

Potential Questions for CSE 471/598 Final Examination

What are broad three classes of engineering applications that intelligent systems can support?

List three cognitive abilities that distinguish human intelligence from the intelligence found in dogs and cats.

What are three metaphors that have influenced research in AI and cognitive systems? What assumptions do they share?

How do Newell and Simon define a physical symbol system? What is the physical symbol system hypothesis?

How does Lisp support physical symbol systems in terms of its data structures and its processing?

What three memories does Icarus rely on to support conceptual inference? What type of content does each memory contain?

Why are three aspects of rules that make them a good formalism to support intelligent behavior?

What is the difference between query-driven reasoning and data-driven reasoning? Which method does Icarus use for conceptual inference?

How does abductive reasoning differ from deductive inference?

How does analogical reasoning differ from deductive inference?

What features do abductive and analogical reasoning have in common?

What are qualitative models, what are envisionments, and how can a reasoning system use the former to generate the latter?

What is the difference between decision-theoretic and satisficing approaches to decision making?

Humans are seldom able to make optimal choices. How do they make satisficing decisions with their bounded resources?

What are three ways in which stimulus-response systems for reactive control operate differently from humans?

What structures comprise the "standard" model of human cognition and how does it operate?

What are three advantages of production systems for modeling high-level cognition?

Describe the components and the operation of a production system architecture.

What are three distinct uses of knowledge stored in a hierarchical task network?

What are the basic building blocks of a hierarchical task network and how are they organized in memory?

Describe how Icarus' mechanisms for skill execution differ from its processes for conceptual inference.

What four items must one specify to define a problem space?

How does heuristic search differ from exhaustive search? Describe two forms that heuristics can take.

Explain the difference between state-driven and goal-driven problem solving. Which is most commonly used in AI game-playing systems?

What are three reasons that board games have served as good testbeds for AI and cognitive science since their inception?

Explain how means-ends analysis differs from query-driven approaches to deductive inference.

Clarify the difference between problem solving and problem formulation. How is the latter relevant to explanations of insight?

Describe how means-ends problem solving leads Icarus to acquire new hierarchical skills. Does the architecture learn from success or from failure? How many training problems or subproblems does it take to learn each skill?

Explain how one can view language understanding in terms of conceptual inference. State whether deductive or abductive reasoning are best suited to this task and why.

Describe three out of four challenges which confront systems that attempt to understand natural language. Does syntactic or semantic knowledge have greater potential to address them?

List three out of four challenges that one must address when building practical dialogue systems.

Explain the difference between chatterbots like Eliza and human-like dialogue systems.

Specify the task of plan understanding in terms of its inputs and outputs. How does it differ from the task of activity recognition?

List three out of four types of domain-independent cognitive structures that one can use to specify and elicit emotions. Describe in English the relations among these structures for two complex emotions.

Explain the difference between dimensional theories of personality and ones that incorporate cognitive structures. How can the latter influence an agent's behavior?

How does metacognition differ from metacognition and what types of cognitive structures are required to support it?

What types of theoretical commitments about structures and processes does a cognitive architecture incorporate? How does the associated programming language reflect these assumptions?