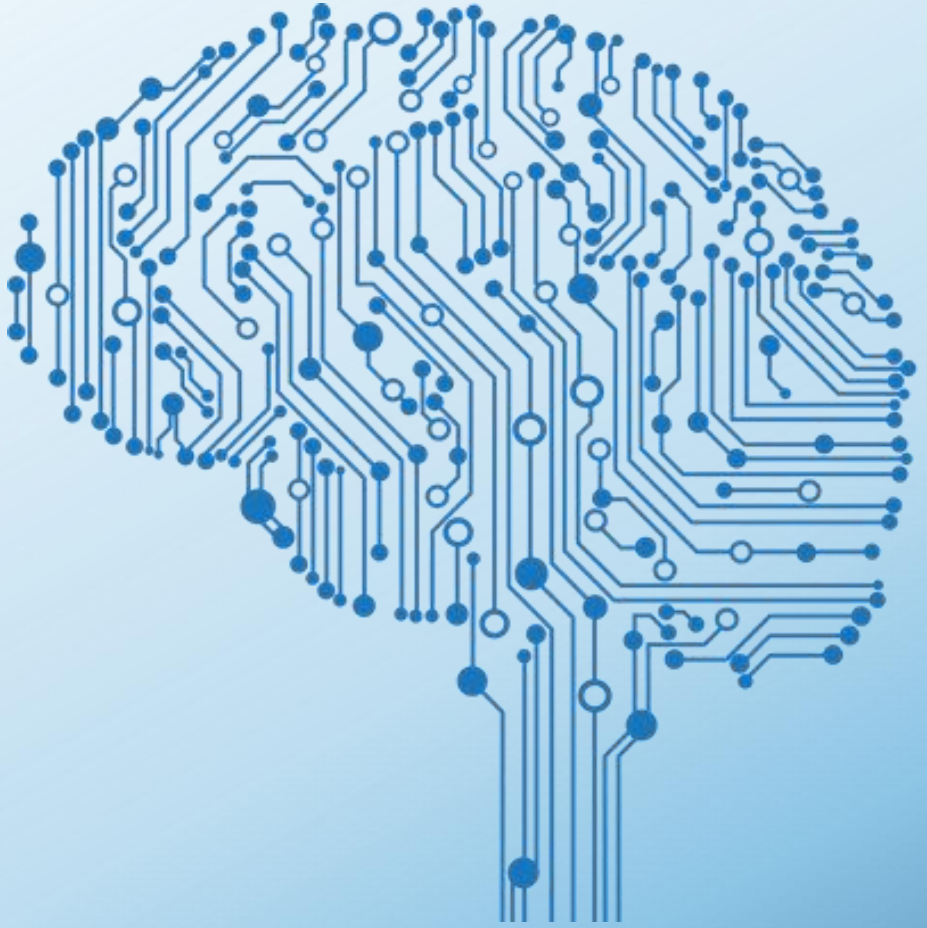
IntelliPaat

Reinforcement Learning



Agenda

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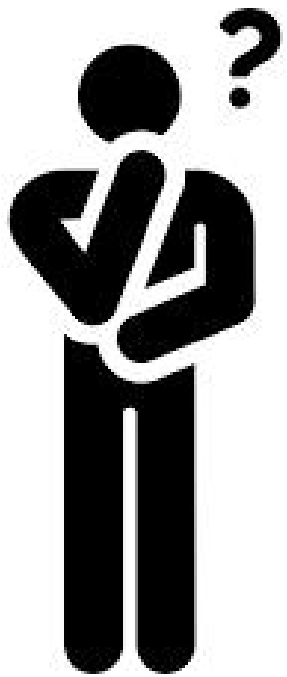
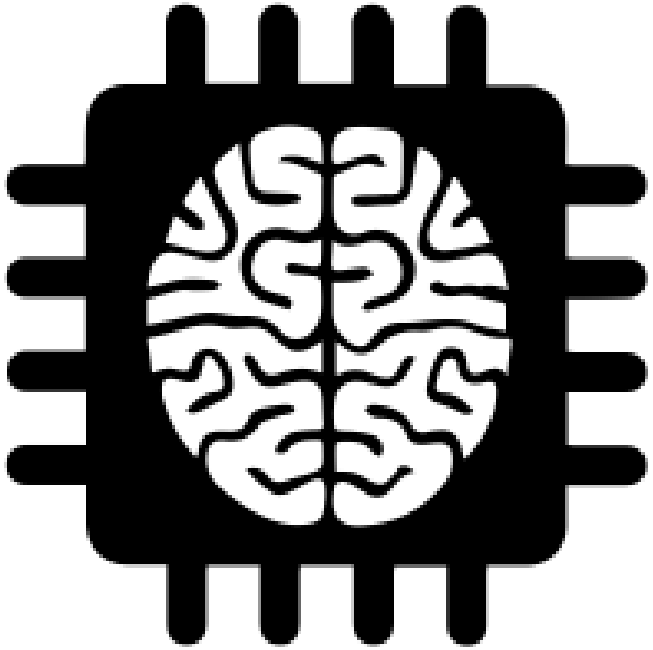
What is Machine Learning?

Machine Learning

It is the application of AI that provides systems the ability to learn and improve based on experience with the given data without being programmed explicitly.

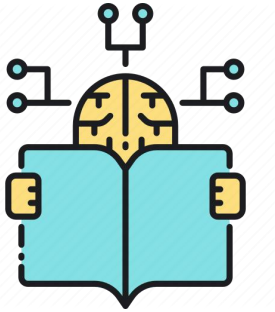




Branches of Machine Learning

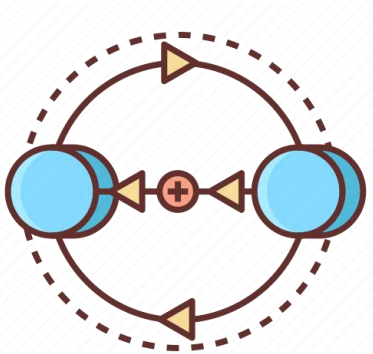
Branches of Machine Learning

Unsupervised Learning



Supervised Learning

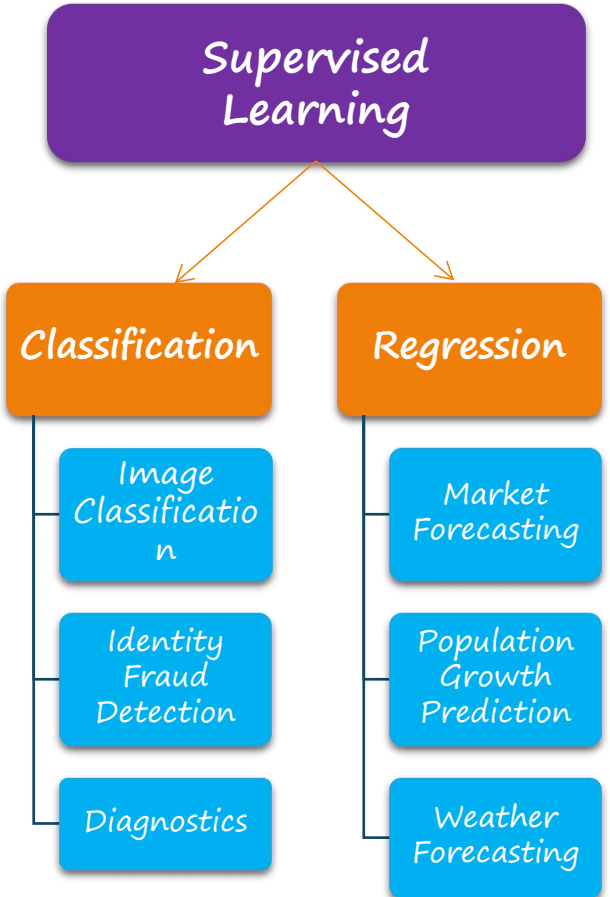
Machine Learning

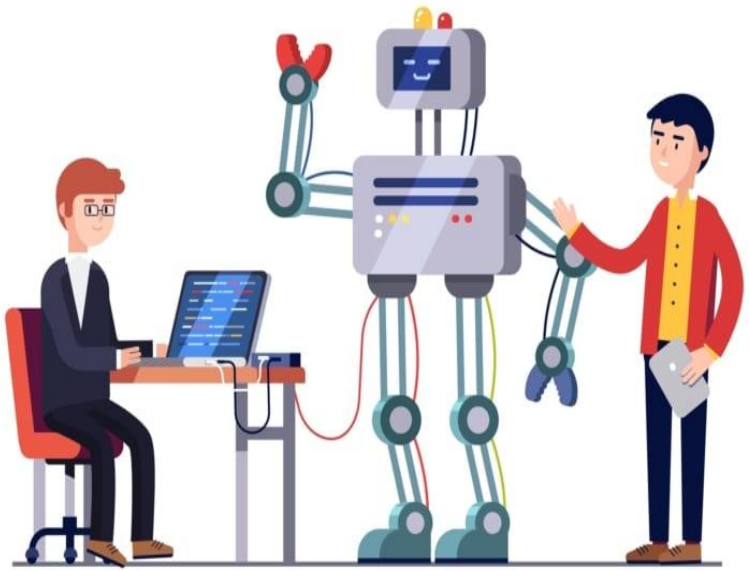


Reinforcement Learning

Supervised Learning

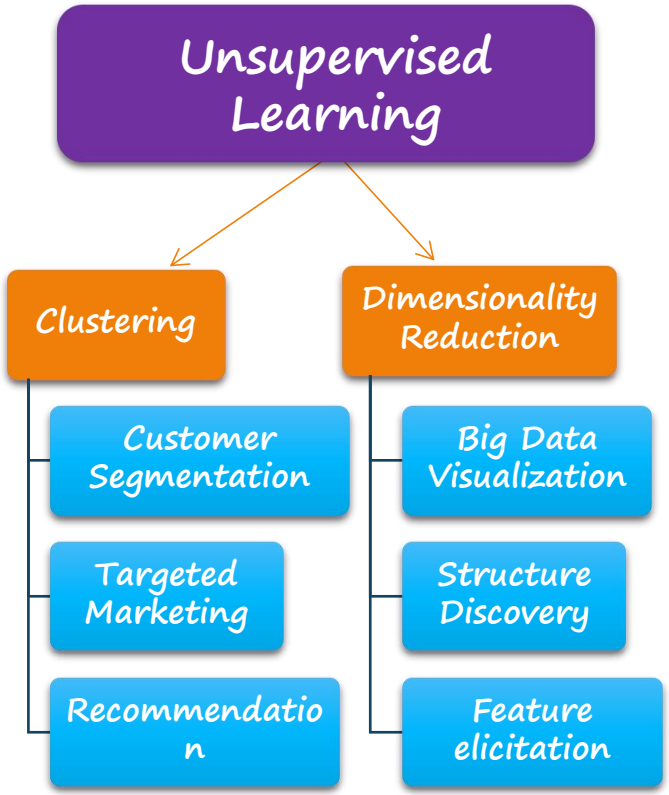
In Supervised Learning, we train the machine with the help of labeled data so that it can predict the future events.

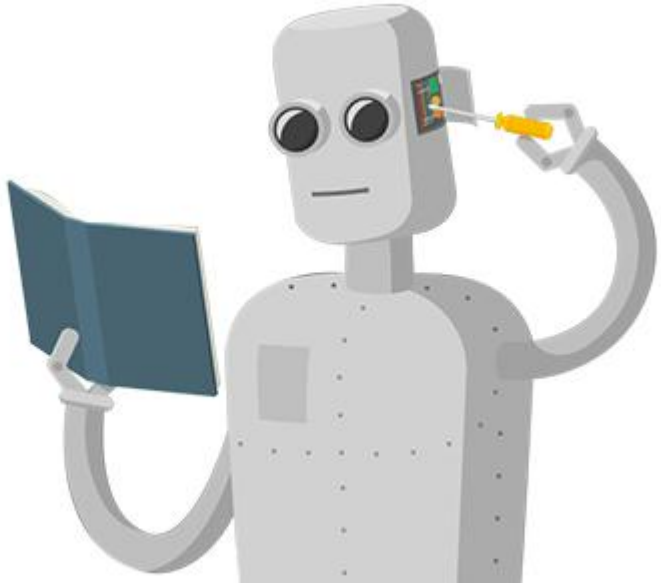




Unsupervised Learning

In Unsupervised Learning, instead of training the machines with labelled data, we let the machines get trained on their own on the given information without any guidance.





What is Reinforcement Learning?

Reinforcement Learning

Reinforcement Learning includes training of the algorithms using a system of reward and punishment. A reinforcement learning algorithm, or an agent, learn by communicating with its environment.

But how does the algorithm knows what is wrong and what is right?

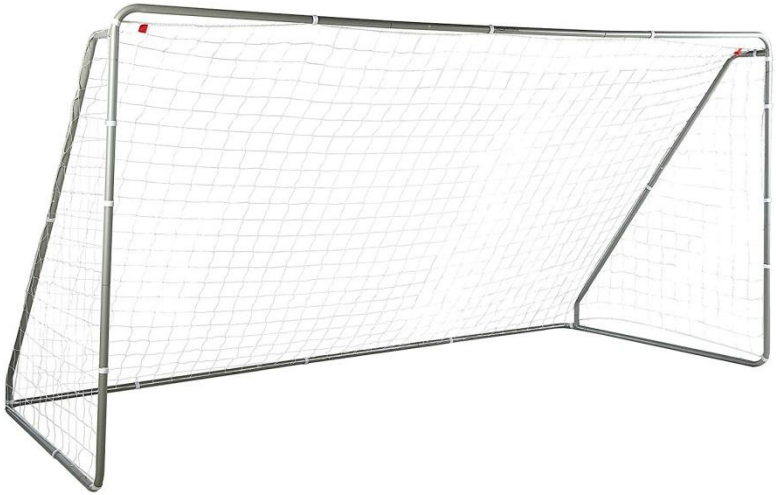
So, while performing certain actions, the agent/algorithm receives rewards by performing correctly and penalties for performing incorrectly. The agent learns without any interference from a human by maximizing its reward and minimizing its penalty.

The Reinforcement Learning Process

Reinforcement Learning

The main idea behind Reinforcement Learning is that an agent/algorithm will learn from the environment by associating with it and receiving rewards for executing certain actions. Now let us understand it with a simple example:

Let's say there is footballer who tries score a goal

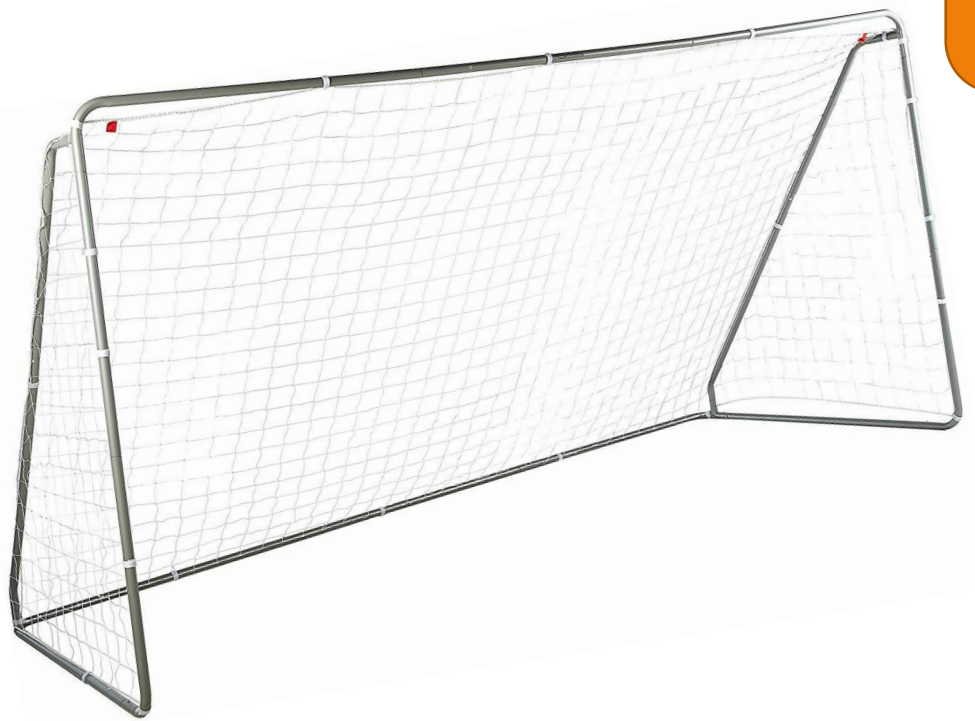


But unfortunately he misses the goal. The goal keeper catches the ball.

So now here he will get -1 as his reward

-1

Again he tries to goal a score. He has now adjusted his position and kicks the ball



Now he has successfully scores a goal. So, here he gets +1 as his reward.

+1

Elements of Reinforcement Learning

Reinforcement Learning Elements

So basically there are 7 main components of Reinforcement Learning:

- Agent
- Environment
- State
- Action
- Reward
- Policy
- Value function

The **agent in RL** is the component that makes the decision of what action to take.

The **environment** is the setting on which the agent is performing certain actions.

The **state** describes the current situation of the agent in the environment.

Actions are the Agent's methods which allow it to interact with its environment, and thus transfer between states.

Every **action** performed by the Agent yields a reward from the environment.

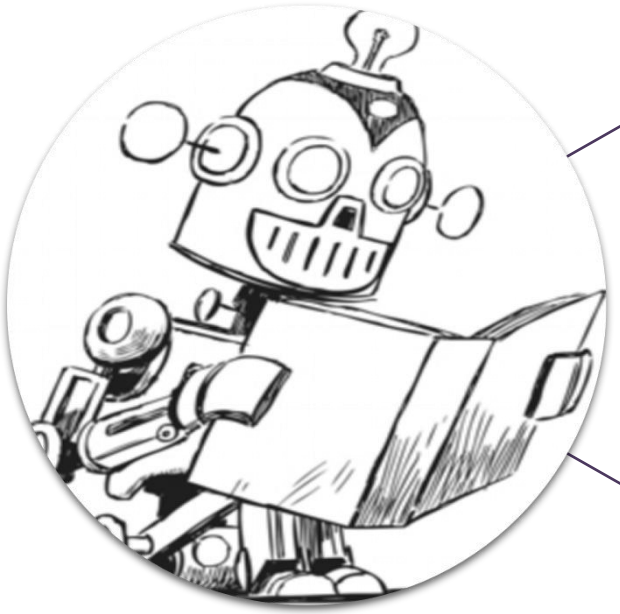
Reinforcement Learning Elements

Policy defines the learning agent's way of behaving at a given time. It is the approach that the agent uses to estimate the next action.

The value function represent how good is a state for an agent to be in. It is often denoted by V(s) where s is the current state.

Classification of RL Agents

Classification of RL Agent



Reinforcement Learning Agent

Model Based Reinforcement Learning

- Model-based reinforcement learning has an agent try to understand the world and create a model to represent it.

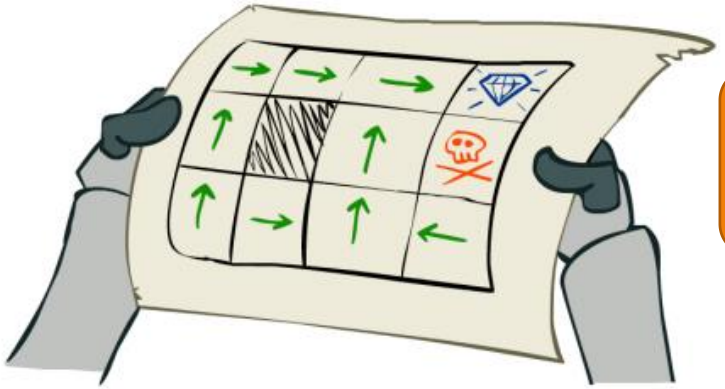
Model Free Reinforcement Learning

- Model-free methods learn directly for experience, this means that they perform actions either in the real world or in the computer.
- Then they collect the reward from the environment, whether positive or negative, and they update their value functions.

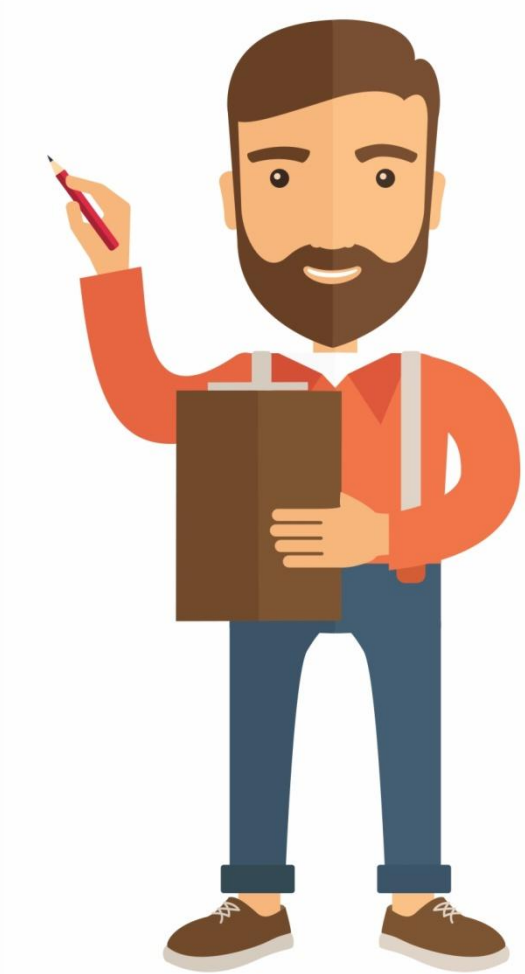
Reinforcement Learning Problems

Reinforcement Learning Problems

Multi Armed Bandit



Markov Decision Process



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