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Characteristics of the environment

Accessible or inaccessible.

An **accessible** environment is one in which an agent can obtain complete, accurate, up-to-date information about the environment's state. In this project, we have different agents, one of which is the system agent; this agent is particularly important since its job is to load the environment itself. So, in this case, the system agent communicates the complete, up-to-date information of the environment to the other agents.

Deterministic or non-deterministic.

An environment in which an action has one single guaranteed effect is **deterministic**, this means that there is no uncertainty about the resulting state after performing an action. Hence, we can say that there is a clear difference in the state of the environment after any action performed by an agent. For example, the harvester after collecting the garbage, changes the state of the environment to 'no garbage'; there is no other state it could change to.

Episodic or non-episodic.

In an environment that can be considered **episodic** each episode accounts for the agent's actions and reactions of the current episode. This means that every agent's actions are independent in each episode. This kind of environment has a considerable advantage compared with non-episodic due to agents not having to think further. This attribute is seen in the agents where their actions are delimited by each episode and do not require information of previous steps; for example, a scout does not require any previous information from previous episodes to collect the garbage.

Static or dynamic.

This environment is **static** considering the definition, a static environment is one that can be assumed to remain unchanged except by the performance of actions by the agent. In this problem, the effect on the environment is always determined by the agents. There is no other process aside from the agents that is affecting the world. For instance, the appearance of the garbage in the environment is performed by the system agent, and no process affects the environment.

Discrete or continuous.

The environment is **discrete** since it has a fixed grid organization in the environment. This problem has a set of specific rules that govern the environment. There exist several finite actions that the agents must do to finish the task. The time is represented in a discrete quantity of steps.

KIND OF ARCHITECTURES

System Agent

- **Reactive**: the system agent reacts to the initial configuration file to initialize the environment; it also reacts to the message from the coordinator agent to know when to proceed to the next simulation step. In this way, the system agent updates the status environment.

Coordinator Agent

- **Reactive**: this agent only reacts to two things. The former is when the system agent initializes/updates the environment so that the coordinator agent can centralize the orders to be executed in each turn. The latter is to tell the system agent when the tasks have been completed.

Scout Coordinator

- **Hybrid**: this coordinator focuses on long-term planning of finding the garbage but also must react for fast reactions in case there is garbage discovered.

Harvester Coordinator

- **Hybrid**: this coordinator focuses on long-term planning of recollecting the garbage but also must react for fast reactions in case there is garbage discovered.

Scouts

- **Reactive**: they must react fast to changes detected such as discovering new garbage.

Harvesters

- **Reactive**: they must react fast to changes detected such as picking up garbage.

PROPERTIES:

System Agent

- **Reactivity**: the only two things system agent do is reacting to the initial configuration file to initialize the environment and it also reacts to the message from the coordinator agent to know when to proceed to the next simulation step. In this way, the system agent updates the status environment.
- **Social**: this agent must communicate the current state to the coordinate agent to know when to proceed to the next simulation step.
- **Veracity**: the information passed to the coordinator agent is, in all of cases, truthful.
- **Autonomy**: this agent does not interact with the user, for this reason this agent is autonomous.
- **Temporal continuity**: this agent continues running in a thread and interacting with another agent.

Coordinator Agent

- **Reactivity**: once both scout and harvester coordinator finish their tasks, the coordinator agent must inform the system agent to start a next simulation step.
- **Social**: The agent coordinator must communicate with both scout and harvester coordinator and with the system agent.
- **Veracity**: the information passed to the system, scout coordinator and harvester coordinator agent is, in all of cases, truthful.
- **Autonomy**: this agent does not interact with the user, for this reason this agent is autonomous.
- **Temporal continuity**: this agent continues running in a thread and interacting with another agent.

Scout Coordinator

- **Reactivity**: the coordinator must react to the scouts when it receives information from them to interact with their message and inform the coordinator agent or make changes to the plan.
- **Deliberative**: the coordinator has a representation of the map and city. The scout coordinator calculates the optimal routes to look for garbage.
- **Social**: The scout coordinator must communicate with all the scouts and the coordinator agent.
- **Veracity**: the information passed to the scout and coordinator agent is, in all of cases, truthful.
- **Autonomy**: this agent does not interact with the user, for this reason this agent is autonomous.
- **Temporal continuity**: this agent continues running in a thread and interacting with another agent.

Harvester Coordinator

- **Reactivity**: the coordinator must react to the harvesters when it receives information from them to interact with their message and inform the coordinator agent or make changes to the plan.
- **Deliberative**: the coordinator has a representation of the map and city. The harvester coordinator calculates the optimal routes to harvest garbage.
- **Social**: The harvester coordinator must communicate with all the harvesters and the coordinator agent.
- **Veracity**: the information passed to the harvester and coordinator agent is, in all of cases, truthful.
- **Autonomy**: this agent does not interact with the user, for this reason this agent is autonomous.
- **Temporal continuity**: this agent continues running in a thread and interacting with another agent.

Scouts

- **Reactivity**: they react to their sensors to identify when there's garbage and to execute the scout coordinator plan.
- **Social**: The scouts must communicate with the scout coordinator and share information.
- **Veracity**: the information passed to the scout coordinator agent is, in all of cases, truthful.
- **Autonomy**: this agent does not interact with the user, for this reason this agent is autonomous.
- **Temporal continuity**: this agent continues running in a thread and interacting with another agent.

Harvesters

- **Reactivity**: they react to their sensors to identify when to pick up/ garbage and to execute the harvester coordinator plan.
- **Social**: The harvesters must communicate with the harvester coordinator and share information.
- **Veracity**: the information passed to the harvester coordinator agent is, in all of cases, truthful.
- **Autonomy**: this agent does not interact with the user, for this reason this agent is autonomous.
- **Temporal continuity**: this agent continues running in a thread and interacting with another agent.

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