**Model-Based Algorithms**

1. These algorithms explicitly build a model of the environment. This model captures the dynamics of the environment, including state transitions and rewards.
2. They use the model to simulate future states and evaluate the consequences of actions. This allows the agent to plan its actions based on predictions about the outcomes.
3. **Examples**: Value Iteration, Policy Iteration, Dyna-Q.
4. **Advantages**:
   1. Can be more sample-efficient since they leverage the model to simulate experiences.
   2. Suitable for environments where the dynamics are known or can be learned effectively.
5. **Disadvantages**:
   1. Building an accurate model can be computationally expensive and complex, especially in large or continuous spaces.

**Model-Free Algorithms**

1. These algorithms do not build or utilize a model of the environment. Instead, they learn directly from the interactions with the environment.
2. They rely on exploration and exploitation to update the value of states or actions based on received rewards, without simulating future states.
3. Examples: Q-Learning, SARSA, REINFORCE.

**Advantages**:

1. Simpler and often easier to implement since they don’t require a model.
2. Effective in environments where the dynamics are unknown or too complex to model.

**Disadvantages**:

1. Typically less sample-efficient, as they may require many more interactions with the environment to learn optimal policies.

**Summary**

**Model-Based**

* + Learns a model of the environment; uses planning to optimize decisions.

**Model-Free**:

* + Learns policies directly from experience; relies on trial and error without a model.

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**Question 3: Introduction to Deep Q-Learning (DQN)**

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