

### **Abstract**

Reinforcement learning (RL) is an area of machine learning concerned with how intelligent agents ought to take actions in an environment in order to maximize the notion of cumulative reward. Deep reinforcement learning is the combination of reinforcement learning (RL) and deep learning. DRL has applications in many fields like medicine, robotics, games, etc. RL works on Markov Decision Process which leads to Q-learning. MDP provides a mechanism to maximize the reward in a given environment. Combining DL and RL leads to the formation of Deep Q-Networks. RL holds great importance in creating AI for games. Few AIs have managed to defeat world champions in a few games like chess. When we dive deeper into RL, we encounter more complex multi-agent environments. The main challenge in multi-agent environments is to understand the interaction between agents. There are certain techniques to deal with such environments including Graph Convolutional Reinforcement Learning. Particular focus is on exploring these concepts and generalizing DRL and exploring its use in more practical applications like personalized recommendations systems, etc.

**Keywords:** Reinforcement Learning, Deep Reinforcement Learning, Machine Learning, Artificial Intelligence, MDP, Neural Networks.

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