

# Artificial Intelligence

## 1 Module Details

- Lecturer:** Derek G. Bridge, Room 304, Science Building  
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www.cs.ucc.ie/dbridge.html
- Course web site:** www.cs.ucc.ie/~dgb/courses/ai.html
- Lectures:**  $2 \times 1$  hr per week
- Examination:** 3 hr written exam
- Private study:** 4 hrs per week (exercises)
- Prerequisites:** Essential: sets, graphs, propositional logic  
Very helpful: functions, relations, algorithm complexity, predicate logic, Java programming  
Mildly useful: probability, calculus

Test your suitability for this module:

- Evaluate
  - $\{a, b\} \subset \{b, c\}$
  - $\{a, b\} \cap \{\}$
- Suppose  $p$ ,  $q$  and  $r$  are **false** statements. Is  $\neg(\neg p \vee q) \wedge r$  a **true** or a **false** statement?
- Using logical equivalences (de Morgan's Laws, etc.), show that  $\neg(p \wedge \neg q) \wedge p$  is equivalent to  $q \wedge p$
- It is reported that the worst case running time of algorithm A is  $O(98n)$ , that of B is  $O(n \log n)$  and C's is  $O(100)$ . Place them in ascending order of algorithmic complexity.

## 2 Defining Artificial Intelligence (AI)

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, with the following possible benefits:
  - empowerment through dissemination of knowledge and expertise;
  - containment of the information explosion;
  - relief from drudgery;
  - deployment in environments that are dangerous or unpleasant to humans.

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

## 3 Defining intelligence

First, do you think intelligence is an all-or-nothing concept or is there a continuum comprising different degrees of intelligence?

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

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

Systems that act like humans	Systems that act rationally
Systems that think like humans	Systems that think rationally

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."*

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

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

**Straw Poll 3:** Are we machines?

If there's time, the lecture will end with a case study of successfully deployed Artificial Intelligence.