

IAI – Exercise Sheet 2

This week we have a set of questions about the definitions of AI, a question about evolution and AI, one about AI in everyday systems and devices, and a selection of past exam questions.

Question 1

On page 2 of Russell & Norvig (2003) they list a number of definitions of AI from other textbooks and attempt to organise them along the two dimensions “human vs. ideal” and “thought vs. action” to give four categories:

<i>Systems that think like humans</i>	<i>Systems that think rationally</i>
<i>Systems that act like humans</i>	<i>Systems that act rationally</i>

Do you think the following eight definitions of AI are reasonable, and classified correctly?

The exciting new effort to make computers think... <i>machines with minds</i> , in the full and literal sense	The study of mental faculties through the use of computational models
The automation of activities we associate with human thinking, such as decision-making, problem solving, learning ...	The study of the computations that make it possible to perceive, reason, and act
The art of creating machines that perform functions that require intelligence when performed by people	A field of study that seeks to explain and emulate intelligent behaviour in terms of computational processes
The study of how to make computers do things at which, at the moment, people are better	The branch of computer science that is concerned with the automation of intelligent behaviour

Question 2

Characterise the following definitions in the above categories. Artificial Intelligence is

- a. a collection of algorithms that are computationally tractable, adequate approximations of intractably specified problems.
- b. the enterprise of constructing a physical symbol system that can reliably pass the Turing Test.
- c. the field of computer science that studies how machines can be made to act intelligently.
- d. a field of study that encompasses computational techniques for performing tasks that apparently require intelligence when performed by humans.
- e. a very general investigation of the nature of intelligence and the principles and mechanisms required for understanding or replicating it.
- f. the getting of computers to do things that seem to be intelligent.
- g. the getting of computers to behave like those we see in the movies (HAL, T2, et al.).

Question 3

Can you think of better definitions of Artificial Intelligence? Why are they better? Are there other classification schemes that could be more useful?

Question 4

What is meant by “Weak AI” and “Strong AI”? Do you think the distinction is useful?

Question 5

How do you think artificial neural network systems fit in with the above definitions and classifications? What level of achievement is required of an artificial neural network before you would accept it as an example of AI?

Question 6

Why does evolution tend to result in systems that act intelligently? Does evolution ever produce examples of irrational behaviour? Should we expect artificial evolution to lead automatically to good AI systems?

Question 7

Things that might come under the heading “AI” are increasing being incorporated into everyday systems and devices. Discuss the use of AI techniques in:

- a. Word processing/typesetting systems.
- b. Mobile phones.
- c. Web-based shopping sites.
- d. Photocopier machines.

Question 8 (Questions from previous exams)

- (a) The field of Artificial Intelligence emerged from a number of older disciplines. List the three that you think are most important, and explain why.
- (b) List the four sub-fields of AI that you think are most important. For each, give a representative goal or sub-goal or system that has been achieved so far.
- (c) Some proponents of AI like to distinguish between scientific and engineering goals. Explain that distinction, and comment briefly on whether you think it is useful.
- (d) Describe two examples (from different sub-fields of AI) where scientific models of human intelligence have led to useful real world applications.
- (e) List three AI techniques or concepts that are useful in more than one sub-field of AI. For each, give an example of their use in two distinct sub-fields.