SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

23AMB201 - MACHINE LEARNING

II YEAR IV SEM

UNIT V – REINFORCEMENT LEARNING

TOPIC 1,2 – Introduction - Single State Case-Elements of Reinforcement Learning

1. Reinforcement Learning solutions are computational approaches to learning from interactions with an environment that solve sequential decision-making problems. They are a type of machine learning that learns from interacting with an environment that gives feedback.
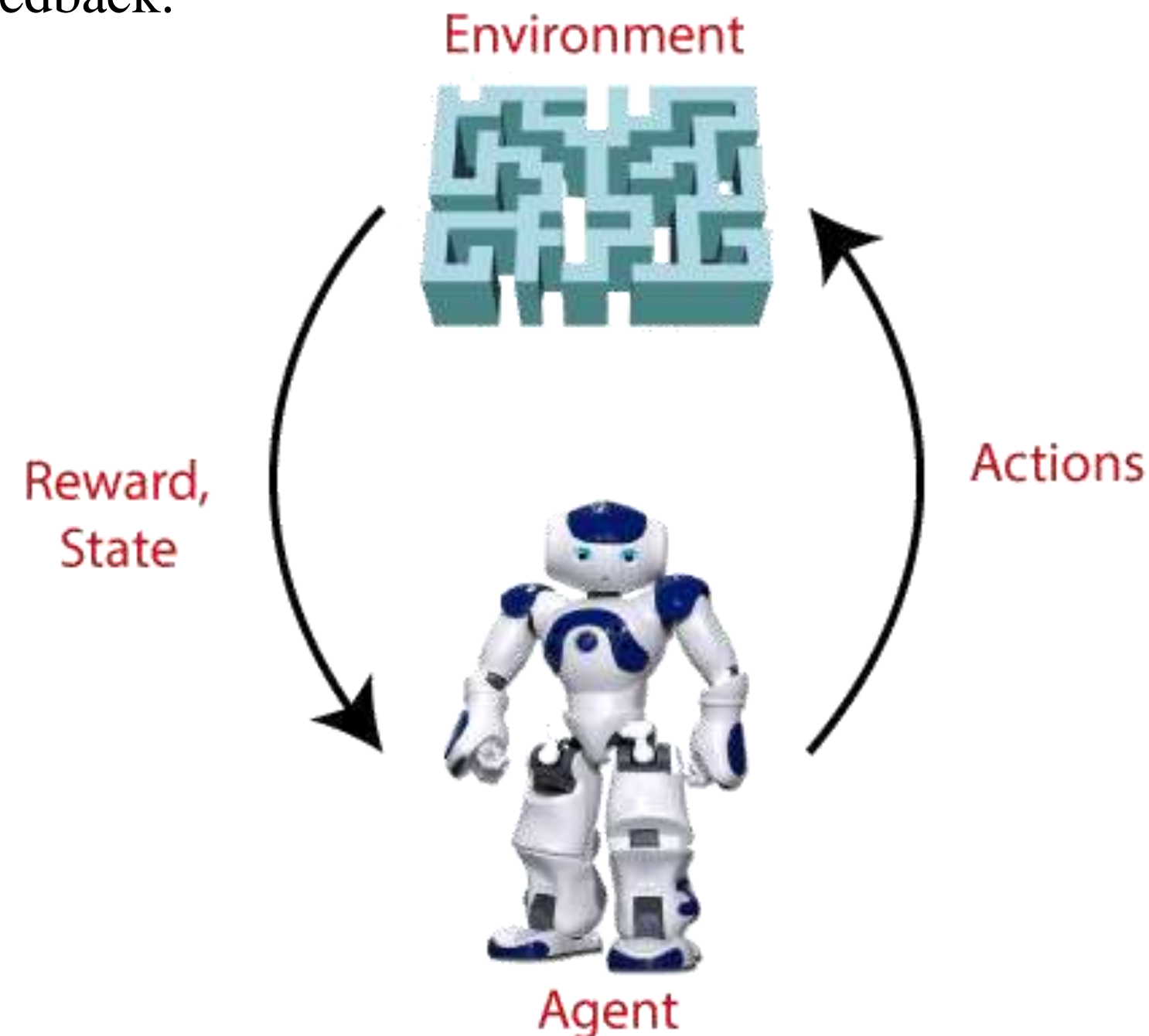
In **Reinforcement Learning (RL)**, a **single-case state** typically refers to a situation where the environment can be described with only **one state** — that is, the agent always starts and remains in the same state throughout the interaction.

Characteristics of a Single-Case State

1. **No state transitions**: The state does not change regardless of the actions taken.

2. **Simplified environment**: It removes the complexity of modeling multiple states and transitions.

3. **Focus on action selection**: The agent's goal is to learn the best action(s) to take in that fixed state to maximize reward.

4. **Can be used for testing or toy problems**: Useful in introductory scenarios or theoretical analysis.
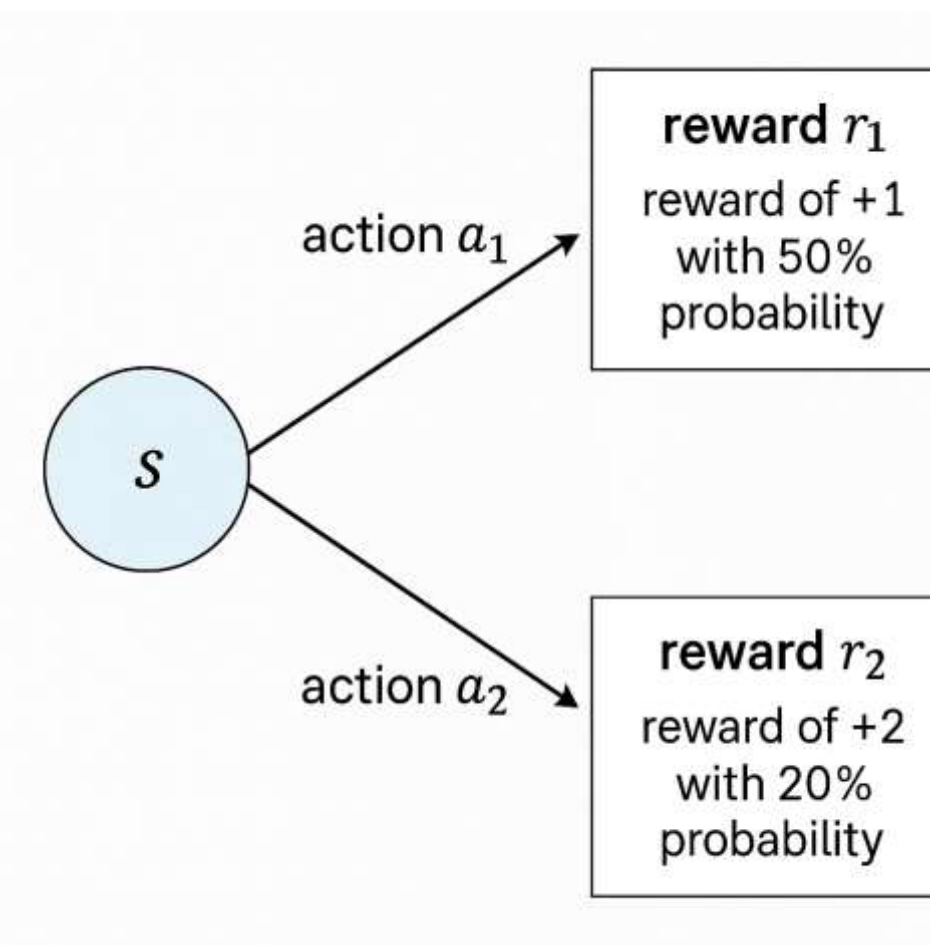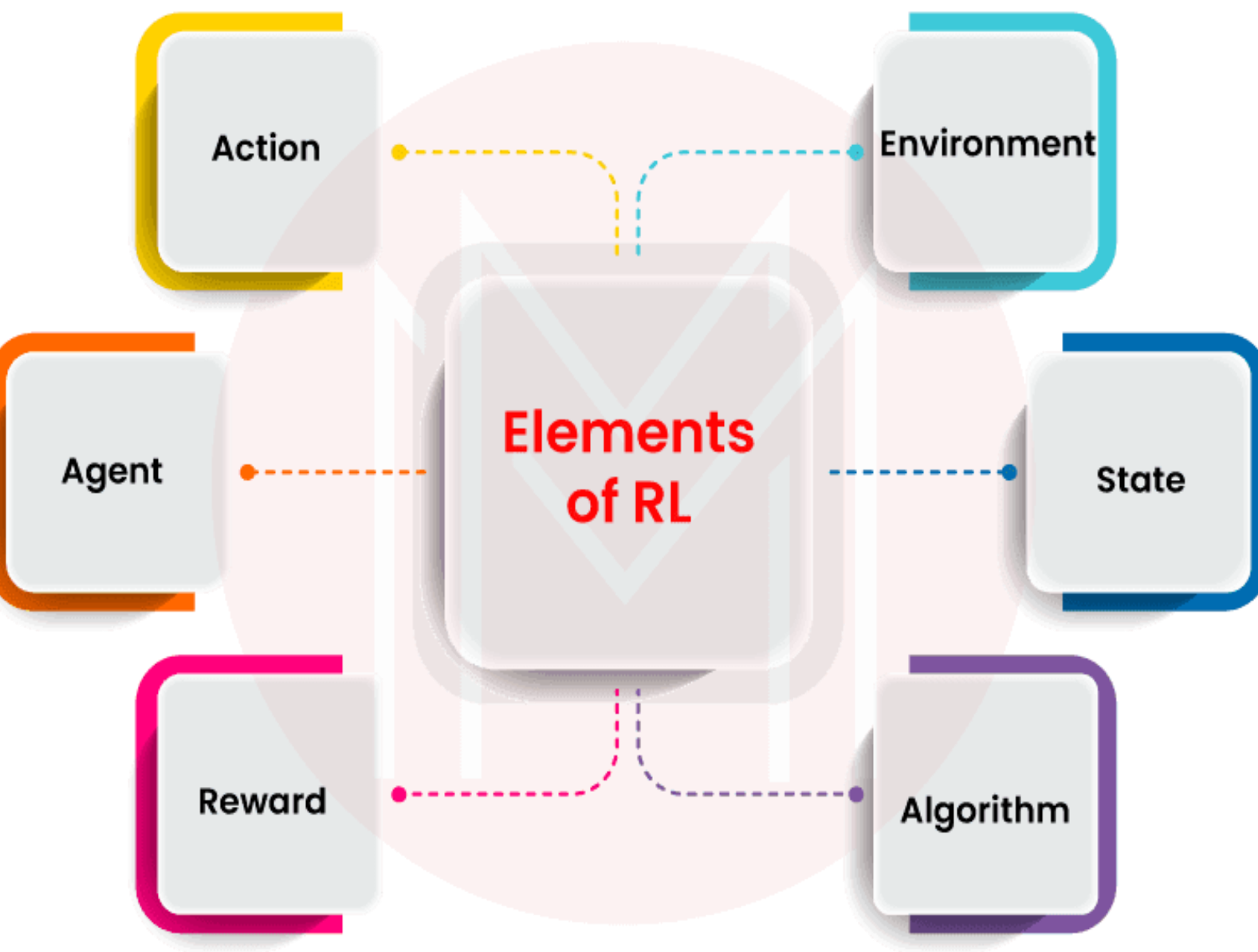
Suppose an agent is in a room with two buttons:

1. Button A gives a reward of +1 with 50% probability.

2. Button B gives a reward of +2 with 20% probability.

The agent always starts and ends in the same room (state). Over time, it

must learn which button to press more frequently to maximize its

expected reward.

Environment(): A situation in which an agent is present or surrounded by.

Agent(): An entity that can perceive/explore the environment and act upon it.

Action(): Actions are the moves taken by an agent within the environment.

State(): State is a situation returned by the environment after each action taken by the agent.

Policy(): Policy is a strategy applied by the agent for the next action based on the current state.

Reward(): A feedback returned to the agent from the environment to evaluate the action of the agent.

Value(): It is expected long-term retuned with the discount factor and opposite to the short-term reward.

Q-value(): It is mostly similar to the value, but it takes one additional parameter as a current action.