Homework Set 5

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CS533

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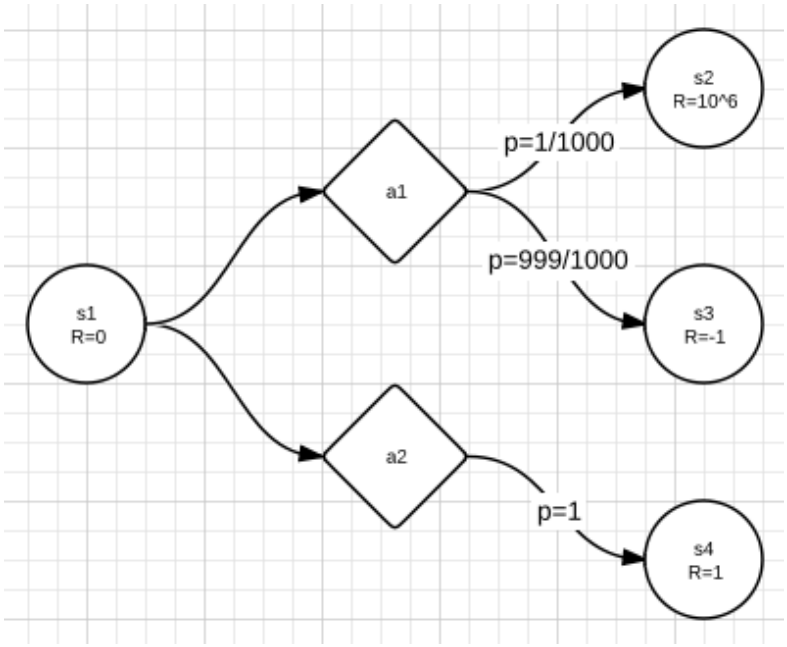
1. Consider the following MDP:



Suppose that the given algorithm initially chooses to take action a_1 from state s_1. Chances are that it will end up in s_3, and receive a negative reward. Since s_4 and the action a_2 have a zero reward, and then a positive reward once explored, the algorithm will choose a_2 from state s_1 from then out. This is because the algorithm offers no means for exploration. This is a sub-optimal policy, however, because over an arbitrarily large number of trials $\pi(s_1) \rightarrow (a_1)$ is superior due to the large reward at the improbable state s_2.

2. The given $\hat{U}(x, y)$ is linear in all of $(\theta_0, \theta_1, \theta_2, \theta_3)$, so:

$$\theta_i \leftarrow \theta_i + \alpha(u(s) - \hat{U}(s)) \frac{\partial \hat{U}(s)}{\partial \theta_i}$$

And now:

$$\theta_0 \leftarrow \theta_0 + \alpha(u(s) - \hat{U}(s))$$

$$\theta_1 \leftarrow \theta_1 + \alpha(u(s) - \hat{U}(s))(x)$$

$$\theta_2 \leftarrow \theta_2 + \alpha(u(s) - \hat{U}(s))(y)$$

$$\theta_3 \leftarrow \theta_3 + \alpha(u(s) - \hat{U}(s))\sqrt{(x - x_g)^2 + (y - y_g)^2}$$