

ASSESSMENT 1 BRIEF

MODULE CODE	COM7003
MODULE TITLE	Artificial Intelligence
MODULE LEADER	Xin Lu
ASSESSMENT TITLE	Technical Report
WEIGHTING	70%

ASSESSMENT LEARNING OUTCOMES

Upon successful completion of this assessment, you will be able to:

1. Demonstrate an understanding of a range of AI and machine learning algorithms and predictive problem-solving techniques.
2. Demonstrate detailed knowledge of the use of AI systems for data processing and analytics.
3. Evaluate and optimise the performances of various AI and machine learning methods for data analytics.
4. Critically apply AI in a real-world context to demonstrate an understanding of the applicability and limitations of AI technologies and tools.

INSTRUCTIONS

Purpose of the Assignment

The assignment is designed to evaluate your ability to independently carry out a machine learning-based project. The focus is on demonstrating critical thinking, justifying your decisions throughout the development process, and applying machine learning techniques effectively in a business context to generate accurate predictions from data.

Assignment Requirements

You are expected to showcase how machine learning can address a real-world business problem by making accurate predictions. You have the flexibility to choose an appropriate use case and dataset; however, it is recommended to source your data from reliable repositories, such as:

- <https://archive.ics.uci.edu/>
- <https://www.kaggle.com/datasets>

Dataset Selection

You are responsible for identifying and selecting a suitable dataset. If you encounter difficulties in this process, please consult the module team for guidance.

Implementation Requirements

Your implementation should be carried out in a Jupyter Notebook and must include code for all stages of your model development pipeline. This includes data preparation, model selection, training, evaluation, and optimisation.

In addition to the Jupyter Notebook, you must produce a detailed report that:

1. Documents your development process.
2. Justifies your methodological choices.
3. References the source of your dataset.
4. Incorporates relevant academic literature to substantiate your decisions and statements.

Report Structure

Your report should address the following key questions:

1. **What is the problem you aim to solve, and why is it significant in a business context?**
2. **How did you prepare your data for analysis and model training?** Include steps such as data cleaning, feature engineering, and handling missing values.
3. **Which machine learning algorithm(s) did you select, and why were they appropriate for this problem?** Discuss the reasoning behind your choice(s) and alternative approaches considered.
4. **How did you optimise your model's performance?** Detail the methods used for hyperparameter tuning, feature selection, or other optimisation techniques.
5. **How did you evaluate your model's performance?** Specify the metrics used and explain why they are suitable for the problem at hand. Include a discussion of the results and their implications.

SUBMISSION DETAILS

RELEASE DATE	4 th of Feb 2025
SUBMISSION DATE	14 th of March 2025
DELIVERABLES	<p>1. Jupyter Notebook</p> <ul style="list-style-type: none"> • Submit a Jupyter notebook file containing all code used during the data exploration, preprocessing, model training, and evaluation phases. • Ensure your code is well-structured, appropriately commented, and easy to follow. • Include a clearly labelled comment section in your notebook with a link to the source of your dataset for reproducibility. <p>2. Report (Maximum 2,000 Words)</p> <ul style="list-style-type: none"> • Provide a detailed, professional report documenting your decisions throughout the development of your model. • The report should address key aspects such as problem definition, data preparation, model selection, optimisation, and evaluation. • Justify your choices using relevant academic literature and references to best practices in machine learning. • Ensure the report is concise, adheres to the 2,000-word limit, and is written to a high academic standard.
SUBMISSION DETAILS	<p>Submit your assignment by uploading it to Moodle <u>before midday</u> on the submission date. This deadline will be automatically and strictly enforced. If your submission is late, your grade may be affected. If you have any issues submitting your work, you must email the assessment team and copy in the module leader <u>before the assessment due time</u>. Do not leave your submission until the last minute to avoid any penalties due to problems with the submission portal.</p> <p>Assessment Team: assessment@leedstrinity.ac.uk Module Leader: x.lu@leedstrinity.ac.uk</p> <p>We may ask for a demonstration of your work following the submission. If needed, this will be communicated to you individually via email. Please check your emails regularly.</p>

Your feedback / feedforward and mark for this assessment will be provided within 15 working days.

MARKING CRITERIA

Marks are awarded based on the following criteria. Within each part, aim to complete the work for each section before moving on to the next. The following banded marking scheme is used:

<i>Exceptional</i>	100/95/92		<i>Pass</i>	58/55/52
<i>Distinction</i>	88/85/82		<i>Bare Fail</i>	48/45/42
<i>Distinction</i>	78/75/72		<i>Fail</i>	38/35/32
<i>Merit</i>	68/65/62			

If you have completed all the preparatory exercises and attended your classes, the estimated additional time required to PASS this assessment is approximately 40 hours.

To obtain a PASS mark (50%), you must have:	Implementation <ul style="list-style-type: none">○ Identified an appropriate dataset for developing a predictive model.○ Submitted a working Jupyter Notebook file containing reasonably written code and appropriate comments.○ Demonstrated a methodical approach to data exploration and pre-processing within the implementation.○ Successfully identified and trained an appropriate machine learning model for the selected problem. Report <ul style="list-style-type: none">○ Provided a clear account of the development process within the report, with direct answers to each of the questions being provided.○ Appropriately evaluated the performance of the model using relevant metrics.○ Accessed the usefulness of the model in the context of the dataset and use case.○ Appropriately referenced the source of your dataset.
	Implementation <ul style="list-style-type: none">○ Code that has been developed to a good standard and is fully documented.○ In-depth approach to data exploration and pre-processing.○ Implemented and evaluated at least two different machine learning algorithms, comparing their performance.○ Took appropriate steps taken to optimise model performance, such as hyperparameter tuning.○ Consistently demonstrated strong AI and data science coding skills, with accurate implementation of machine learning models. Report <ul style="list-style-type: none">○ Provided a detailed discussion of the model development process, addressing all the specified questions in depth.○ Explored the implications of data exploration and processing on model development in detail.○ Made use of a minimum of three academic sources to support statements.
To obtain a MERIT mark (60%), you must have (in addition to the above):	Implementation <ul style="list-style-type: none">○ Ensured the code is written to a professional standard in terms of readability and maintainability.
To obtain a DISTINCTION mark (70%), you must have (in addition to the above):	

<p>addition to the above):</p>	<ul style="list-style-type: none"> ○ Evaluated the performance of a minimum of three different machine learning algorithms, with clear justifications for their inclusion. ○ Used appropriate evaluation metrics tailored to the problem, such as accuracy, precision, recall, or F1-score. ○ Addressed class imbalance where applicable, using methods such as resampling, synthetic data generation, or adjusted evaluation metrics. ○ Assessed the real-world performance of the model, ensuring steps are taken to avoid data leakage, such as separating training and test datasets correctly. <p>Report</p> <ul style="list-style-type: none"> ○ Provided excellent detail throughout all sections of the report. ○ Justified all decisions should be well justified and supported with either evidence from testing or literature. ○ Cited a minimum of five separate academic sources should be cited. ○ Provided a detailed discussion on how an estimate of real-world performance was obtained, and how data leakage was avoided.
<p>To obtain an EXCEPTIONAL DISTINCTION mark (80%), you must have (in addition to the above):</p>	<p>Implementation</p> <ul style="list-style-type: none"> ○ Synthesized and applied the used of advanced Machine learning techniques, such as Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), transformers or transfer learning, to address the problem effectively. ○ Incorporated advanced data preprocessing techniques, such as feature engineering, dimensionality reduction, or advanced handling of missing data, with clear justifications for their use. ○ Showcased exceptional coding standards, including modular design, reusable functions, and well-organized structure, ensuring maintainability and scalability of the code. ○ Provided a thorough comparison of models, including statistical analysis of performance metrics to validate results. <p>Report</p> <ul style="list-style-type: none"> ○ Delivered a report that is exemplary in clarity, coherence, and depth, demonstrating a deep understanding of machine learning concepts and their applications. ○ Provided an in-depth discussion of ethical considerations, such as bias, fairness, privacy, and potential societal impacts of the predictive model. ○ Cited a minimum of 10 academic sources, integrating them seamlessly to support arguments, justify decisions, and contextualize findings within existing research.

USE OF GENERATIVE ARTIFICIAL INTELLIGENCE IN THIS MODULE

You may use generative AI such as ChatGPT to assist you in the process of undertaking the assessment in the following ways: brainstorming, research, planning, feedback, editing, generating generic code, assisting in debugging, suggesting optimisations for code written by you

All use of generative AI must be explicitly acknowledged, and any artificially generated content (e.g. images, code) explicitly labelled, with the source of the AI tool referenced using current APA referencing conventions. You can find further guidance on the library website on their [AI webpage](#)).

In submitting your assignment, you agree to disclose the extent to which you have used generative AI in preparing this work and include evidence of your AI use in your appendices (e.g. dated screen shots of your use of this tool or copy and paste your AI chat into Word).

Failure to disclose your generative AI use may result in a 0 for your assignment and a referral for academic misconduct (see the Student Academic Misconduct Policy under Essential Info in the MyLTU app).

Include one of the following statements on your assignments:

Either:

This assignment used generative AI in the following ways for the purposes of completing the assignment (choose 1 to 8 of the following): brainstorming, research, planning, feedback, editing, generating generic code, assisting in debugging, suggesting optimisations for code written by you.

Or:

This assignment did not use generative AI for the purposes of completing the assignment.

ACADEMIC MISCONDUCT

Academic Misconduct includes all forms of academic dishonesty, whether intentional or accidental, that compromise the integrity of the University's assessment processes. It is essential that you review our [Student Academic Misconduct Policy](#) to understand the guidelines and the serious consequences that may arise if they are not followed.

HELP AND SUPPORT

- Please use the module handbook and the [School of Computer Science Community Teams site](#) as a source of information. Do try and find the answer out yourself before reaching out for help.
- Support will be provided via Microsoft Teams and email during office working hours. You can also ask questions during your timetabled sessions. You may request a one-to-one meeting with a tutor during their published office hours.
- The Student Support team are available seven days a week to support you in all aspects of student life. This could be for support relating to your course, your accommodation or for more general advice such as relationships or your wellbeing. Log in to the LTU app to access support services.
- The full set of university guidelines on assessments, deadlines, and extensions is available on the LTU app, please familiarise yourself with the documentation.