

FCAI

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

Learned Q-function is $\phi^T \mathbf{w}$ in R_L

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

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

Finite Horizon Planning has Limitations

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Approximate infinite horizon return
using learned Q -function



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

Best of both worlds!

