



## UNDERSTANDING AI MODULE

771763\_B22\_T2

### PORTFOLIO OF WORK (SUMMATIVE ASSESSMENT)

#### Summative Assessment (100 marks)

The summative assessments will be via four (4) components in the areas of intelligent agents' design, supervised and unsupervised learning, computer vision and ethics of AI.

#### Submission Deadline

The portfolio is due by **4th May 2023, 2:00 pm (14:00 hours) British Standard Time (BST)** at the latest. Please note that the submission will be via Canvas.

**The pass mark for the module is 50%.**

#### Submission Instructions

- Solutions to the questions for all the components should be combined and submitted in ONE PDF document only.
- Plan to submit before the actual time of the deadline (consider system glitches or any other eventualities that may occur at the last minute of submission);
- Do not submit a source code file or portfolio of work belonging to another person;
- Do not upload any dataset with your submission;
- Only use the codes provided in the module during lab sessions creatively;
- Your source code should be submitted as a separate file and in pdf format; (use CTRL + P on your Jupyter notebook file and Save as PDF)
- Where appropriate, ensure to include the screenshot of outputs in your report; screenshot of source codes is NOT allowed.

#### Academic Integrity (Portfolio of work)

Portfolio of work (reports and codes) is an independent task and should be treated as such. Please visit the links below for more details.

<https://libguides.hull.ac.uk/integrity> AND <https://libguides.hull.ac.uk/integrity/writing>

#### Referencing your work

Towards a proper referencing of your work, please check the referencing style at the link below for guidance: <https://libguides.hull.ac.uk/referencing/harvard>

**Total point: 100 marks**

## COMPONENT ONE (Design of Intelligent agents)

(a) Review four (4) refereed journal and/or conference articles on the “**Application of Intelligent Agents**” in any ONE area among the following underlisted areas.

- Climate change
- Cybercrime
- Renewable energy
- Health and Wellness
- Construction and Manufacturing
- Agriculture
- Transportation

Provide a concise report of the aim(s) and contributions of each of the articles you have reviewed. In your report, ensure to connect the contributions of the reviewed articles by providing highlights of **four** successes that the intelligent agents have made so far in the area you have chosen. Provide **four** current gaps or challenges in the design and use of intelligent agents in the area you have chosen and emphasise why it is important to address those gaps. Suggest at least **two** opportunities that may serve as future contribution(s) of intelligent agents, addressing the gaps you have identified in the area you have chosen and why the contribution may be an important one. **(Maximum of 1000 words).**

*Do not forget to provide the references list of the four articles reviewed under a separate heading “list of reviewed articles”. Note that this does not replace the references section expected for your submission.*

**The assessment criteria can be found under the portfolio assessment criteria section.**

## COMPONENT TWO: Sales Performance of Video Games

**Required Dataset:** Video games sales dataset

**Dataset Link:**

<https://www.kaggle.com/datasets/ibriiiee/video-games-sales-dataset-2022-updated-extra-feat>

The task is to predict the sales performance of several video games worldwide; to classify and cluster the video games based on some categorical variables.

**Attempt the following questions:**

- a. Which of the variables in the video game dataset or a combination of them best predicts “global sales” of video games and why? Provide quantitative justifications for your answers.
- b. What effect will the number of critics and users as well as their review scores have on the sales of Video games in North America, EU and Japan?
- c. What propelled the choice of your regressor for this task? Aptly discuss with quantitative reasons!

- d. Use all the relevant categorical variables in the Video Game Dataset as the target variable at each instance and determine which of the variables performed best in classifying the dataset. Explain your findings.
- e. How did you check whether your models did not overfit?
- f. Can your classification models be deployed in practice based on their performances? Explain.
- g. In the video game dataset, use a relevant categorical variable and other relevant non-categorical variables to form groups at each instance. By employing internal and external evaluation metrics, determine which categorical variable best describes the groups formed.

The assessment criteria can be found under the **portfolio assessment criteria section**.

### COMPONENT THREE (Handwritten Digits Recognition)

The study of handwritten digits character recognition, also known as optical character recognition (OCR), is important for several reasons including document digitization, form processing, banking and finance, handwritten-based user authentication and so on. The task here is to correctly classify the handwritten digits in the MNIST dataset using Convolutional Neural Network (CNN). The dataset can be found at: <http://yann.lecun.com/exdb/mnist/>

Based on this task, consider the following questions:

- a) How did the use of different regularisation methods affect the performance of your CNN model?
- b) Report how changes to the number of convolution blocks affect the performance of your model quantitatively?
- c) What is the effect of varying learning rates on the performance of the CNN algorithm.
- d) Was there a case of overfitting observed in your model at any point ? Explain.

The assessment criteria can be found under the **portfolio assessment criteria section**.

### COMPONENT FOUR (Ethics of AI)

With reference to any **ONE** of the services industries of your choice (for example: transport services industry, financial services industry, educational services industry, manufacturing industry and so on), review at least **three (3) refereed journal articles** on ethics of AI within the scope of any or some of the following underlisted themes:

- Transparent AI
- Explainable AI
- Fair AI (Fairness and Bias)
- Trustworthy AI
- Socially-responsible AI

Provide a concise report of the aim(s) and contributions of each of the articles reviewed. In your report, ensure to highlight any **three** connections between the themes in the context of AI adoption within the industry you have chosen. In this respect, identify **three** current gaps, challenges, or open questions yet unanswered and emphasise why it is important to address those gaps. Conclude the report by providing **three** suggestions on how to bridge these gaps. **(Maximum of 500 words)**

*Do not forget to provide the references list of the three articles reviewed under a separate heading “list of reviewed articles”. Note that this does not replace the references section expected for your submission.*

**The assessment criteria can be found under the portfolio assessment criteria section.**

## PORTFOLIO ASSESSMENT CRITERIA AND WEIGHTING

Criteria	Distinction	Merit	Pass
<b>Component One</b> (Design of Intelligent Agents)  <b>[20 marks]</b>	<p>Four records of success of intelligent agents design in an application environment are identified and well described with suitable references;</p> <p>Four current challenges with intelligent agents are identified in an application environment;</p> <p>Two solutions to the challenges of intelligent agents in an application environment are presented and very insightful;</p> <p>The introduction is of excellent quality, the sources used are relevant both in the breadth and depth; critical analysis is done and good quality of key findings are presented in the conclusion;</p> <p>The report is presented in a well written format. For example: sections like abstract, introduction, methodology, result and conclusion are evident.</p> <p><i>100 points max</i></p>	<p>Three records of success of intelligent agents design in an application environment are identified and well described with suitable references;</p> <p>Three current challenges with intelligent agents are identified in an application environment;</p> <p>One solution to the challenges of intelligent agents in an application environment is presented and insightful;</p> <p>The introduction is of good quality, the sources used are relevant; good quality of key findings are presented in the conclusion;</p> <p>The report is presented in a well written format. For example: sections like abstract, introduction, methodology, result and conclusion are evident.</p> <p><i>69 points max</i></p>	<p>Two records of success of intelligent agents design in an application environment are identified and well described with suitable references;</p> <p>Two current challenges with intelligent agents are identified in an application environment;</p> <p>One solution to the challenges of intelligent agents in an application environment is presented and insightful;</p> <p>The report is presented in a well written format. For example: sections like abstract, introduction, methodology, result and conclusion are evident.</p> <p><i>59 points max</i></p>

<b>Component Two</b> (Sales Performance of Video Games)  <b>[40 marks]</b>	<p>All questions are answered correctly.</p> <p>Insightful solutions to the questions are evident.</p> <p>There is clear evidence of many evaluations and quantification conducted.</p> <p>Screenshots of the outputs are presented in the report.</p> <p>Code is submitted, well commented, and fully replicates the results.</p> <p>The study is presented in a well written format. For example: sections like the abstract, introduction, methodology, result and conclusion are evident.</p> <p><i>100 points max</i></p>	<p>Most questions (5) are answered correctly.</p> <p>Insightful solutions to the questions are evident.</p> <p>There is clear evidence of some evaluations and quantification conducted.</p> <p>Screenshots of the outputs are presented in the report.</p> <p>Code is submitted, well commented, and fully replicates the results.</p> <p>The study is presented in a well written format. For example: sections like the abstract, introduction, methodology, result and conclusion are evident.</p> <p><i>69 points max</i></p>	<p>Some questions (4) are answered correctly.</p> <p>Insightful solutions to the questions are evident.</p> <p>There is clear evidence of few evaluations and quantification conducted.</p> <p>Screenshots of the outputs are presented in the report.</p> <p>Code is submitted, well commented, and fully replicates the results.</p> <p>The study is presented in a well written format. For example: sections like the abstract, introduction, methodology, result and conclusion are evident.</p> <p><i>59 points max</i></p>
<b>Component Three</b> (Handwritten Digits Recognition)  <b>[20 marks]</b>	<p>All questions are answered correctly.</p> <p>Insightful solutions to the questions are evident.</p> <p>There is clear evidence of many evaluations</p>	<p>Most questions (3) are answered correctly.</p> <p>Insightful solutions to the questions are evident.</p>	<p>Some questions (2) are answered correctly.</p> <p>Insightful solutions to the questions are evident.</p>

	<p>and quantification conducted.</p> <p>Screenshots of the outputs are presented in the report.</p> <p>Code is submitted, well commented, and fully replicates the results.</p> <p>The study is presented in a well written format. For example: sections like the abstract, introduction, methodology, result and conclusion are evident.</p> <p><i>100 points max</i></p>	<p>There is clear evidence of some evaluations and quantification conducted.</p> <p>Screenshots of the outputs are presented in the report.</p> <p>Code is submitted, well commented, and fully replicates the results.</p> <p>The study is presented in a well written format. For example: sections like the abstract, introduction, methodology, result and conclusion are evident.</p> <p><i>69 points max</i></p>	<p>There is clear evidence of few evaluations and quantification conducted.</p> <p>Screenshots of the outputs are presented in the report.</p> <p>Code is submitted, well commented, and fully replicates the results.</p> <p>The study is presented in a well written format. For example: sections like the abstract, introduction, methodology, result and conclusion are evident.</p> <p><i>59 points max</i></p>
<p><b>Component Four</b> (Ethics of AI) <b>[20 marks]</b></p>	<p>Three AI ethics compliance in the context of AI adoption in a services industry are identified with suitable references;</p> <p>Three ethical AI gaps are identified in the context of a services industry adopting AI;</p> <p>The solutions to the ethical AI gaps are presented and very insightful;</p> <p>The introduction is of excellent quality, the sources used are relevant both in the</p>	<p>Two AI ethics compliance in the context of AI adoption in a services industry are identified with suitable references;</p> <p>Two ethical AI gaps are identified in the context of a services industry adopting AI;</p> <p>The solutions to the ethical AI gaps are presented and insightful;</p> <p>The introduction is of good quality, the</p>	<p>Two AI ethics compliance in the context of AI adoption in a services industry are identified with suitable references;</p> <p>Two ethical AI gaps are identified in the context of a services industry adopting AI;</p> <p>The solutions to the ethical AI gaps are presented and insightful;</p>

	<p>breadth and depth; critical analysis is done and good quality of key findings are presented in the conclusion;</p> <p>The report is presented in a well written format. For example: sections like abstract, introduction, methodology, result and conclusion are evident.</p> <p><i>100 points max</i></p>	<p>sources used are relevant; good quality of key findings are presented in the conclusion;</p> <p>The report is presented in a well written format. For example: sections like abstract, introduction, methodology, result and conclusion are evident.</p> <p><i>69 points max</i></p>	<p>The report is presented in a well written format. For example: sections like abstract, introduction, methodology, result and conclusion are evident.</p> <p><i>59 points max</i></p>
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### **Grading Remarks**

**Distinction** (Overall mark: 70–100%)

**Merit** (Overall mark: 60–69%)

**Pass** (Overall mark: 50–59%)

**Fail** (Overall mark: Below 50%).