



Reinforcement Learning

Learn from mistake.....



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Reinforcement learning

- Reinforcement learning works on a **feedback-based process**, in which an AI agent (A software component) automatically explore its surrounding by hitting & trail, taking action, learning from experiences, and **improving its performance**.
- Agent gets **rewarded** for each good action and get **punished** for each bad action; hence the goal of reinforcement learning, agent is to maximize the rewards.
- In this , there is no labelled data like supervised learning, and agents learn from their experiences only.
- For example, a child learns various things by experiences in his day-to-day life.
- Agent receives feedback in terms of punishment and rewards.

Reinforcement Learning

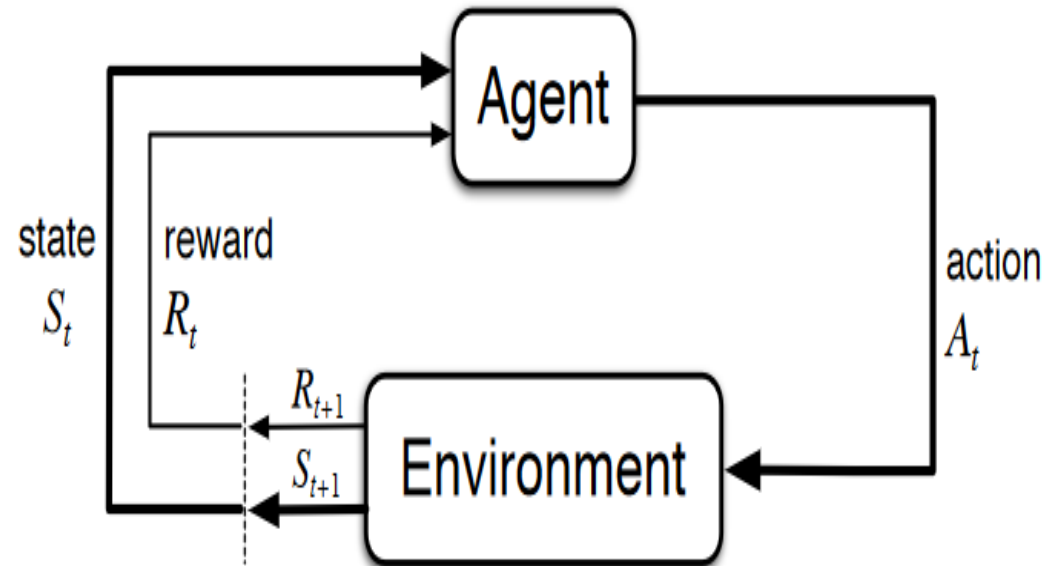


Figure 3.1: The agent–environment interaction in a Markov decision process.



Types Of Reinforcement Learning

- Reinforcement learning is categorized mainly into two types of methods/algorithms:
 - ✓ Positive Reinforcement Learning
 - ✓ Negative Reinforcement Learning

Positive Reinforcement Learning:

- Positive reinforcement learning specifies increasing the tendency that the required behavior would occur again by adding something.
- It **enhances the strength of the behavior** of the agent and positively impacts it.

Negative Reinforcement Learning:

- Negative reinforcement learning works exactly opposite to the positive RL.
- It increases the tendency that the specific behaviour would occur again by avoiding the negative condition.

Example-positive & negative Reinforcement learning

How to practice reinforcement with kids?

POSITIVE



- Making their favorite dish after they finish their homework.
- Taking them to a park if they clean their room.
- Clapping and cheering them every time they solve a math problem!
- Complying with a request if they ask you politely.

NEGATIVE



- Studying really hard to avoid getting failed in the exams.
- Putting one's toys at the right place after playing to avoid getting them lost or misplaced.
- Doing their homework on time to save their television privileges.
- Eating healthy to avoid falling sick.



Reinforcement Learning Use cases



- Video Games
- Resource Management
- Robotics
- Text Mining



	Supervised Learning	Unsupervised Learning
Training Data	Requires labeled data with known outputs	Works with unlabeled data
Task	Prediction or Classification tasks	Clustering or Dimensionality Reduction
Learning Approach	Learns from labeled data and feedback	Learns from inherent patterns or structures
Examples	Linear Regression, Logistic Regression,	K-means Clustering, Hierarchical Clustering,
	Decision Trees, Support Vector Machines,	Principal Component Analysis (PCA),



Exercise

- Suppose your email program watches which emails you do or do not mark as spam, and based on that learns how to better filter spam. What is the task T in this setting?
 - A) Classify emails as spam or not Spam
 - B) Watching you label emails as spam or not spam
 - C) The number of emails correctly classified as spam /or not spam



Exercise

- A toy shop wants to predict the number of Barbie doll which would be sold the next three months. What type of problem is this ?

A) Unsupervised

B) Supervised

C) Reinforcement

D) None



Exercise

- What kind of learning is required to group a set of unlabeled dolls a Barbie, Frozen and others

A) Unsupervised

B) Supervised

C) Reinforcement

D) None



Exercise

- A software is designed to evaluate whether a customer account is hacked or not is an example of

A) Unsupervised

B) Supervised Classification

C) Supervised Regression

D) None



Exercise

Identify the unsupervised learning algorithm

- Given email labeled as spam/not spam learns a spam filter.
- Given a set of new articles found on the web, group them in articles under finance, movie and ,political domain.
- Given a database of patients diagnosed as either having diabetes or not, learn to classify new patterns as having diabetes or not.
- Given a database of customer data , automatically discover market segments and group customers into different domain.

APPLICATIONS OF MACHINE LEARNING

INTELLIGENT AGENTS,
NATURAL LANGUAGE
PROCESSING ETC.

Virtual Assistant



SENTIMENT ANALYSIS,
FILTERING SPAM ETC.

Social Media



Machine
Learning
Applications

eCommerce



Transport



SAFETY
MONITORING,
AIR TRAFFIC
CONTROL ETC.

CUSTOMER
SUPPORT,
PRODUCT
RECOMMENDATION
, ADVERTISING,

Healthcare



Financial Services



ALGORITHMIC TRADING,
PORTFOLIO MANAGEMENT,
FRAUD DETECTION

DRUG DISCOVERY,
DISEASE DIAGNOSIS,
ROBOTIC SURGERY

Users Of Machine Learning

