Max Stetter

3 Problems PEAS:

1. When jumping on a trampoline there are several factors that can play into how high someone or something will bounce. An AI agent that is able to help someone jump or bounce an object to a certain height. Adjusting the size of the trampoline, adding weights, how to jump, how high to initially jump from and double bouncing are all things that the agent would be able to manipulate to bounce someone/something to a certain height.

Performance Measure:

Agents in this environment will be scored based on how accurately the agent was able to bounce someone/something. Depending on how far off the measurement was will determine how off the jump was. A completely accurate jump height would be 0.

- -1* (inches the bounce was short)
- 1* (inches the bounce was too high)

Environment:

Observability: This environment is fully observable as the agent is able to know exactly what it can and cannot use to bounce someone/something.

Uncertainty: It is deterministic because given the exact same actions each time it will get the same exact result each time.

Duration: Episodic. All data and things can be taken into consideration to act accordingly.

Stability: Static. All items are available and if no action is taken nothing will happen.

Granularity: Continuous. The agent is measuring how accurate it is making something/ someone bounce.

Participants: Single. The agent only provides instructions and parameters for jumping to x height.

Knowledge: Known. The physics of elasticity, gravity and force are all known.

Actuators:

- Adjust the size of the trampoline.
- Add weights to bounced object.
- Adjust initial jump height.
- Add people to double bounce.
- How to throw/jump object/person.

Sensors:

- Weight of object to be bounced.
- Current size of trampoline.
- Current height of jumping platform.
- Available weights

2. Someone that is trying to meet certain dietary goals would be able to benefit from an AI agent that helps them meet their daily nutrient goals. If you have a goal of 100g of protein per day and as you log your food you realize it is 11:00 at night and you still need 30g of protein to meet your goal, the agent could choose several meals or snacks that would allow you to meet your goal before the next day. Food choices, how many macronutrients remaining and time remaining in the day can all play a factor in the agent's choice on what food to recommend. The agent ideally would recommend more whole foods earlier in the day and as the day goes on and the macronutrients need to be crammed in then things like protein shakes would start being more recommended because they're easy to make and provide high protein.

Performance Measure:

Agents in this environment are judged based on how well they can recommend foods that meet their person's dietary goal. A perfect score is 0 which is when all meals are accurately provided and meet the person's exact dietary goals. The score is summed at the end.

- 1*(every calorie/gram above the set goal)
- -1*(every calorie/gram below the set goal)

Environment:

Observability: Partially observable. It is unknown what a person will decide to eat in a day and what meals they will actually follow.

Uncertainty: Stochastic. It is unknown what ingredients will be available on a given day as well as what the person has planned to eat.

Duration: Sequential. The meals must be adjusted as the person consumes food and the day goes by.

Stability: Dynamic. The remaining calories/grams will change throughout the day as the person consumes food.

Granularity: Continuous. The caloric/gram goals are constantly being measured as well as the nutrients in the foods that can be consumed to meet those goals before the day ends.

Participants: Single agent. No need to take any other input.

Knowledge: Known. All nutrients in foods are known and can be calculated as well as the exact outcome when a food is consumed.

Actuators:

- Suggest food.
- Provide alternative foods.
- Adjust for better suited food based on time remaining.

Sensors:

- Current calorie/gram consumed.
- Current time of day.
- Goal caloric intake.
- Goal gram intake.
- Available foods.

3. Lunar Landing.

Performance Measure:

The following points are summed after the lander has successfully or failed to land. A solution score is considered 200+ points.

- Points increased/decreased the closer/further the lander is to the pad.
- Points increased/decreased the slower/faster the lander is moving.
- Points decrease if the lander is tilted.
- Points increased by 10 for each leg in contact with the ground.
- Points decreased by 0.03 each frame a side engine is firing.
- Points decreased by 0.3 each frame the main engine is firing.
- -100/+100 points for crashing or landing safely.

Environment:

Observability: Fully. All of the required information is available to land correctly.

Uncertainty: Stochastic. All of the actions are deterministic however the landing terrain changes each episode.

Duration: Sequential. The lander adjusts the thrusters after every time it is used. It recalculates after each action.

Stability: Dynamic. Most of the factors remain the same. Even the landing zone stays the same. However the surrounding terrain changes each episode.

Granularity: Continuous. Each action the agent makes is measured in a non binary way.

Participants: Single agent. No other input from other agents.

Knowledge: Known. The physics of the world are known.

Actions:

- Do nothing
- Left engine
- Right engine
- Main engine

Sensors:

- X coordinates
- Y coordinates
- X velocity
- Y velocity
- Lander angle
- Lander angular velocity
- Leg contact