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CIS 421 Artificial Intelligence

Assignment: 7 - Q Learning

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Analysis of Assignment 7

To understand how the different parameters affected the simulation, it would be important to first step back, and hypothesize how they SHOULD affect the simulations, and then compare and contrast.

Learning Rate:

As the learning rate approaches 1, we should see our q values being heavily affected by every new action and update. This is effective in a deterministic environment (such as in the case of variation 1), but be too optimistic in the case of a stochastic environment (such as in the case of variation 3). Due to a flaw in my design of the state, the stochastic approach does not succeed for this simulation. Therefore, at a lower learning rate, we can see that the agent more consistently finds the optimized path. In this simulation, due to poor state design, the agent pursues ponies and creates a reasonable policy, but fails to find the most optimized path.

Discount Factor:

The discount factor should affect how much the agent trusts its old prediction. If the discount factor is too high, then the previously acquired knowledge is discarded, and unoptimized paths can surface. This was seen in the trials, as the highest discount value generated a large reward, but extremely unoptimized path.

Overall, I would restructure my entire approach to this implementation. The biggest difficulties I encountered were trying to understand how to properly design a state, and how to design/implement the different objects. However, despite this, the algorithm functioned well in its poorly designed environment,

proving that Q Learning is an effective, and very computationally reasonable algorithm for decision making.