Cardiff Metropolitan University
Assignment Cover Sheet

Student Details (Student should fill in the content)				
Name				
Student ID				
Scheduled unit details				
Unit code	CIS 6005			
Unit title	Computational Intelligence			
Unit enrolment details	Year	3		
	Study period	2022-2023		
Lecturer				
Mode of delivery	Full Time			
Assignment Details				
Nature of the Assessment				
Topic of the Case Study	Deep learning for education plus AI mini project			
Learning Outcomes covered	L01, L02, LO3			
Word count	4000			
Due date / Time				
Extension granted?	Yes	No	Extension Date	
Is this a resubmission?	Yes	No	Resubmission Date	
Declaration				
I certify that the attached material is my original work. No other person's work or ideas have been used without acknowledgement. Except where I have clearly stated that I have used some of this material elsewhere, I have not presented it for examination/assessment in any other course or unit at this or any other institution				
Name/Signature			Date	
Submission				
Return to:				
Result				

Marks by 1st Assessor		Signature of the 1st Assessor		Agreed on Mark
Marks by2nd Assessor		Signature of the 2nd Assessor		

Comments on the Agreed Mark.

For Office use only (hard copy assignments)

Receipt date		Received by	

STUDENT NAME:	STUDENT NUMBER:

CMU B.Sc. (HONS) SE- ASSIGNMENT FEEDBACK SHEET –ICBT CAMPUS

Assignment Type & Title:

For student use: *Critical feedback on the individual progression towards achieving the assignment outcomes*

For the Assessors' feedback

Indicate the Task number strengths and Weaknesses and the marks for each task

Task No/Question No	Strengths (1st Assessor)	Strengths (2nd Assessor)

Task No / Question No	**Weaknesses (1st Assessor)**	**Weaknesses (2nd Assessor)**

Areas for future improvement	
Comments by 1st Assessor	**Comments by 2nd Assessor**

Marks				
Task /Question No	Marks by 1st Assessor	Marks by 2nd Assessor	Marks by IV (if any)	IV Comments (If Any)
Total Marks				

Name and the Signature of the 1st Assessor		Date:	
Name & Signature of the 2ndAssessor :		Date :	
Name & Signature of the IV: (If any)		Date :	

Task 01

The learning outcomes assessed are:

L01 - Critically appraise a comprehensive/detailed understanding of the computational intelligence domain

LO3 - Critique and contextualize emerging research in the area of computational intelligence

Task (L01, L03)

Education is a broad term that encompasses the process of acquiring knowledge, skills, values, and attitudes. It encompasses a wide range of learning experiences that contribute to intellectual, social, emotional, and physical development. Knowledge acquisition, skill development (cognitive skills, communication skills, and technical skills), values, and ethics, socialization, critical thinking, and emotional intelligence are all parts of education. Due to technical advancement, many areas of education have been significantly developed, including adaptive learning systems, intelligent tutoring systems, automated grading and feedback, content recommendation systems, speech and language processing, virtual labs and simulations, educational data analysis, etc. Due to these novel approaches, new difficulties and complications have arisen that need to be further addressed.

Deep learning and artificial intelligence (AI) are two related topics that have attracted a lot of attention lately. The creation of intelligent systems that can carry out activities that traditionally require human intelligence, such as understanding natural language, identifying images, making decisions, and obtaining knowledge from experience, is referred to as artificial intelligence (AI). Deep learning comes as a subset of machine learning (ML) and can be utilized in various domains and industries, revolutionizing the way it approaches and solves complex problems. Machine learning has become increasingly prevalent in the field of education, revolutionizing various aspects of the industry. The application of machine learning in education is an area that is fast developing, with ongoing research and development work to improve and broaden the capabilities of this technology across many educational domains. There have been many studies conducted on how deep learning can be used to improve many aspects of the educational sector. You have to choose at least three reputable research papers and write a research report about the success of using deep learning for educational sector improvements, incorporating your views on the topic.

Your report should at least cover the following aspects.

- Introduction to the concept of deep learning
- A brief explanation of different deep learning techniques used in the selected domain
- Summary of how Deep learning architectures have been used in your chosen research papers
- Conclusion on the success of using deep learning techniques in the mentioned domain in your own words

  Note: Your report should reflect the effort you made to relate the theories learned in the classroom to explain others' research work.

The assignment should be presented as a **structured report** of **no more than** 2000 words. Pages and sections should be numbered and a contents page should be provided. All sources should be acknowledged using references in the text and supported by a reference section at the end of the report.

(Marks-50)

Task 02 (L01, L02)

The learning outcomes assessed are:

LO1 - Critically appraise a comprehensive/detailed understanding of the computational intelligence domain.

LO2 - Design and develop computational intelligence software artefacts.

Mini Project (LO1, LO2)

Select an **ongoing** real-world **Kaggle competition** and develop a Machine learning (ML) model for the competition. You need to enrol for the selected competition compete by the rules of the competition and submit your answers to that. Finally, you need to build a software application with the model(s) you built to be used in real-world environments. Based on the compaction scenario, you can use any programming language of your choice in which **one or more of the following techniques** are utilized.

1. Support Vector Machines

2. Neural Networks

3. Decision Trees

4. Clustering techniques

5. Ensemble methods, e.g., Random Forests

You will be assessed on the following criteria.

1. A <u>comprehensive explanation of no more than 2000 words</u> explaining the following aspects of your project.
   a. A literature review or similar applications
   b. System architecture and how your application differs from other existing applications
   c. Machine learning technique used (e.g., ANNs, DTs RFs, etc.)
   d. The theory behind the machine learning technique that you used
   e. Exploratory data analysis (EDA)
   f. Full model evaluation
   g. Conclusion of the final model
2. A <u>demonstration of your project</u> should be focused on explaining and demonstrating how the software you built works.
3. A <u>15-minute viva</u> will be held following the demonstration to clarify the system implementation details and theory.

At the submission of the assignment, you should deliver the following to ICBT SIS contains,

- The report
- Source code of the project.
- An executable file with a readme file on how to run the software.

Report Marking Criteria (100%)

Task 01 (50%)

Component	Introduction to the deep learning	Allocated marks	10
Range %	**Criteria**		
0-39	Very limited, totally lacking in relevance, partially answered		
40-49	Limited structure, not very relevant		
50-59	The adequate, tendency not to be very clear in line with the main tenets of the topic		
60-69	Competent and logical sequence around the main topic		
70-79	Clear and logical sequence with a sense of direction. With proper citations to support arguments.		
80-100	Very clear structure and logical structure in line with the main tenets of the topic and proper citations.		

Component	A brief explanation of different deep learning techniques used in the given domain	Allocated marks	10
Range %	**Criteria**		
0-39	Very limited, totally lacking in relevance, partially answered		
40-49	Limited structure, not very relevant		
50-59	The adequate, tendency is not to be very clear in line with the main tenets of the topic.		
60-69	Proper identification of different deep learning techniques on the selected topic and providing the answer in a logical flow with citations.		
70-79	Good level of understanding of deep learning techniques and properly linking them to the selected application domain. Evidence of own arguments with proper citations.		
80-100	Good level of understanding of deep learning techniques and properly linking them to the selected application domain. Critical comparison among different architectures with correct citations and logical flow.		

Component	Summary of how Deep learning architectures have been used in chosen research papers	Allocated marks	20
Range %	**Criteria**		
0-39	Very limited, totally lacking in relevance, partially answered, irrelevant selection of papers.		
40-49	Limited structure, papers are not very relevant		
50-59	Selected papers are in line with the topic, summarization is adequate but lacking or unclear arguments.		
60-69	Correct selection of papers, given a proper summarization of the paper, flaws in factual content and reasoning		
70-79	The selection of papers covers different architectures of deep learning. Good summarization of the papers with critical comparisons. Flaws in factual content and reasoning with the correct use of citations.		
80-100	Very solid understanding of the subject matter. Very few flaws in factual content and reasoning and the answers are very analytical. The explanations are complete and well-structured. An additional set of papers with similar architecture has been used to provide a better evaluation of each paper outcome and also a very critical analysis across all papers.		

Component	Conclusion	Allocated marks	10
Range %	**Criteria**		
0-39	The conclusion is missing or very lacking in structure and clarity		
40-49	Limited structure, celerity, and arguments		
50-59	An adequate level of content and focus. Flaws of logical flow and arguments.		
60-69	Proper structure of some minor errors and flaws in factual content and reasoning		
70-79	Good conclusion with proper structure and language. Arguments are properly raised with a clear focus.		
80-100	Very good conclusion with evidence on a high level of critical analysis and writing.		

Total Mark: _____/50___

Task 02 (50%)

Application – Exploratory data analysis (10%)	
Excellent data analysis with a high number of insights, charts, etc.	7-10%
Basic data analysis with few insights	4-6%
Poor data analysis	0-3%
Understanding and the ability to explain clearly the theory behind the ML technique that you used – 40%	
Excellent grasp of technical concepts and ability to explain, compare and contrast the advantages and disadvantages of the ML technique used. Able to clearly explain why the technique works and how it is applied to the specific problem at hand with coherency	32-40 %
Able to explain how the ML technique works with some flaws but only a general understanding of the technique without comprehensive knowledge of how and	20-32 %
why the ML technique works. Limited capacity to compare and contrast different ML techniques.	
Understands the inputs and outputs of the system and can explain how the system is used but doesn't demonstrate sufficient understanding of how the ML technique works. Not able to compare and contrast different ML techniques.	10-20 %
Poor grasp of ML techniques and the ML system implemented.	0-10 %
Demonstration – 30%	
A well-thought-out presentation with a clear setup. Ability to pinpoint which code segment is supposed to host the ML application and how inputs and outputs are processed. Able to know which function invocations are being called during system functioning, navigate through the function flow in code and the ability to demonstrate the knowledge of libraries used during the viva.	24-30 %

Explanation of how the code works is not exceptional. Occasional wrong information is provided and although libraries have been used not sufficient understanding on how exactly they could be used. Answers to the questions raised during the viva are only marginally satisfactory.	15-24 %
Only a limited understanding of how the system works and fails or makes continuous errors in providing satisfactory answers to the questions raised during the viva. Only provides limited information and fails to navigate the code flow.	10-15 %
Poor understanding of how the system works and although the system works fails to explain how and why it works and the questions are not answered up to a satisfactory level.	5-10 %
ML system doesn't work and viva questions are not answered to a satisfactory level. Poor implementation overall.	0-5 %
Implementations details – 20%	
Excellent implementation details on the report	14-20 %
Good implementation details on the report	6-13 %
Poor implementation details on the report	0 – 5 %

Total Mark: _____/50___

Final Grading criteria for the coursework

Marks	Final Grade
>=70	1
69-60	2:1
59-50	2:2
49-40	3
<40	fail