

Questions:

1. **What are the two tracks pursued in the field of artificial intelligence, and how do they differ in methodology?**

Answer: The field of artificial intelligence pursues two tracks: the engineering track, focused on developing systems with intelligent behavior, and the theoretical track, aiming to understand animal intelligence, especially human intelligence. The engineering track follows a performance-oriented methodology, emphasizing achieving specific goals, while the theoretical track adopts a simulation-oriented methodology, prioritizing understanding the underlying processes over external performance.

2. **How does the Turing test measure intelligence, and why is it considered less meaningful today?**

Answer: The Turing test, proposed by Alan Turing in 1950, measures intelligence by assessing whether a machine can behave indistinguishably from a human during communication. Its significance has diminished because machines can create an appearance of intelligence without true understanding. For instance, programs like DOCTOR (a version of ELIZA) generated intelligent-sounding responses by restructuring statements without true comprehension. Modern instances include Internet viruses engaging in deceptive dialogues. The Turing test's limitations arise from the ease with which machines can mimic intelligence without genuine understanding, making it less meaningful in evaluating true cognitive abilities.

3. **In the context of the puzzle-solving machine, what is the first intelligent behavior required, and how is it achieved?**

Answer: The first intelligent behavior required by the puzzle-solving machine is the extraction of information through a visual medium. The challenge lies in understanding the image to extract the current status of the puzzle. The machine achieves this by encoding the puzzle image in the computer's memory using bits, where each bit represents the brightness level of a pixel. By comparing sections of the picture to prerecorded templates, the machine

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can detect the arrangement of digits (1 through 8) on the puzzle, revealing the puzzle's condition.

4. **What are the levels of analysis involved in understanding natural language, and why do formal programming languages differ significantly from natural languages in terms of comprehension?**

Answer: Understanding natural language involves three levels of analysis: syntactic, semantic, and contextual. Syntactic analysis, including parsing, identifies the grammatical role of each word. Semantic analysis identifies the semantic role, such as the action, agent, and object. Contextual analysis considers the context of the sentence, crucial for determining the true meaning. Formal programming languages differ significantly from natural languages because programming languages are constructed with well-designed primitives, ensuring each statement has one grammatical structure and meaning. In contrast, natural language statements can have multiple meanings depending on context, requiring additional knowledge for comprehension.

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