

PEAS Assessments

1. I am a retro game enthusiast and the prices of rare old games can fluctuate wildly. A useful AI agent would help collectors predict the future value of their games by analyzing market data and historical trends. The agent could suggest optimal times to buy or sell specific games.

Performance Measure:

The following elements are added together, and the negative of the sum is used to get the performance measure. A perfect score is 0, which happens when all price predictions are perfectly accurate and timed.

1 * (number of incorrect price predictions)

5 * (days where a game was sold for less than its peak value)

10 * (games in the collection that decreased in value after purchase)

Environment:

Observability: Fully observable. Agent is able to see current and historical price data.

Uncertainty: Stochastic. Game prices can fluctuate in ways that are hard to predict.

Duration: Sequential. Each action influences the potential outcomes of future decisions, as holding or selling games at different times leads to different results.

Stability: Dynamic. Prices change over time for all sorts of reasons, even when the agent is not doing anything.

Granularity: Discrete. Prices are discrete and are updated in discrete time intervals (every day, every week etc.)

Participants: Multi-agent. The agent is competing with other buyers and sellers.

Knowledge: Known. Agent can see all current prices as well as historical trends.

Actions:

Buy a game

Sell a game

Percepts:

Collection inventory

Current market prices

Historical price data

Value indicators (such as search trends, auction activity, social media mentions, etc.)

2. Energy bills are expensive and it can be hard to balance staying cool in St. George and still keeping your electric bill low. An agent could help monitor electricity usage along with indoor & outdoor temperatures to help find a sweet spot and keep the house within a reasonable temperature for as cheap as possible.

Performance Measure:

These elements will be summed and the negative of the sum used to produce the performance measure:

5 * (total deviation in degrees from the target temperature)

1 * (total energy cost in dollars)

10 * (number of times temperature exceeds or drops below comfort range by more than 5 degrees) - penalty for extreme temperatures outside the desired range.

Environment:

Observability: Partially observable. Agent can monitor indoor temperatures, outdoor temperatures, electricity usage, but it can't predict sudden changes in outdoor temperature or energy price spikes.

Uncertainty: Stochastic: Environment includes unpredictable factors like sudden changes in temperature or changes in household behavior that affect energy use.

Duration: Sequential. Agent's actions (adjusting thermostat, turning off appliances) affect future states, such as the indoor temperature and energy usage over time.

Stability: Dynamic. Temperatures and electricity prices change over time, with or without the agent.

Granularity: Continuous. Temperature readings and electricity use vary continuously.

Participants: Single-Agent. Only one agent in charge of adjusting temperatures.

Knowledge: Partial. Can access immediate information about weather and trends but can't predict far into the future.

Actions:

Adjust temperature

Turn on / off appliances

Draft schedule

Percepts:

Indoor temperature

Outdoor temperature

Electricity usage rate

Electricity cost per kilowatt-hour

Time of day

Weather forecast

3. Lunar Lander - the agent learns to land a rocket safely on the landing pad at (0,0) using either discrete or continuous control of the engines. Fuel is infinite.

Performance Measure:

1 * (distance from the center of the landing pad when landing)

50 * (good landing: -1, bad landing: 1)

Environment:

Observability: Fully observable. Agent has access to all relevant state information every frame: position, velocity, and angle.

Uncertainty: Stochastic? In continuous mode with wind enabled, the environment has random disturbances that affect the lander's trajectory. Otherwise deterministic.

Duration: Sequential. Agent's actions in one step directly influence the state in future steps; thrust affects acceleration.

Stability: Dynamic, with wind on. Environment changes in real-time as the agent acts.

Granularity: Continuous. State variables (position, velocity, angle) change continuously.

Participants: Single-agent. No other landers to compete with.

Knowledge: Known. Agent knows the physics of the environment and the effects of its actions.

Actions:

- Fire left side engine
- Fire right side engine
- Fire main engine

Percepts:

- X-position and Y-position
- X-velocity and Y-velocity
- Angle
- Leg-to-ground contact