Exam practice

October 16, 2023

INTELLIGENT AGENTS

a) Define Artificial Intelligence, Machine Learning, and Deep Learning, highlighting their key characteristics and differences.

b) Clarify what "percepts" and "commands" are and how they fit into the architecture of an intelligent agent. Explain the distinction between the belief state and percept history.

SEARCH

a) Between depth first search and breadth first search, which will find the shortest path through a maze, and why? What are the main differences between the two algorithms?

b) What are the characteristics of an admissible and consistent heuristic?

LOGIC

a) Explain what syntax and semantics are in the context of propositional logic. How are propositions constructed? What values can they take on?

b) Why is first-order logic considered to be more expressive than propositional logic? What are the main differences between the two frameworks?

CONSTRAINTS SAT PROBLEMS AND OPTIMIZATION

a) For what type of problems and search space would you use a local search approach? What are the limitations of a steepest ascent/descent algorithm?

b) Specify how node consistency and arc consistency relate to CSPs and provide an explanation of how they can be enforced to solve the constraint satisfaction problem.

UNCERTAINTY

a) What is conditional probability? How does it relate to the joint probability distribution?

b) What is the Markov Assumption? What are the two probability types present in Hidden Markov Models? What do they represent?

MACHINE LEARNING

a) Machine learning includes different tasks, such as supervised, unsupervised, and reinforcement learning. How do these tasks differ?

b) What is overfitting, and what are the main strategies to avoid it?

APPLICATIONS

a) What are convolutional neural networks? What is their purpose?

b) What are word embeddings in NLP? How do word embeddings learn to represent meaning and similarity between words?

ETHICS AND SOCIAL IMPACT

a) What is the atoms-to-bits transformation in the digital economy?

b) Discuss common biases in Artificial Intelligence and provide examples.