

## Outline

- ◇ PAGE (Percepts, Actions, Goals, Environment)
- ◇ Environment types
- ◇ Agent functions and programs
- ◇ Agent types
- ◇ Vacuum world

## PAGE

Must first specify the setting for intelligent agent design

Consider, e.g., the task of designing an **automated taxi**:

Percepts?? video, accelerometers, gauges, engine sensors, keyboard, GPS, ...

Actions?? steer, accelerate, brake, horn, speak/display, ...

Goals?? safety, reach destination, maximize profits, obey laws, passenger comfort, ...

Environment?? US urban streets, freeways, traffic, pedestrians, weather, customers, ...

## Internet shopping agent

Percepts??

Actions??

Goals??

Environment??



## Rational agents

Without loss of generality, "goals" specifiable by performance measure defining a numerical value for any environment history

Rational action: whichever action maximizes the expected value of the performance measure given the percept sequence to date

Rational  $\neq$  omniscient

Rational  $\neq$  clairvoyant

Rational  $\neq$  successful



## Environment types

	Solitaire	Backgammon	Internet shopping	Taxi
Accessible??				
Deterministic??				
Episodic??				
Static??				
Discrete??				

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## Agent functions and programs

An agent is completely specified by the agent function mapping percept sequences to actions

(In principle, one can supply each possible sequence to see what it does. Obviously, a lookup table would usually be immense.)

One agent function (or a small equivalence class) is rational

Aim: find a way to implement the rational agent function concisely

An agent program takes a single percept as input, keeps internal state:

```
function SKELETON-AGENT(percept) returns action
  static: memory, the agent's memory of the world
  memory ← UPDATE-MEMORY(memory, percept)
  action ← CHOOSE-BEST-ACTION(memory)
  memory ← UPDATE-MEMORY(memory, action)
  return action
```

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