CS4618: Artificial Intelligence I

1 Module Details

Lecturer: Derek G. Bridge, Room G-61, Western Gateway Building
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Credit weighting: 5 credit optional module

Prerequisites: Essential: All of CS1105
Very helpful: programming, data structures
Mildly useful: algorithm complexity, calculus

Lectures: 2 × 1 hr per week
Labs: 1 × 1 hr per week
Private study: 3 hrs per week

Course web site: www.cs.ucc.ie/~dgb/courses/ai1.html

Examination: 1.5 hr written exam (80% of the marks)

Continuous assessment: Class test (20% of the marks)

How to fail: Skip lectures & labs; avoid private study; cram just before the exam; expect the exam to be a memory test

How to pass: Attend lectures & labs; summarise the notes; tackle the exercises properly; expect a problem-solving exam

Test your suitability for this module:

1. Evaluate
   (a) \( \{a, b\} \cap \{a\} \)
   (b) \( \{a, b\} \cup \{\} \)

2. Suppose \( p, q \) and \( r \) are false statements. Is \( (p \lor \neg p) \land \neg(q \lor r) \) a true or a false statement?

3. Using logical equivalences (de Morgan’s Laws, etc.), show that \( \neg(\neg p \lor \neg q) \land p \) is equivalent to \( p \land q \)
4. There are three switches. The first can be set to on or off; the second and third can be set to 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.

The fruits of nearly 60 years of AI research are all around us. Examples will be given in the lecture.

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 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.

<table>
<thead>
<tr>
<th>Systems that act like humans</th>
<th>Systems that think like humans</th>
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<tr>
<td>Systems that act in some ideal way</td>
<td>Systems that think in some ideal way</td>
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Alan Turing, the ‘father’ of Computer Science and Artificial Intelligence wrote: “The original question, ‘Can machines think?’ I believe to be too meaningless to deserve discussion.” Instead of attempting definitions, he replaced the question by another, in the form of a game, success in which settles the issue. He 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.