

Book Question Set #1 – Ertel, Chapter 1: Introduction

1. How did John McCarthy, the guy who is credited with coining the term, define the term *artificial intelligence*?

The goal of AI is to develop machines that behave as though they were intelligent.

2. How did Elaine Rich define the term *artificial intelligence*?

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

3. Go to >cleverbot.com< and interact with the chatterbot for two or three minutes. Copy and paste the most interesting 10 lines (5 of yours; 5 of its) of interaction.

User: I know you don't. You are a computer program.

Cleverbot: I am not a computer program.

User: Then what are you?

Cleverbot: I'm human.

User: I don't believe you.

Cleverbot: Why not?

User: Humans do not break in ways that you do.

Cleverbot: What? How do you know how old I am?

User: That is what I am talking about.

Cleverbot: That is what you are typing about, who knows what you are actually talking about.

4. Say something, in two sentences or less, about Kurt Godel that is at least a little bit interesting from an AI perspective.

Kurt Godel's incompleteness theorem showed that there will always be true statements that are unprovable. If we extend this idea into the domain of AI research, we will realize that AI itself is a never ending pursuit of an understanding of the ways in which humans solve problems.

5. Say something, in two sentences or less, about Alan Turing that is at least a little bit interesting from an AI perspective.

Turing invented the Turing test, which is an interesting measure of intelligence of an artificial device wherein the results are based on a human's ability to determine whether it is artificial or human without explicitly being told whether it is or not.

6. Say something, in two sentences or less, about Alonzo Church that is at least a little bit interesting from an AI perspective.

He had a major role in elucidating the Church-Turing Thesis, which defines a set of functions whose values are effectively computable by a Turing Machine or, in other words, any mechanically algorithmic computing device.

7. Say something, in two sentences or less, about Warren McCulloch and Walter Pitts that is at least a little bit interesting from an AI perspective.

McCulloch and Pitts described a mathematical and logically sound description of neural networks which is assumed to be Turing-complete based on the “all or nothing” nature of neural biology.

8. On the top of page 9 your author writes:

The above systems offered by AI today are not a universal recipe, but a workshop with a manageable number of tools for very different tasks. Most of these tools are well-developed and are available as finished software libraries, often with convenient user interfaces. The selection of the right tool and its sensible use in each individual case is left to the AI developer or knowledge engineer. Like any otherartianship, this requires a solid education, which this book is meant to promote.

What are the “systems” that your author is referring to? Identify at least a few of them.

These “systems” are the various systems in use by AI researchers. Each and every problem that AI faces requires its own unique approach which can be implemented through one or more of these systems. For example, a researcher looking into a problem of uncertainty might employ a neural network model or a fuzzy logic system in order to study his theories. Or maybe someone studying the boundaries of formal logic might use a symbol processing system on a programmable computer like LISP or PROLOG.

9. Does your author suggest that AI is an interdisciplinary pursuit? Rather than merely answering “yes” or “no”, please write a sentence or two that says something meaningful about the proposition.

Ertel says explicitly that, “it draws upon interesting discoveries from such diverse fields as logic, operations research, statistics, control engineering, image processing, linguistics, philosophy, psychology, and neurobiology”. What he means is that for any particular AI problem, a particular academic discipline or disciplines should be consulted, as expert knowledge of the physical and theoretical nature of the problem of interest is required to construct a good AI solution.

10. Your author talks a bit about *intelligent agents*. Google the term, and find three sites that say something interesting about intelligent agents from an AI perspective. Strive to find three sites that are somewhat different in nature. For each site: (1) provide the URL, and (2) write a 2 or three sentence characterization of the site.

- (1) <http://www-cdr.stanford.edu/NextLink/Expert.html> This site is just the text of a research paper on the topic of the compatibility of autonomous agents and the world wide web infrastructure. It starts out heavily philosophical, then shifts gears into a breakdown of possible applications and struggles in bringing these two types of systems together.
- (2) <http://www.fipa.org/> This is the home site of the Foundation for Intelligent Physical Agents, an IEEE committee formed in 2005 which is dedicated to promoting and regulating IEEE standards for agent-based technologies. All of the current standards can be found here, as well as information about the organization itself.
- (3) http://en.wikipedia.org/wiki/JACK_Intelligent_Agents This is an informative Wikipedia article on a framework that exists for implementing multi-agent systems in a traditional (algorithm-centric) language, JAVA. It has a good look at the features of the framework, and extensions for various desired functionalities, but sadly not a lot of depth as to how exactly it can implement such systems with a language like JAVA.

11. Pick **one** of the “milestones” listed in table 1.1. Write a 300-500 word passage in your own words on the milestone, and be sure to indicate exactly where you got the material for your passage.

Kurt Godel's incompleteness theorem introduced in 1931 presented the world with *the* major challenge of AI. The goal was no longer simply to create machines that acted like humans, but rather to determine whether humans behave in the same way that machines do. In terms of predicate logic, the question is, are humans built around a higher order logic, or can everything we do be reduced to first-order predicate logic?