What is Reinforcement Learning?

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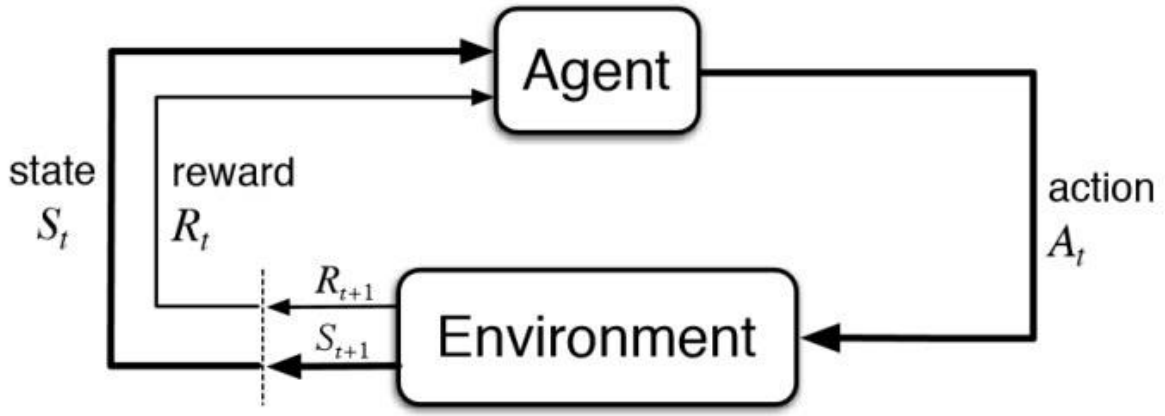
What is reinforcement learning?

Reinforcement Learning (RL) is a type of machine learning technique that enables an agent to learn in an interactive environment by trial and error using feedback from its own actions and experiences.

Though both supervised and reinforcement learning use mapping between input and output, unlike supervised learning where feedback provided to the agent is correct set of actions for performing a task, reinforcement learning uses rewards and punishment as signals for positive and negative behaviour.

As compared to unsupervised learning, reinforcement learning is different in terms of goals. While the goal in unsupervised learning is to find similarities and differences between data points, in reinforcement learning the goal is to find a suitable action model that would maximize the total cumulative reward of the agent. The figure below represents the basic idea and elements involved in a reinforcement learning model.



Some key terms that describe the elements of a RL problem are:

Environment: Physical world in which the agent operates
State: Current situation of the agent
Reward: Feedback from the environment
Policy: Method to map agent's state to actions
Value: Future reward that an agent would receive by taking an action in a particular state

A Reinforcement Learning problem can be best explained through games. Let's take the game of PacMan where the goal of the agent (PacMan) is to eat the food in the grid while avoiding the ghosts on its way. The grid world is the interactive environment for the agent. PacMan receives a reward for eating food and punishment if it gets killed by

the ghost (loses the game). The states are the location of PacMan in the grid world and the total cumulative reward is PacMan winning the game.

Since, RL requires a lot of data, therefore it is most applicable in domains where simulated data is readily available like gameplay, robotics.

RL is quite widely used in building AI for playing computer games. AlphaGo Zero is the first computer program to defeat a world champion in the ancient Chinese game of Go. Others include ATARI games, Backgammon, etc

In robotics and industrial automation, RL is used to enable the robot to create an efficient adaptive control system for itself which learns from its own experience and behaviour. DeepMind's work on Deep Reinforcement Learning for Robotic Manipulation with Asynchronous Policy updates is a good example of the same.

Other applications of RL include text summarization engines, dialog agents (text, speech) which can learn from user interactions and improve with time, learning optimal treatment policies in healthcare and RL based agents for online stock trading.

To learn more check out this great resources: https://www.daisyintelligence.com/reinforcement-learning-ai/

THE END