Module Specification

Machine Learning for Language and Vision

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Contents

Part 1: Information

Module title: Machine Learning for Language and Vision

Module code: UFCEQ1-15-M

Level: Level 7

For implementation from: 2023-24

UWE credit rating: 15

ECTS credit rating: 7.5

Faculty: Faculty of Environment & Technology

Department: FET Dept of Computer Sci & Creative Tech

Partner institutions: None

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 introduce you to a range of contemporary AI-based algorithms for processing and responding appropriately to natural language (e.g. speech and text) and visual artefacts such as images and videos.

Weekly lectorials and workbooks will cover the key concepts and provide hands-on experience with using range of state-of-the-art tools for handling language and vision-based problems.

You will also be introduced to the key legal and ethical issues, such as (but not limited to) avoiding unintentional bias against groups of people with protected characteristics.

The first two weeks will focus on developing your professional skills such as group working, project management and presentation skills including visual analytics suitable for different audiences.

You will then use these skills in the assessment, where you will work in small groups to develop two deliverables.

Typically the deliverables will be:

a solution to an visual based problem such as detecting and identifying objects in images,

a solution to a language-based problem such as recognising key entities and intents in utterances.

Features: Not applicable

Educational aims: This module aims to provide students with the opportunity to acquire the technical skills and understanding to:

identify and formulate appropriate representations for problems relating to language and vision,

critically appraise a range of Ai-based approaches for solving those problems,

 design, implement and evaluate solutions to problems, justifying their methodology in terms of the context in which solutions. re being deployed, and associated legal and ethical issues.

Outline syllabus: Professional skills:

tools and techniques for working with a group of colleagues to deliver successful project outcomes on time,

creative effective presentations and data visualisations for communicating with range of stakeholders.

Language:

preprocessing (lemmatisation, stop-words),

semantic and statistical methods e.g. Naive Bayes,

'Deep Learning' approaches:

recurrent models e.g. LSTM,

encoder-decoder architectures,

attention mechanisms,

working with pretrained models e.g. BERT, GPT-2/3.

Vision:

preprocessing,

'traditional' image processing for feature creation,

Convolutional Neural Networks,

transfer learning with pre-trained models.

Addressing legal and ethical concerns, such as avoiding unintentional bias against groups of people when learning from historical data, targeted disinformation, and generating fake news, images etc.

Part 3: Teaching and learning methods

Teaching and learning methods: Lectures will cover the key concepts, first at the abstract level then by reference to examples how these have manifested in our research projects and in collaborations with commercial partners. This will typically include guest lectures from our collaborators.

Lab sessions with practical workbooks will provide the opportunity for students to gain hands-on experience using range of state-of-the-art tools for handling language and vision-based problems.

In addition to these weekly timetabled sessions, a mixture of online resources (through the VLE) and scheduled sessions will provide background and resources to help students develop their reflective writing, presentation, group-working and project-management skills.
The students will then have the opportunity to learn 'hands-on' as they put these into practice during the group work assessment and the individual reflective writing assignment.

Independent learning study hours include engaged with essential and exploratory reading, practical study, assignment preparation and completion etc.

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

MO1 Design, implement and evaluate an AI-based system for processing natural language such a social media or forum posts, dialogue, or documents, and formulating appropriate responses - for example, identifying entities or sentiment.

MO2 Design, implement and evaluate an AI-based system for processing visual artefacts such as images or videos and formulating appropriate responses - for example, object detection and identification.

MO3 Be able to justify the methodology chosen when developing an AI-based solution in terms of the problem characteristics and those of a range of contemporary AI-based tools.

MO4 Be able to justify the approach to considering ethical, legal and societal concerns when designing and implementing AI-based systems.

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://rl.talis.com/3/uwe/lists/EA5140AC-FE13-E777-6C53-B39626C17A3E.html?lang=en-US&login=1

Part 4: Assessment

Assessment strategy: Weekly workbooks in the timetabled lectorials will provide frequent opportunity for peer-discussion and informal formative feedback from the tutors.

Weekly online self-assessment tests will provide further opportunities for formative feedback on students understanding of the concepts covered.

Summative assessment will the based around a group work assignment:

 Typically composed of two deliverables, these will concern the design, implementation and evaluation of an AI-based solution for language and vision problems.

An online system will be used to provide automated marking and feedback via

submission of the code developed, plus answers to a set of questions designed to test students' understanding of the work they have submitted, their ability to justify their chosen approach, and awareness the surrounding legal and ethical issues.

Additionally each student will submit a brief report reflecting on their experiences of, and personal lessons learned from, the group's project management and how they contributed. This report should include a reflective critique of how well the group covered relevant ethical concerns.

The resit attempt will be assessed in the same way as the first attempt
Wherever possible students will be assigned new groups and be assigned new tasks.

Assessment tasks:

Reflective Piece (First Sit)
Description: Reflective report describing and critically appraising elements of the management of the project,
Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO4

Online Assignment (First Sit)
Description: Submission of two deliverables typically comprising:
- code and answers to questions concerning the development of an AI-based solution to a language-based problem.
- code and answers to questions concerning the development of an AI-based solution to a vision-based problem.
Weighting: 75 %
Final assessment: Yes
Group work: Yes
Learning outcomes tested: MO1, MO2, MO3

Reflective Piece (Resit)

Description: Reflective report describing and critically appraising elements of the management of the project,

Weighting: 25 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2, MO4

Online Assignment (Resit)

Description: Submission of two deliverables typically comprising:

- code and answers to questions concerning the development of an AI-based solution to a language-based problem.

- code and answers to questions concerning the development of an AI-based solution to a vision-based problem.

Weighting: 75 %

Final assessment: Yes

Group work: Yes

Learning outcomes tested: MO1, MO2, MO3

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Artificial Intelligence [Frenchay] MSc 2023-24