Module Specification

Machine Learning and Predictive Analytics

Version: 2024-25, v1.0, 08 May 2024

Contents

Part 1: Information

Module title: Machine Learning and Predictive Analytics

Module code: UFCE9S-15-M

Level: Level 7

For implementation from: 2024-25

UWE credit rating: 15

ECTS credit rating: 7.5

College: College of Arts, Technology and Environment

School: CATE School of Computing and Creative Technologies

Partner institutions: None

Field: Computer Science and Creative Technologies

Module type: Module

Pre-requisites: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: Yes

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Not applicable

Features: Not applicable

Educational aims: See Learning Outcomes.

Outline syllabus: You will cover:

Introduction to predictive analytics:

Defining predictive analytics - introduction

Business Relevance of PA - Business intelligence and applications:

Relevance of pattern recognition, classification, optimisation

Predictive analytics and big data

Case study: a business application using predictive analytics approaches

Predictive analytics in business - applications:

Sources of data and value of knowledge

Identify a wide range of applications for predictive analytics:

Marketing and recommender systems, fraud detection, business process analytics,

credit risk modelling, web analytics and others

Social media and human behaviour analytics

Case study: email targeting - which message will a customer answer? - (tutorial)

Analytics models and techniques:

Introduction to analytics modelling

Types of analytics models:

Predictive models

Survival models

Descriptive models

Define pattern recognition, inferring data and data visualisation

Briefing learning and regression approaches

Comparison of approaches - use and goals - (tutorial)

Introduction to machine learning:

Introduction: Basic principles:

Basic notions of learning

Introduction to learning problems (classification, clustering and reinforcement) and

literature

Identifying different learning approaches - supervised, unsupervised and reinforcement

Case study on different types of learning - (tutorial)

Machine learning for predictive analytics (1):
Review of types of problems

Machine Learning techniques:
Decision tree learning
Artificial neural networks
Clustering
Naive Bayes classifier
k-nearest neighbours
Genetic algorithms

Case study on problem - a "suitable" predictive modelling technique - (tutorial)

Regression techniques for predictive analytics:
Review of types of problems (application)
Linear regression models
Survival or duration analysis (time to event analysis)
Ensemble learning and random forest
Case study on problem - a "suitable" predictive modelling technique - (tutorial)

Advanced topics and Software tools:
Analytics in the context of big data
Predictive analytics as art and science
Software tools; the R project and Python

Trends and challenges in predictive analytics - where are we going?

Part 3: Teaching and learning methods

Teaching and learning methods: The module, presented via our online virtual learning environment, consists of a clearly signposted, easy-to-navigate student journey through carefully chosen learning materials which are designed to engage and challenge students as they work towards achieving the module learning outcomes. Content may be in a range of formats, including clear well-written text, diagrams, animations, video and interactive video, activities, quizzes, asynchronous discussions, coding and interpretation exercises.

Students will be provided with as many opportunities as possible to 'perform their understanding' rather than just reading or watching video to passively acquire knowledge. This may be in the form of simple tasks, activities or quizzes that students can engage with in the online environment, or larger pieces of work that may require additional thought. Whatever their nature, such tasks will be authentic (connected to the real world) and directly relevant to the programme learning outcomes.

The online environment also provides important opportunities to encourage students to work with, and learn from, their peers. The careful use of structured online discussion forums helps to foster an active learning community and enable students to share their responses to key questions, and to discuss, and even challenge, each other's ideas.

All learning materials are produced and presented in a way that ensures that they are appropriate for as diverse an audience as possible. We follow W3C accessibility standards and ensure that all content can be used with all popular screen-readers, offering alternative formats where possible. In general, we aim to avoid using language, idioms, images or other devices which root the content in any particular culture or creed that instead adequately reflect the diversity of the student audience.

In general, modules are designed with a number of key learning principles in mind that align closely with those of the university.

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 Synthesise evidence on the value of data as an asset for businesses to "mine" knowledge and "predict" trends.

MO2 Develop and evaluate predictive analytics approaches and techniques such as regression and random forest classifiers.

MO3 Understand predictive analytics trends and challenges and illustrate fluency with software tools used in predictive analytics.

MO4 Visualise and present the results of predictive and descriptive models alongside an evaluation of performance and recommendations for improvement.

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 126 hours

E-learning/online learning = 24 hours

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://uwe.rl.talis.com/modules/ufcfmj-15-m.html

Part 4: Assessment

Assessment strategy: The assessment involves solving a business related problem based on given requirements and data, proposing a solution and preparing a pilot predictive model. This brings together module material on the context, data and requirements for implementing a predictive module and in the course of completion students will gain experience in model building, presenting results and evaluating accuracy.

There will be opportunities for formative feedback in the form of regular forum discussions as part of tutorial work completed, group discussions, and progress reviews of the coursework project.

Assessment tasks:

Report (First Sit)

Description: Individual coursework report (2000 words)

Weighting: 100 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4

Report (Resit)

Description: Individual coursework report (2000 words)

Weighting: 100 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Data Science [UWE Online] MSc 2023-24

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