INTRODUCTION TO ARTIFICIAL INTELLIGENCE CSCI-6660-01

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INTELLIGENT PATHWAY NAVIGATOR

Problem statement:

- The main objective of the project is to train the agent the best transitions from any grid point to the target state.
- The system should incorporate machine learning algorithms to predict traffic conditions and recommend alternate routes.
- The goal is to reduce traffic congestion, travel time, and improve overall traffic efficiency in the city. The system should also be user-friendly and accessible to all drivers, including those with limited technology experience

Problem Approach:

- The primary objective of this project is to teach an agent how to navigate through a grid environment and find the optimal path to reach a goal state using the Q-Learning model. The project can be extended to find the fastest route between any two points in the real world.
- To achieve this goal, the project will involve designing a grid environment for the agent, defining the agent's actions and rewards, implementing the Q-learning algorithm, and testing the agent's learning using various scenarios.

Deliverables:

- The project deliverables include designing a grid environment for the agent, training the agent to find the optimal path to reach the goal state using the Q-Learning model, and testing the agent's learning using various scenarios to evaluate its performance.

- Specifically, the project will involve creating a grid environment with clear markings for the goal state and obstacles, training the agent to learn the best way to navigate through the grid to reach the goal state, and testing the agent's ability to find optimal paths under different conditions.

Evaluation Methodology:

- The Q table records the rewards for each state in the grid.
- The graph depicts the agent's learning trajectory from the first episode to the end of the training course.
- Will use the Q-learning algorithm, which takes into account sample complexity, regret, average total rewards per episode, and so on.
- we will also compare Policy optimization algorithms, Policy gradient algorithms, A3C (Asynchronous Advantage Actor-Critic)