Reinforcement Learning

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In order to inculcate the concept of Reinforcement Learning we need to draw the outline for the Hierarchy of Artificial Intelligence first. So, AI is the broad term for training model so as to enable machines on operating autonomously. Then comes Machine learning that is a subset of artificial intelligence where the computer program derives rules from the data itself. It uses a variety of data collected in the past to uncover patterns hidden in that data. The patterns are then used to create a model, which is applied to new data to provide a more well-informed and adaptive prediction. And eventually Reinforcement learning being a subset of machine learning is where the computer program dynamically learns by adjusting actions based on continuous feedback to maximize a reward. Like for example machines that learn to play chess from actually playing the game over time. Hereafter we need to familiarise with the Reinforcement Learning terminologies such as, Agents, Environment, State, Action and Rewards etc. Every Reinforcement Learning model has an Agent, which is a piece of software that acts autonomously in a given environment to reach a specified goal. The Environment is the surrounding area that the agent interacts within. While interacting with the environment the agent encounters several states. State is defined by the current position within the environment that is known to the agent. In other words, the state is what the agent's perspective of the environment. For every state, our agent must take an Action to try and achieve its goal. Depending on which action the agent takes in a given state, it will be given a Reward. If the chosen action gets the agent closer to the goal, this action is reinforced for the future through a positive reward. If the action is unhelpful, it is discouraged with either a negative reward or no reward at all. This reward is provided by the environment and specified through a Reward Function, which is code written to incentivize behaviour through parameters defined by the creator of the environment. In Reinforcement Learning what drives the learning is called the agent. The environment is the place where the agent learns. And when the agent does something in the environment that provokes a response such as crossing a boundary it shouldn't cross that's called an action. The response is considered either a reward or penalty depending on whether the agent did something to be reinforced or discouraged in the model purely based on its reward function. As the agent moves within the environment its actions should start receiving more and more rewards and fewer and fewer penalties so as to maximize efficiency until it meets the desired outcome.

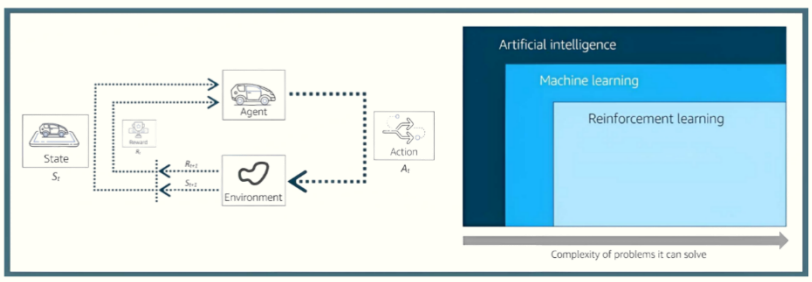

Fig.: Working principle of Reinforcement Learning & Hierarchy of Artificial Intelligence