

CS4409: Topics in Artificial Intelligence

1 Module Details

- Lecturer:** Derek G. Bridge, Room 304, Science Building
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www.cs.ucc.ie/dbridge.html
- Credit weighting:** 10 credit *optional* module
- Prerequisites:** Essential: sets, graphs, propositional logic
Very helpful: functions, relations, probability, predicate logic, programming
Mildly useful: algorithm complexity, calculus
- Lectures:** 2×1 hr per week
- Private study:** 4 hrs per week (exercises)
- Course web site:** www.cs.ucc.ie/~dgb/courses/tai.html
- Examination:** 3 hr written exam
- How to fail:** Skip lectures; avoid private study; cram at Easter; expect the exam to be a memory test
- How to pass:** Attend lectures; summarise the notes; tackle the exercises properly; expect a problem-solving exam

Test your suitability for this module:

- Evaluate
 - $\{a, b, c\} \cap \{c, b, a\}$
 - $\{a, b, c\} \setminus \{c, b, a\}$ (also written $\{a, b, c\} - \{c, b, a\}$)
- Suppose p, q and r are true statements. Is $(p \vee p) \wedge \neg(q \vee r)$ a true or a false statement?
- Using logical equivalences (de Morgan's Laws, etc.), show that $\neg(\neg p \wedge \neg q) \vee p$ is equivalent to $p \vee q$
- There are four switches. Each can be in one of three positions: low, medium or high. How many different configurations are there in total?

2 Defining Artificial Intelligence (AI) and Intelligence

The goal of AI is *to build intelligent systems*. This raises the question: what do we mean by 'intelligent system'? We'll come to that shortly. Before that, we might ask: why would we want to build intelligent systems? There is a scientific reason and an engineering reason:

- AI may help us to understand ourselves and other intelligences.
- AI may enhance computer systems so that they are more useful to us.

Now let's return to the thorny issue of what we mean by intelligence.

To get you to reflect on your opinions about intelligence, we'll conduct three straw polls:

Straw Poll 1: Are gorillas intelligent? Dogs? Rats? Grasshoppers? Amoebae?

Straw Poll 2: Is machine intelligence possible... in principle? ... in practice?

Straw Poll 3: Are we machines?

Many kinds of definitions of intelligence have been advanced, perhaps falling into four broad types.

Systems that act like humans	Systems that think like humans
Systems that act in some ideal way	Systems that think in some ideal way

Alan Turing proposed a test for intelligence, now referred to as the *Turing Test*. His test is based on indistinguishability from humans in a conversation. As a definition of intelligent system it lies in the upper left-hand quadrant of the table: it tests for systems that act like humans.

Personally, however, I define intelligent systems in terms of the problems they solve:

"Intelligent systems provide solutions to problems that are difficult to solve.

"The difficulty stems from the presence in the problem of disorder, uncertainty, lack of precision or inherent intractability."

This definition, if it lies in the table at all, probably lies in the lower left-hand quadrant.

3 Applications of AI

The lecture will end with a brief case study of successfully deployed Artificial Intelligence.