Reinforcement Learning Cheatsheet

Izen

February 26, 2018

1 Deep Q-networks

$$\ell(\theta) = \mathbb{E}_{(s,a,r,s')\sim\mathcal{U}(\mathcal{D})}\left[\left(y^{\text{DQN}} - Q(s,a;\theta)\right)^2\right] \tag{1}$$

$$y^{\text{DQN}} = r + \gamma\, Q(s', \arg\max_{a'} Q(s',a';\theta^-);\theta^-) \tag{2}$$

2 Double Deep Q-networks

$$\ell(\theta) = \mathbb{E}_{(s,a,r,s')\sim\mathcal{P}(\mathcal{D})}\left[\left(y^{\text{DDQN}} - Q(s,a;\theta)\right)^2\right] \tag{3}$$

$$y^{\text{DDQN}} = r + \gamma\, Q(s', \arg\max_{a'} Q(s',a';\theta);\theta^-) \tag{4}$$

3 Dueling Networks

$$Q(s,a;\theta,\alpha,\beta) = V(s;\theta,\beta) + A(s,a;\theta,\alpha) \tag{5}$$

$$Q(s,a;\theta,\alpha,\beta) = V(s;\theta,\gamma) + \left(A(s,a;\theta,\alpha) - \max_{a'\in\mathcal{A}} A(s,a';\theta,\alpha)\right) \tag{6}$$

$$Q(s,a;\theta,\alpha,\beta) = V(s;\theta,\gamma) + \left(A(s,a;\theta,\alpha) - \frac{1}{|\mathcal{A}|}\sum_{a'} A(s,a';\theta,\alpha)\right) \tag{7}$$