CS7637: Knowledge-Based AI:
HW 3

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1 ANALOGY

1.1 Select an analogy

"Time is like a marathon; we must pace ourselves in order to make it to the finish line."

1.2 Models of target and source

This example of analogy compares two technically unrelated things, drawing comparisons between a characteristic they have in common. In this example, the characteristic that is similar in both time and marathon is compared.

My models of the target and the source are simple as the analogy is short and clear:

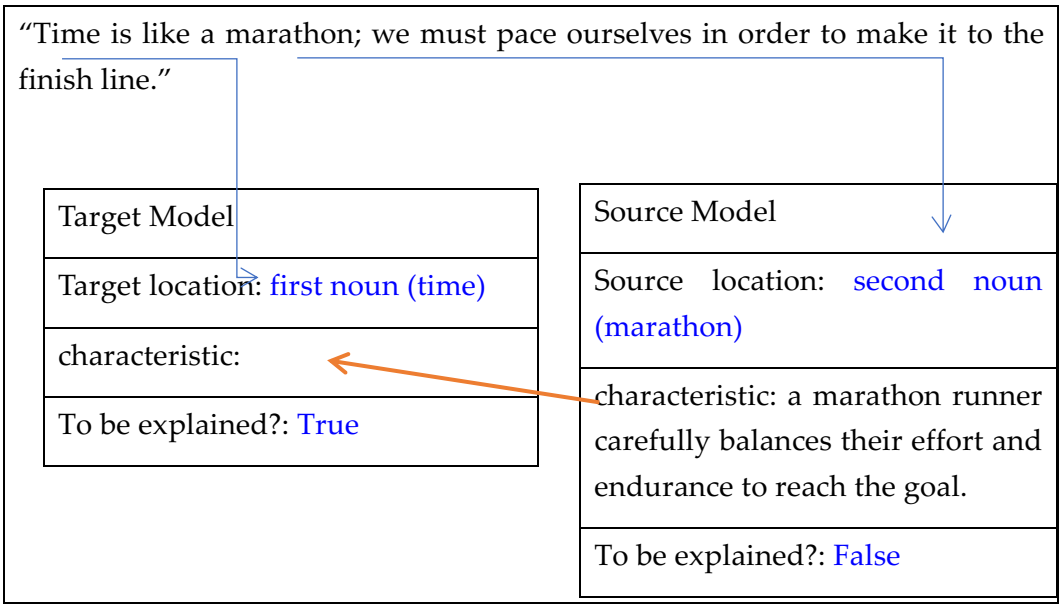

Figure 1— Models of target and source of the selected analogy

In this analogy, "time" is the target and "a marathon" is the source. The analogy is using the concept of running a marathon as a source domain to explain the idea of pacing oneself over a long period, which is the target domain.

1.3 What the author intends to transfer?

To complete a marathon, one needs to pace carefully throughout the race to make it to the finish line. Similarly, by using this example, the author tries to warn people that, in life, we need to manage our time and energy carefully and effectively to achieve our life goals.

1.4 Revised Analogy and Discussion

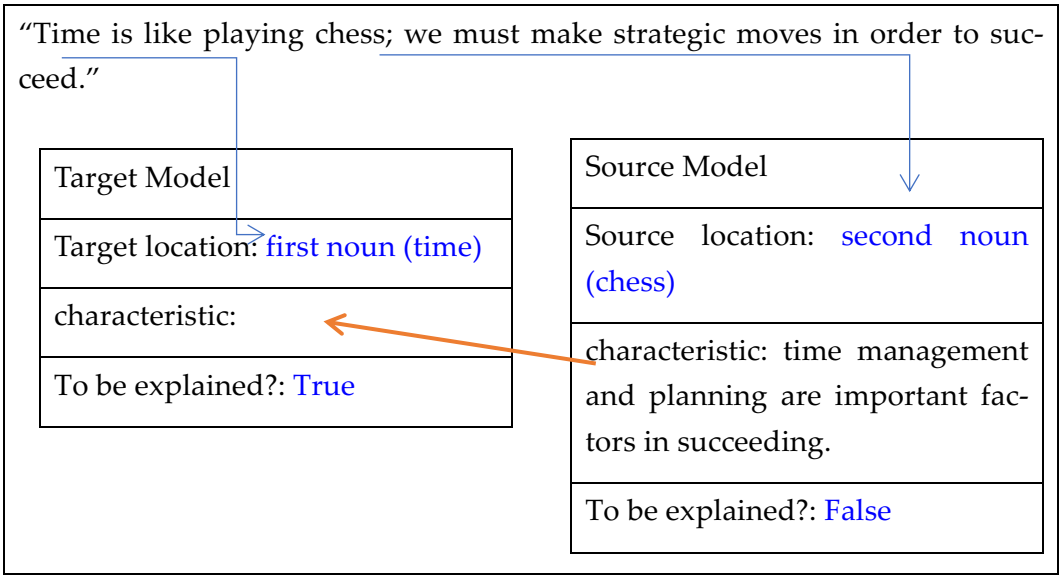

Figure 2 — Models of target and source of the revised analogy

In this analogy, I think time management and planning are important factors in achieving our aims, much like the planning and strategy that goes into playing chess. Here, different from the first analogy, the source (chess game) attaches more importance to planning actions during the process while the first one warns people that they shouldn't be either too fast or too slow.

2 AI

2.1 Intelligence

2.1.1 *Define Intelligence*

I think intelligence can be defined as the ability to obtain, process, and apply knowledge and skills to solve problems, adapt to new situations, and achieve goals.

This definition is mainly based on the definition by the American Psychological Association (APA) which defines intelligence as "the ability to understand complex ideas, adapt effectively to the environment, learn from experience, engage in various forms of reasoning, and overcome obstacles through mental effort."

2.1.2 *Explore Intelligence*

Humans are non-AI entities but are intelligent based on the proposed definition. We are not AI agents but we have many cognitive abilities such as language, creativity, and critical thinking. We can participate in and practice all mentioned activities of the definition.

Some animals could be viewed as intelligent. Although I do not know much about animals, I am aware that animals like chimpanzees and dolphins are very smart in terms of problem-solving, tool use, and communication. They exhibit intelligent behaviors.

Some plants have intelligent behaviors by adapting to environmental stimuli. For example, mimosa pudica, commonly known as the "sensitive plant," reacts to touches and rapidly changes the shape of its leaves in response to external stimuli. Scientists believe that this ability to respond to touch may help the plant to defend itself against herbivores, by making it less visible or less accessible to them.

Systems comprised of multiple people can also be intelligent. The first example that comes into my mind is “think tank” where collective intelligence is revealed. In this example, the system relies on the contributions of a large number of individuals to obtain, process, and apply knowledge and skills to solve problems, adapt to new situations, and achieve goals. This fits the definition well.

2.1.3 *Testing for Intelligence*

To test an AI’s intelligence, I think we can use a mixed measures including accuracy, speed, and adaptability. The first two criteria are similar to the efficiency used to measure our Raven’s problem-solving agent. The accuracy of an AI's output can be measured against a set of known or expected results. Meanwhile, we can record the running time of each task. As for adaptability, just like the monster-defining assignment, we can evaluate its performance on new monsters with new traits and see how well it adapts to new information.

2.2 Consciousness

2.2.1 *Define Consciousness*

I would like to define consciousness as the awareness of the surroundings and one's own thoughts, feelings, and experiences. It is the subjective experience of perceiving, processing, and responding to information.

2.2.2 *Explore Consciousness*

Humans are no doubt conscious. We are able to experience various thoughts and emotions. Some animals are also conscious as they respond differently to various environments and reveal different emotions such as excitement, happiness, and sadness. For example, many people keep dogs and cats and treat them as families. Plants may exhibit a form of consciousness as well, just like the mimosa pudica I mentioned earlier. It responds to environmental stimuli and exhibits complex behaviors. For systems comprised of multiple people, I would say NO. According to the definition, consciousness is a subjective and individual characteristic, which is hard to share among groups of people.

2.2.3 *Testing for Consciousness*

I feel it is impossible for an AI agent to be conscious or test an agent's consciousness. An entity can exhibit high levels of intelligence without being conscious. According to the definition, if consciousness is all about the individual experience, there is no way to tell whether an agent is truly experiencing or just processing its code accordingly. No emotion is also a type of emotion.

2.3 Free Will

2.3.1 *Define Free Will*

I would like to define consciousness as the following: free will is the ability to act freely and intentionally, without being constrained by outside influences or prior causes.

2.3.2 *Explore Free Will*

Humans are widely believed to possess free will, as under various circumstances, they can make choices and decisions that are not solely determined by external factors or pre-determined causes. This is also protected by law in most countries.

Animals such as dolphins and elephants may also possess a degree of free will by exhibiting complex behaviors and decision-making processes.

Plants, probably No. I do not think plants can make decisions at their wish and they also cannot choose where to grow.

For systems comprised of multiple people, yes, unless it is a prison where prisoners cannot have much free will.

2.3.3 *Testing for Free Will*

At this stage, I think it is unclear whether AI agents can possess free will in the same sense as humans. One measure is randomness. If an AI agent/entity can both make decisions that are not solely determined by external factors and exhibit a degree of randomness, it may be argued that the agent has a degree of free will. However, I think it is difficult to define the threshold and decide whether the randomness is due to free will or system setting.

2.4 Discuss the relationship

I think intelligence is independent of the other two elements, while consciousness is the prerequisite for free will. Consciousness and free will may not be a must for AI entities, but they no doubt enhance their performance. In addition, intelligence focuses more on the ability of an AI entity to process information and perform tasks associated with human cognition. There could be no need for the entity to "think critically and creatively". For consciousness and free will, again, although some AI entities are designed to look autonomous or self-directed, we cannot tell whether these systems are truly conscious or simply following pre-determined algorithms.