Intelligent Agents

CHAPTER 2

Internet shopping agent

- **Percepts**:
  - Video, accelerometers, gauges, engine sensors, keyboard, GPS, ...

- **Actions**: steer, accelerate, brake, horn, speak/dial, ...

- **Goals**: safety, reach destination, maximize profits, obey laws, passenger comfort, ...

- **Environment**: US urban streets, freeways, traffic, pedestrians, weather, customers, ...

Rational agents

Without loss of generality, “goals” specifiable by a 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 / efficient
- Rational / constrained
- Rational / successful

Environment types

<table>
<thead>
<tr>
<th>Environment types</th>
<th>Solitaire</th>
<th>Backgammon</th>
<th>Internet shopping</th>
<th>Taxi</th>
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<tr>
<td>Accessible?</td>
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<td>Deterministic?</td>
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<td>Episode?</td>
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<td>Stuck?</td>
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<tr>
<td>Discrete?</td>
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<tr>
<td>Accessible??</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Deterministic??</td>
<td>Yes</td>
<td>No</td>
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<td>Semi??</td>
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<td>Semi</td>
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The environment type largely determines the agent design.
The real world is (of course) inaccessible, stochastic, sequential, dynamic, continuous.

Agent functions and programs

An agent is completely specified by the agent function, mapping percept sequences to actions.
(On 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.

Aims: find a way to implement the rational agent function concisely.

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

Agent types

Four basic types in order of increasing generality:
- Simple reflex agents
- Reflex agents with state
- Goal-based agents
- Utility-based agents

Simple reflex agents

Agent

Sensors → What the world is like now

[Diagram showing condition-action rules and effectors]

Reflex agents with state

Agent

Sensors → What the world is like now → What my actions do

[Diagram showing condition-action rules and effectors]

Goal-based agents

Agent

Sensors → What the world is like now

[Diagram showing goals and effectors]