COMP 4200/5430 Artificial Intelligence
ENVIRONMENT MODELS.

Our intelligent agents operate within an environment. Section 2.3 of *AIMA* introduces ways of modeling these environments.

According to the *AIMA* analysis, there are six key properties of environments:

The six key properties/questions are:

1. **Fully or partially observable?** Is information about the entire world completely available to the agent ("fully observable"), or is critical information hidden ("partially observable")?

2. **Single agent or multi-agent?** Will our agent be acting alone in the world, or will it inhabit a world with multiple agents?

3. **Deterministic or stochastic?** When an agent takes an action, will it *necessarily* cause a specific effect in the world ("deterministic")? Or, are the outcomes of an agent's actions probabilistic ("stochastic")? (Note that in the latter case, usually there is a set of outcomes, with respective probabilities for each alternative being depending on some observable properties of the world.)

4. **Episodic or sequential?** When an agent is evaluating its choices before taking an action, can it know that the world will unfold in a specific series of events ("sequential")? Or, does the world appear as if brand new each time the agent will taken an action ("episodic")?

5. **Static or dynamic?** Does the "time stand still" while the agent is deliberating ("static")? Or, does the world change continuously, even when the agent "isn't looking" ("dynamic")?

6. **Discrete or continuous?** Does the state of the world progress in precise steps ("discrete")? Or, is the world more organic and analog, and the inputs to the agent are approximations to measurements of the world ("continuous")?

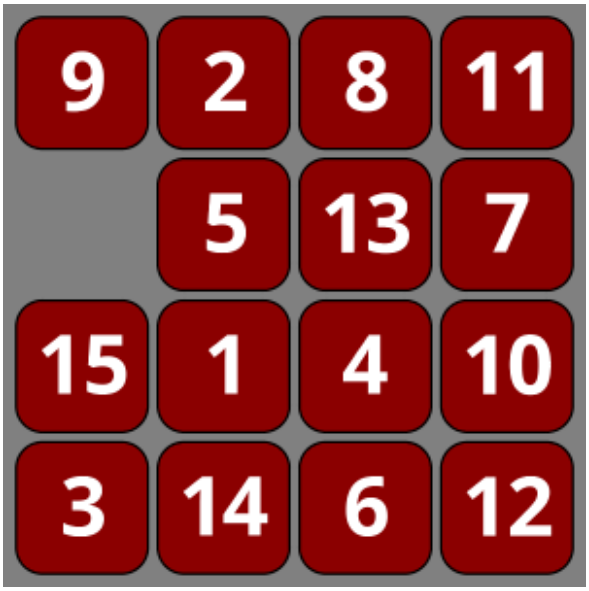
Answering questions about these six properties defines the nature of the environment.

An agent's task is structured by the properties of its environment. The specific configuration of properties gives a good indication of what AI technique or strategy (or set of strategies) that agents should use.

Based on this framework, analyze the task environments on the following pages.

COMP 4200/5430 Artificial Intelligence

15 puzzle game. This is the game where you have to unscramble a two-dimensional grid of tiles by sliding one tile at a time.

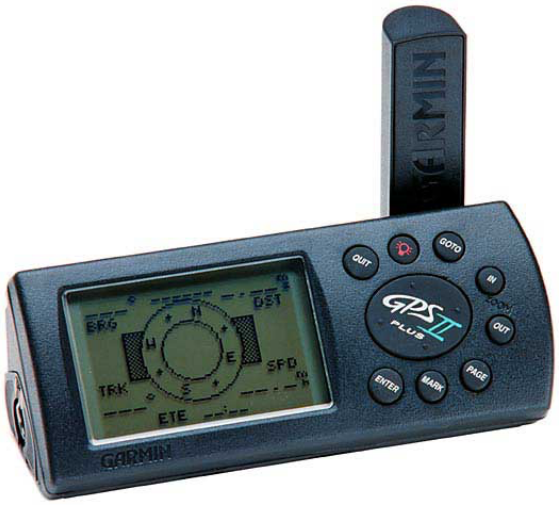


Circle one or the other		Why? (put notes in this column)
fully-observable	partially-observable	
single agent	multi-agent	
deterministic	stochastic	
sequential	episodic	
static	dynamic	
discrete	continuous	

Image: https://martingalemeasure.files.wordpress.com/2014/06/puzzle1.gif

COMP 4200/5430 Artificial Intelligence

Old fashioned GPS. This is the route-planning devices that knows your location and your destination, and is *not* aware of traffic.



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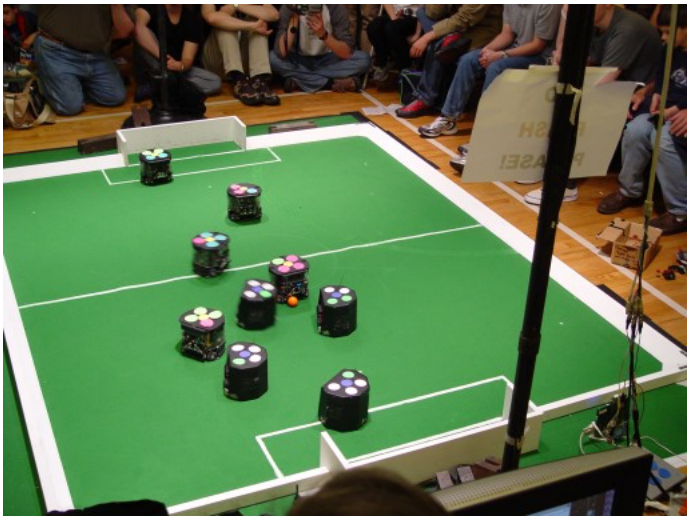
COMP 4200/5430 Artificial Intelligence

Robot soccer. Two teams of robots try to score goals against each other.



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