CPU5006: Artificial Intelligence

ASSESSMENT S1: Rule-Based AI Scientific Research Paper

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Contribution towards overall module mark	40%
Date set	22nd September 2025
Marked work returned by	26th November 2025
DEADLINE DATE	4th November 2025

Assessment 1: Rule-based AI Experiments

Word Count: 2,000 min - 3,000 max

The Brief

Your task is to write a scientific paper on a research experiment regarding rule-based (RB) AI **algorithm(s)** you have created.

You are to create a research question that you aim to solve using the RB AI systems, with one of the provided datasets. You have the freedom to decide on what your research question should be, as long as it is related to the required dataset that has been chosen.

Your scientific paper will need an introduction, literature review, methodology, results, discussion, and conclusion sections. The scientific paper should demonstrate your understanding of the material introduced in this module. An abstract and front cover sheet is not required. You will be marked on your report's depth and presentation, with a weighting effect being applied to the overall assignment result if the necessary expectations are not met, if your score is < 70 in the criteria.

Deliverables

The deliverables for this assessment are:

- The Scientific Paper: 3,000 words max, delivered in Word or PDF format. However, anything less than 1,800 words is not likely to score highly.
- You RB AI system(s) implementation(s) and experiment outcomes and analysis, Python source code, and sample data used to demonstrate your algorithm(s).

The Scientific Research Paper

The scientific research paper is the primary assessed element. It should describe:

- Set the scene for your research in the introduction and provide an overview of the events that have occurred.
- The literature review should explain the problem you are trying to solve and provide a background to the AI systems and the domain problem.
- The methodology should identify the metrics, the dataset, and how the systems were created. Ensure that you clearly explain the critical design decisions of the AI systems and the underlying fundamental logic.
- The Results and Discussion section should outline the results and then your understanding of what the results mean. Ensure you apply critical analysis to the results and explain/challenge what they show.
- The conclusion is where you summarise your research paper, giving key insights into the findings of the problem.
- The Reference section is essential and should be linked to the references used in your paper. Ensure that the Harvard or ACM style is used.

For your RB research problem, please select a problem from the following dataset:

- Car Evaluation Dataset
- Credit Risk Dataset
- Adult Dataset
- Food Dataset

The paper should be the result of a combined effort of your research into possible solutions and the development process and results of implementing the two rules-based AI algorithms into functional research code. The report must use UK English spelling.

While you can adapt the suggested format if it is appropriate for your research paper, it is recommended that you follow it. Additionally, it must be well-researched and written using proper academic language.

Your paper is to be based on and facilitated by developing two algorithms that attempt to solve a research problem of your choice. You can only use rule-based AI systems to solve this problem. An ideal solution will optionally perform better in relation to your research goal. Ensure that you use appropriate metrics to support your research claims.

To demonstrate each algorithm, you will develop a simple but functional piece of code that utilises an appropriate dataset. The code is an important artefact used to complete both algorithms to assess and compare their performance, but the software itself is not marked.

The software must be written in Python, unless your lecturer agrees otherwise.

Use of Artificial Intelligence (AI) Tools

All assessments permit the use of established AI tools for spelling, punctuation, and grammar (e.g., Grammarly, spell checks, autocorrect).

Additionally, tools like ChatGPT can be used to develop and create your coding solutions and aid with report writing. However, they must be referenced and commented on within your code where they are used. Regarding the writing of your report, they can be used for spelling checking, proofreading, and aiding in the report-writing process.

Submission

Please follow the submission instructions below. Work that is submitted incorrectly may not be accepted or could incur a points penalty.

Before submitting, have you:

- Have you checked that your software compiles and works as expected?
- Ensured that all necessary files have been pushed to GitHub and are publicly accessible.
- Spell-checked and grammar-checked your work? Please make an appointment with the Writing and Learning Centre or speak to your tutor if you are experiencing challenges in this area.
- Formatted your written work to the specification below?
- Referenced all sources of information accurately? Please refer to www.citethemrightonline.com (Harvard) for guidance.

The source code for the algorithm implementation must be submitted via a GitHub repository. Please adhere to the following method:

- Commit and **push** the final version of your code to your GitHub repository for this assignment.
- Please copy the link for your unique GitHub repository and include it at the beginning of your paper.
- Finalise your report and submit it following the instructions below.

Your paper must be submitted via Turnitin. Please adhere to the following method:

- Save your work as a PDF or Word document.
- Log in to Minerva, navigate to the Assessment folder, and submit your document via the appropriate Turnitin Link.

Format

All written work must conform to university styling and submission guidelines. They must:

- Contain appropriate in-text citation that supplies an accurate list of references.
- Be accurate in referencing. Refer to the Bath Spa guidelines and the Harvard system, as described at www.citethemrightonline.com.
- Be accurate in spelling and paragraphing.

Word counts

Written assessments must be a maximum of the word count stated in the briefs. For example, an assessment with a specified max word count of 3,000 must be a maximum of 3,000 words.

Submissions that do not fall within the word count limit may be penalised for not meeting the constraints of the assessment. Furthermore, written pieces that fall below the minimum word count of 1800 may lack the detail the assessment requires.

Marking Criteria

Assessment 1 - The AI scientific paper will be marked against the following criteria:

- Introduction and Lit Review (25%)
- Methodology (25%)
- Results and Discussion (25%)
- Conclusion (15%)
- Report Depth and Presentation (10%) *

* This will apply a weighting effect to your overall score if it is less than 70.

Criteria	Weighting	Mark Range Description	Mark Range
Introduction and Lit Review	25%	Lacks a coherent introduction and/or literature review. Minimal or no evidence of understanding the topic area. No logical structure, and content is either irrelevant or absent. Sources are missing or inappropriate.	0 - 19 (Low Fail)

		Weak introduction and/or literature review with limited relevance to the topic. Significant gaps in structure, clarity, or logic. Limited or poor-quality sources, with minimal critical engagement.	20 - 39 (Fail)
		Basic introduction and literature review that outlines the topic with limited depth or relevance. Structure is simplistic or disorganised. Use of sources is present but not well-integrated or critically evaluated. Writing is of a reflective level.	40 - 49 (Third)
		A fair introduction and literature review with clear topic relevance. Reasonable structure and some evidence of understanding key concepts. Sources are mostly relevant and referenced, but critical insight is limited or inconsistent.	50 - 59 (2:2)
		A good introduction and literature review with clear structure, logical flow, and a focused discussion of the topic. Good use of relevant sources, with some critical engagement. Demonstrates understanding and thoughtful synthesis of literature.	60 - 69 (2:1)
		A very good introduction and literature review. Clear, concise, and well-structured with a strong rationale for the study. Excellent range of relevant literature critically evaluated. Shows independent thought and synthesis, demonstrating engagement with the topic beyond basic expectations.	70 - 79 (First)
		An excellent introduction and literature review showing originality, depth, and clarity. Literature is critically analysed and integrated into a compelling argument. Shows clear independence of thought and insight, with evidence of advanced academic writing skills. Near publishable quality.	80 - 89 (High First)

		Exceptional introduction and literature review of publishable or near-publishable standard. Demonstrates originality, sophistication, and authority. Literature is expertly synthesised and evaluated. Exceeds expectations for this level of study. Use of tools like ChatGPT, or uses them critically and creatively.	90 - 100 (Outstanding)
Methodology	25%	Methodology is missing, incoherent, or wholly inappropriate. No clear explanation of chosen methods or rationale. No understanding of methodological principles or their relevance to the problem. No alignment between methods and research aims.	0 - 19 (Low Fail)
		Methodology is poorly developed or inappropriate. Weak explanation of chosen methods with minimal justification. Theory-practice links are superficial or incorrect. Lacks clarity and shows very limited understanding of how to apply AI concepts in a practical context.	20 - 39 (Fail)
		Basic methodology with some relevant elements but lacks depth, justification, or coherence. Limited explanation of how methods relate to the problem. Some signs of theory-practice understanding, but overly simplistic or generic (e.g., heavy reliance on AI-generated text without adaptation).	40 - 49 (Third)
		A fair methodology with appropriate methods chosen and explained. Clearer rationale with a developing understanding of theory-practice links. Some justification provided for decisions. Reasonably aligned with the problem domain.	50 - 59 (2:2)
		A good, well-structured methodology with appropriate and justified methods. Clear rationale and sound alignment between theory and practice.	60 - 69 (2:1)

		Shows understanding of the AI techniques used and their relevance to the domain problem. Methodology is replicable and coherent.	
		A very good methodology demonstrating strong conceptual understanding and critical justification. Advanced techniques are applied thoughtfully with clear links to the problem. Excellent alignment between theory and implementation. Evidence of independent thinking in selecting and adapting methods.	70 - 79 (First)
		An excellent, rigorous methodology. Sophisticated, well-justified, and effectively executed. Demonstrates deep understanding of AI approaches, with strong, critically reflective connections between theory and practice. Almost publishable.	80 - 89 (High First)
		Outstanding methodology that exceeds expectations. Expert-level justification and clarity. Innovative application of AI methods. Demonstrates independence, originality, and academic maturity. Little to no reliance on AI tools unless critically and transparently integrated. Work is of publishable quality.	90 - 100 (Outstanding)
Results and Discussion	25%	No meaningful results presented, or results are incomprehensible or entirely irrelevant. No discussion or misinterpretation of data. No connection to research aims or methodology. No evidence of reflection or insight.	0 - 19 (Low Fail)
		Very limited results with poor or unclear presentation. Discussion is superficial, confused, or lacks relevance. No clear link to research questions or prior literature. Interpretation may be incorrect or unsupported.	20 - 39 (Fail)

		Basic results presented but lacking detail, clarity, or appropriate formatting. Discussion is mostly descriptive, with limited interpretation or reflection. Some attempt to relate to research aims or literature, but analysis is generic or uncritical. May rely on AI tools without thoughtful integration.	40 - 49 (Third)
		Results are presented clearly and mostly appropriately. Discussion shows a developing ability to interpret findings with some reference to research questions or literature. Some analysis and insight, but may be limited in depth or structure. Occasional critical reflection.	50 - 59 (2:2)
		Clear, relevant, and well-presented results. Thoughtful and coherent discussion with good links to research questions, methodology, and literature. Analysis shows understanding and includes some critical reflection. Demonstrates independent thinking.	60 - 69 (2:1)
		Very good presentation and interpretation of results. Discussion is analytical, well-reasoned, and well-structured, showing clear connections to the wider literature and research context. Critical evaluation is evident. Insightful reflections on limitations or implications.	70 - 79 (First)
		Excellent results and highly effective discussion. Deep, critical engagement with findings, literature, and methodology. Reflective, insightful, and coherent throughout. Shows originality and academic maturity. Work approaches publishable standard.	80 - 89 (High First)
		Outstanding quality of results and discussion. Demonstrates expert-level analysis, originality, and deep critical thinking. Seamless integration of findings with research aims and literature. Demonstrates	90 - 100 (Outstanding)

		research maturity, independent insight, and creative interpretation. Work is of publishable or near-publishable standard.	
Conclusion	15%	No meaningful conclusion provided, or content is entirely irrelevant or incoherent. Does not address research aims, findings, or implications. No evidence of reflection or understanding.	0 - 19 (Low Fail)
		Conclusion is poorly written, vague, or largely repetitive. Limited summary of findings, with minimal or inaccurate reflection on research aims or outcomes. No critical insight or consideration of limitations.	20 - 39 (Fail)
		Basic conclusion that restates results but lacks depth or critical reflection. Limited reference to the research aims or significance. Some structure, but lacks clarity or originality. May rely heavily on AI-generated text.	40 - 49 (Third)
		Fair summary of key findings with some reflection on their significance. Attempts to link back to aims or methodology. May touch on limitations or future work, but superficially. Reasonably structured but lacking deeper insight.	50 - 59 (2:2)
		Good conclusion with clear summary of key findings and their relevance. Reflects meaningfully on the research process and outcomes. Some thoughtful consideration of limitations and suggestions for future research. Shows independent thinking.	60 - 69 (2:1)
		Very good conclusion. Concise, coherent, and well-structured. Strong alignment with research aims and thoughtful reflection on findings, limitations, and future directions. Demonstrates critical thinking and maturity.	70 - 79 (First)

		Excellent conclusion. Insightful synthesis of findings, clearly connected to research aims. Critical evaluation of outcomes, limitations, and implications. Shows originality and academic maturity. Approaching publishable quality.	80 - 89 (High First)
		Outstanding conclusion. Demonstrates exceptional clarity, critical thinking, and originality. Expert reflection on the study's contributions, limitations, and implications. Forward-thinking, creative, and beyond expectations for this level. Suitable for publication.	90 - 100 (Outstanding)
Report Depth and Presentation	10%	Presentation is unprofessional or unreadable. Multiple spelling and grammar issues. Incorrect format (e.g., a generic or technical report). Code screenshots or irrelevant visuals used. Lacks basic academic conventions.	0 - 19 (Low Fail)
		Poorly presented with inconsistent formatting. Frequent spelling or grammar errors. Incorrect tone (e.g., too informal or report-style). Visuals are poorly chosen, low quality, or inappropriate (e.g., screenshots of code). Limited effort to meet academic standards.	20 - 39 (Fail)
		Basic structure and presentation. Uses some academic conventions, but inconsistently. Spelling and grammar are understandable but include regular errors. Some UK English used, but inconsistencies remain. Visuals are simplistic or partially inappropriate. Formatting may resemble a report more than a research paper.	40 - 49 (Third)
		Reasonable structure and mostly appropriate presentation. Some attention to academic tone and UK English spelling, with minor inconsistencies.	50 - 59 (2:2)

		Visuals generally support the content but may lack clarity or polish. Formatting is broadly research-paper aligned.	
		Good, well-presented report that follows academic research paper conventions. Clear use of UK English spelling and grammar throughout. Visuals are appropriate, well-labelled, and well-integrated. Structure is professional and well-formatted.	60 - 69 (2:1)
		Very good presentation with clear, polished academic style. Consistently uses UK English spelling and grammar. Visuals are high-quality, relevant, and support the argument. Format adheres closely to a research paper, with appropriate referencing, structure, and tone.	70 - 79 (First)
		Excellent academic presentation with consistent, error-free use of UK English. Highly appropriate formatting, structure, and tone for a research paper. Visuals are professional, well-designed, and fully integrated. Shows attention to detail throughout.	80 - 89 (High First)
		Outstanding presentation quality. Perfect adherence to research paper style and academic tone. Flawless use of UK English. Visuals are exceptional in clarity, relevance, and design. Demonstrates a professional standard beyond undergraduate expectations. Suitable for academic dissemination.	90 - 100 (Outstanding)

Intended Learning Outcomes (ILOs)

ILO	Assessed
Systematic knowledge of rules based artificial intelligence methods and algorithms.	✓

An ability to analyse critically the benefits and limitations of rules-based artificial intelligence methods.	✓
An ability to evaluate a problem critically, and propose a solution that deploys an appropriate machine learning method.	
An ability to select, evaluate critically and apply appropriate tooling to construct a functional machine learning model.	

Mark penalties may be applied to late submissions without prior approval of an extension. Please ensure that you prepare and submit your work promptly to allow for any potential issues that may arise.