GAN

2025-1 Mobility UR

2025.03.27 김유진

I. 기존 코드에서 품질 좋은 이미지 탐색

II. Epoch

III. Loss function & activation function

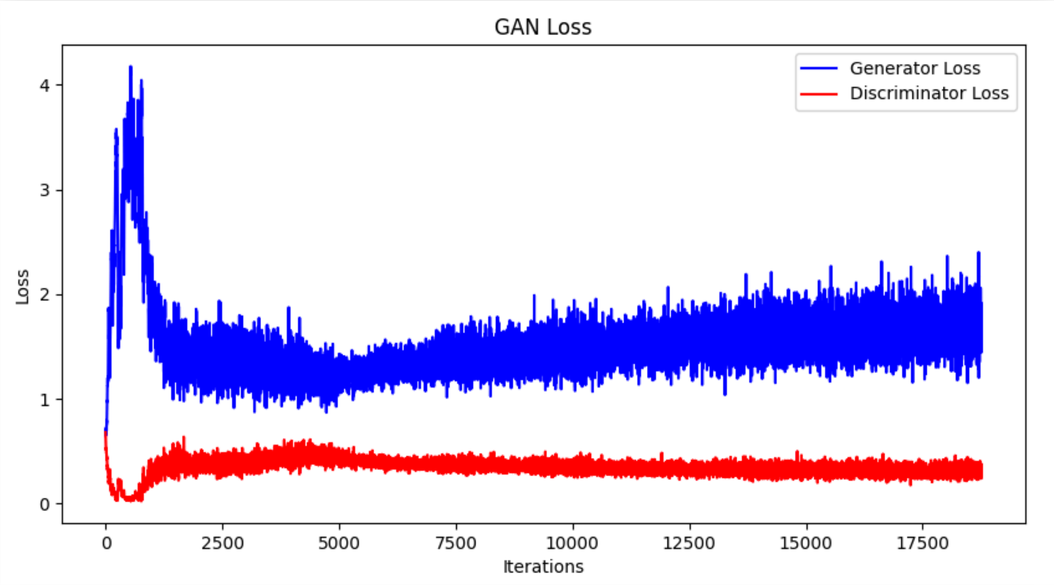
IV. Learning rate

V. Layer

VI. Conclusion

기본 코드 결과

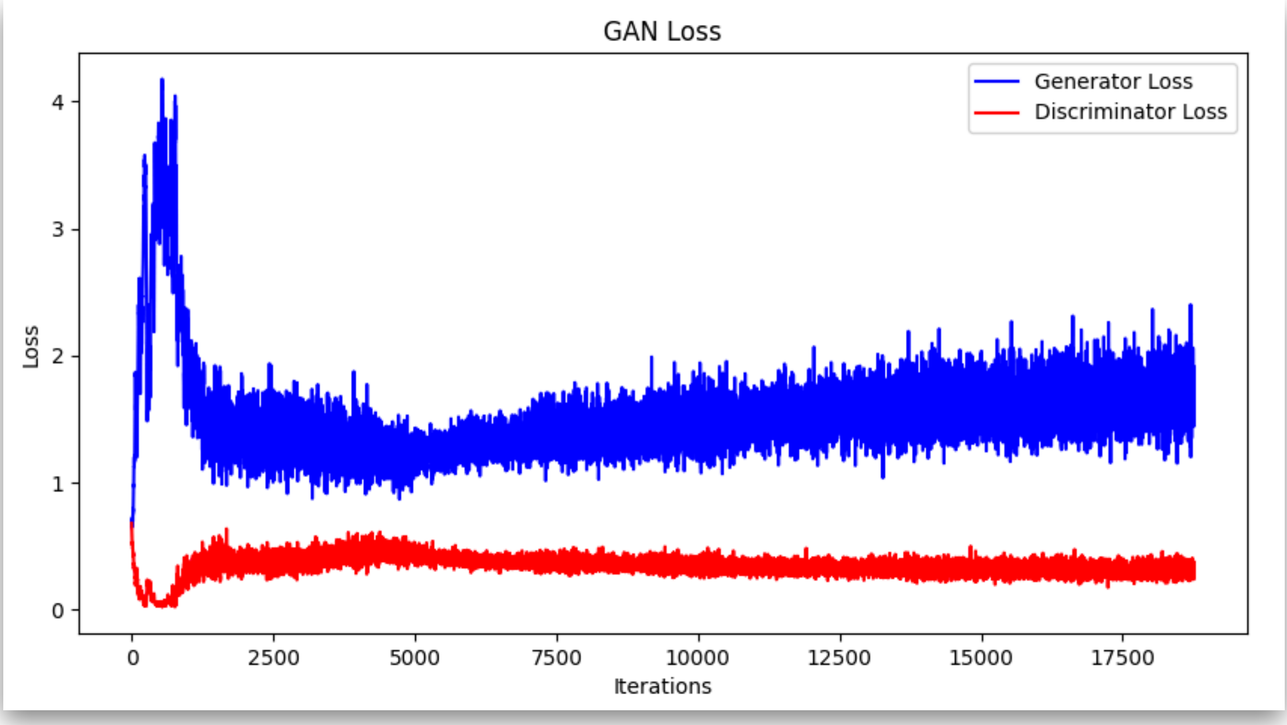
| 대조군


GAN Loss
Generator Loss
Discriminator Loss
Loss
Iterations
0
1
2
3
4
0
2500
5000
7500
10000
12500
15000
17500


Generated Images at Epoch 20

기존 코드에서 품질 좋은 이미지 탐색

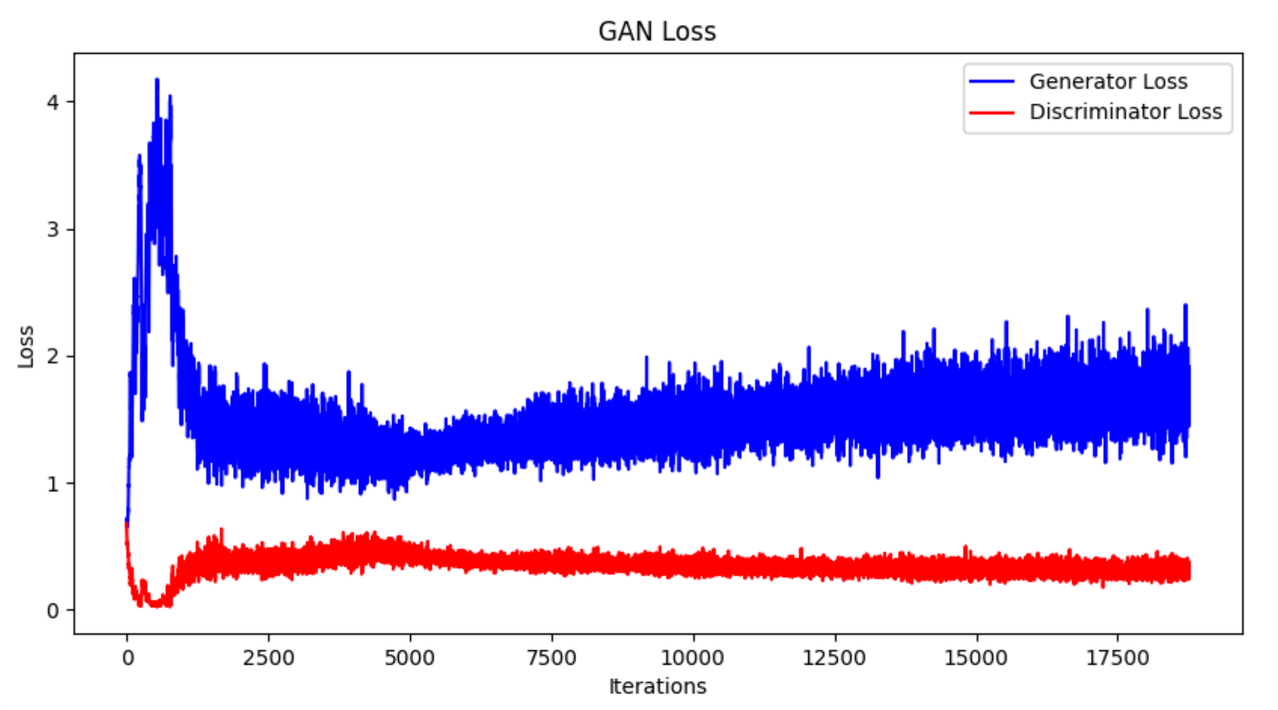
| 1. 20번의 epoch 중 loss_gen이 가장 작은 시점 탐색 : 전체 epoch에서 탐색



코드를 처음 실행할 때의 작은 loss 탐지

기존 코드에서 품질 좋은 이미지 탐색

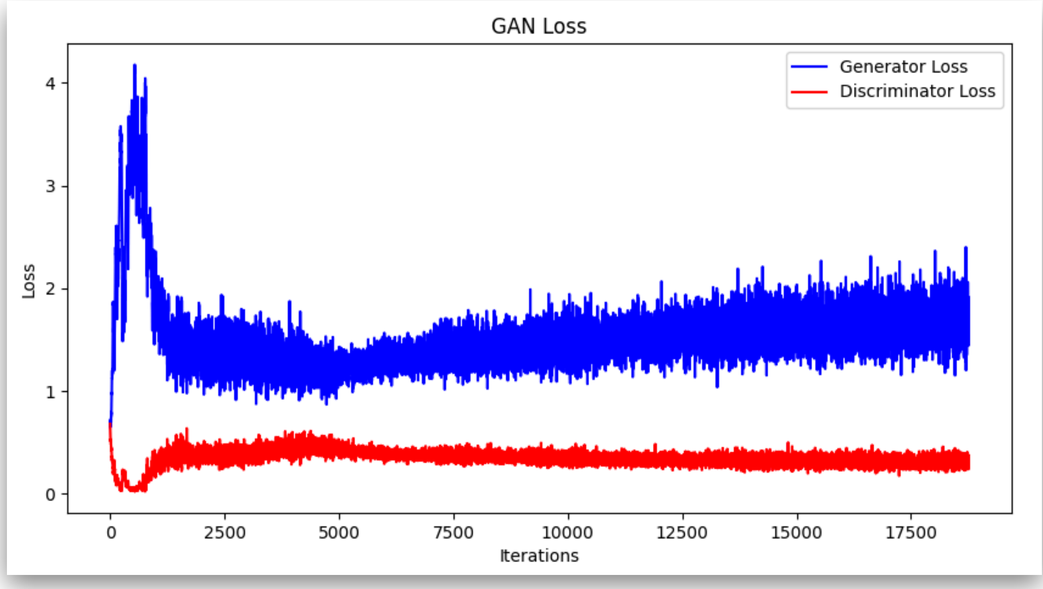
| 1. 20번의 epoch 중 loss_gen이 가장 작은 시점 탐색 : epoch 1 이상에서 탐색

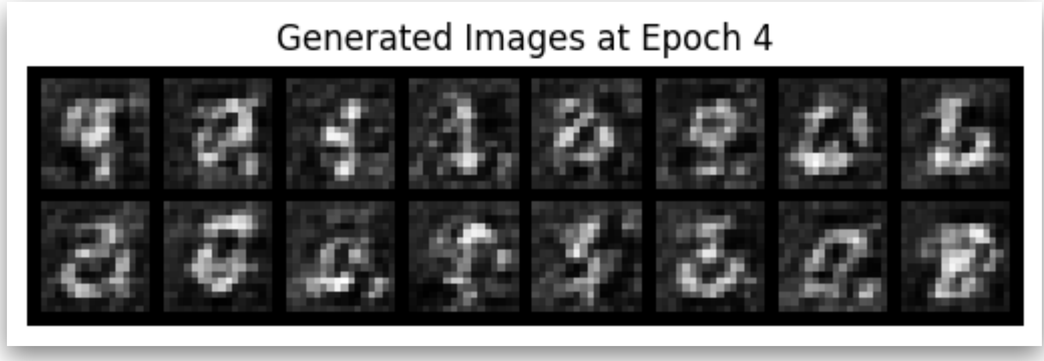


discriminator의 loss가 높아 generator가 올바른 이미지를 만들지 못할 때의 loss가 낮은 특정 부분을 벗어나지 못함

기존 코드에서 품질 좋은 이미지 탐색

| 2. loss_disc와 loss_gen간의 차이가 적은 곳 탐색 : epoch 1 이상에서 탐색

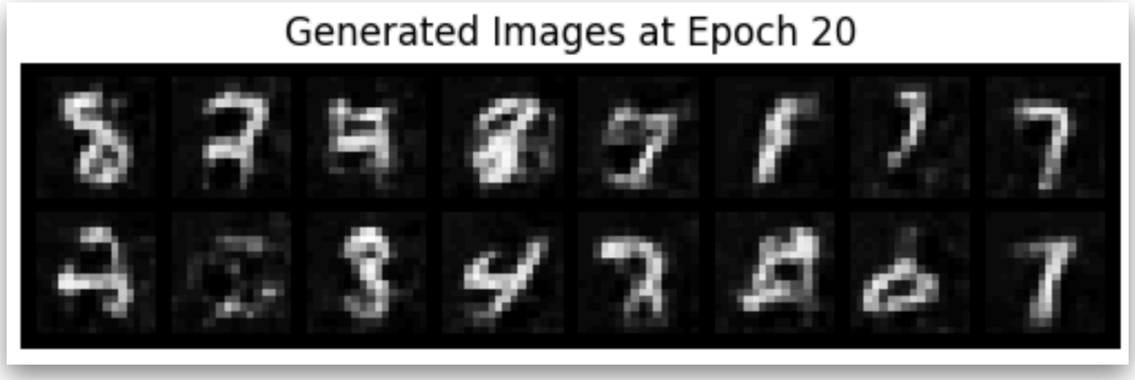




generator가 올바른 이미지를 만들지 못할 때
generator과 discriminator의 loss의 차가
적은 특정 부분을 벗어나지 못함

기존 코드에서 품질 좋은 이미지 탐색

| 3. loss_disc와 loss_gen간의 차이가 적은 곳 탐색 : epoch 20 내에서 탐색



< 대조군 >

I. 기존 코드에서 품질 좋은 이미지 탐색

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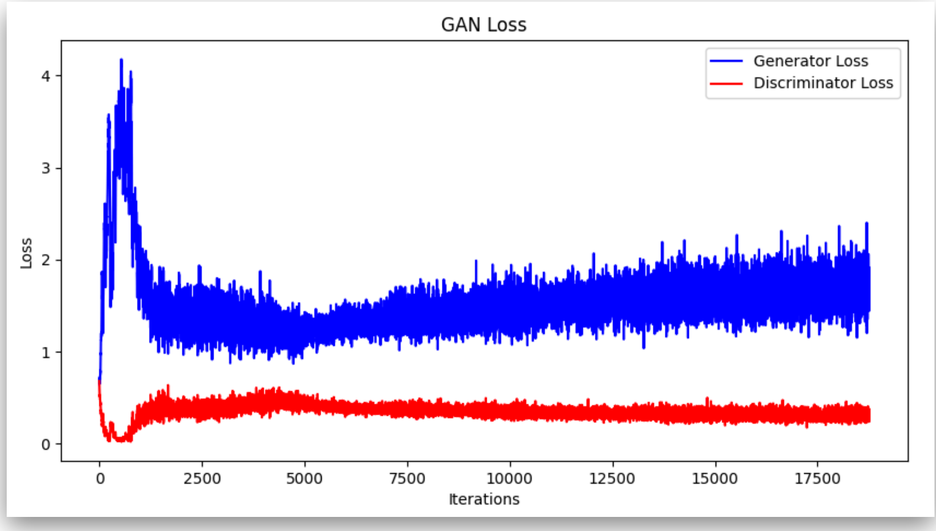
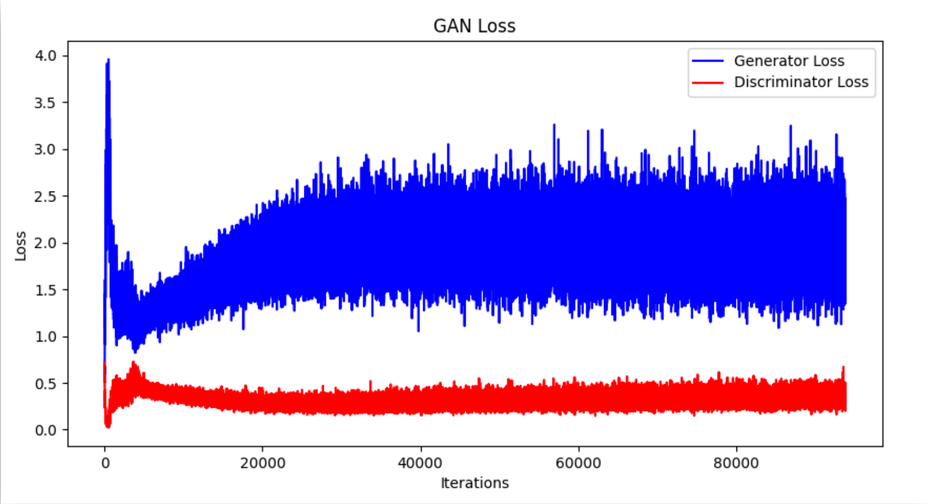
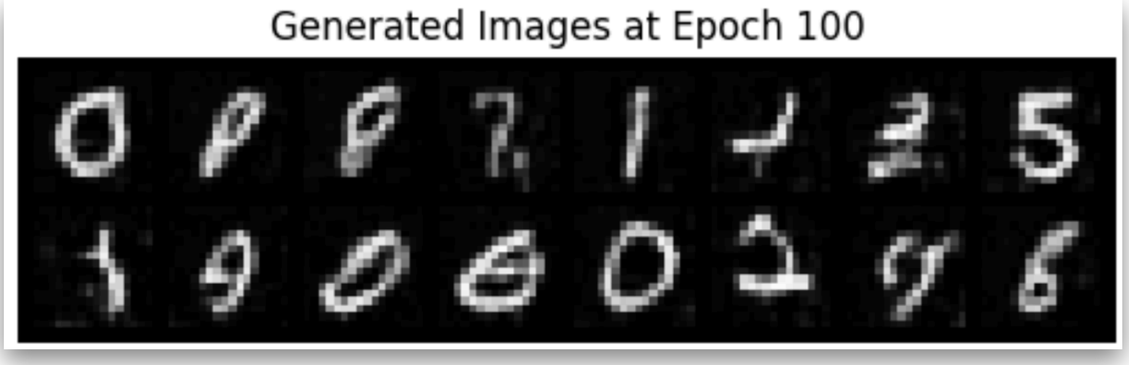
Epoch

| epoch 20 -> epoch 100







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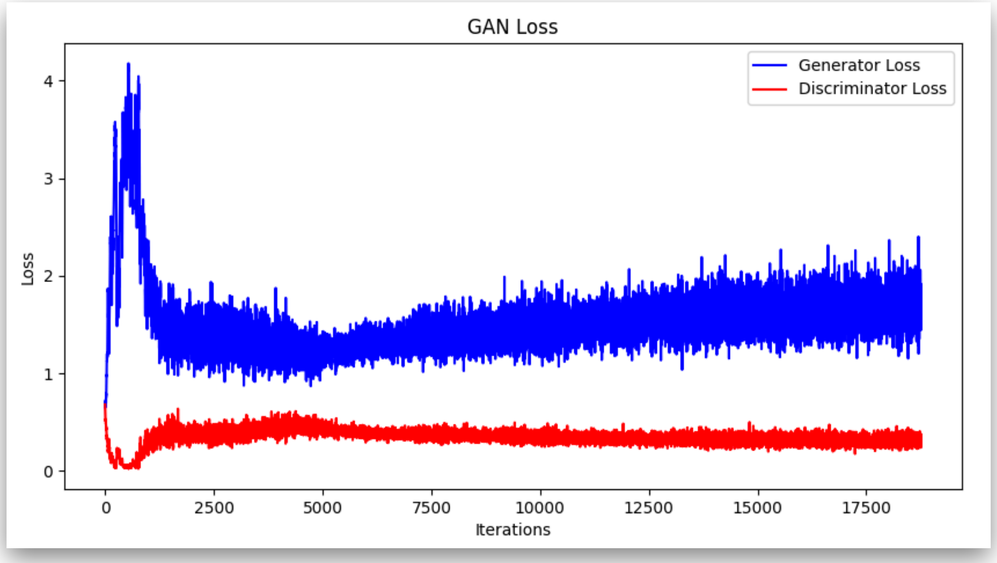
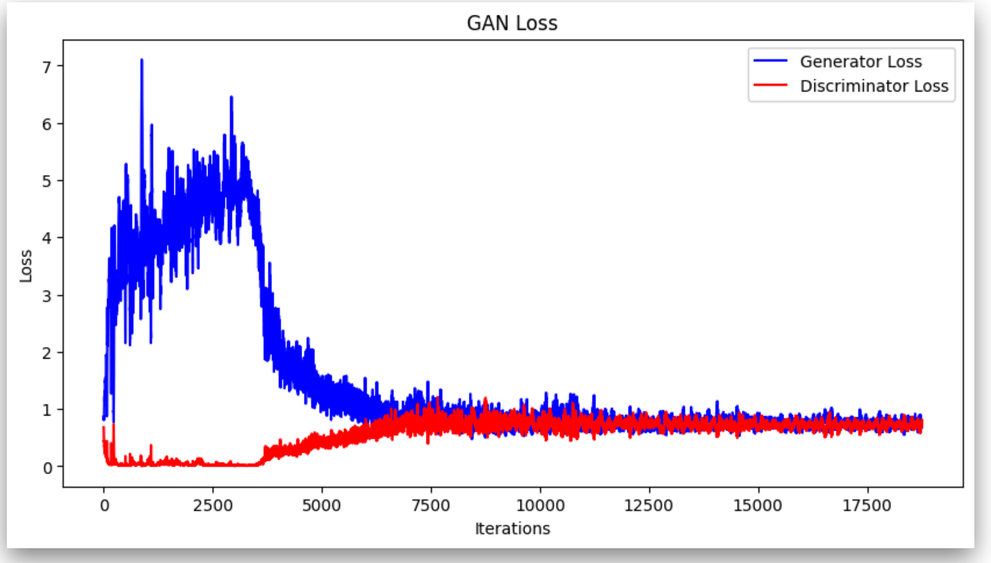
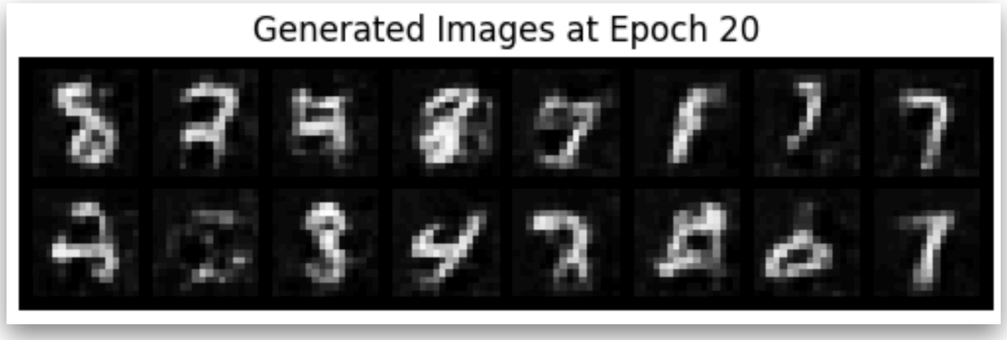
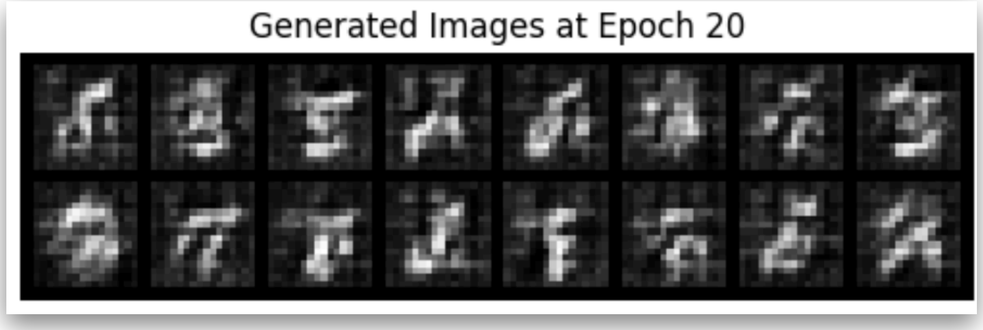
Loss function & Activation function

| discriminator 활성화함수 모두 LeakyReLU 변경, 마지막 layer sigmoid 제거 & loss function BCEWithLogitsLoss로 변경



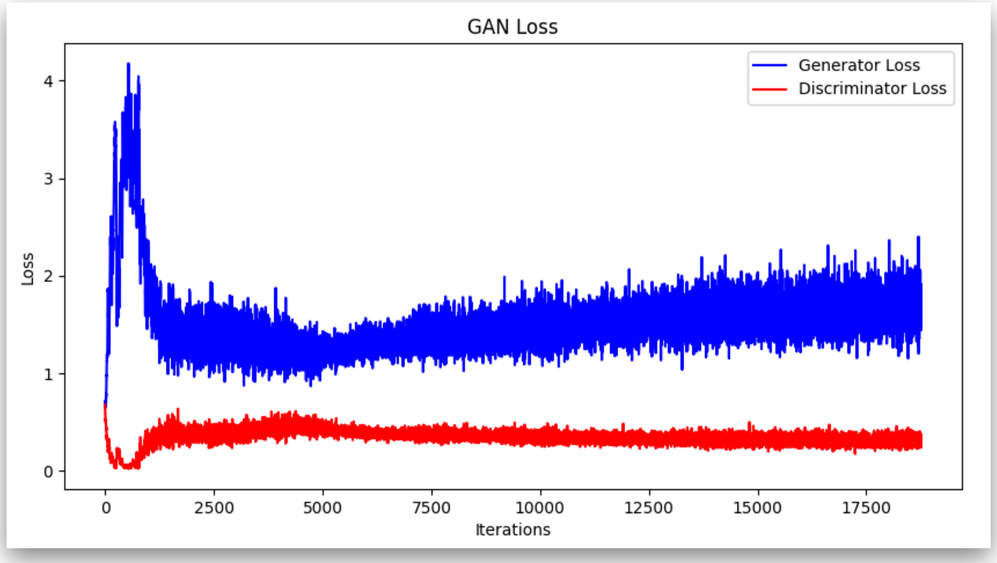


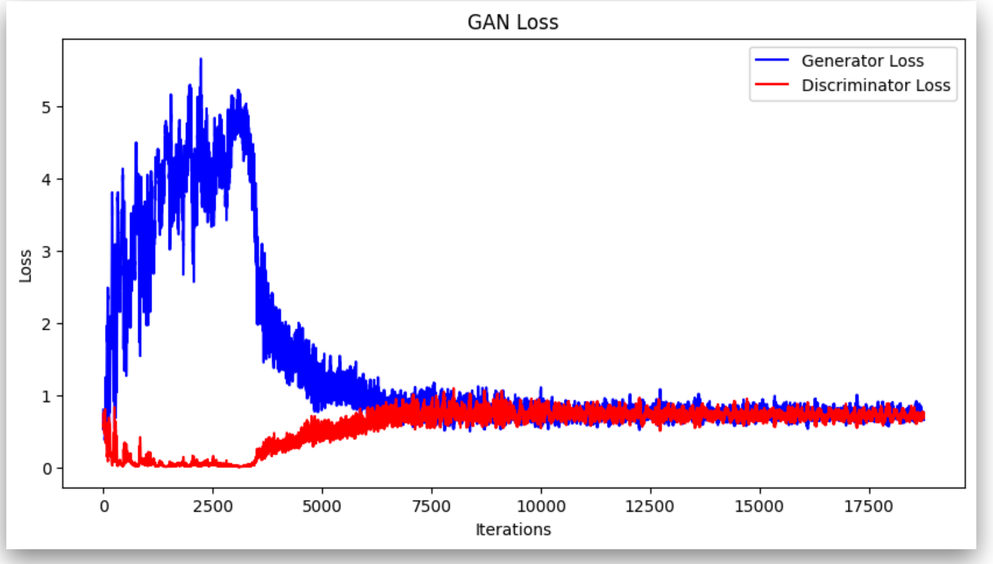


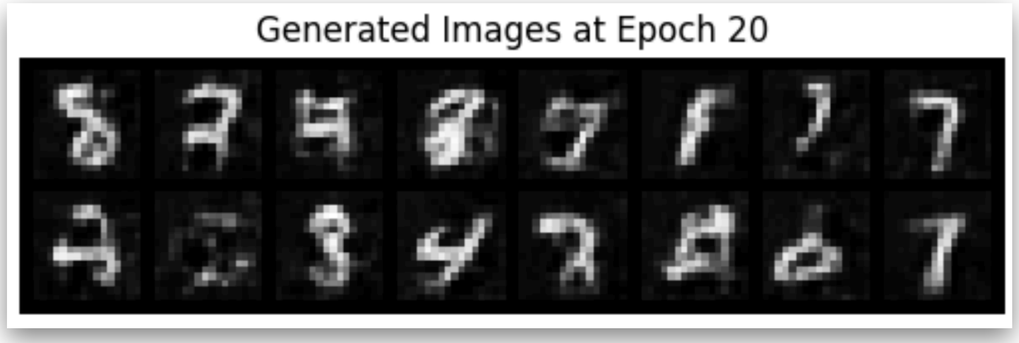


Loss function & Activation function

| discriminator 활성화함수 모두 LeakyReLU 변경

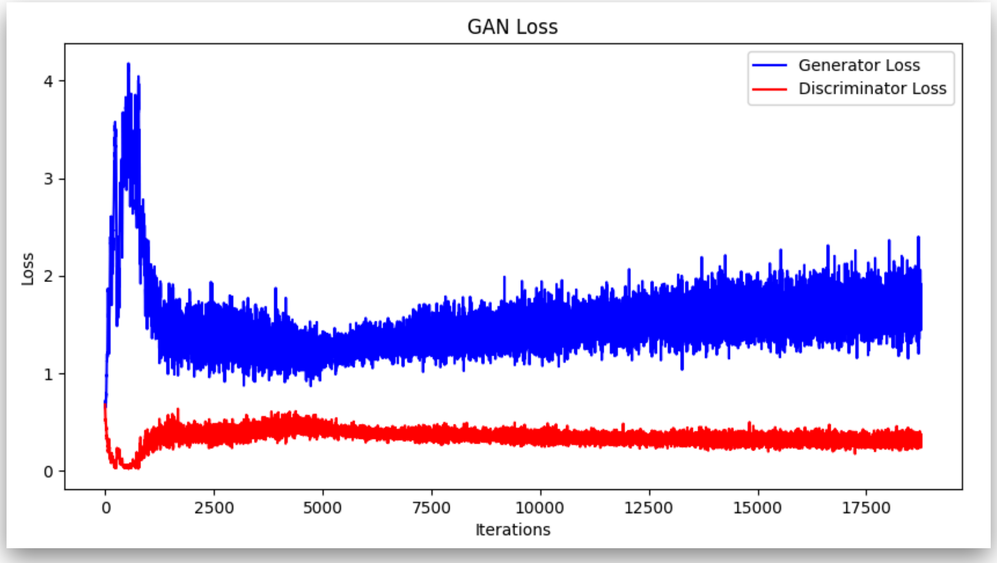


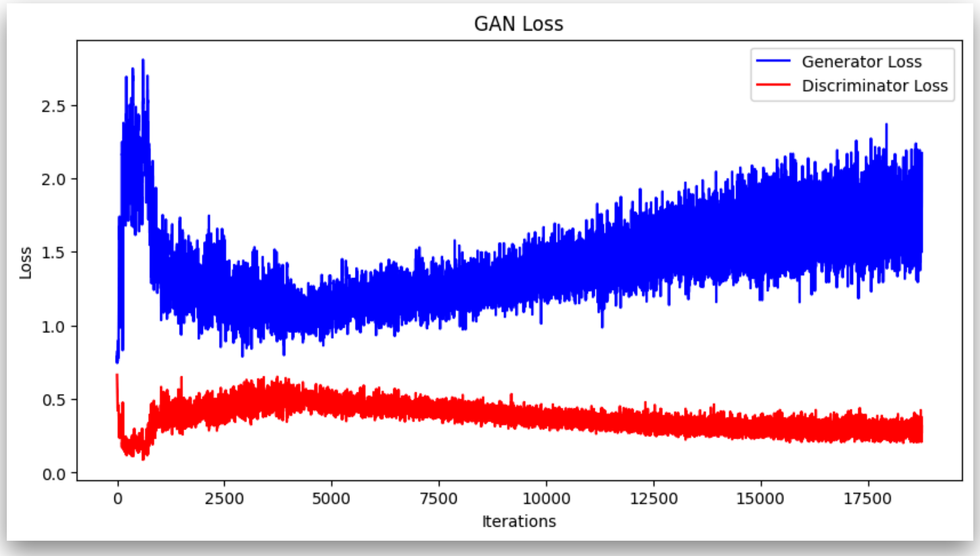


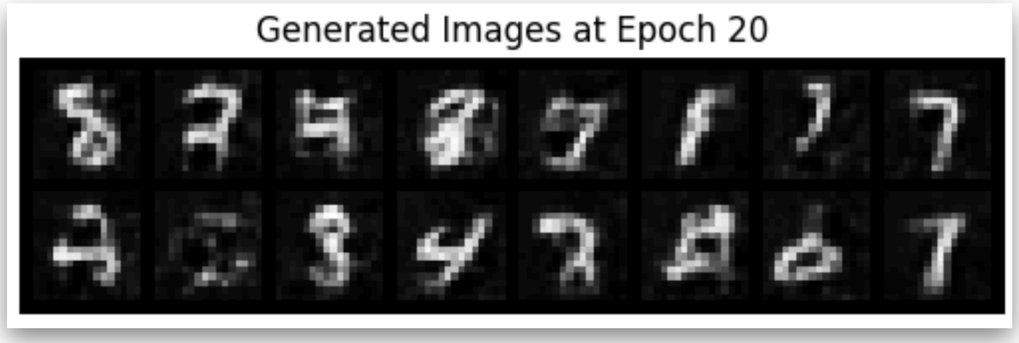


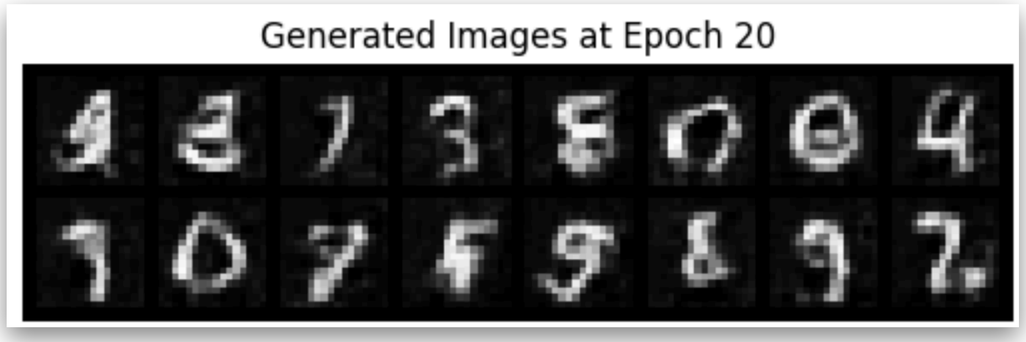
Loss function & Activation function

| discriminator 마지막 layer sigmoid 제거 & loss function BCEWithLogitsLoss로 변경



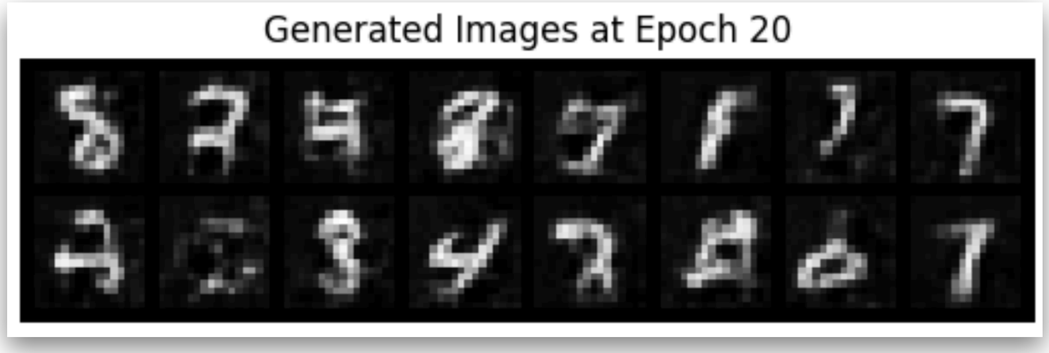






Loss function & Activation function

| discriminator 마지막 layer sigmoid 제거 & loss function BCEWithLogitsLoss로 변경 - epoch 변경



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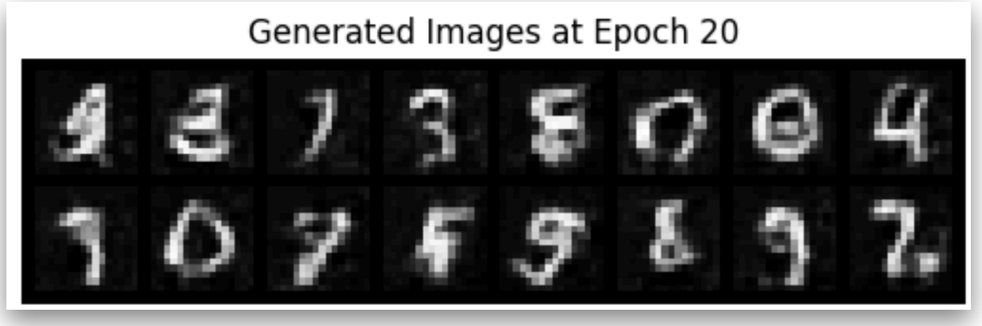

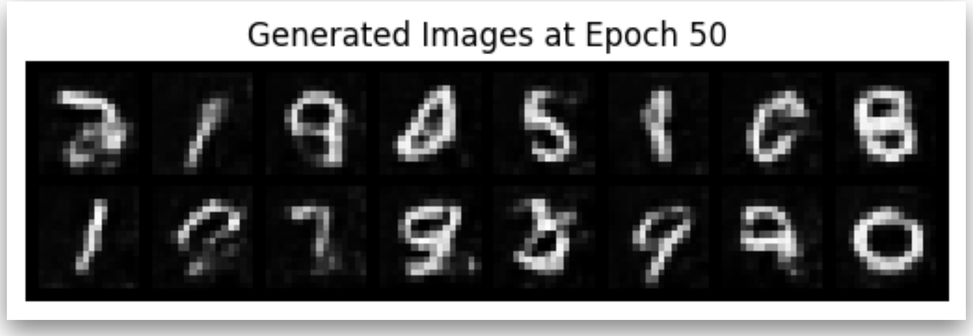

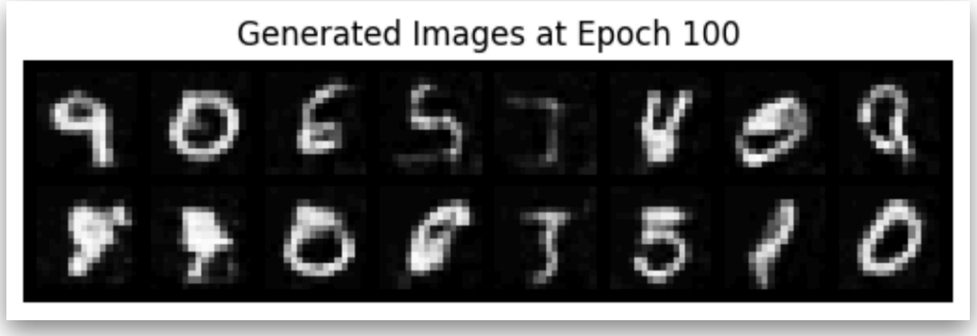

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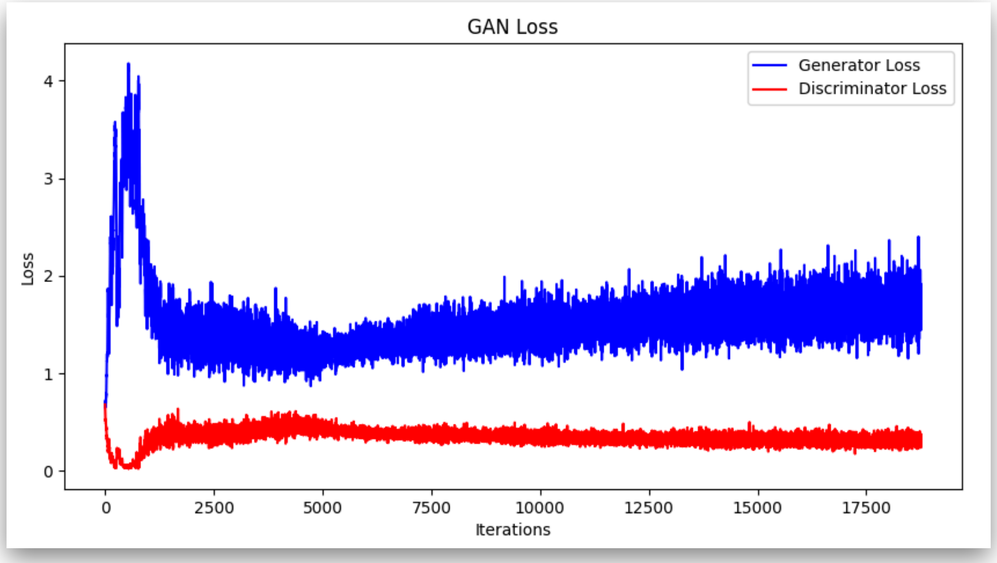
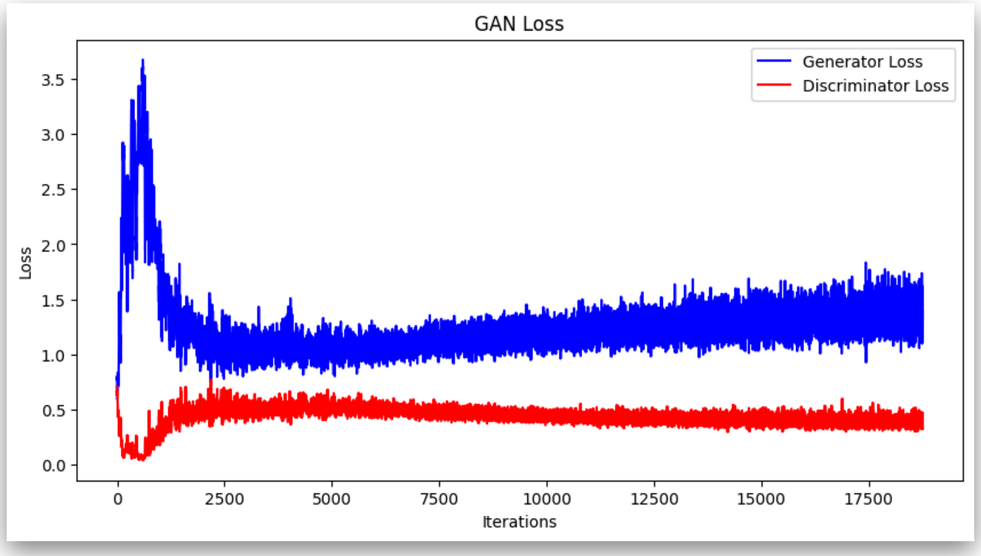
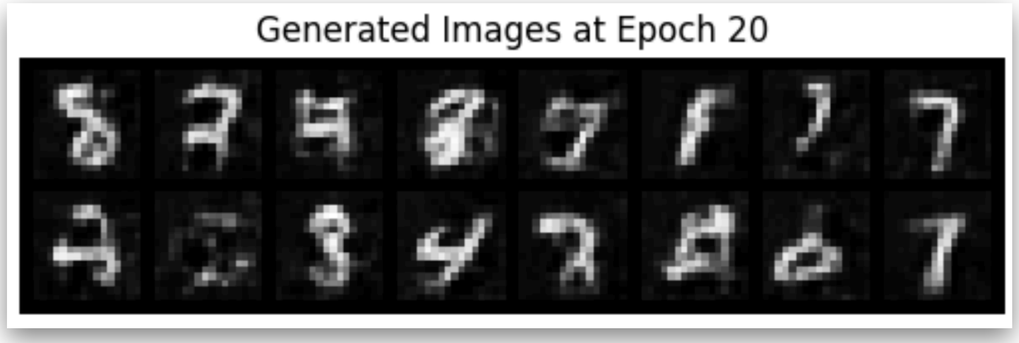
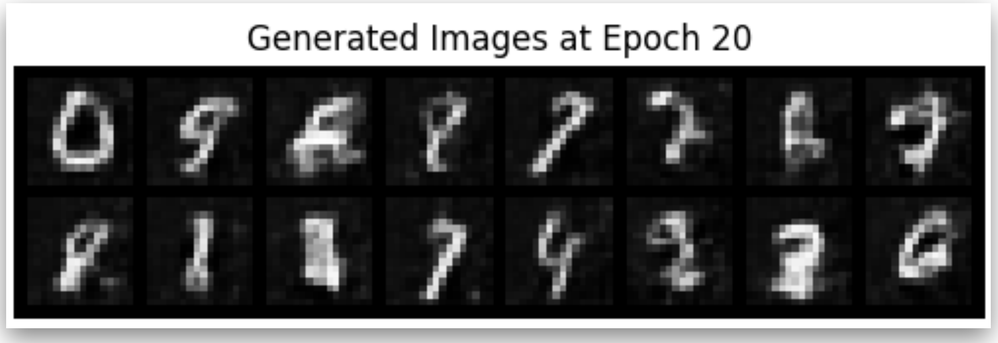
Learning rate

- loss function 변경 (sigmoid 삭제), lr = 0.0002, disc lr*0.5



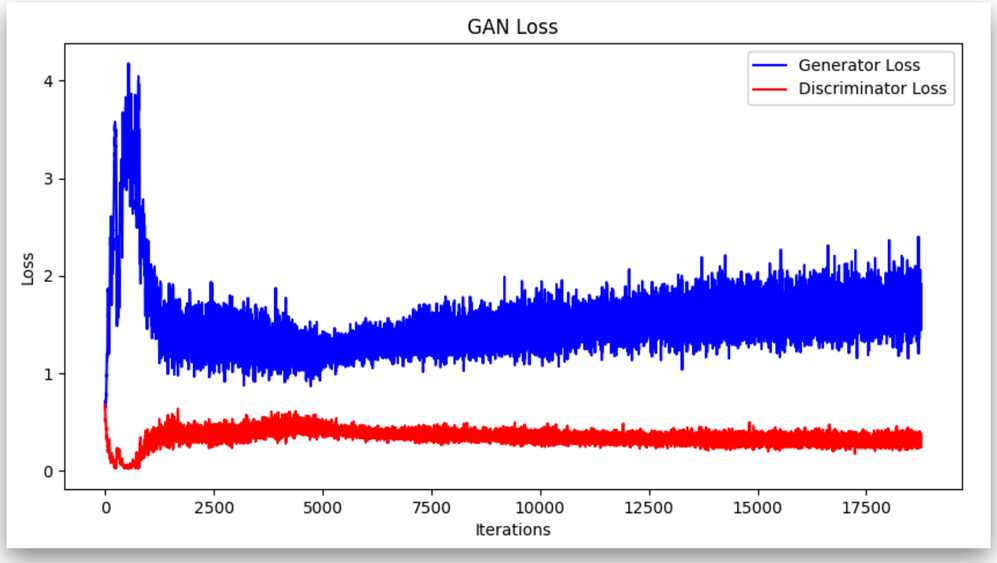


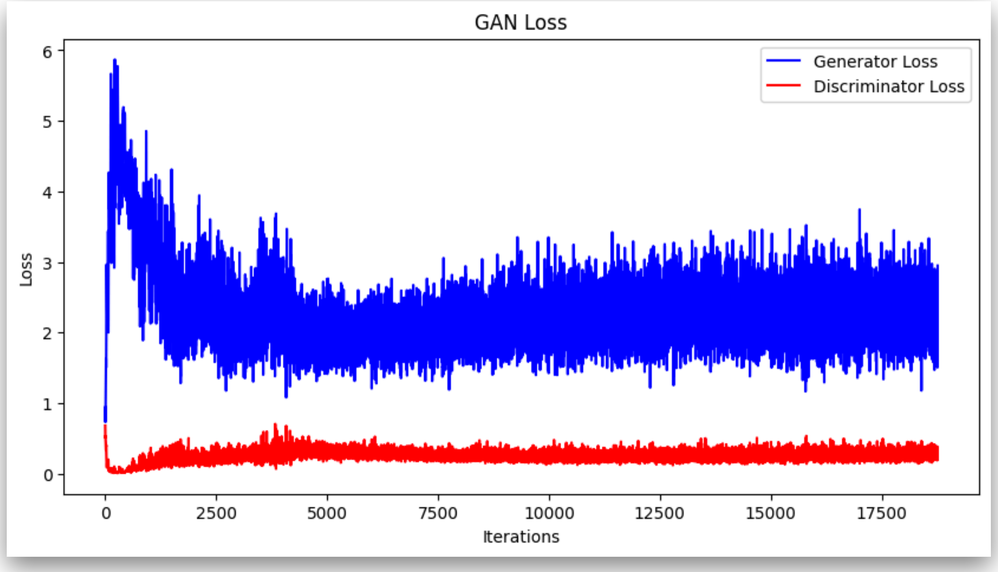


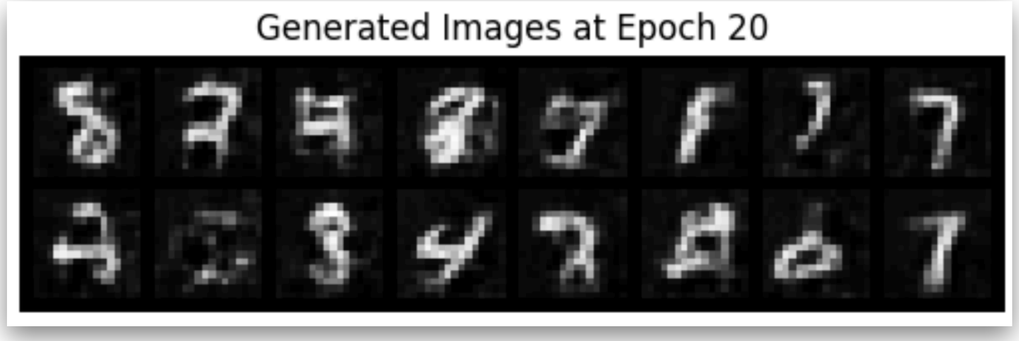


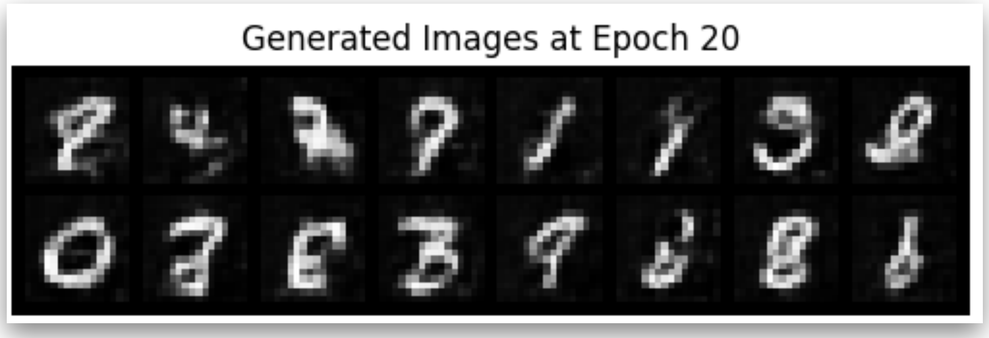
Learning rate

- loss function 변경 (sigmoid 삭제), lr = 0.0005, disc lr*0.75



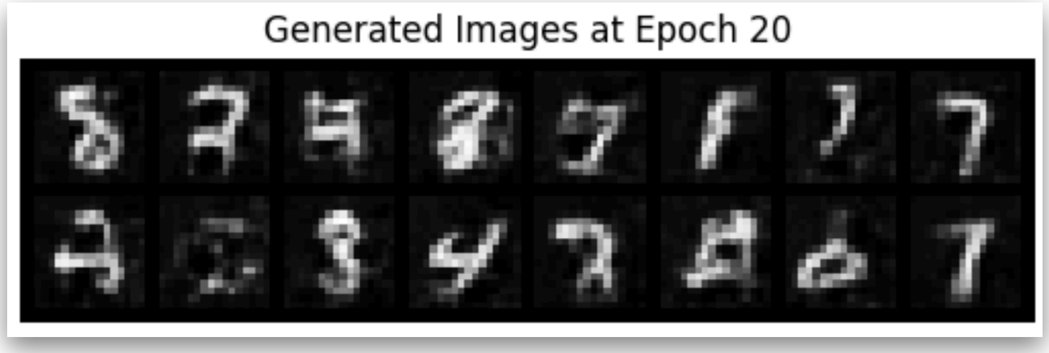






Learning rate

- loss function 변경 (sigmoid 삭제), lr = 0.0005, disc lr*0.75 - epoch 변경



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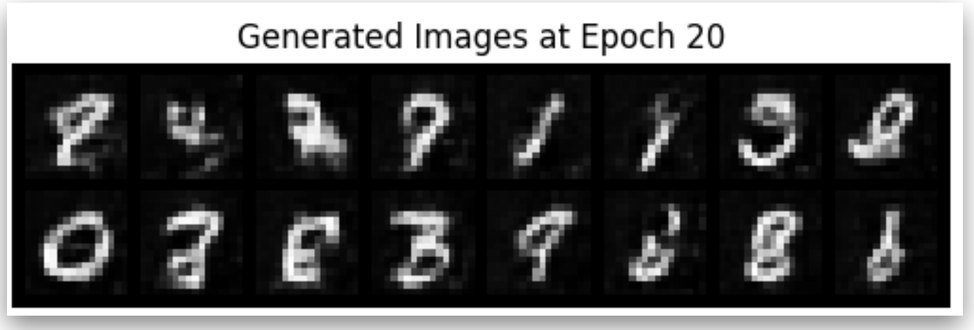

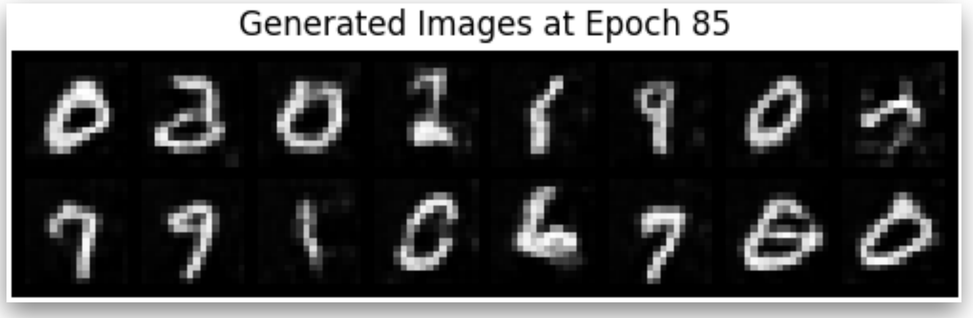

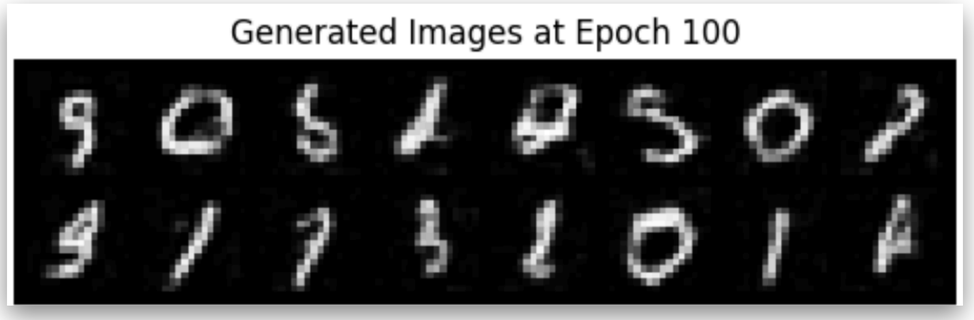

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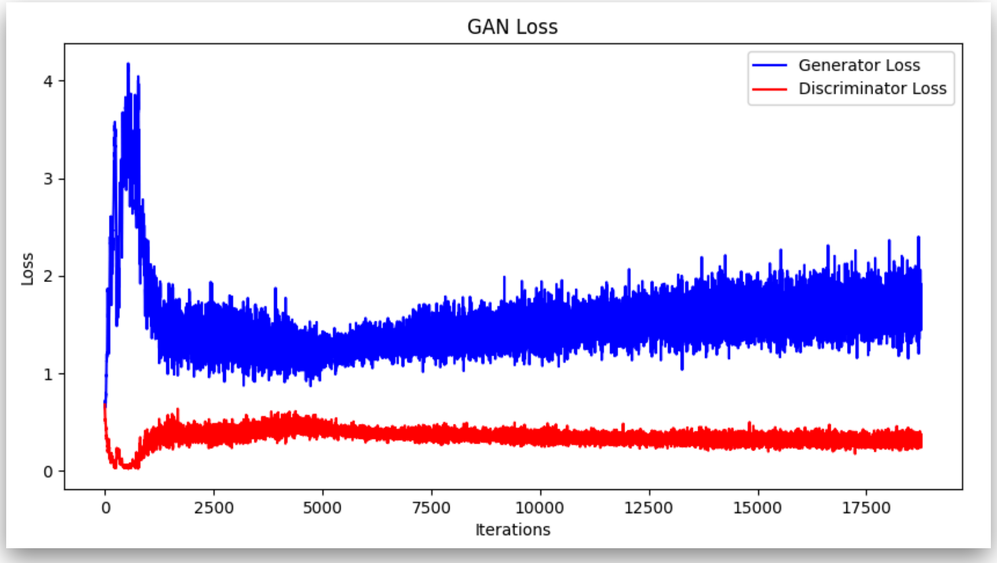
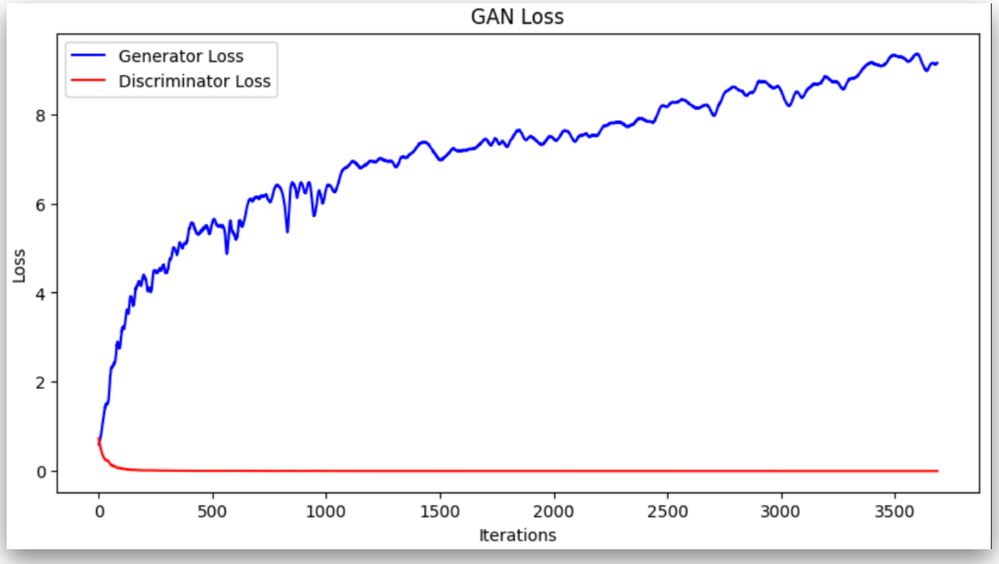
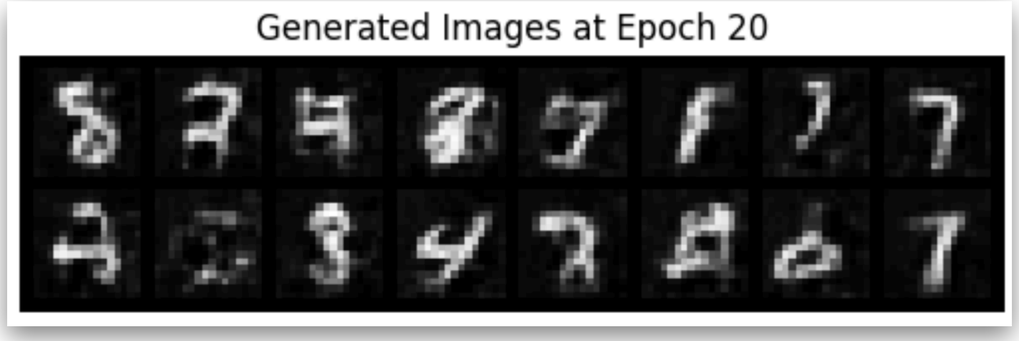
Layer

| loss function 변경 (sigmoid 삭제), discriminator & generator layer 1 추가

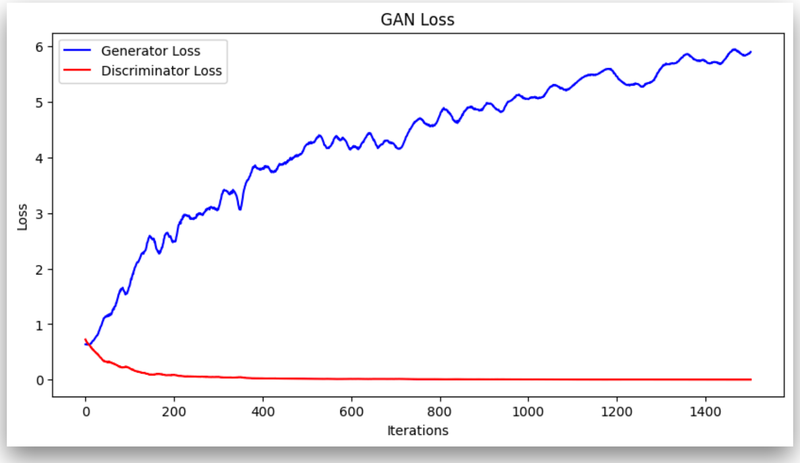




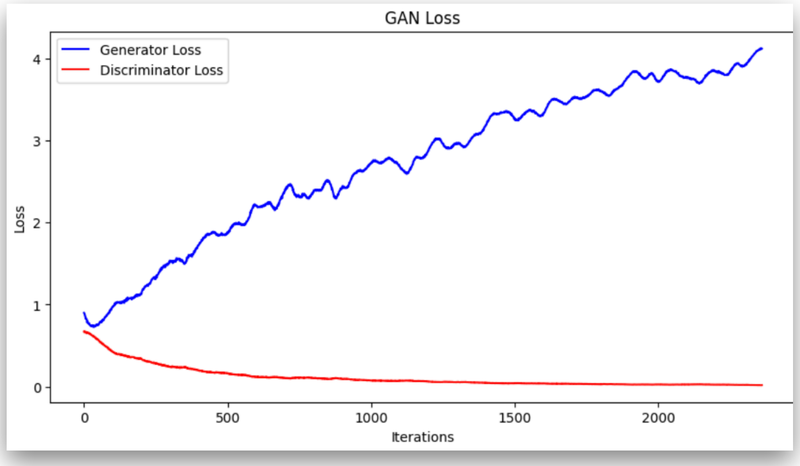


Layer

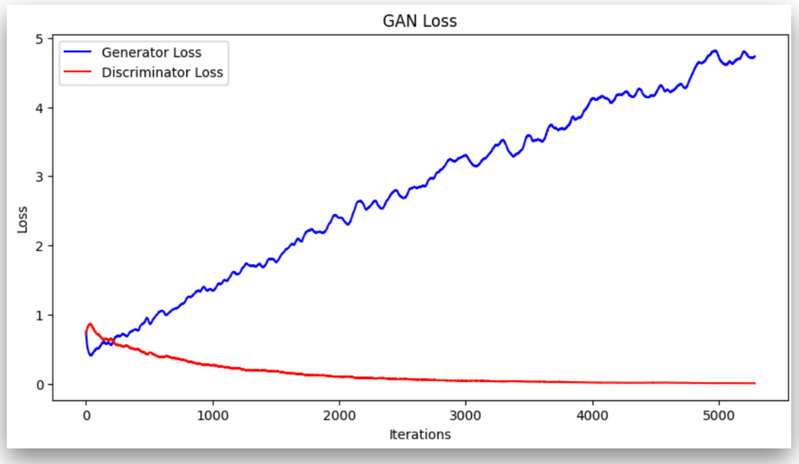
| loss function 변경 (sigmoid 삭제), discriminator & generator layer 1 추가 & lr 수정



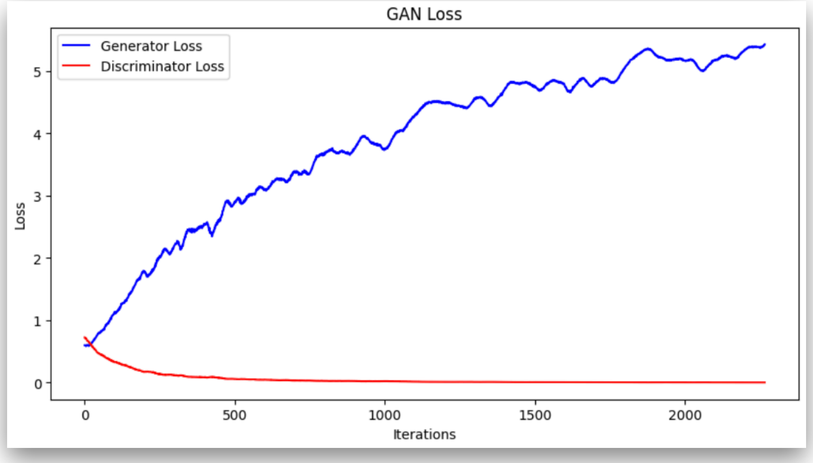
< discriminator lr*0.5 >



< discriminator lr*0.25 >



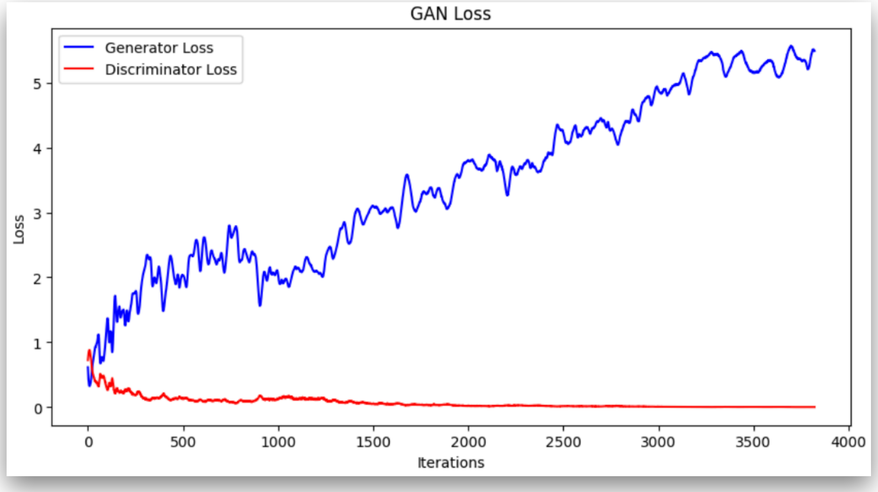
< discriminator lr*0.1, generator lr*2 >

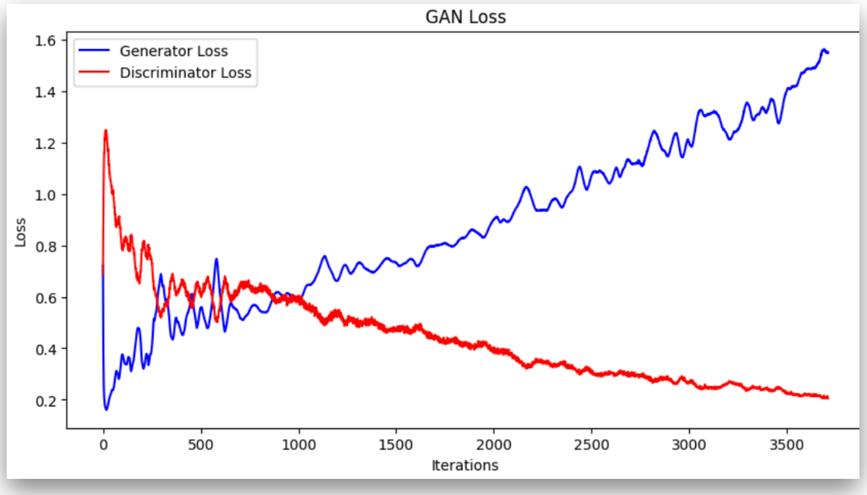


< discriminator lr*0.5, lr = 0.00005 >

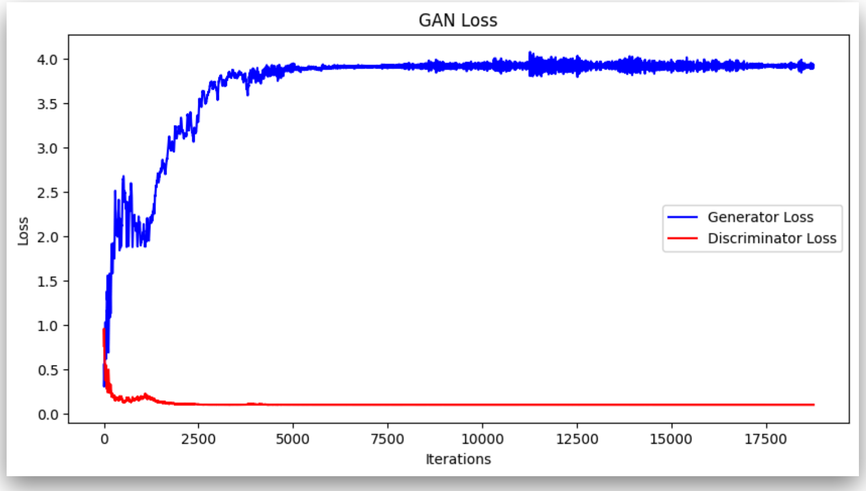
Layer

| loss function 변경 (sigmoid 삭제), generator layer 1 추가 & lr 수정 & Label smoothing





< label smoothing, discriminator lr*0.25, generator lr*2 >



< Label smoothing >

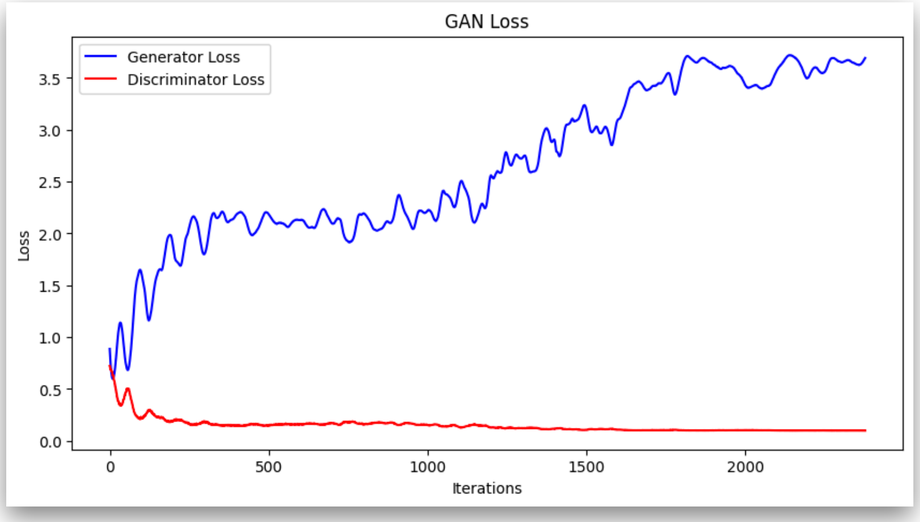
Label smoothing

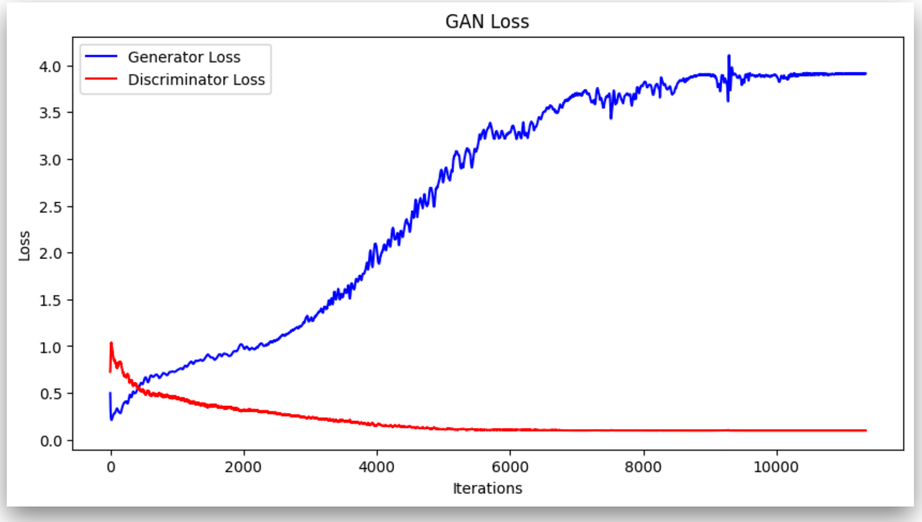
```
loss_disc_real = bce_loss(disc_real, torch.ones_like(disc_real) * 0.98)
loss_disc_fake = bce_loss(disc_fake, torch.zeros_like(disc_fake) + 0.02)
```

- 진짜 이미지에 대한 레이블을 1에서 0.98로 조정
- 가짜 이미지에 대한 레이블을 0에서 0.02로 조정

Layer

| loss function 변경 (sigmoid 삭제), generator layer 2 추가 & lr 수정 & Label smoothing





< Label smoothing, disc lr*0.25, gen lr*1.5 >

< Label smoothing >

I. 기존 코드에서 품질 좋은 이미지 탐색

II. Epoch

III. Loss function & activation function

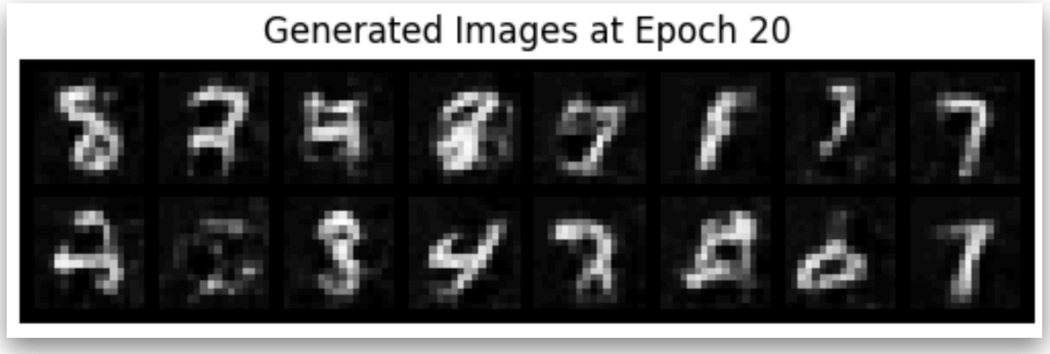
IV. Learning rate

V. Layer

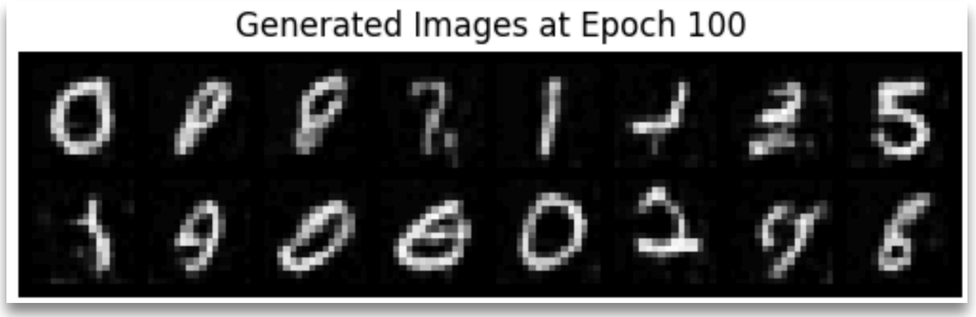
VI. Conclusion

Conclusion

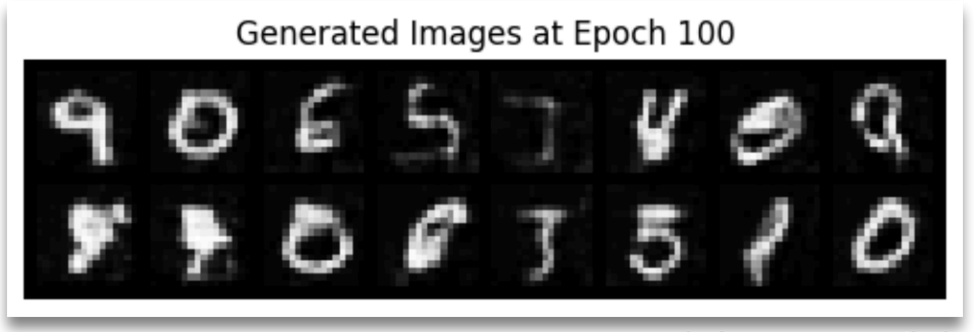
| 비교



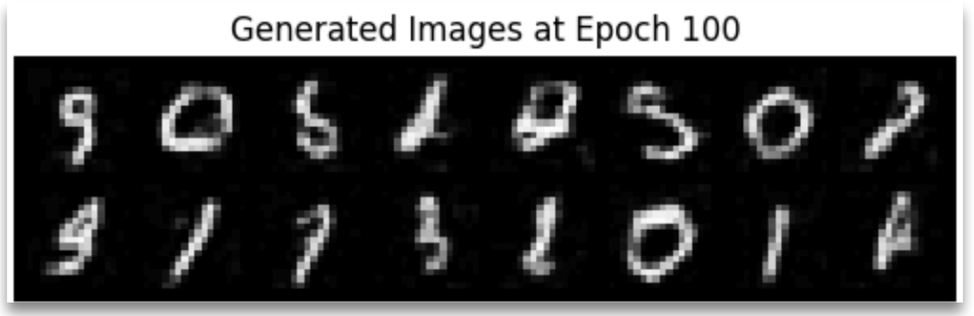
< 대조군 >



< 기존 코드 + epoch 100 >



< loss function BCEWithLogitsLoss로 변경(sigmoid 제거) + epoch 100 >



< loss function BCEWithLogitsLoss로 변경 (sigmoid 삭제), lr = 0.0005, disc lr*0.75 + epoch 100 >

Thanks for Listening

2025-1 모빌리티 UR 김유진

2025.03.27