Neural Networks Homework #3.

Prof: Cheng-Yuan Liou, TA: Jiun-Wei Liou

Reinforcement Learning

The modified Q-learning Demo code for this homework can be downloaded at course website. According to the paper[1], the reinforcement learning formulas are as following:

$$y(t) = f\left[\sum_{i=1}^{n} w_i(t)x(t) + \text{noise}(t)\right]$$
$$w_i(t+1) = w_i(t) + \alpha r(t)e_i(t)$$
$$e_i(t+1) = \delta e_i(t) + (1-\delta)y(t)x_i(t)$$

$$p(t) = \sum_{i=1}^{n} v_i(t) x_i(t)$$

$$v_i(t+1) = v_i(t) + \beta [r(t) + \gamma p(t) - p(t-1)] \bar{x}_i(t)$$

$$\bar{x}_i(t+1) = \lambda \bar{x}_i(t) + (1-\lambda) x_i(t)$$

$$\hat{r}(t) = r(t) + \gamma p(t) - p(t-1)$$

The meaning of corresponding variables can be directly inferred from [1].

1. Modify the two functions get_action.m and failed_update.m within demo codes for inserting ACE to solve the same problem as original demo codes, comparing the performance and briefly states your findings.

Notes: Suggested length of your homework report is no more than 6 pages.

References

 Barto, A.G., Sutton, R.S., and Anderson, C. (1983). Neuron-like adaptive elements that can solve difficult learning control problems, IEEE Transactions on Systems, Man, and Cybernetics, vol. SMC-13, no. 5, pp. 834-846.