UNIVERSITY OF LONDON

BSc EXAMINATION

COMPUTER SCIENCE

ARTIFICIAL INTELLIGENCE MOCK EXAM (PART B ONLY)

NOTE THAT THIS MOCK EXAM ONLY INCLUDES THE LONG ANSWER PART B QUESTIONS.

PART B

This MOCK exam only includes PART B. Candidates should answer any **TWO** questions from Part B.

Question 1

(a) Describe in layperson's terms what the Deepmind DQN agent does. [4]

(b) Describe the raw data that is fed to the DQN agent. [4]

(c) How is the raw data processed before it is fed to the neural network? [4]

(d) For each process you described in the previous question, state why that process is applied. [6]

(e) Explain how the training works in DQN. What is the input to the network? What is the output? What is the error metric. [6]

(f) Compare training in DQN to a more typical training process where the input data is a fixed set. [6]

Question 2

(a) Explain in layperson's terms what a generative system is. [2]

(b) How can a machine learning system generate creative artefacts such as images, music and sound? [4]

(c) There are various taxonomies of generative systems. Name a researcher or researchers who has created a taxonomy and include a citation. [4]

(d) Describe a robot that can autonomously paint a picture of its own design in terms of the taxonomy you mentioned. [2]

(e) What kind of neural network architecture is suitable for processing image data and why? [4]

(f) "Computers can be creative". Give TWO arguments for and TWO against this view. [8]

(g) There is concern about the impact of Artificial Intelligence on humans. Describe ONE negative and ONE positive effect for AI systems that can autonomously compose music. Justify your answer. [6]

Question 3

You have been asked to use a genetic algorithm to design a new kind of crash protection system for cars. The system is a metal structure that will be placed at the front of the car and its purpose is to minimise the damage to passengers in the cabin.

(a) Explain in layperson's terms what a genetic algorithm does. [4]

(b) What does it mean to genetically encode a problem? [4]

(c) How might you go about genetically encoding the crash protection system? [8]

(d) What is a fitness function in a genetic algorithm? [2]

(e) How would you go about designing a fitness function for the genetic algorithm? [6]

(f) Compare genetic algorithms to another 'automated design' technique of your choosing. Both can generate designs. Think of TWO differences and TWO similarities. [6]

END OF PAPER

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