

Here is a study guide on Introduction to Artificial Intelligence:

****What is Artificial Intelligence?****

Artificial Intelligence (AI) is the study of how to create systems that can make decisions, interact with their environment, and optimize their behavior to achieve certain objectives.

****Objectives in AI****

- * Learn to control all degrees of freedom of the environment that are controllable
- * Act to learn (instead of learning to act for a fixed task)
- * Related notions: (Bayesian) Experimental Design, Active Learning, and intrinsic motivation

****Interactive Domains****

- * The agent interacts with a domain and receives observations
- * The agent decides on an action, and the world transitions
- * The world is in a state s_t at time t , and the agent senses observations o_t

****State****

- * A state description of a domain that makes future observations conditionally independent of all history observations given the state and future actions

****Examples****

- * Computer interaction: What is a sufficient definition of state for a computer that you interact with?

* Thermostat scenario: What is a sufficient definition of state for a thermostat scenario?

****Artificial Intelligence as Optimization****

* Optimization principles are a means to describe systems and their behavior

* Everything can be cast as optimal under some objective

****Decision Making and Inference****

****Forward Chaining vs. Backward Chaining****

FC is data-driven (e.g., automatic recognition, routine decisions)

BC is goal-driven (e.g., problem-solving, e.g., Resolution inference rule (complete for propositional logic))

****Resolution****

* Conjunctive Normal Form (CNF) conversion

* Resolution inference rule (complete and sound for propositional logic)

****Summary of Key Points****

* Artificial Intelligence is the study of how to create systems that can make decisions and optimize their behavior

* Objectives in AI include learning to control degrees of freedom and acting to learn

* Interactive domains involve agents interacting with environments and making decisions

* State is a description of the world that makes future observations conditionally independent of all history observations

* Optimization principles are used to cast systems as optimal

- * Forward and backward chaining are two approaches to decision making and inference
- * Resolution is a method for logical inference in propositional logic

****Flashcards****

1. What is Artificial Intelligence?

Answer: AI is the study of how to create systems that can make decisions and optimize their behavior.

2. What is an objective in AI?

Answer: Learn to control all degrees of freedom of the environment that are controllable.

3. What is the difference between forward and backward chaining?

Answer: FC is data-driven, while BC is goal-driven.

4. What is the resolution inference rule?

Answer: A method for logical inference in propositional logic.

5. What is the state in AI?

Answer: A state description of a domain that makes future observations conditionally independent of all history observations given the state and future actions.