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# Artificial Intelligence Lab 3

Task: Model-Based Reflex Agent

## Introduction

In this lab task, we are required to design and implement a Model-Based Reflex Agent. Unlike a simple reflex agent that only reacts to the current situation, a model-based reflex agent also keeps track of the previous state or action. This allows the agent to make more intelligent decisions and avoid repeating unnecessary operations.

## Objective

The main objective of this task is to create an agent that controls a heater system based on the current temperature. The agent should:  
- Turn ON the heater when the temperature is below the desired level.  
- Turn OFF the heater when the temperature is above the desired level.  
- Avoid unnecessary ON/OFF switching by remembering the previous action.

## Working of the Agent

1. The agent takes the desired temperature as a reference.  
2. It continuously checks the current temperature from the environment.  
3. If the temperature is lower than the desired value and the heater is not already ON, the agent will turn ON the heater.  
4. If the temperature is higher than the desired value and the heater is not already OFF, the agent will turn OFF the heater.  
5. If the current temperature is equal to the desired temperature, the agent keeps the last action without making unnecessary changes.

## Implementation (Python Code)

class ModelBasedReflexAgent:  
 def \_\_init\_\_(self, desired\_temp):  
 self.desired\_temp = desired\_temp  
 self.last\_action = None  
  
 def decide(self, current\_temp):  
 if current\_temp < self.desired\_temp:  
 if self.last\_action != "HEATER ON":  
 self.last\_action = "HEATER ON"  
 return "Turn HEATER ON"  
 else:  
 return "Keep HEATER ON"  
  
 elif current\_temp > self.desired\_temp:  
 if self.last\_action != "HEATER OFF":  
 self.last\_action = "HEATER OFF"  
 return "Turn HEATER OFF"  
 else:  
 return "Keep HEATER OFF"  
  
 else:  
 return f"No Change ({self.last\_action})"  
  
# Example usage  
agent = ModelBasedReflexAgent(desired\_temp=25)  
temperatures = [20, 22, 25, 27, 24]  
for t in temperatures:  
 print(f"Current Temp: {t} -> Action: {agent.decide(t)}")

## Sample Output

Current Temp: 20 -> Action: Turn HEATER ON  
Current Temp: 22 -> Action: Keep HEATER ON  
Current Temp: 25 -> Action: No Change (HEATER ON)  
Current Temp: 27 -> Action: Turn HEATER OFF  
Current Temp: 24 -> Action: Turn HEATER ON