


Ai #1

Lecture



AI aims to make a machine that...

Thinking Humanly

- Machine that mimics how human think



- And thus acts like humans

Thinking Rationally

- Machine thinks logically or systematically



- thus acting in the best possible way.

Acting Humanly

- Machine acts like humans

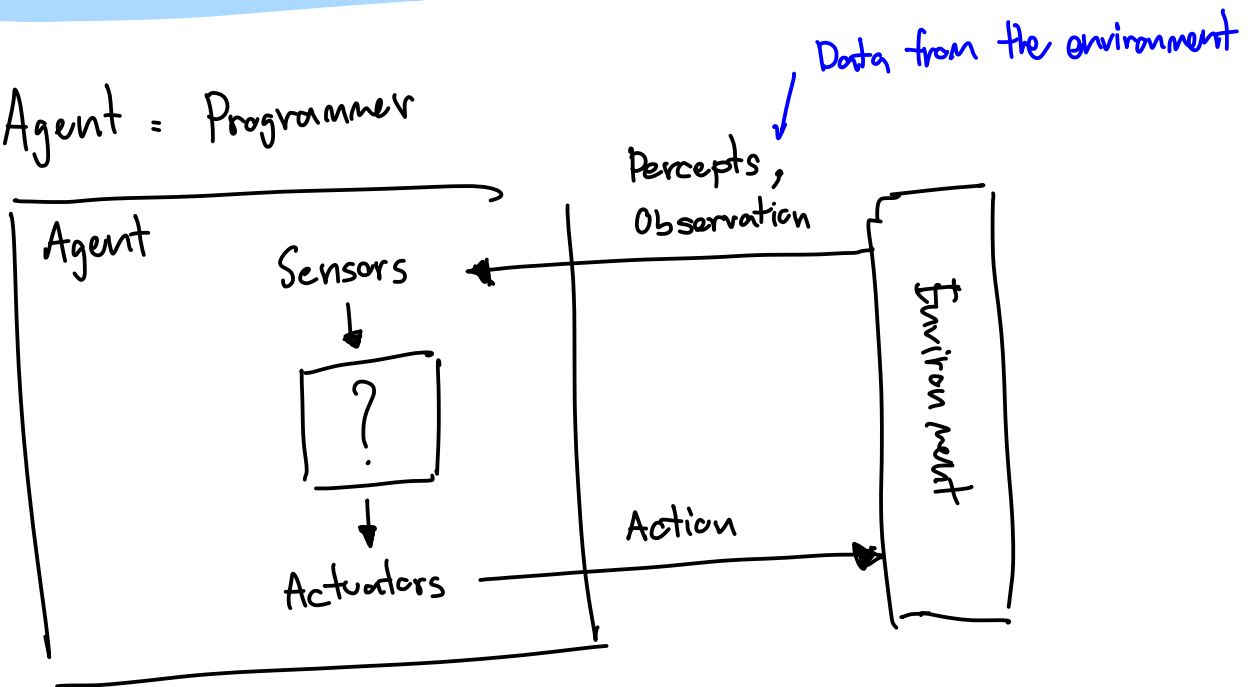
Acting Rationally

- Machine acts to achieve best outcome
best decision

- Intelligent Agents -

Interaction: Agent and Environment

Agent = Programmer



Agent interact with environments through Sensors and Actuators

> Environment

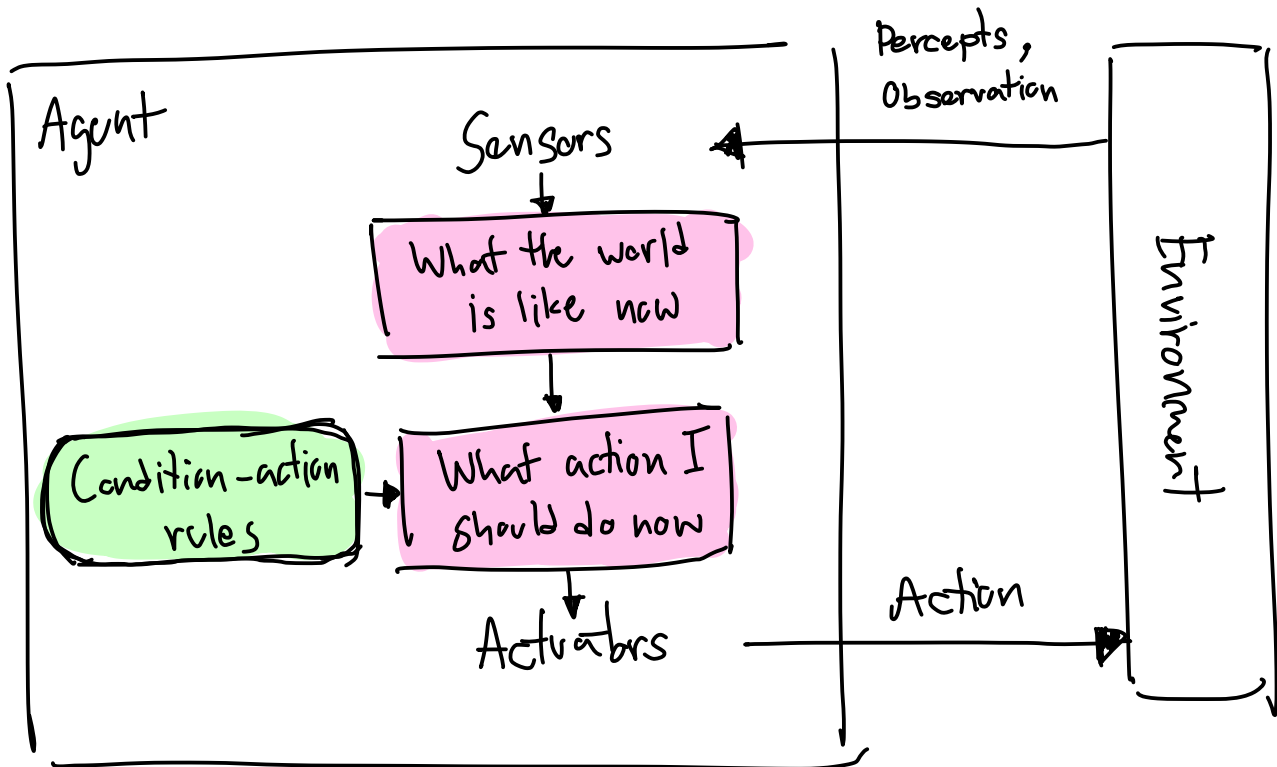
Fully Observable

- ① one observation will get all action in the environment

Partially Observable

- ① require many observations to get full data.
- ② hidden data
(attempt to infer from what agent can observe.)

Simple flex Agent



- Rectangles to denote the current internal state of the agent's decision process.
- Ovals represent the background information.

example

```
function REFLEX-VACUUM-AGENT([location,status]) returns an action
  if status = Dirty then return Suck
  else if location = A then return Right
  else if location = B then return Left
```

> Simple flex Agent in the two-location vacuum environment

> State : A representation of a system

Agent States S^a

> Info of the environment inside the agent.

(1.) Only contain what necessary

(2.) "Sometimes"

$$O_t = S_t^a$$

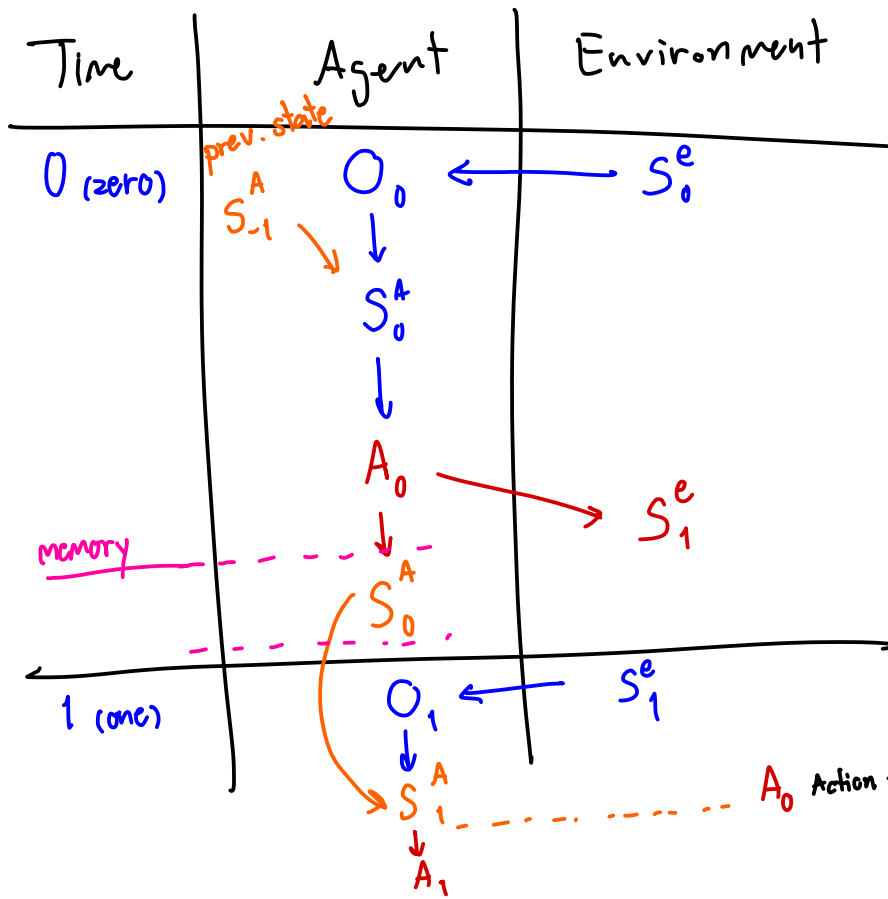
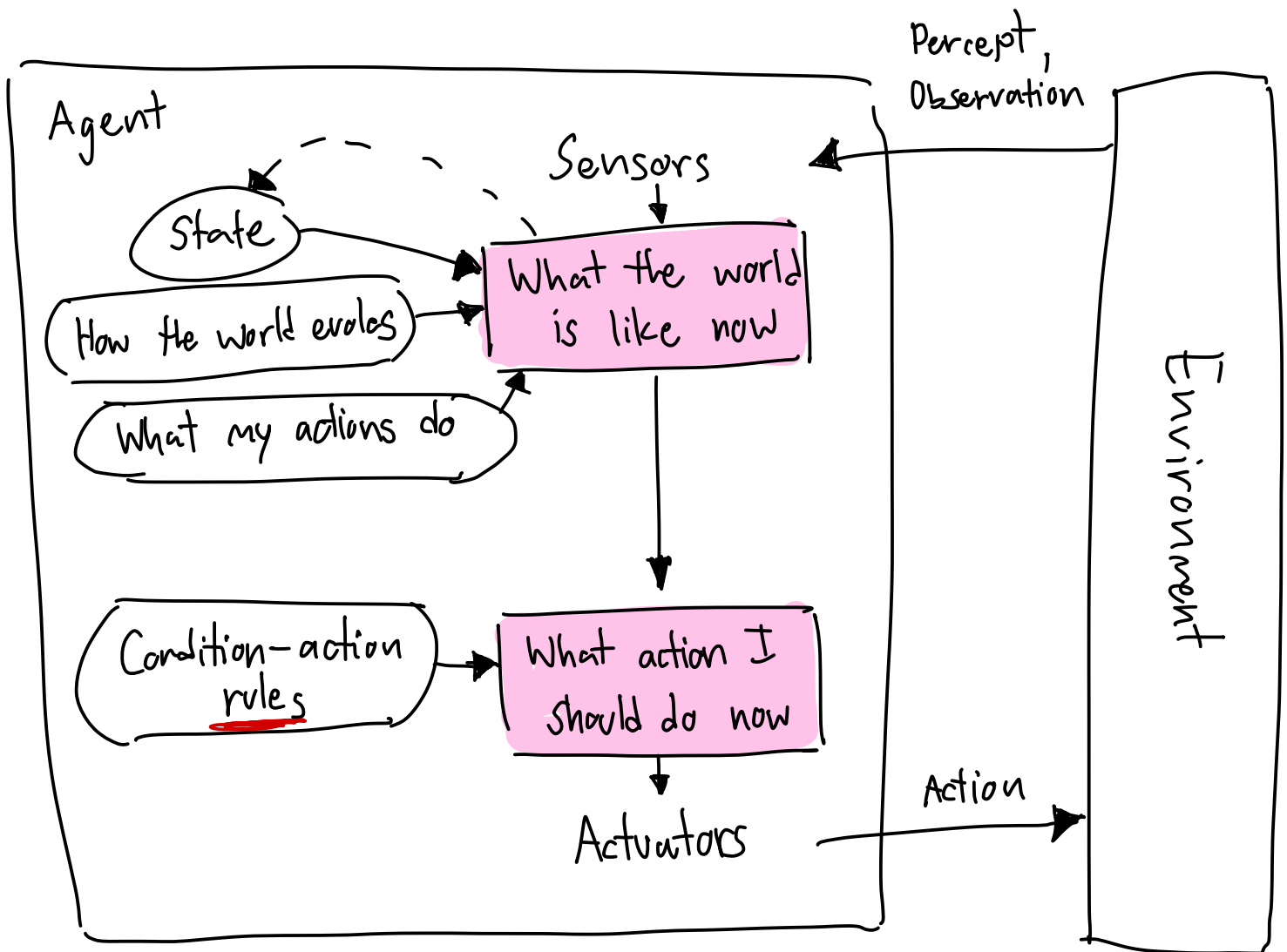
Environment States S^e

> Data in the environment

(1.) $S_t^e \neq O_t$

(2.) S_t^e usually has too many things

Model-based reflex agent



O : Observation
 t : Time
 A : Agent
 S : State
 A : Action

Model-based reflex agent

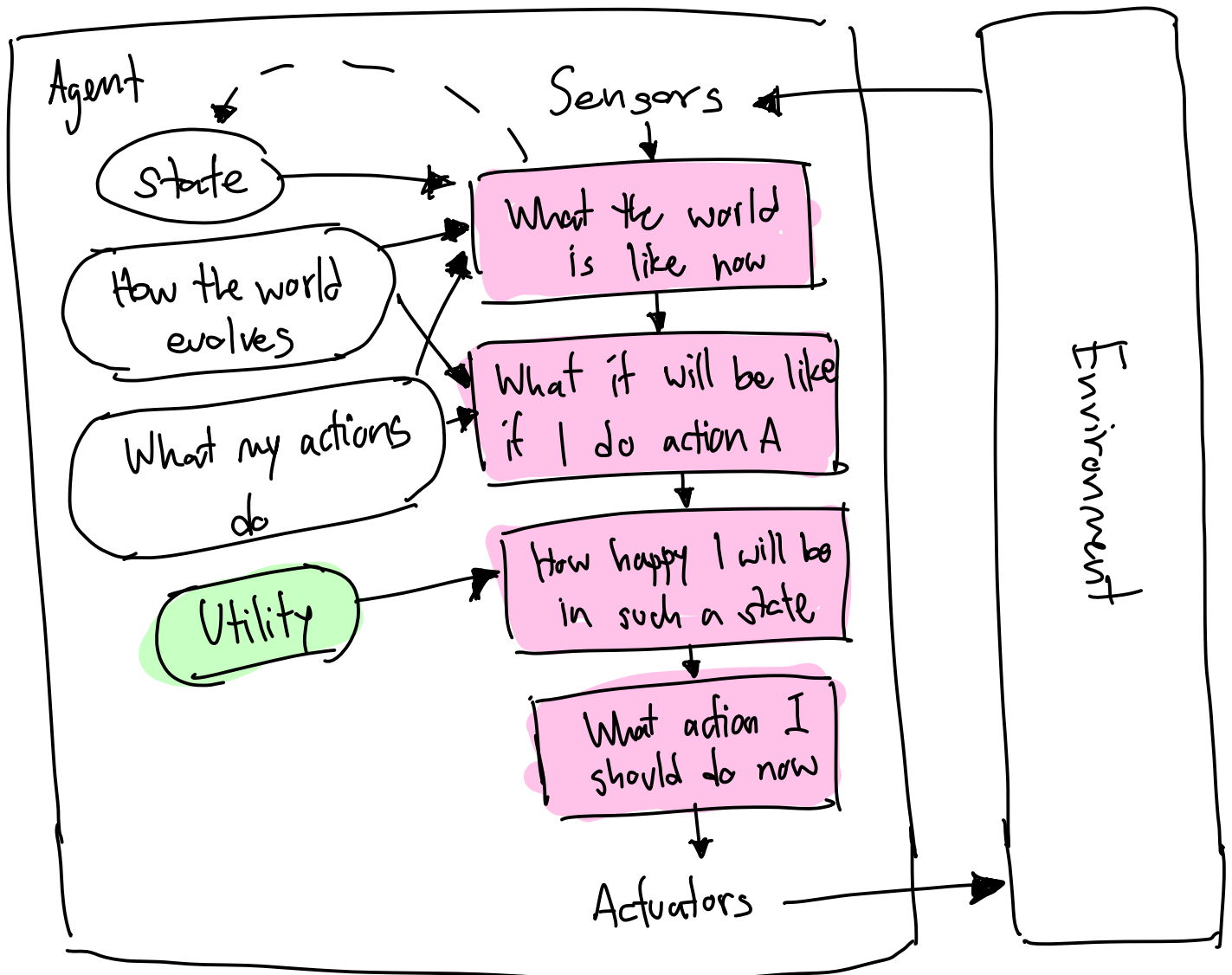
example

```
function MODEL-BASED-REFLEX-AGENT(percept) returns an action
  persistent: state, the agent's current conception of the world state
               transition_model, a description of how the next state depends on
                 the current state and action
               sensor_model, a description of how the current world state is reflected
                 in the agent's percepts
               rules, a set of condition-action rules
               action, the most recent action, initially none

  state ← UPDATE-STATE(state, action, percept, transition_model, sensor_model)
  rule ← RULE-MATCH(state, rules)
  action ← rule.ACTION
  return action
```

- > A Model-based reflex agent.
- > keep track of the current state of the world, using an internal model.
- > Chooses an action in the same as the reflex agent.

Model-based, utility-based agent



- > Model-based, utility-based agent along with utility function preferences among states of the world.
- > Chooses the action that leads to the best expected utility.
- > weighted by the probability of the outcome.

Model-based, utility-based agent

