SNS COLLEGE OF ENGINEERING

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Department of AI &DS

Course Name – 23ADT201 ARTIFICIAL INTELLIGENCE

II Year / III Semester

Unit 1-INTELLIGENT AGENTS
Topic:STRUCTURE OF AGENTS

Case Study: Autonomous Customer Support Chatbot

Objective: To develop an AI-driven chatbot capable of autonomously handling customer inquiries, learning from interactions, and improving over time.

Overview: The autonomous customer support chatbot is designed to assist users by answering queries, resolving issues, and providing information. The chatbot leverages machine learning to enhance its performance based on user interactions and feedback.

1. Basic Structure of an AI Agent

The fundamental structure of an AI agent typically includes the following components:

- **Sensors**: These are the mechanisms by which the agent perceives its environment. Sensors gather data or information from the environment. For instance, a camera can act as a sensor for visual information, while a microphone might capture audio.
- **Actuators**: Actuators are the components through which the agent interacts with or affects the environment. For example, in a robotic system, motors and servos might act as actuators to perform movements or manipulations.
- **Agent's Architecture**: This is the internal structure of the agent that processes the information received from the sensors and decides on the actions to be performed through the actuators.

Types of AI:

AI agents can be classified based on their architecture and complexity:

- **Simple Reflex Agents**:
  - **Architecture**: They operate based on a set of condition-action rules. They react to the current percept without considering the history of previous states.
  - **Example**: A thermostat that adjusts the temperature based on the current temperature reading.
- **Model-Based Reflex Agents**:
  - **Architecture**: They maintain an internal state to keep track of the environment's history. This internal model helps in dealing with partially observable environments.
  - **Example**: A robot vacuum cleaner that remembers areas it has already cleaned.
- **Goal-Based Agents**:
  - **Architecture**: They use a goal or objective to guide their actions. These agents can plan and make decisions based on the desired outcome.
  - **Example**: A navigation system that plans the route to reach a specific destination.

Types of AI:

- **Utility-Based Agents**:
  - **Architecture**: They evaluate actions based on a utility function that measures the satisfaction of their goals. These agents aim to maximize their overall happiness or performance.
  - **Example**: A financial trading system that makes decisions to maximize profit.
- **Learning Agents**:
  - **Architecture**: They have the capability to learn and adapt from their experiences. Learning agents improve their performance over time based on feedback from the environment.
  - **Example**: A recommendation system that improves its suggestions based on user feedback.

AGENT ARCHITECTURE MODEL

- **Reactive Architecture**:
  - **Structure**: Emphasizes immediate responses to stimuli. It does not maintain internal state or history.
  - **Usage**: Often used in simple, reactive systems.
- **Deliberative Architecture**:
  - **Structure**: Involves complex reasoning and planning. It maintains internal models of the environment and considers future states.
  - **Usage**: Used in systems requiring sophisticated planning and decision-making.
- **Hybrid Architecture**:
  - **Structure**: Combines reactive and deliberative approaches. It uses both immediate responses and long-term planning.
  - **Usage**: Useful in systems requiring both quick reactions and complex planning.

Components of a Learning Agent

A learning agent incorporates several additional elements:

- **Learning Element**: This component is responsible for learning from experiences. It adjusts the agent's behavior based on feedback or new data.
- **Performance Element**: Executes the actions based on the current policy or strategy.
- **Critic**: Provides feedback to the learning element about the performance of actions and decisions, often in the form of rewards or penalties.
- **Adaptor**: Adjusts the agent's behavior or strategies based on learning from past experiences and feedback.

Implementation Considerations

- **Scalability**: The agent's architecture must be scalable to handle various levels of complexity, from simple tasks to complex decision-making scenarios.
- **Robustness**: The architecture should be robust to handle uncertainties and variations in the environment effectively.
- **Efficiency**: The agent must operate efficiently, balancing computational resources with performance.

THANK YOU