsupervised, semi-supervised and reinforcement learning.
O2	Understand and explain the concepts of supervised and unsupervised learning algorithms.
O3	Demonstrate technical skills to apply machine learning concepts to given case studies.

Learning, Teaching and Assessment Strategy

The delivery of the module consists of lectures, lab sessions, and seminars, supplemented by directed study. Formal lectures will outline the theoretical principles of basic ML algorithms and applications.

Through seminars and lab sessions, students will get involved in activities such as analysing case studies and working with problem-solving exercises using selected programming languages; for example, Python and Matlab.

In independent study, students are expected to learn and practice using ML code templates with support from tutors and peers.

Students will complete formative tasks throughout this module, both individually and in groups, which mirror the tasks expected for the elements of the summative assessment. Feedback will be provided via seminar and laboratory sessions.

The summative assessment for this module takes the form of a single report on the practical implementation of a supervised or unsupervised ML algorithm on open-access datasets to solve a given problem. In this assessment, students are expected to demonstrate their exploration of the given problem using existing literature, understanding of the datasets, processing of the data, development of a meaningful ML application and evaluation of their work.

Supplementary assessment if required is as original.

Mode of Assessment			
Type	Method	Description	Weighting
Summative	Coursework - Written	Report on a given case study (2000 words)	100%

Reading List
To access the reading list for this module, please visit https://bradford.rl.talis.com/index.html