1.0

1.1. FOUNDATION ISSUES

**What is AI?**

**Thinking Humanly,**

(The automation of) activities that we associate with human thinking, activites such as decision-making, problem solving, learning. The Exciting new effort to make computers think… machines with minds, in the full and literal sense.

**Acting Humanly**

The study of:

* Mental faculties through the use of computational models.
* the computations that make it possible to perceive, reason, and act.

**Thinking Rationally**

The art of creating machines that perform functions that require intelligence when performed by people

The study of how to make computers do things at which, at the moment, people are better.

**Acting Rationally**

AI.. is concerned with intelligent behaviour in artifacts.

Computational Intelligence is the study of the design of intelligent agents.

**The Turing Test (Acting Humanly)**

Proposed by Alan Turing (1959) – To provide a satisfactory operational definition of intelligence.

A Computer passes the test if a human interrogator, after posing some written questions, cannot tell whether the written responses come from a person or from a computer.

The computer would need to posess the following capabilities:

**Natural language processing** to enable it to communicate successfully in language.

**Knowledge representation** to store what it knows or hears.

**Automated reasoning** to use the stored information to answer questions and to draw new conclusions

**Machine learning** to adapt to new circumstances and to detect and extrapolate patterns.

Turing’s test deliberately avoided direct physical interaction between the interrogator and the computer, because physical simulation of a person is unnecessary for intelligence.

However, the so-called total Turing Test includes a video signal so that the interrogator can test the subject’s perceptual abilities, as well as the opportunity for the interrogator to pass physical objects “through the hatch.”

To pass the total turing test, the computer will need:

Computer vision to perceive objects

Robotics to manipulate objects and move about

Figure 1.1. Turing imitation game: Phase 1

The interrogator, a man and a woman are each placed in separate rooms and can communicate only via a neutral medium such as a remote terminal. The interrogator’s objective is to work out who is the man and who is the woman by questioning them. The rules of the game are that the man should attempt to deceive the interrogator that he is the woman, while the woman has to convince the interrogator that she is the woman.

Figure 1.2 Turing imitation game: Phase 2

the man is replaced by a computer programmed to deceive the interrogator as the man did. It would even be programmed to make mistakes and provide fuzzy answers in the way a human would. If the computer can fool the interrogator as often as the man did, we may say this computer has passed the intelligent behaviour test.

Physical simulation of a human is not important for intelligence. Hence, in the Turing test the interrogator does not see, touch or hear the computer and is therefore not influenced by it’s appearance or voice.

However, the interrogator is allowed to ask any questions, even provocative ones, in order to identify the machine. The interrogator may, for example, ask both the human and the machine to perform complex mathematical calculations, expecting that the computer will provide a correct solution and will do it faster than the human.

Thus, the computer will need to know when to make a mistake and when to delay it’s answer. The interrogator also may attempt to discover the emotional nature of the human, and thus, he might ask both subjects to examine a short novel or poem or even painting. Obviously, the computer will be required here to simulate a human’s emotional understanding of the work.