

COMP9444 Neural Networks and Deep Learning

Quiz 8 (Weeks 9-12)

This is an optional quiz to test your understanding of the material from Weeks 9 to 12.

1. In the context of Deep Q-Learning, explain the following:

- a. Experience Replay
- b. Double Q-Learning

2. Briefly describe the Evolutionary Computation algorithms that were applied to the following domains:

- a. Backgammon, Simulated Hockey
- b. Atari Pong, MuJoCo humanoid walking

3. What is the Energy function for these architectures:

- a. Boltzmann Machine
- b. Restricted Boltzmann Machine

Remember to define any variables you use.

4. The Variational Auto-Encoder is trained to maximize

$$\mathbb{E}_{z \sim q_{\phi}(z | x^{(i)})} [\log p_{\theta}(x^{(i)} | z)] - \text{D}_{\text{KL}}(q_{\phi}(z | x^{(i)}) \parallel p(z))$$

Briefly state what each of these two terms aims to achieve.

5. Generative Adversarial Networks make use of a two-player zero-sum game between a Generator G_{θ} and a Discriminator D_{ψ} , to compute

$$\min_{\theta} \max_{\psi} (V(G_{\theta}, D_{\psi}))$$

Give the formula for $V(G_{\theta}, D_{\psi})$.

6. In the context of GANs, briefly explain what is meant by *mode collapse*, and list three different methods for avoiding it.

Make sure you try answering the Questions yourself, before checking the [Sample Answers](https://www.cse.unsw.edu.au/~cs9444/18s2/quiz/quiz8.html)