量化投资作业 4

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1. 作业要求

- 理解课堂展示的“demo_4_gan”项目，并将原始GAN改造为WGAN-GP。

2. 实验过程

1. 在网络组建中删除`nn.Sigmoid()`

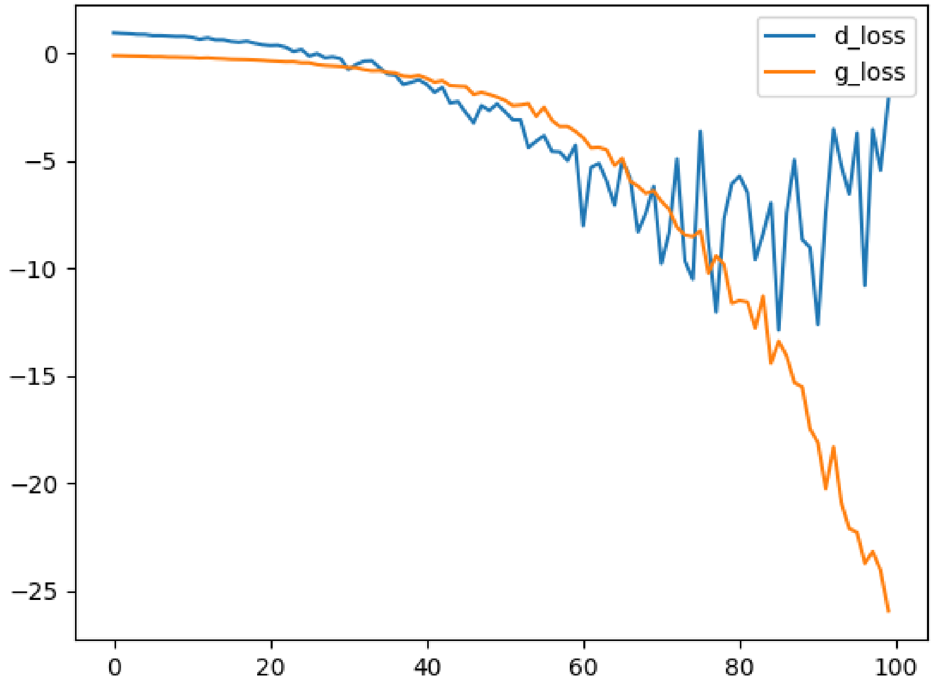
2. 修改新的loss函数

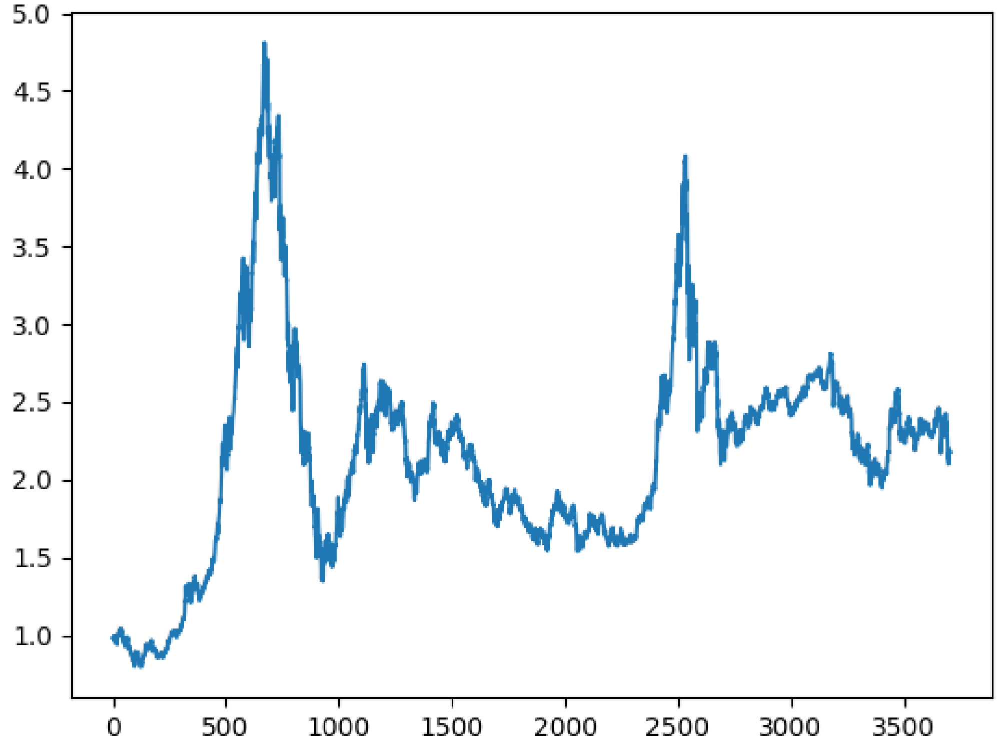
```
# a. 训练判别器
# a4. 判别器进行预测
        real_pred = D(real_data)
        fake_pred = D(fake_data)
 ...
# b. 训练生成器
# b3. 计算损失
        # 不做noise labeling
        real_label = torch.ones(param.batch_size,
1).to(param.device)
        g_loss = -fake_pred.mean()
```

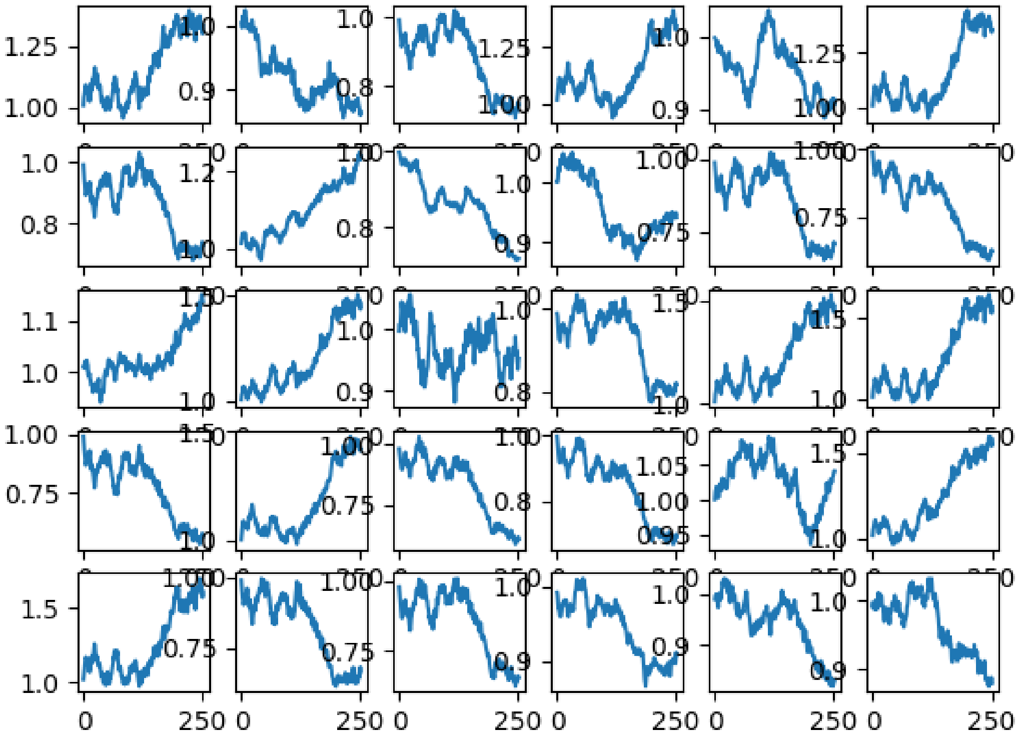
3. 设置梯度惩罚项

```
    def compute_gradient_penalty(D, real_data, fake_data,
lambda_term, batch_size, cuda_index):
        tensor = torch.FloatTensor(batch_size, 1, 1,
1).uniform_(0, 1)
        tensor = tensor.expand(batch_size, real_data.size(1),
real_data.size(2), real_data.size(3))
        if cuda:
            tensor = tensor.cuda(cuda_index)
        else:
            tensor = tensor
        interpolated = tensor * real_data + ((1 - tensor) *
fake_data)
        if cuda:
            interpolated = interpolated.cuda(cuda_index)
        else:
            interpolated = interpolated
        interpolated = Variable(interpolated, requires_grad=True)
        d_interpolated = D(interpolated)
        grads = autograd.grad(outputs=d_interpolated,
inputs=interpolated,

 grad_outputs=torch.ones(d_interpolated.size()).cuda(cuda_index)
if cuda else torch.ones(
                                  d_interpolated.size()),
create_graph=True, retain_graph=True)[0]
        grad_penalty = ((grads.norm(2, dim=1) - 1) ** 2).mean() *
lambda_term
        return grad_penalty

    d_optimizer = torch.optim.Adam(D.parameters(), lr=1e-5, betas=
(0.1, 0.999))
    g_optimizer = torch.optim.Adam(G.parameters(), lr=2e-4, betas=
(0.5, 0.999))
```

3. 实验结果




5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0
500
1000
1500
2000
2500
3000
3500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1.00
1.0
0.9
1.0
0.8
1.25
1.00
1.0
0.9
1.25
1.00
1.0
0.8
1.2
1.0
1.0
0.8
1.00
0.75
1.00
0.75
1.1
1.0
1.0
0.9
1.0
0.8
1.5
1.0
1.5
1.0
1.00
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0.75
1.0
0.8
1.05
1.00
0.95
1.5
1.0
1.5
1.0
1.00
0.75
1.00
0.75
1.0
0.9
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0.9
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1.0
0.9
0
250
0
250
0
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250
0
250