# The Essence of Artificial Intelligence

## Chapter 1: Introduction

### Top Ten Salient Sentences

1. It can be especially useful to automate these tasks, as there may be a shortage of human experts. Expert Systems are concerned with the automation of these sorts of tasks.

2. Solving problems in a particular domain generally requires knowledge of the objects in the domain and knowledge of how to reason in that domain – both these types of knowledge must be represented.

3. Knowledge must be represented efficiently, and in a meaningful way. Efficiency is important, as it would be impossible (or at least impractical) to represent explicitly every fact that you might ever need.

4. You have to able to infer new facts from your existing knowledge, as and when needed, and capture general abstractions which represent general features of sets of objects in the world.

5. To represent knowledge in a meaningful way it is important that we can relate facts in a formal representation scheme to facts in the real world. The formal representation will be manipulated using a computer program, with new facts concluded, so it is vital that we can work out what these formally represented conclusions mean in terms of your initial problem.

6. Developing good ways to search through these possibilities for a good solution is is therefore vital. Brute force techniques, where you generate and try out every possible solution, may work, but are often very inefficient as there are just too many possibilities to try. Heuristics techniques are often better, where you only try the options which you think (based on your current best guess) are most likely to lead to a good solution.

7. However, it would be rather optimistic to expect all the mysteries of human intelligence to be unraveled and automated in 30 years of research! People now are happy with more limited objectives, as outlined above: getting computers to do more restricted tasks, as intelligent assistants, and also developing programs that allow us to come to a better understanding of particular aspects of human reasoning.

8. With these more limited objectives, progress has been fair: expert systems have been used successfully, if not that extensively, “intelligent” control systems are finding their way into everyday household objects such as washing machines; intelligent agents provide a currently popular programming metaphor; and limited speech understanding systems are becoming widespread.

9. Some of the most successful techniques for certain AI tasks turn out to be based on well understood mathematical methods, rather than theories of human reasoning. For example, expert systems based on probability theory are sometimes more effective than those based on models of how doctors do their diagnosis, while the best current speech understanding systems are based on statistical methods rath than a deep understanding of human language.

10. Searle argued that just behaving intelligently wasn’t enough. He tried to demonstrate this by suggesting a thought experiment, referred to as the “Chinese room”. Imagine that you don’t speak any Chinese, but that you have a huge rule book which allows you to look up Chinese sentences and tells you how to reply to them in Chinese. You don’t understand Chinese, but can behave in an apparently intelligent way.