

Task environment & Structure of agents

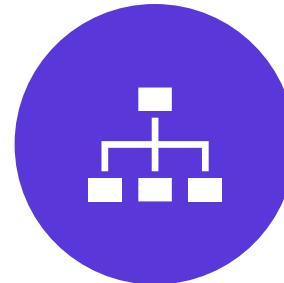
Unit 1 Artificial Intelligence
Subject Code: VBDS1402

A blackboard filled with mathematical calculations and diagrams. At the top right, there is a diagram of a circle divided into four quadrants, with the bottom-left quadrant shaded and labeled 'c'. Below this, there is a triangle labeled 'A'. In the center, there is a large circle containing the text 'x = 9.25'. To the right of this circle, there is a summation formula: $\sum N^{50} \cdot x - \frac{1}{2}$. At the bottom left, there is a binary sequence: [010112, 010002, 011002]. The text 't=4' is written next to it. The background contains various other mathematical symbols and numbers.

In this session you will learn:



Task Environment
examples



Structure of Agents



Agent and
Environment with
respect to Vacuum
Cleaner World



Summary

Examples of task environments with their characteristics

Task Environment	Observable	Agents	Deterministic	Episodic	Static	Discrete
Crossword puzzle	Fully	Single	Deterministic	Sequential	Static	Discrete
Chess with a clock	Fully	Multi	Deterministic	Sequential	Semi	Discrete
Poker	Partially	Multi	Stochastic	Sequential	Static	Discrete
Backgammon	Fully	Multi	Stochastic	Sequential	Static	Discrete
Taxi Driving	Partially	Multi	Stochastic	Sequential	Dynamic	Continuous

Examples of task environments with their characteristics

Task Environment	Observable	Agents	Deterministic	Episodic	Static	Discrete
Medical Diagnosis	Partially	Single	Stochastic	Sequential	Dynamic	Continuous
Image Analysis	Fully	Single	Deterministic	Episodic	Semi	Continuous
Part-Picking robot	Partially	Single	Stochastic	Episodic	Dynamic	Continuous
Refinery Controller	Partially	Single	Stochastic	Sequential	Dynamic	Continuous
Interactive English Controller	Partially	Multi	Stochastic	Sequential	Dynamic	Discrete

Structure of Agents

Agent = Architecture + Program

Architecture: Architecture is machinery that an AI agent executes on.

Agent Function: Agent function is used to map a percept to an action.

$$f:P^* \rightarrow A$$

Agent program: Agent program is an implementation of agent function. An agent program executes on the physical architecture to produce function f.

Difference between Agent program and agent function:

Agent Program takes current percept as input.

Agent function takes the entire percept history.

Table driven agent

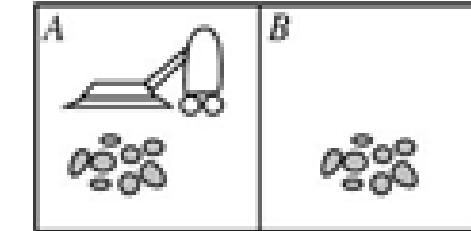
```
function TABLE-DRIVEN-AGENT (percept) returns an action
  persistent: percepts, a sequence, initially empty
    table, a table of actions, indexed by percept sequences, initially fully
    specified
  append percept to the end of percepts
  action ← LOOKUP (percepts, table)
  return action
```

The TABLE-DRIVEN-AGENT Program is invoked for each new percept and returns an action each time. It retains the complete percept sequence in memory.

Agent and environment with respect to vacuum cleaner world

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- Vacuum cleaner world has just two locations: squares A and B.
 - The vacuum agent perceives which square it is in and whether there is dirt in the square.
 - It can choose to move left, move right, suck up the dirt, or do nothing.
 - One very simple agent function is the following: if the current square is dirty, then suck; otherwise, move to the other square.
 - A partial tabulation of this agent function.

Vacuum-cleaner world -



Percepts: location and contents
e.g. [A, Dirty]

Actions: Left, Right, Suck
Function-table (table look-up agent)

Percept	Action
[A, Clean]	Right
[A, Dirty]	Suck
[B, Clean]	Left
[B, Dirty]	Suck

Fill in the blanks (A Quick Recap)

- Chess is a competitive multiagent environment.
- In the taxi-driving environment, avoiding collisions maximizes the performance measure of all agents, so it is a partially cooperative multiagent environment.
- The code repository also includes an environment generator for each environment class that selects particular environment (with certain likelihoods) in which to run the agent.
- Agent = Architecture + Program

Summary

- In this lesson you have learned:
 - Examples of Task environments with their characteristics
 - Structure of Agent Programs
 - Agent and environment with respect to vacuum cleaner world

Chapter 1 Completed
Introduction to AI and Intelligent Agents