Assign 2

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Q1. 1. Model base learning

- Agent learns to predict dynamics of its environment, building an internal model of environment's state transition and reward
- In model based learning, agents used experience to update its internal model, which typically consists of two main components

a) State transition model: This component predicts next state given current state and action. It captures the environment dynamics and can be represented as probability distribution over next state

b) Reward model: The component estimates the expected reward given current state and action. It captures environment's reward structure

- Once agent has an accurate model, it can use planning algorithms.

2. Temporal based learning

- Temporal difference learning is a model free method which means that agent does not learn an explicit model of environment's dynamics.
- Instead it directly learns an optimal policy or value function by updating its estimates using the difference between current and

predicted future rewards, known as temporal difference error

- TD learning is combination of two other reinforcement learning : monte carlo and dynamic programming.
- It combines idea of sampling from MC learning with bootstrapping from DP.
- There are two primary techniques.

a) SARSA (State Action Reward and State Action)
This is an on policy TD learning algorithm, which means it learns the value of the policy being followed. The agent updates its action value based on current state

b) Q Learning : based on off policy TD algorithm, which means it learns value of optimal policy regardless of policy being followed. The agent updates its function based on the current state

Q2

- ML can be used effectively for video surveillance to analyze and process video data, enabling intelligent decision making and automating various tasks
- It can perform task like:

1) Object recognition & tracking :
ML algorithms can be trained to identify and track objects, such as people, vehicles and animals in real time. This allows surveillance system to monitor specific objects of interest

2) Motion detection
ML can be used to detect and analyze motion in video streams, enabling system to identify unusual activity and trigger alerts or other actions when necessary

3) Behaviour analysis
ML algorithms can be trained to recognize and analyze specific behaviours or actions, such as people loitering, fights or thefts., allowing system to respond to such dangerous situations

4) Anomaly detection
ML can be used to establish normal patterns of activity in a video stream and identify any deviations from these patterns, signaling potential security threats

5. Facial recognition

ML techniques can be used to identify individuals in video streams, allowing for personalized security measures, access control.

6. Crowd analysis.

ML can be applied to analyze crowd behaviour, density and movement patterns can be used for public safety.