COMP9444 Neural Networks and Deep Learning

Quiz 8 (Weeks 8–10)

This is an optional quiz to test your understanding of the material from Weeks 8 to 10.

1. Write out the steps in the REINFORCE algorithm, making sure to define any symbols you use.

2. In the context of Deep Q–Learning, explain the following:

   a. Experience Replay
   b. Double Q–Learning

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

   $$\mathbf{E}_{z \sim q_\phi(z \mid x^{(i)})} [\log p_\theta(x^{(i)} \mid z)] \quad - \quad D_{KL}(q_\phi(z \mid x^{(i)}) \parallel p(z))$$

   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