A rational agent is one who selects an action that is expected to maximize its performance measure given the percept sequence and any built-in knowledge.

The remaining questions are about a tire air filling machine which accepts only quarters, requires a minimum of two quarters to start operating, and gives 30 seconds of air per quarter. While in operation you can add single quarters.

2. Give the PEAS description for this air filling machine. [5]

Performance Measure:
  • Dispenses air for the proper amount of time when enough quarters are inserted

Environment:
  • quarters
  • compressed air
  • passage of time

Actuators:
  • compressed air dispenser

Sensors:
  • coin slot
  • timer

3. Classify your air filling machine task environment according to the following properties: [3]

- Fully observable/partially observable
  - Fully observable
- Deterministic/stochastic
  - Deterministic
- Episodic/sequential
  - Sequential

4. Explain each of your three choices in the previous question. [6]

- Fully Observable because the agent always knows when quarters are inserted and has accurate perceptions of the passage of time
- Deterministic because all actions have predictable results
- Sequential because the actions which increase the performance measure depend on more than the single most recent percept
Now assume that you want to use the above described air filling machine to fill the tires of your car to the correct air pressure. You may assume the availability of an air pressure gauge as well as the knowledge of what the correct air pressure for your car’s tires is.

5. Give a formal description of this problem by defining the initial state, successor function, goal test, and path cost function. [8]

- Initial State: no quarters have been inserted, tires are at some initial pressure
- Successor Function: returns the following actions and their results: insert quarter, check tire pressure, fill tire, deflate tire
- Goal Test: If all tires are at the proper pressure, the goal has been reached
- Path Cost Function: the path cost is the number of quarters that have been used