



Module Specification

Machine Learning and Predictive Analytics [TSI]

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Part 1: Information

Module title: Machine Learning and Predictive Analytics [TSI]

Module code: UFCED1-12-M

Level: Level 7

For implementation from: 2023-24

UWE credit rating: 12

ECTS credit rating: 6

College: College of Arts, Technology and Environment

School: CATE School of Computing and Creative Technologies

Partner institutions: Transport and Telecommunication Institute

Field: Computer Science and Creative Technologies

Module type: Module

Pre-requisites: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: This module will equip students with knowledge and understanding of tools and techniques commonly utilised within the field of Machine Learning.

Features: Not applicable

Educational aims: This module will provide students with knowledge and understanding of tools and techniques commonly utilised within the field of Machine Learning to solve complex problems.

Outline syllabus: This module 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: This module is made up from one part

The Component B, coursework involves solving a business related problem based on given requirements and data, proposing a solution and preparing a pilot predictive model. This component 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.

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 Identify learning problems including classification, clustering and reinforcement; distinguish their scope and outline suitable solutions

MO3 Develop and evaluate predictive analytics approaches and techniques such as regression and random forest classifiers

MO4 Apply problem solving skills necessary for identifying the organisational capacity needed to employ a predictive analytics solution

MO5 Visualise and present the results of predictive and descriptive models alongside an evaluation of performance and recommendations for improvement

MO6 Understand predictive analytics trends and challenges and illustrate fluency with software tools used in predictive analytics

Hours to be allocated: 120

Contact hours:

Independent study/self-guided study = 112 hours

Face-to-face learning = 48 hours

Total = 160

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link

<https://ri.talis.com/3/uwe/lists/170DB3CA-83CA-C04E-9391-ACBBFEA9BD8F.html?lang=en-gb&login=1>

Part 4: Assessment

Assessment strategy: This module is assessed through a single assessment. Students are required to produce a written report, using appropriate case studies and models to support their decisions.

Assessment tasks:

Report (First Sit)

Description: Report (including any models)

Weighting: 100 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6

Report (Resit)

Description: Written report, including any models

Weighting: 100 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Computer Science (Data Analytics and Artificial Intelligence) {Double Degree} [TSI]

MSc 2023-24