The link between Value and Policy

$$\pi^*(s) = \underset{a}{\operatorname{argmax}}\, Q^*(s,a)$$

Finding an optimal value function leads to having an optimal policy.

the state-value function

$$V_\pi(s) = E_\pi[G_t \mid S_t = s]$$

calculates the value of a state.

the action-value function

$$Q_\pi(s,a) = E_\pi[G_t \mid S_t = s, A_t = a]$$

calculates value of state-action pair

the bellman equation

More efficient state-value function

$$V_\pi(s) = E_\pi[R_{t+1} + \gamma \times V_\pi(S_{t+1}) \mid S_t = s]$$

$$V(S_t) = R_t + 1) + \text{gamma} \times V(S_{(t+1)})$$