

MA410 Artificial Intelligence Quiz 1 - 27th September 2010.

Answer *all* questions. Supply complete answers on double-sided sheet.
Marks for each question given in brackets. Time allowed: 25 mins.

Name: The Robot Student ID: —

1. History and Research (27 marks)

- (a) Give a brief description of the Turing Test. (6) Human judge communicates via computer with isolated machine & human. If judge cannot reliably tell the difference, then machine passes the test.
- (b) Name 3 current restrictions on a machine's ability that prevent it from passing the Turing Test? (3) Outside World interpretation, abstract thought, creativity, nat. language... (any 3)
- (c) Name *one* main researcher & a contribution they've made to AI from the disciplines: (6 = 3 * 2)
- Computer Science: John McCarthy - Invention of Lisp language
 - Maths (excluding Alan Turing): Claude Shannon - Electromechanical Mouse
 - Linguistics or Philosophy: John Searle - Chinese Room Scenario
- (d) Name and explain *one* area of latest research in AI. What technologies does it use? (5) Exploratory Computer Vision - using computers to recognise & describe objects. Technologies: Pattern Recognition, Image Processing.
- (e) How might AI be used to automatically correct typographical errors? (3) Using intelligent rules to recognise how close spelling mistakes are to real words.
- (f) Name *two* areas of latest research not already mentioned. (4) Swift File, Drivisco Project, Personal Wizards, Performance Mgmt. ... (any two)

2. Intelligence (15 marks)

- (a) What does intelligence mean? (4) Computational part of ability to achieve goals.
- (b) Explain what Artificial Intelligence is and what the study of it entails. (5) Study of how agents can simulate intelligence such as learning, reasoning & understanding information in context.
- (c) Some connection within both a computer system and a brain is damaged. The computer malfunctions but the brain is able to process perfectly the same information. Explain. (6) Computer stores data in set places but brain has many pathways.

3. Computer Terms (24 marks = 6 * 4)

(a) Explain the following terms in the context of Artificial Intelligence:

- i. Genetic Algorithms Algorithms inspired by evolution to solve optimisation & search problems.
- ii. Neural Networks Study of interconnecting artificial neurons mimicking biological ones.
- iii. Expert Systems Software providing answers to problems involving expert knowledge.
- iv. Robotics Engineering Science of design, manufacture & software of robots.
- v. Heuristics Rules of thumb used in search algorithms.
- vi. Semantic Web Development of www where meaning & services of information are provided.

4. Knowledge Processing (14 marks)

(a) Name three forms of knowledge representation structures used in computer programs. (6)

Databases, Objects, Procedures, Inference Rules ... (any 3)

(b) Name one aspect of natural language which is difficult for A.I. (1) Ambiguity

(c) Create an English sentence with granularity & an inverse relationship. Convert to logical syntax. Explain. (7)

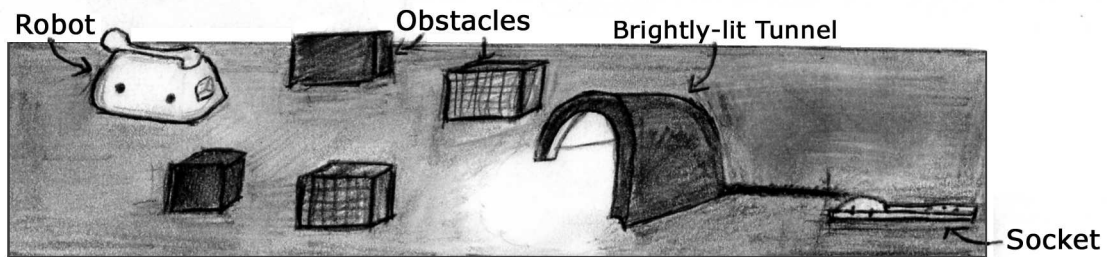
Sentence → The mammal is under the table. under(mammal, table). ← Logical Syntax.

Granularity: What type of mammal? a dog, cat, ...

Inverse: Mammal under table = table over mammal.

5. AI Example (20 marks)

(a) A battery-operated robot, with a light sensor, is switched on and placed in a room. It is able to avoid obstacles and is attracted to light but avoids bright light. A brightly-lit tunnel with a battery recharger is plugged in. (see diagram below)



i. What intelligent behaviour(/s) will this robot simulate? Explain in full. (15)

It will avoid obstacles and recharge its own batteries.
When batteries go low, light sensor is less sensitive so will go into tunnel.
When recharged, its sensitivity is restored so will move away from tunnel.

ii. What could you introduce to illustrate the robot's inability to adapt to a new environment? (5)

Another brightly lit item (or an obstacle directly in front of tunnel)