Assessment Brief

Submission and feedback dates

Submission deadline: Before 14:00 on **Monday 20th May 2024**.

This assessment is eligible for 48 hour late submission window

Marks and Feedback due on: Written feedback on June 10th 2024. Informal, formative feedback will be available throughout the course.

N.B. all times are 24-hour clock, current local time (at time of submission) in the UK

Submission details

Module title and code: **UFCEN1-15-M Knowledge-based and Hybrid Systems**

Assessment type: Portfolio

Assessment title: Group project - Hybrid system implementation

Assessment weighting: 100% of total module mark

Size or length of assessment: This is a group assessment and only one copy should be uploaded per group: 6-pages report, implementation source code, recorded demo.

Module learning outcomes assessed by this task:

MO1. Critically appraise the strengths and weaknesses knowledge-based paradigms of Artificial Intelligence and compare with other paradigms in the light of considerations such as ethical issues, scalability and guarantees of correctness/optimality.

MO2. Design and implement a knowledge-based approach to a given problem, justifying the methodology used in the light of organisational imperatives (such as correctness, reuse of existing knowledge and maintainability) and ethical and social implications of AI-based solutions such as privacy, fairness, and accountability.

MO3. Critically analyse large complex problems, decomposing them into smaller sub-problems to be solved by AI algorithms from different paradigms, justifying the decomposition in terms of the sub-problem characteristics such as pre-existing knowledge, data availability, requirements of formal correctness, and ethical issues such as explainability.

MO4. Design and implement hybrid AI architectures to coordinate different approaches for sub-problems within a larger system, justifying the methodology chosen in terms of criteria such as: organisational imperatives (e.g. reusing existing knowledge and tools); legislative

requirements (e.g. formal correctness and explainability); and context-specific requirements for balancing speed, accuracy, and resource management.

Section 1 - Overview of assessment

What am I required to do on this assessment?

For this assignment you collaborate with your peers in small groups to design and implement a hybrid knowledge-based system.

There are 3 deliverables to submit via Blackboard: a report, a zip folder with the implementation source code, and a recorded demo.

The assignment is described in more detail in Section 2.

If you have questions about this assignment, please post them to the discussion board on Blackboard, or email / speak with your tutors.

Section 2 – Assessment specification

Your main objective on this assessment is to design and implement a hybrid knowledge-based music recommendation system:

- We will provide you with a dataset of songs and related metadata (genre, year, artists, etc.) to use in developing the system. You can also collect/generate any additional data to compliment the dataset (e.g., user listening preference data).
- You must choose an appropriate knowledge representation format (such as an ontology, set of rules, knowledge-graph, etc) to encode relationships between the features of your dataset.
- You must choose an appropriate AI methodology (genetic algorithm, deep learning, etc) to incorporate into your hybrid system.
- The system should allow users to input queries, such as "acoustic 1980s pop", and output a ranked list of 5 song recommendations that match the user's preferences based on the knowledge base dataset. You can design the user's query form that helps the system make best suggestions.
- Recommendations should be justified by linking knowledge-based reasoning with relationships found in the data.

This work should innovative, have a strong scientific background, and have been fully implemented and tested. You have the opportunity to apply what you have learned from this module, as well as all the other modules and previous expertise in developing (AI) systems.

Section 3 – Deliverables

Your final submission should include the following three files. All files should be submitted through Blackboard – one submission per group.

<u>Report</u>

This is a 6-page scientific journal-style paper that will allow you to critically reflect on the strength and weakness of your hybrid system. Following the structure of the provided template you must include:

- Related works: discuss published work that relates to your project. How is your approach similar or different from others? You will need to reference appropriate sources using the UWE Harvard referencing style.
- Ethics: discuss the legal, ethical and social considerations that are associated with your solution, and possible solutions.
- Data: details on data pre-processing and relationships identified.
- Methods: Discuss your approach to design and implement the hybrid system, including the knowledge base construction process, the AI method implemented and integration approach.
- Evaluation & Results: Outline the evaluation process, the queries used to test your hybrid system, and related outputs. You should provide a justification for the recommendations obtained.
- Conclusions: summarise your key results, analyse technique effectiveness and limitations, and provide future work extensions.

Throughout the report you can include graphs, tables, diagrams, etc to support your writing.

There is not a word limit count, but you report should not be more than 6-pages long.

<u>Source Code</u>

Python notebooks or other code files containing the full implemented hybrid recommendation system. This should also include any additional datasets you might have generated, along with dependencies, configurations, instructions needed to build/install/run the system in any machine. You might choose to submit these files as a ZIP folder.

<u>Demo</u>

This is a pre-recorded demo video that walks through and showcases the capabilities of the developed recommendation system. During the demo you should highlight key functionalities, evidence how users can input queries and receive recommendations, explain the source code for the most challenging features you have implemented.

You can use any recorded technologies, but the video should <u>not be longer than 10mins</u>, and <u>all group members should participate in the video narration.</u>

Section 4 – Completing your assessment

Where should I start?

Get to know your group members and identify their skills and experiences that can contribute to the collaborative aspects of this assessment.

Spend some time familiarising yourself with the data provided and the reading list provided. If you have any questions around the assessment, talk with the tutors as soon as possible.

What do I need to do to pass?

To pass the module the mark must be 50% or above, and you should submit all the 3 deliverables.

This assessment is designed to be a collaborative effort within your assigned group, as such, you are required to complete the work within your groups and evidence your contribution to the group's submission. Marking criteria in Section 5 highlight the minimum requirements to achieve a pass.

How do I achieve high marks in this assessment?

To achieve high marks you should:

- Attend your timetabled sessions, review lecture material and recommended reading.
- If you do not complete your workbook activities within the session, try to complete them before the following week.
- Actively collaborate within your group.
- Complete the requirements beyond the minimum pass, as reported in the marking criteria in Section 5.
- Submit all 3 deliverables, as outlined in Section 3.

How does the learning and teaching relate to the assessment?

Sessions are structured into two parts.

The first part is a theoretical interactive lecture to build your foundational knowledge around knowledge-based and hybrid systems. The second part is a tutorial where you will work on practical hands-on activities designed to complement and complete the topics introduced in the lecture. Sessions and reading materials will provide you with the scientific and practical knowledge to complete your assessment.

What additional resources may help me complete this assessment?

If you have any questions around this assessment, please:

- Post a question in the discussion section on Blackboard.
- Talk with your tutors during the practical sessions.
- Email/Meet your tutors for progressive feedback on your work.

What do I do if I am concerned about completing this assessment?

UWE Bristol offer a range of Assessment Support Options that you can explore through this link, and both Academic Support and Wellbeing Support are available.

For further information, please see the Academic Survival Guide.

How do I avoid an Assessment Offence on this module? [2]

Use the support above if you feel unable to submit your own work for this module.

This is a group assignment; however, you should avoid working with others outside of your group. Working with other groups / group members may lead to collusion, an academic offence, where you work together in a manner not permitted in the assignment.

1. In line with UWE Bristol's Assessment Content Limit Policy (formerly the Word Count Policy), word count includes all text, including (but not limited to): the main body of text (including headings), all citations (both in and out of brackets), text boxes, tables and graphs, figures and diagrams, quotes, lists.

2. UWE Bristol's UWE's Assessment Offences Policy requires that you submit work that is entirely your own and reflects your own learning, so it is important to:

   - Ensure you reference all sources used, using the UWE Harvard system and the guidance available on UWE's Study Skills referencing pages.

   - Avoid copying and pasting any work into this assessment, including your own previous assessments, work from other students or internet sources.

   - Develop your own style, arguments and wording, so avoid copying sources and changing individual words but keeping, essentially, the same sentences and/or structures from other sources.

   - Never give your work to others who may copy it.

   - If using Generative AI in your work, you will need to evidence and document how you have used the AI tool(s) and evaluated the output produced. You will also need to reference it appropriately using the UWE referencing guidelines.

When submitting your work, you will be required to confirm that the work is your own, and text-matching software and other methods are routinely used to check submissions against other submissions to the university and internet sources. Details of what constitutes plagiarism and how to avoid it can be found on UWE's Study Skills pages about avoiding plagiarism.

Section 4 – Completing your assessment

Your assessment will be marked according to the following marking criteria.
You can use these to evaluate your own work before you submit.
All deliverables will contribute to each of the criteria. The last 3 criteria are specific for the code, video and report submission, respectively.

	Inadequate 0% - 29%	Needs work 30% - 49%	Pass / Good 50% - 69%	Excellent 70% - 100%
Analysis and Knowledge representation (20%)	Little to no data analysis or preprocessing evidenced. Knowledge representation lacking or unsupported.	Basic data handling. Knowledge representation weak, and not fully suitable.	Appropriate analysis and data pre-processing. Knowledge representation is appropriate, or with minor issues. Steps are not fully justified.	Robust data handling and pre-processing. Knowledge representation is appropriate, and all the steps are justified.
Hybrid system development (20%)	The implemented system may be not hybrid, or inappropriate for this task.	AI approach is weak or not fully suitable for the task. Limited integration between AI and knowledge components.	Hybrid integration appropriate for the task, or with minor issues. AI approach not fully justified.	AI methodology fully justified. Hybridization between components is fully functional.
Related works (15%)	Little to no discussion of past works related to the project.	Minimal relevant papers mentioned. Little connections of existing literature to applied methodology.	Related papers appropriately discussed Methodology is compared to and justified with published works.	Related papers appropriately discussed. Methodology is critically justified with published works. Insights on future works extensions.
Experimental evaluation (15%)	Little to no evidence of experiments conducted, or results analysed.	Queries do not show the full capability of the system. Limited experimental process explained. Limited results analysis or not linked to the knowledge representation chosen.	Designed queries validate the core functionalities. Good evaluation of system performance, results, and chosen experiments. Some linkage to the knowledge base.	Designed queries validate the core functionalities. Excellent evaluation of system performance, results, and chosen experiments. Clear linkage to the knowledge base.
Ethical considerations (10%)	Little to no description of legal and ethical issues for the given problem or approach followed.	Some discussion of legal and ethical issues, but little to no reference to the specific problem.	Good discussion of legal and ethical issues. Relevance to the given problem. None or some solution proposed.	Excellent discussion of legal and ethical issues. Relevance to the given problem. Concrete solution proposed.
Novelty (5%)	Little to no evidence of innovation.	The innovative ideas are not fully supported by scientific studies.	The innovative ideas have strong scientific background, but they have been partially implemented.	The innovative ideas have strong scientific background, and have been fully implemented and tested.
System operability (5%)	Code does not execute, or runs with major errors.	Code executed with minor issues. Limited documentation.	Operable system meeting core aims. Limited documentation.	Operable system meeting core aims. Good documentation. Ready for production.
Presentation coherence (5%)	Demo lacks clarity. Little connectivity to report.	Demo covers some system functionalities. Results justification does not align with report.	Functionalities are fairly explained. Results justification mostly aligns with report.	System functionalities are clearly explained. Results justification aligns with report.
Writing and formatting (5%)	No use of template or UWE referencing style. Basic writing skills.	Fair clarity. Some graphical/tabular illustrations. Minor UWE referencing issues.	Good clarity. Some graphical/tabular illustrations. Minor UWE referencing issues.	High-level of clarity, clear use of visualisation. Correct UWE referencing.