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ML - Assignment 2

Q. 1) Describe Model based learning and temporal difference learning methods of reinforcement learning.

→ 1) Model based learning and temporal difference learning are two distinct methods used in reinforcement learning.

2) Model based learning is a method in which the agent learns to predict the dynamics of its environment, building an internal model of the environment's state transition and rewards. The internal model enables the agent to simulate possible future scenarios and plan actions to optimize the performance.

3) In model based learning, the agent uses it experience to update its internal model, which typically consist of two main components a) State transistion Model. b) Reward Model

4) Once the agent has an accurate internal Model, it can use planning algorithms like Monte-Carlo Tree search, value iteration or policy iteration.

5) Temporal difference learning is a model free method, which means that the agent does not learn an explicit model of the environments dynamics. Instead, it directly learns an optimal policy or value function by updating it estimates using difference between current and predicted future rewards, known as temporal difference error.

6) There are two primary TD learning algorithms: a) SARSA (State-Action-Reward State Action). b) Q-learning.

Q. 2) Explain how ML can be used for video surveillance. Also describe which technique of ML is most suitable for designing it.

→ 1) ML can be used for video surveillance to analyze and process video data and automating various tasks. By using ML techniques, it can perform tasks such as object recognition, motion detection, behaviour analysis and anomaly detection.

2) Some applications of ML in video surveillance:

(a) Object recognition and tracking: ML algo can be trained to identify and track objects, such as people, vehicle and animals. This allows the surveillance system to monitor specific objects of interest and track their movement across different cameras feeds.

(b) Crowd analysis: ML can be applied to analyze crowd behaviours, density and movement patterns, which can be useful for public safety, traffic control, or event management.

3) The most suitable ML tech for designing video surveillance depends on the specific task and req. However, deep learning tech, particularly CNN are used.

4) In summary, ML, especially deep learning techniques like CNN can significantly enhance video surveillance system by automating task, such as object recognition, motion detection and behaviour analysis.

5) The choice of ML technique depends on the specific application and requirements of the video surveillance system.