Deep generative model/Advanced computer vision Quiz 2

Please submit answers no later than 4/26 5:00 PM.

You can use either English or Korean for answers.

to save your progress.

*Required

Student ID *

Your answer

Student Name *

Your answer

[1 point] In GAN, the aim of the generator G is:

- ◯ to maximize classification error for discriminator → 정답처리
- ◯ to minimize classification error for discriminator
- ⊘ to minimize log(1-D(G(z))) for random vector z
- ◯ to maximize log(D(G(z))) for random vector z

[2 point] When a data point X is given, which model directly returns a probability belongs to a specific class Y, P(Y|X)?

- ○ Generative model
- ✓ Discriminative model
- ○ Both of them
- ○ Neither of them

[5 point] Which of the following is incorrect? (multiple choices, there would be the partial score)

- ☐ Generative models can generate new data instances.
- ☑ Given data X, it is easy to find the corresponding latent z vector for GANs, but not for VAEs.
- ☑ Given a set of data instances X and label Y, generative models are learned to directly capture the P(Y|X).
- ☑ Discriminative models capture the joint probability P(X,Y) or P(X).
- ☐ GANs and VAEs are representative deep generative models.

[2 point] Please discuss the role of the 1) adversarial loss and 2) L2 loss, respectively in the Context Encoder.

Your answer 1) quality 2) Fit to context

[2 point] What do you think are the key advances of the CycleGAN compared to pix2pix?

Your answer We can use unpaired data

[1 point] What is recommended when implementing GAN using the deep convolutional architecture? (select all)

- [x] Use LeakyReLU activation in the discriminator instead of ReLU.
- [ ] Use pooling layers in generator.
- [x] Use batch normalization layer in generator and discriminator.

[2 points] What is the optimal discriminator that maximizes the GAN objective? (p_data: original image distribution, p_g: generated image distribution).

- ○ 1
- ✓ p_data / (p_g + p_data)
- ○ (p_g + p_data) / 2
- ○ 0
- ○ None of the above

[2 points] what is the global minimum of the GAN training criterion?

- ○ 0.5
- ✓ -log4
- ○ log4
- ○ -0.5

[2 point] Please describe the `mode collapse' issue of the GAN network.

Your answer Outputs converge to an image regardless of inputs

[1 point] If we classify measures into two groups: (Group 1: FID, inception score), (Group 2: MSE, PSNR, SSIM and LPIPS), what do you think is the criterion?

Your answer

Group 1 is unsupervised measure; Group 2 is supervised measure

[2.5 points] Please choose correct sentences (select all).

- [x] Inception score measures the quality and diversity of generated images.
- [x] To calculate the inception score and Frechet inception distance (FID), we need to involve a pre-trained network.
- [ ] Mean square error (MSE), peak signal-to-noise ratio (PSNR) and structural similarity index measure (SSIM) always work in the similar tendency for given original and generated image pairs.
- [x] MSE is not enough to consider the structural difference between original and generated images.
- [x] Learned perceptual image patch similarity (LPIPS) relatively provides better capability to mimic the human perception, compared to MSE, PSNR and SSIM.

[2.5 points] Please choose correct sentences (select all).

- [x] The original GAN objective uses the Jensen-Shannon divergence as the distance measure between original and generated data distribution.
- [x] Wasserstein GAN uses the Wasserstein distance as the distance measure between original and generated images.
- [x] Gradient penalty term in Wasserstein GAN is added to enforce the 1-Lipschitz condition.
- [x] Clipping for weight scales is a way to meet the 1-Lipschitz condition in the Wasserstein GAN.
- [x] Wasserstein GAN provides gradients for discriminator even when the original GAN's gradient vanishes. This offers more stable GAN training.