$$\sum_{t=0}^{H-1} \gamma^t r(s_t, a_t) + \gamma^H Q_\theta(s_H, a_H)$$

Learned Q-function is common in model-free RL

$$\sum_{t=0}^{\infty} \gamma^t Q(s_t, a_t) \approx \sum_{t=0}^{H-1} \gamma^t r(s_t, a_t) + \gamma^H Q_\theta(s_H, a_H)$$

$$\sum_{t=0}^{H-1} \gamma^t r(s_t, a_t)$$

Finite Horizon Planning has Limitations

27

Approximate infinite horizon return using learned Q-function

Best of both worlds!

Finite Horizon Planning has Limitations

$$\sum_{t=0}^{\infty} \gamma^t Q(s_t, a_t) \approx \sum_{t=0}^{H-1} \gamma^t r(s_t, a_t) + \boxed{\gamma^H Q_\theta(s_H, a_H)}$$

Approximate infinite horizon return using learned Q-function

Learned Q-function is common in model-free RL

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