Module Specification

Machine Learning and Predictive Analytics

Version: 2023-24, v2.0, 20 Mar 2023

Contents

Part 1: Information

Module title: Machine Learning and Predictive Analytics

Module code: UFCFMJ-15-M

Level: Level 7

For implementation from: 2023-24

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: See outline syllabus and assessment.

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 Apply problem solving skills necessary for identifying the organisational capacity needed to employ a predictive analytics solution

MO4 Understand predictive analytics trends and challenges and illustrate fluency with software tools used in predictive analytics

MO5 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

Face-to-face learning = 24 hours

Total = 150

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 assessment in the form of regular in-class presentations of research/implementation completed 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: No

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5

Report (Resit)

Description: Individual coursework report (2000 words)

Weighting: 100 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Information Technology [Frenchay] MSc 2023-24

Data Science [GCET] MSc 2023-24

Data Science [NepalBrit] MSc 2023-24

Data Science [Frenchay] MSc 2023-24

Data Science [Frenchay] MSc 2023-24

Financial Technology [Frenchay] MSc 2023-24

Information Technology [Frenchay] MSc 2022-23