50.021 – Artificial Intelligence

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Week 01: Search

[The following notes are compiled from various sources such as textbooks, lecture materials, Web resources and are shared for academic purposes only, intended for use by students registered for a specific course. In the interest of brevity, every source is not cited. The compiler of these notes gratefully acknowledges all such sources.]

Due: 2nd Feb, 11:59pm
Submission: via eDimension

These answers are provided only as a brief guide. There could be more than one way to answer the questions.

1 PEAS Description

Based on the Agent Model, an agent can be described based on the PEAS description (Performance measure, Environment, Actuators, Sensors).

TASK: For the following agents, define the PEAS description based on these four characteristics and state any assumptions you may have.

1. A robotic platform for autonomous cleaning of the floor within a building.
2. A customer service chatbot for an online retailer.
3. An automated and unmanned convenience store, like Pick&Go in SUTD.

Answer: Multiple answers possible, as long as the appropriate assumptions are given.

2 Environment Types

There are six characteristics (Observable, Deterministic, Episodic, Static, Discrete, Single-agent) when describing a task environment.

TASK: For the following activities, describe the task environment using these six characteristics and state any assumptions you may have.

1. Playing an massively multiplayer online game, such as World of Warcraft (https://en.wikipedia.org/wiki/World_of_Warcraft)
2. Enrolling for a course/subject for a new term at SUTD
3. Purchasing a drink from a vending machine

Answer: Multiple answers possible, as long as the appropriate assumptions are given.

3 Problem Formulation

Missionaries and cannibals is a classical formal problem, and is generally stated as follows. Three missionaries and three cannibals are on one side of the river. They all need to cross in a boat that only holds two people at once. There must never be a situation where there is a group of missionaries in one place who are outnumbered by cannibals.

TASK: Formalise the missionaries and cannibals problem in terms of its state space, initial state, goal test, actions and path cost.
Answer: Note that there are multiple possible formulation and this is just one possible one.

States: (number of missionaries on bank1, number of cannibals on bank 1, location of boat: bank1, bank2)
Initial state: (3, 3, bank1)
Actions: (1M, 0C), (0M, 1C), (1M, 1C), (2M, 0C), (0M, 2C)
Goal test: (0, 0, bank1 or bank2)
Path cost: number of boat trips