COEN 166 Artificial Intelligence Homework #1

Guideline: You can submit a handwritten homework or a typed homework. Make sure that the handwriting is legible. Credits can be deducted for homework that is not discernible. Convert the homework to a single pdf file and submit to Camino.

Problem 1: Define in your own words the following terms: agent, agent function, agent program, performance measure, rational agent.

An agent is a unit with two components that allows it to perceive the environment and act upon what it can perceive. In order to perceive, it has actuators, and it acts through its actuators. It consists of a percept, a percept sequence, an agent function, and an agent program.

An agent function is a function that maps a percept sequence to an action.

An agent program will run the agent function.

The performance measure of an agent determines the success of an agent's actions based on specific criteria.

A rational agent is an agent that seeks to maximize its performance measure based on its knowledge of the environment and the percept sequence.

Problem 2: Give the task environment description of the following scenarios (Fully observable vs. partially observable? Deterministic vs. stochastic/strategic? Episodic vs. sequential? Static vs. dynamic/semi-dynamic? Discrete vs continuous? Single-agent vs. multi-agents?)

a. Taxi driving.

Partially observable - you can only see what is ahead of you and what is viewable through the taxi windows

Strategic - each decision made by the taxi driver is based on what other drivers are doing

Sequential - actions matter in every moment that you are on the road

Dynamic - cars are constantly moving (usually), including the taxi driver

Continuous - speed of the car and positions are continuous values

Multi-agent - there are multiple drivers on the road

b. Playing soccer.

Partially observable - each play can only see what is ahead of them, and needs to actively keep track of opponents and fellow teammates

Strategic - each move is based on what the player does and what everyone else does

Sequential - actions matter in every snapshot moment of the game

Dynamic - real life scenario where players are constantly moving

Continuous - values such as speed of the player and player positions are continuous

Multi-agent - there are multiple players in the game other than the current player, plus the ball

c. Backgammon.

Fully observable - you can view the whole board, nothing is meant to be hidden

Stochastic - game is played with a die

Sequential - you move based on your opponent's choice

Static - turn based, so environment doesn't dynamically update

Discrete - the game has simple rules and is understandable, states are finite and can be determined
Multi-agent - playing against another player