

# Reinforcement Learning

- **Reinforcement Learning** is a type of **machine learning** in which an **agent learns** to make decisions by **interacting with an environment** and receiving **rewards or penalties** for its actions.



# Reinforcement Learning

## Basic Components of Reinforcement Learning

- **Agent** – The learner or decision maker
- **Environment** – The system the agent interacts with
- **State (S)** – Current situation of the agent
- **Action (A)** – Choice made by the agent
- **Reward (R)** – Feedback from the environment



# Reinforcement Learning

## Example : Training a Dog

- Agent → Dog
- Environment → Home
- Action → Sit / Jump
- Reward → Biscuit (positive)
- Goal → Learn correct behavior



# Reinforcement Learning

## Working of Reinforcement Learning

- Agent observes the **current state**
- Agent selects an **action** using a policy
- Environment gives a **reward** and next state
- Agent updates its knowledge
- Steps repeat until optimal behavior is learned



# Reinforcement Learning

## Types of Reinforcement Learning

- **Positive Reinforcement**
  - Reward increases desired behavior
  - Example: Bonus for correct move
- **Negative Reinforcement**
  - Penalty discourages bad behavior
  - Example: Losing points



# Reinforcement Learning

## Applications of Reinforcement Learning

- Game AI (AlphaGo, Chess)
- Robotics
- Self-driving cars

