50.021 Artificial Intelligence: Week 1 HW

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Q1. Environment Types

1. Playing a MMORPG is

**Partially observable**: player has access to only immediate information of his surroundings

**Deterministic and Static**: Each player’s game is mostly affected by the player’s own choices and other players’ actions have minimal impact on the player’s game. Most MMOs are also reactive to the player. The game progresses according to the player’s actions.

**Sequential**: MMORPGs tend to follow a storyline, which makes it sequential.

**Discrete**: There are a set number of actions a player can take, which is determined by the options coded in by the game developers.

**Multi-Agent**: Since it is an MMO, there are other players also playing in the same environment.

1. Buying a movie ticket online is

**Fully observable, deterministic, static, episodic and discrete**: You know all the available movies and show times, and nothing changes while you are considering which movie ticket to buy. The next states are dependent on if you choose to buy a ticket (and which movie they choose), or not buy a ticket.

**Single Agent:** You are buying a ticket alone

1. Planning a holiday itinerary with friends is

**Fully Observable**: You have access to the whole itinerary

**Deterministic**: The itinerary will change based on decisions made by the group

**Sequential**: Planning an itinerary must be done in accordance with the date, location, time etc.

**Static:** The itinerary will not change until the group makes a change to it

**Continuous**: There are any number of things/places the group can decide to do/go

**Multi-Agent**: You are planning with a group of other people

Q2. Problem Formulation

Let the starting side of the river be the left bank and the goal side of the river be the right bank.

Let M represent missionary and C represent cannibal.

State Space: Left(3M, 3C), Right(3M, 3C)

Initial State: Left(3M, 3C)

Goal Test: Right(3M, 3C)

Actions: {goLeft(X, X), goRight(X, X)} where either one or two people can move across the river at a time

Path Cost: Total number of one-way trips across the river

Q3. General Search

1. A state is a representation of a physical configuration. A node is a data structure constituting part of a search tree.
2. A search strategy is the order of node expansions. An uninformed search strategy is a blind search strategy which requires no additional information about states beyond that in the problem definition. An informed search uses problem-specific knowledge beyond the problem definition. An adversarial search is used in a multi-agent environment where the agent needs to consider the actions of other agents and their effects.
3. Tree Search loops through the graph iteratively and chooses a leaf node from the frontier to expand. However, tree search is non-directional and may include redundant paths. Graph Search is a tree search which tracks previously visited states so it will not expand a previously visited state, which will mitigate the issue of redundant paths making the graph intractable. However, if there are many states to track, graph search may become inefficient.