32002: Artificial intelligence **Spring 2014**

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1.1 Introduction

AI may be defined as a branch of Computer Science, that is concerned with *automation of Intelligent behavior.* A very compact definition of Intelligence is:

$$Intelligence = Perceive + Analyze + React$$

The following are often quoted definitions:

- "The capacity to learn or to profit by experience." W. F. Dearborn
- "Ability to adapt oneself adequately to relatively new situations in life." R. Pinter
- "Intelligence is a very general mental capability that, among other things, involves the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience."- L. S. Gottfredson and 52 expert signatories

To get an idea of *Intelligence* it requires answering these and many similar questions:

- Is intelligence a *single faculty* or it is a name for a collection of distinct unrelated abilities?
- Is it a priori existence or it can be learned? What does exactly happen when learning takes place?
- Can Intelligence be inferred from observable behavior or does it require an internal mechanism?
- What is *self awareness*, and what role it plays in intelligence?
- Is it necessary to pattern an intelligence computer program only after it is known about human intelligence?

Unlike the Physics and Chemistry, AI is still a young discipline, hence, its structure, concerns, and methods are less clearly defined like those in physics, and chemistry. AI has been more concerned to expanding limits of computers, apart from defining itself.

1.2 The Turing Test

Alan M. Turing proposed an empirical test for machine intelligence, now called "Turing Test" (see figure 1.1). Turing called it *imitation game*, where machine and human counter-part are put in different rooms, separate from other person, called *interrogator*. The interrogator is not able to see or speak directly to any of the other two, and does not know which entity is machine, and communicates to other two solely by textual device like terminal.

The interrogator is asked to distinguish machine from human, solely on the basis of their answers and questions over the device. If interrogator is not able to distinguish machine from human, then, Turing argues that machine can be assumed to be intelligent. Interrogator may ask highly computation oriented questions to identify machine, and other questions related to poetry etc., to identify the human.

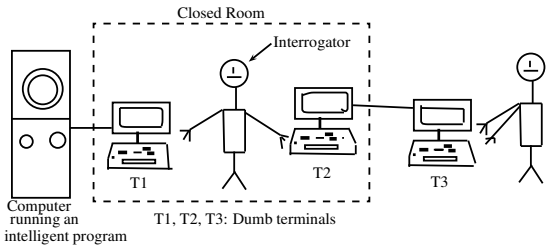

Figure 1.1: Imitation Game: Turing test.

Some of the arguments *for* and *against* to the above test are:

1. It takes human being as a reference for intelligent behavior, rather than debating over the true nature of intelligence: *Against.*
2. Eliminates any bias to human oriented interaction mechanisms, as a terminal is used as communication device: *For.*
3. Biased towards only symbolic problem solving: *Against.*
4. Perceptual skills or dexterity cannot be checked: *Against.*
5. Unnecessarily constrains the machine intelligence to human intelligence: *Against.*

Though, the count of *against* are far more than *for*, there is no other test better than this as on today.

References

[GFL09] D. George F. Ludger, "Artificial Intelligence - Structures and Strategies for Complex Problem Solving," *5th Edition, Pearson Education, India*, 2009, Chapter 1.