Reinforcement Learning Notes

Kiran Kannar

July 16, 2025

Contents

1 Introduction to Reinforcement Learning **2**
1.1 Elements of RL 2

1 Introduction to Reinforcement Learning

Computational approach to **goal-directed** learning by an agent from interactions with an environment.

- Trial-and-error search
- Delayed reward
- Exploration vs exploitation
- Model-based vs model-free

Broadly, maximize reward signa l, despite uncertainty about the environment -¿ Optimization problem.

1.1 Elements of RL

A Markov Decision Process (MDP) involving:

- Policy : Mapping from states to actions
- Reward Signal : Scalar signal that indicates the **desirability** of the state i.e. immediate value
- Value Function : Expected cumulative reward from a state i.e. far-sighted judgment of value of starting from a particular state.
- Model (of the environment): Predicts the next state and reward given the current state and action; used for planning.

Value function is computed without **explicit search** over possible sequences of future states and actions. Focus is on highest value, and not on highest reward, even though value is computed from rewards.