light_data_3.4/result/3.4：

（1）/norm_LS：

用 LS 算法，求出各个 snr 信号的 NMSE。LS 估计时用的信号是归一化之后的信号。

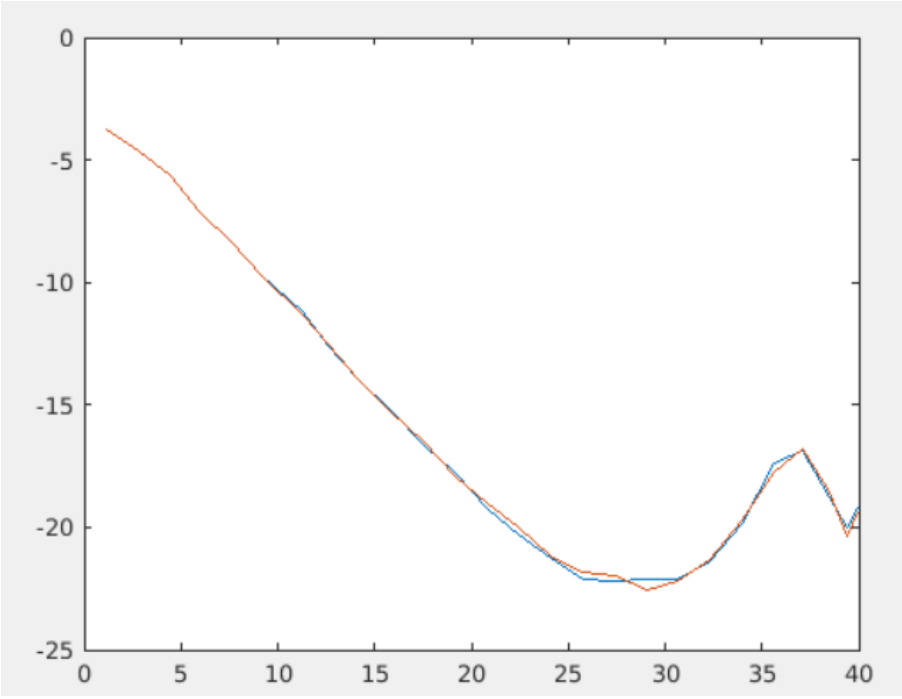
（2）/mix_amp：

混合 snr 数据作为训练数据，且数据归一化。测试数据集不仅是 xTest,还有用来训练的 xTrain 也做一遍测试，看看有没有过拟合。与 3.3 不同的是，3.3 的发送信号是 8pam，3.4 的发送信号是均匀分布的随机信号。

1.1 mix_amp/Twononlinear1（两层非线性层，更改 Hidden Units）

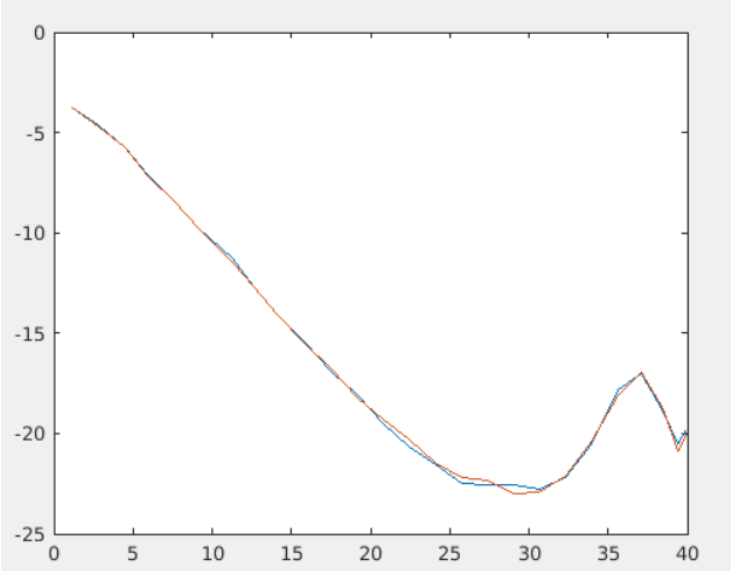
蓝线是测试集 NMSE，红线是用训练集 xTrain 测试出来的 NMSE

```
Twononlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 25
```



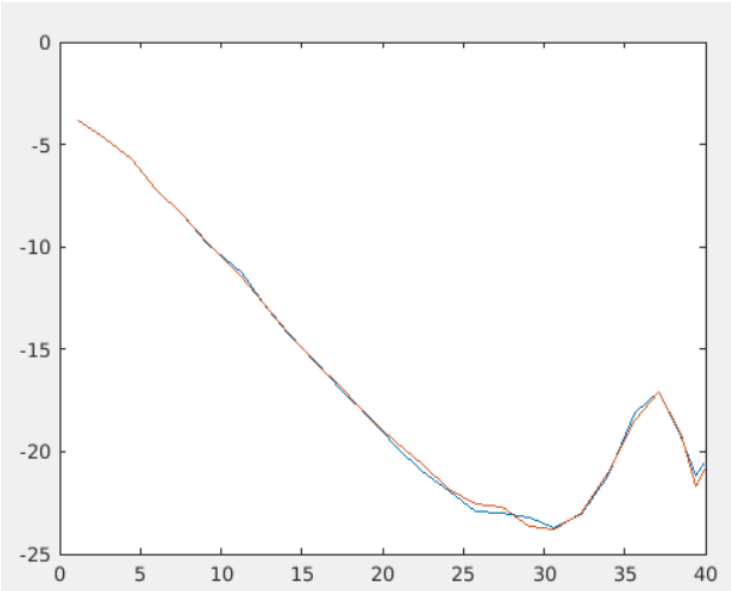
1.2 mix_amp/Twononlinear2

```
Twononlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 30
```



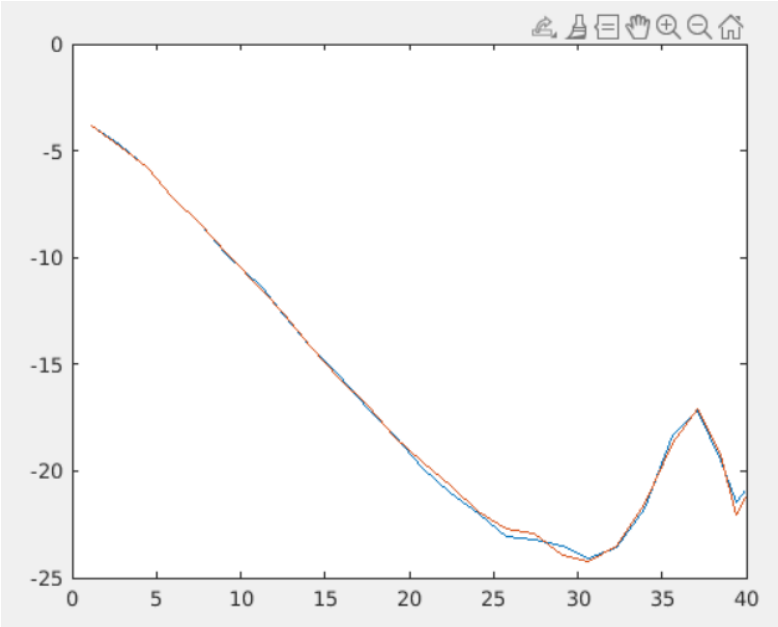
1.3 mix_amp/Twononlinear3

```
Twononlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 40
```



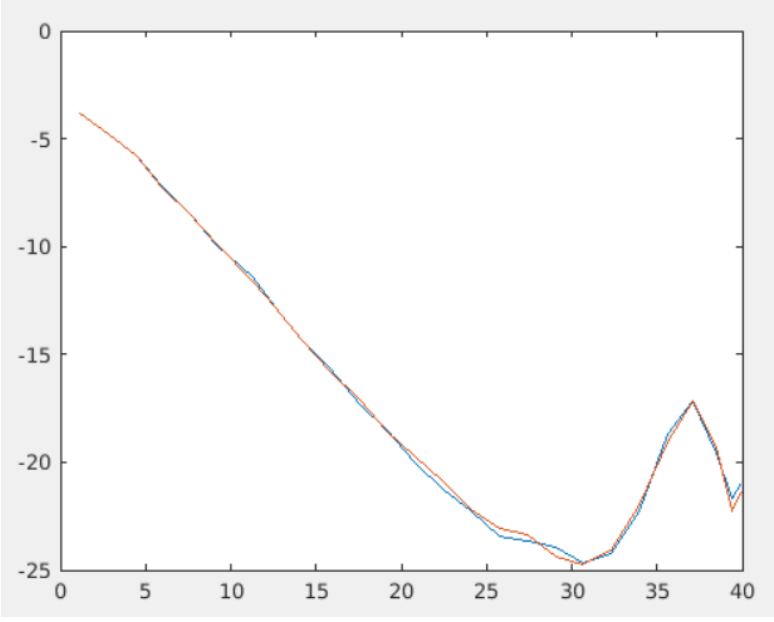
1.4 mix_amp/Twononlinear4

```
Twononlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 50
```



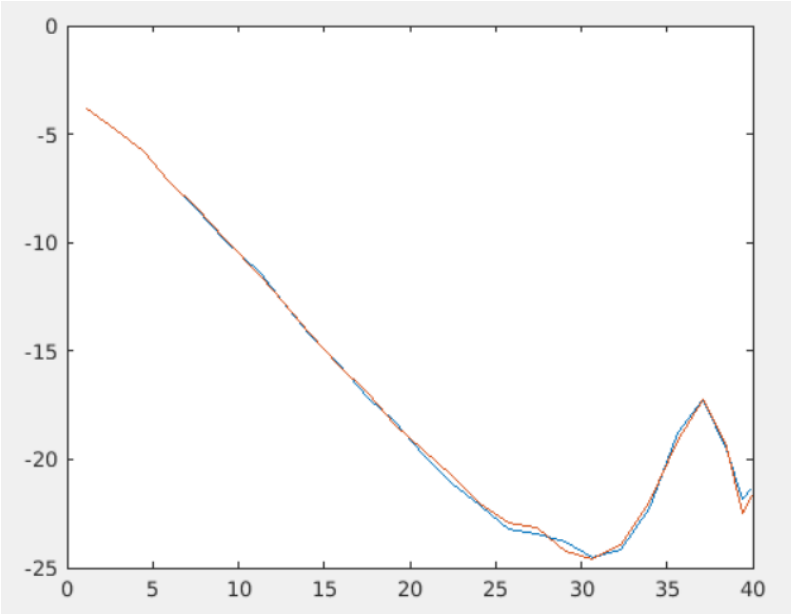
1.5 mix_amp/Twononlinear5

```
Twononlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 60
```



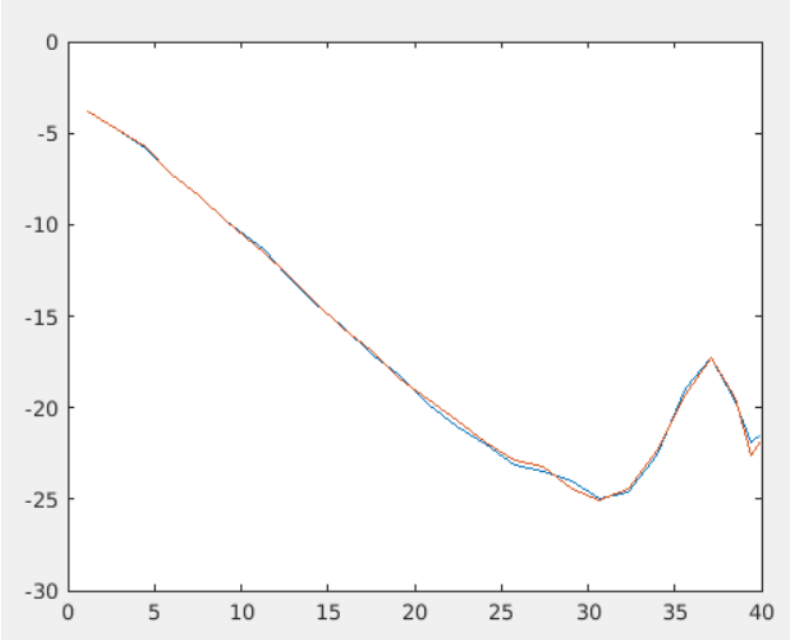
1.6 mix_amp/Twononlinear6

```
Twononlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 70
```



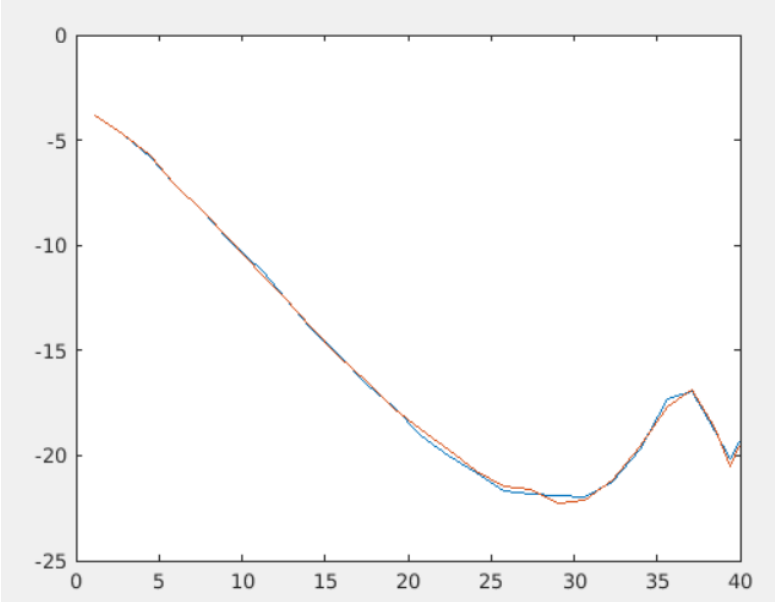
1.7 mix_amp/Twononlinear7

```
Twononlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 80
```



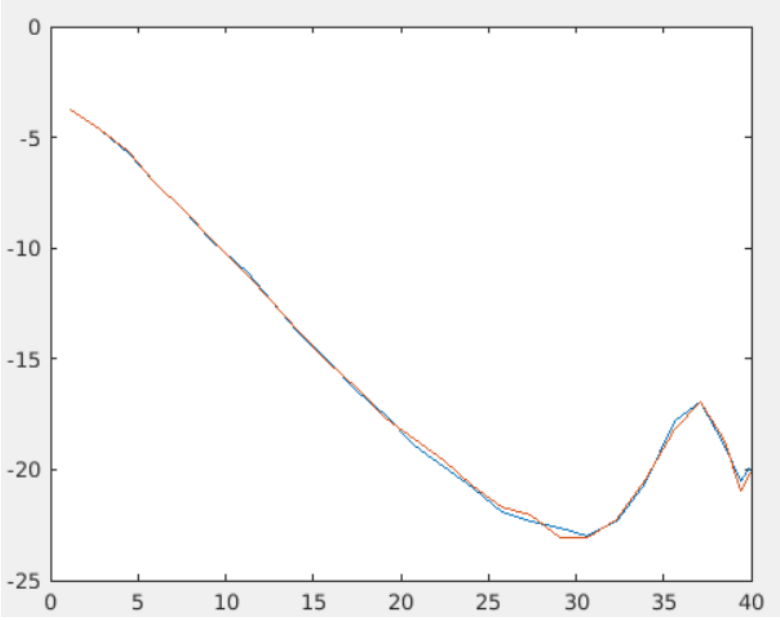
2.1 mix_amp/Threenonlinear1（三层非线性层，更改 Hidden Units）

```
Threenonlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 25
```



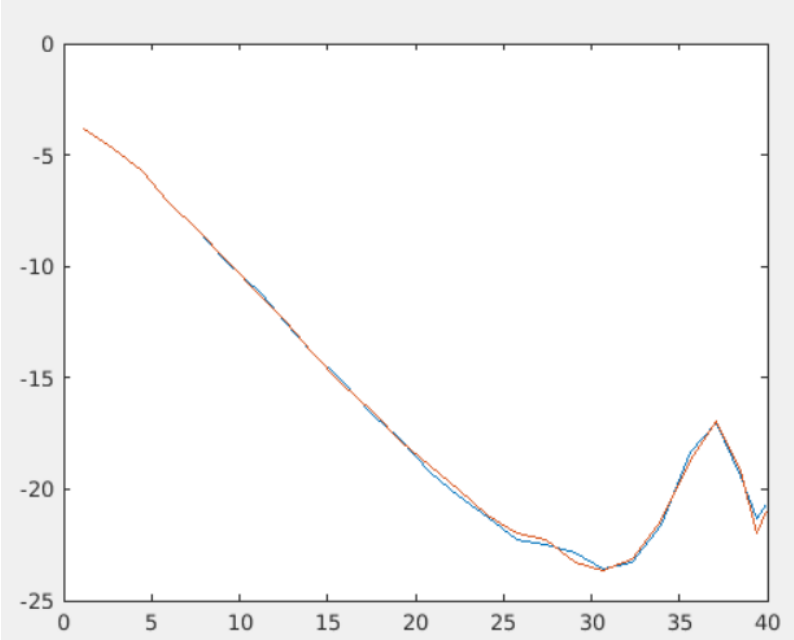
2.2 mix_amp/Threenonlinear2

```
Threenonlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 30
```



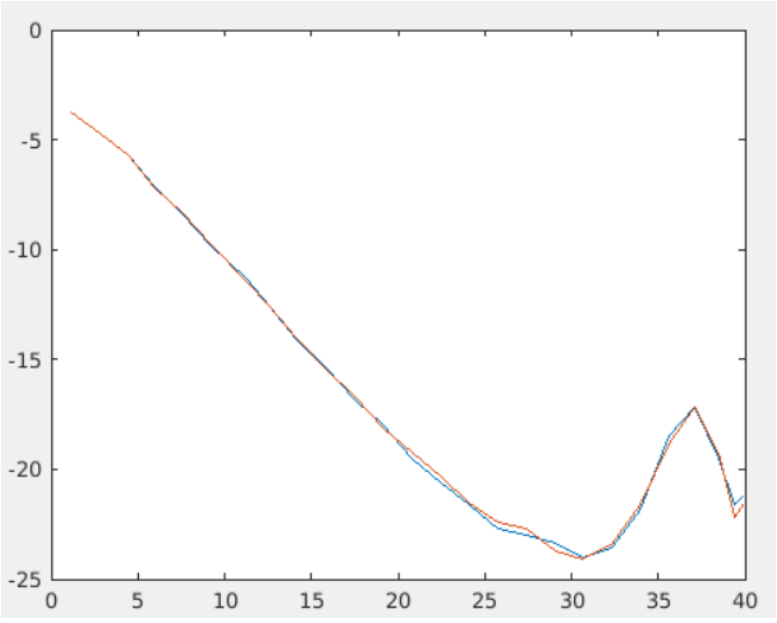
2.3 mix_amp/Threenonlinear3

```
Threenonlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 40
```



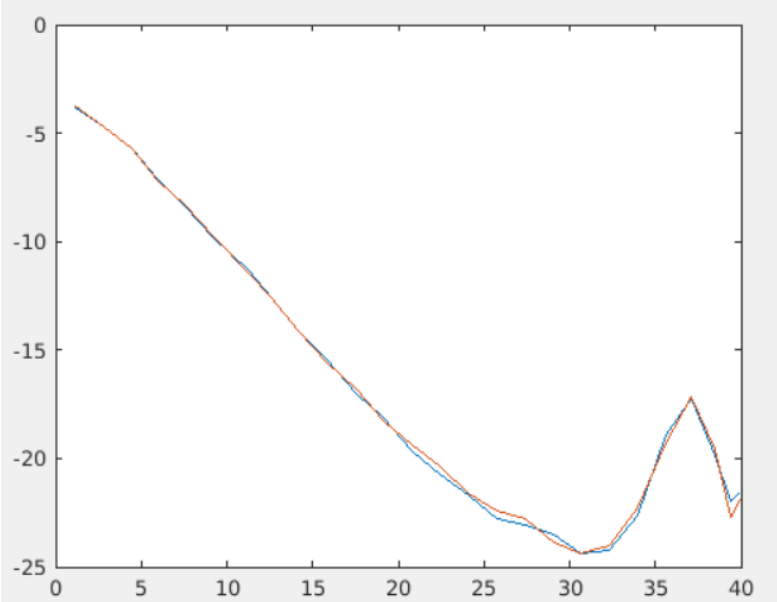
2.4 mix_amp/Threenonlinear4

```
Threenonlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 50
```



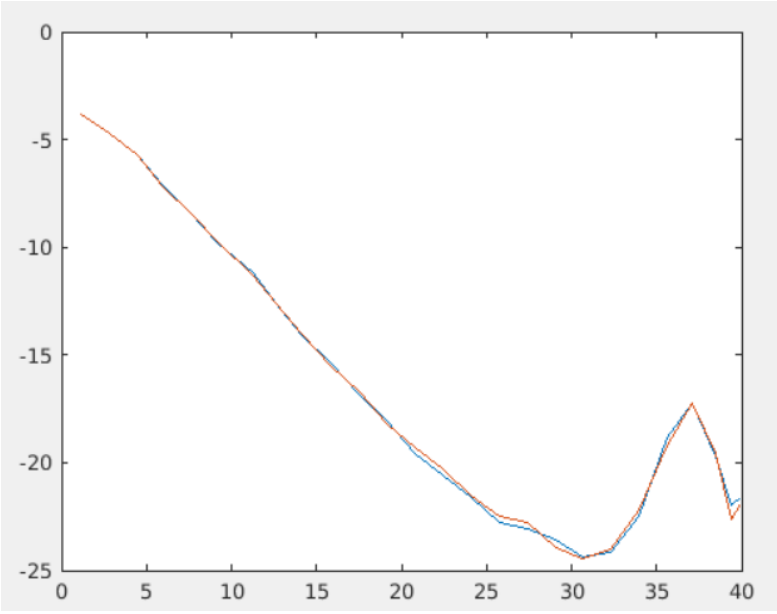
2.5 mix_amp/Threenonlinear5

```
Threenonlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 60
```



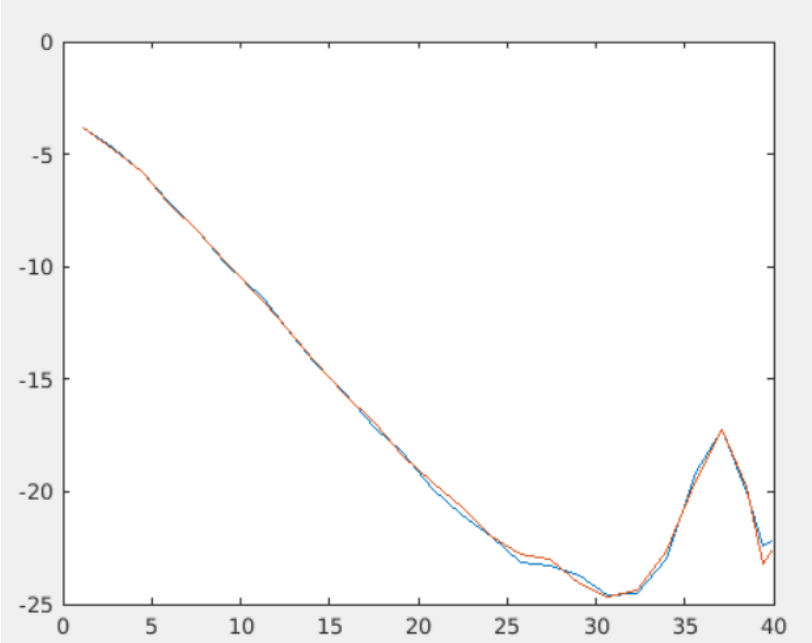
2.6 mix_amp/Threenonlinear6

```
Threenonlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 70
```



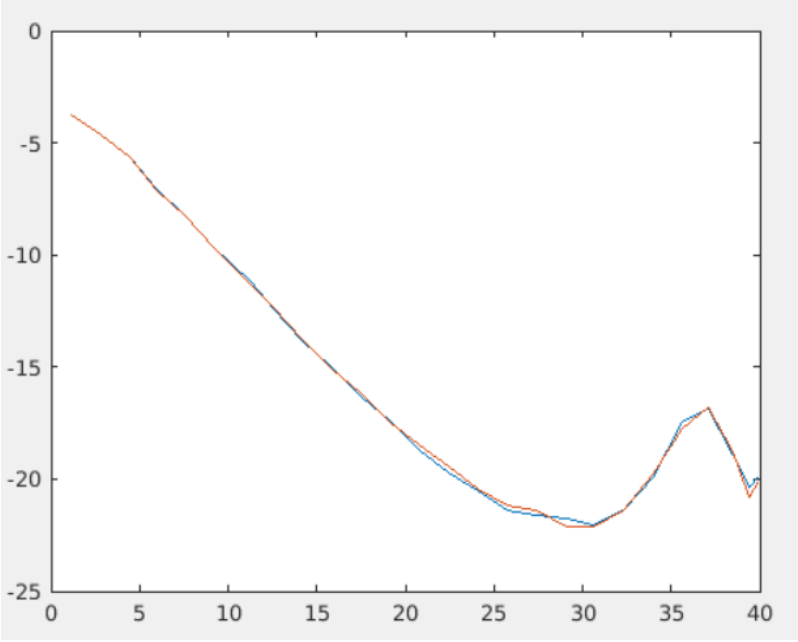
2.7 mix_amp/Threenonlinear7

```
Threenonlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 80
```



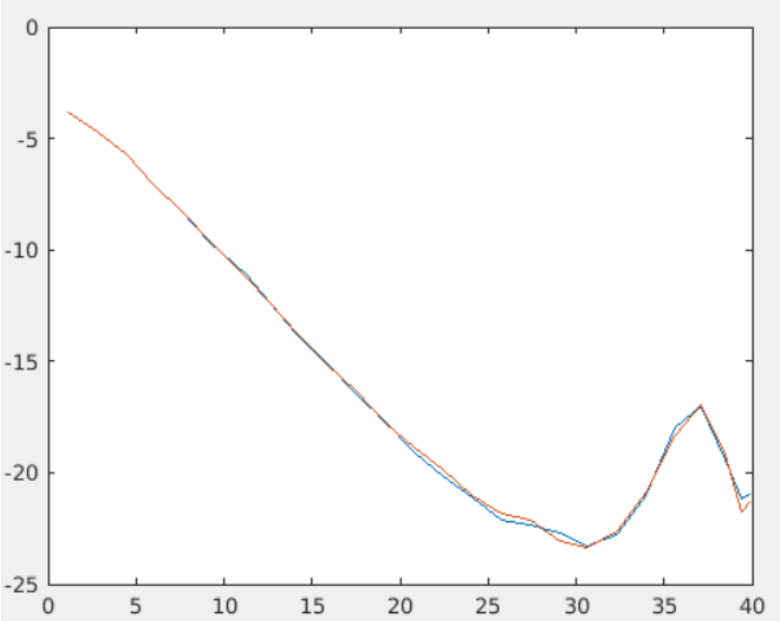
4.1 mix_amp/Fournonlinear1（四层非线性层，更改 Hidden Units）

```
Fournonlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 25
```



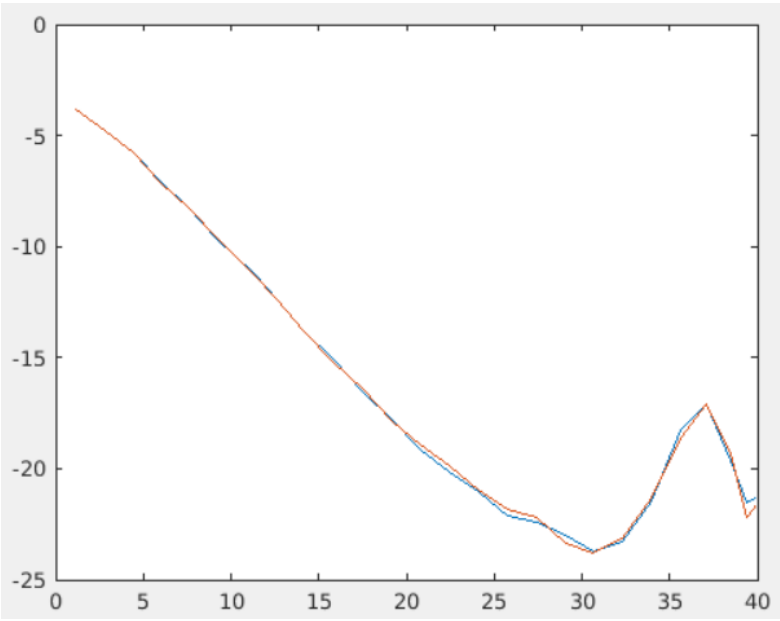
4.2 mix_amp/Fournonlinear2

```
Fournonlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 30
```



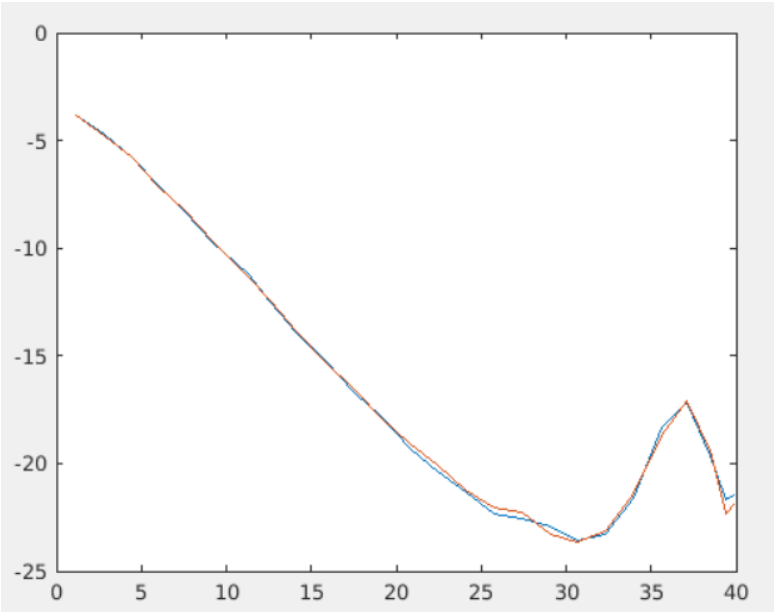
4.3 mix_amp/Fournonlinear3

```
Fournonlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 40
```



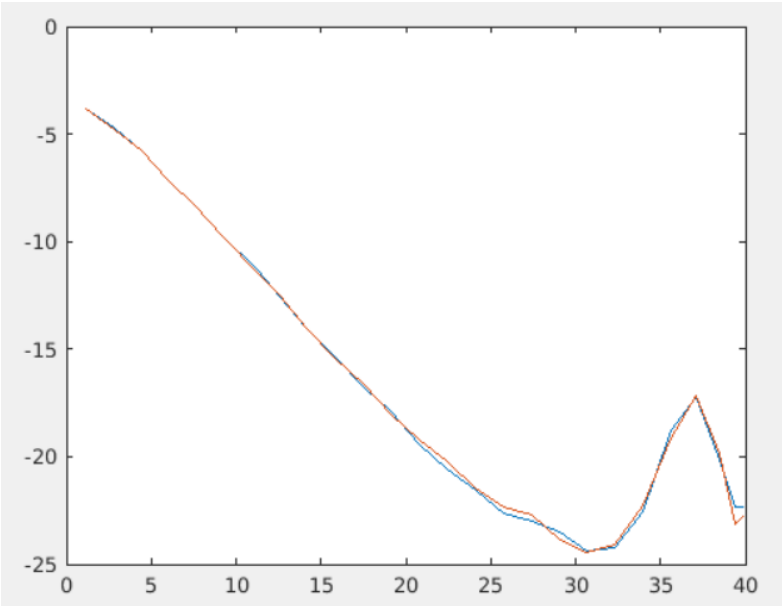
4.4 mix_amp/Fournonlinear4

```
Fournonlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 50
```



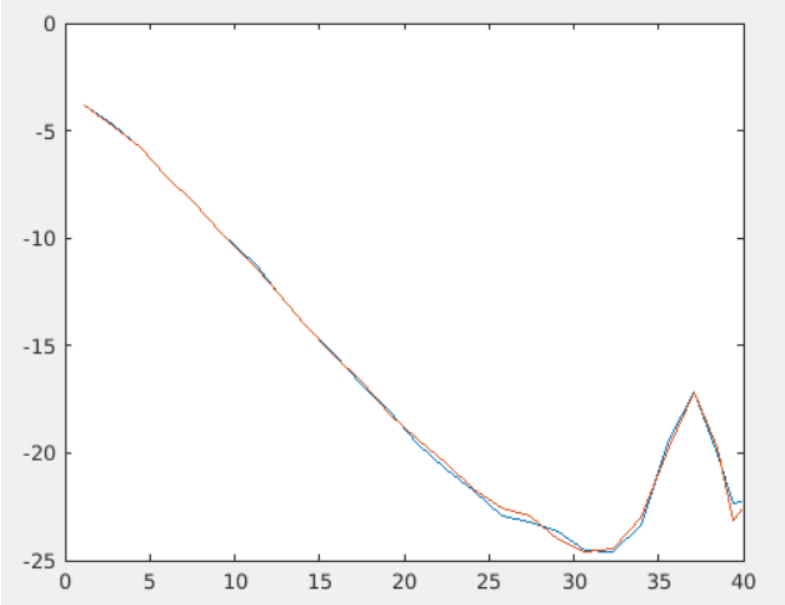
4.5 mix_amp/Fournonlinear5

```
Fournonlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 60
```



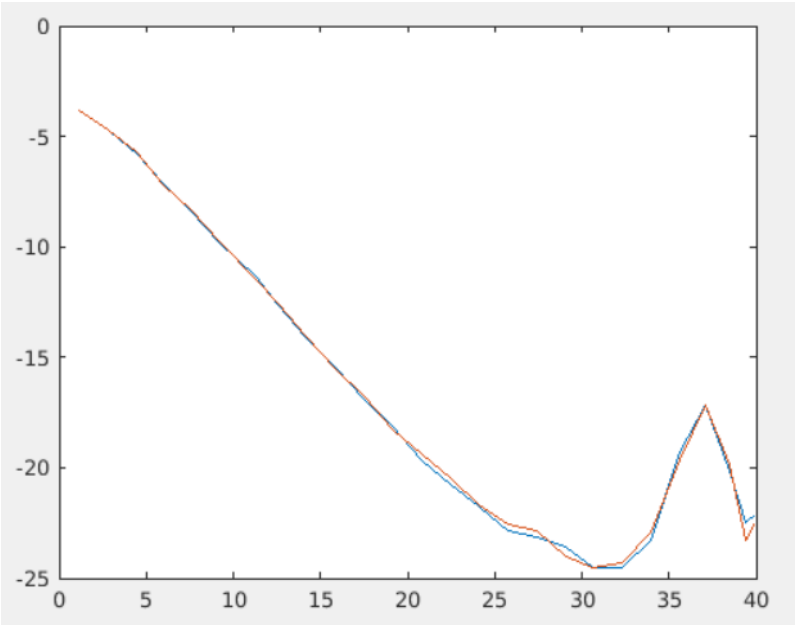
4.6 mix_amp/Fournonlinear6

```
Fournonlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 70
```



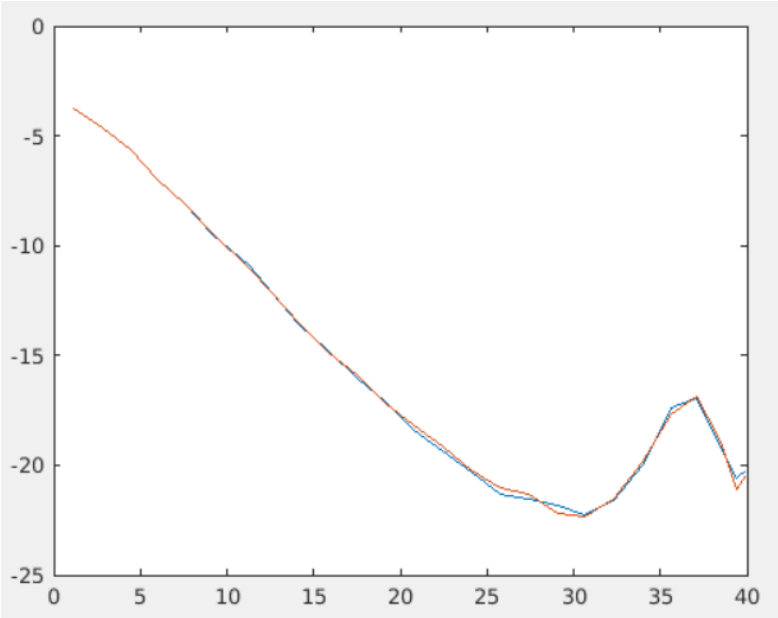
4.7 mix_amp/Fournonlinear7

```
Fournonlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 80
```



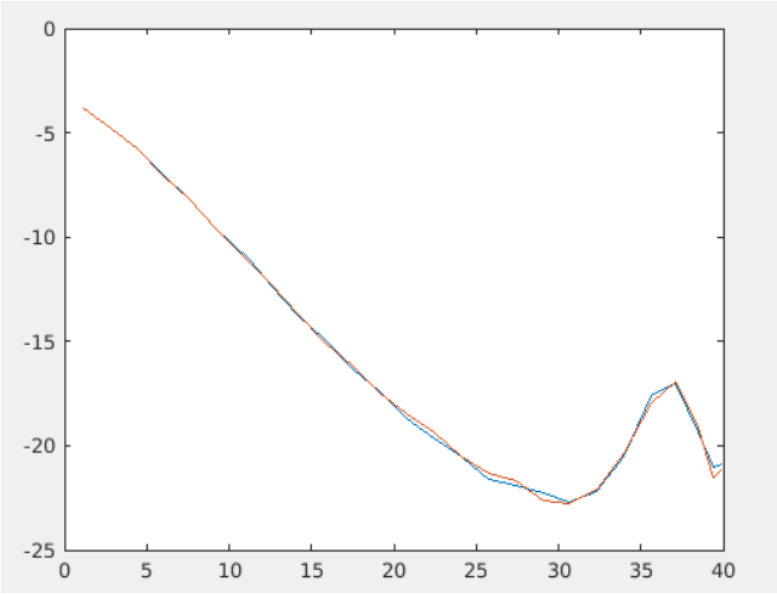
5.1 mix_amp/Fivenonlinear1（五层非线性层，更改 Hidden Units）

```
Fivenonlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 25
```



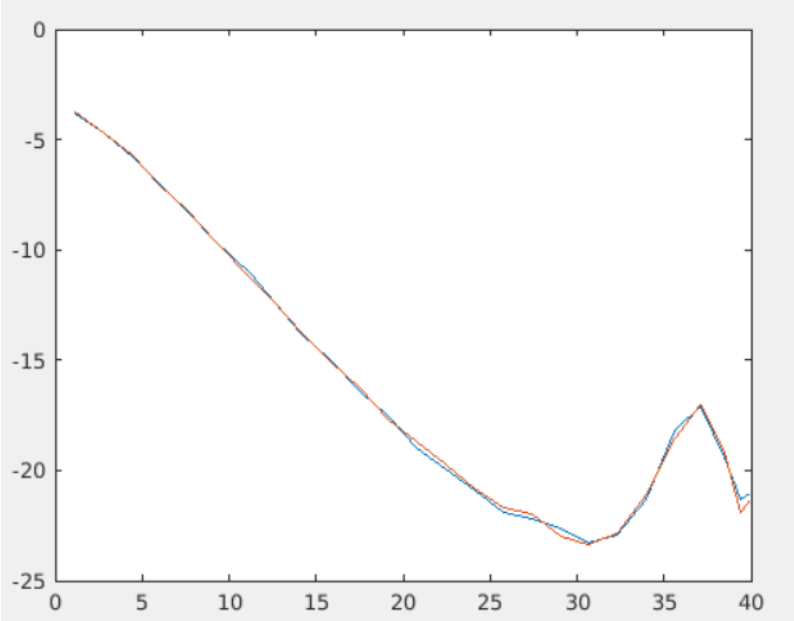
5.2 mix_amp/Fivenonlinear2

```
Fivenonlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 30
```



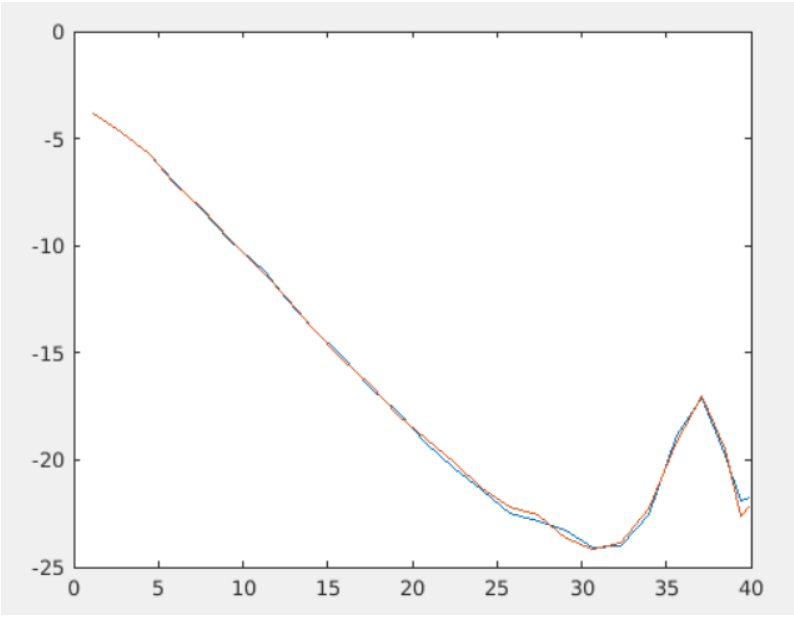
5.3 mix_amp/Fivenonlinear3

```
Fivenonlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 40
```



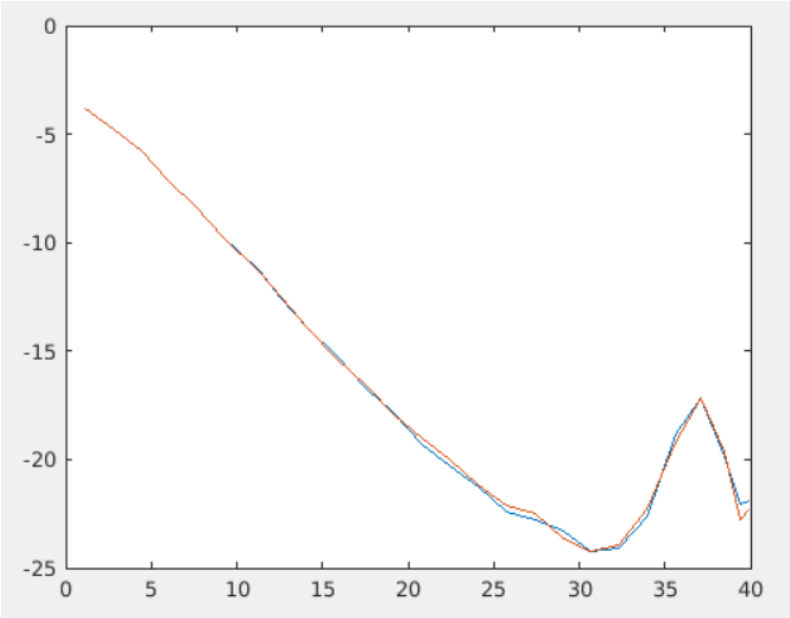
5.4 mix_amp/Fivenonlinear4

```
Fivenonlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 50
```



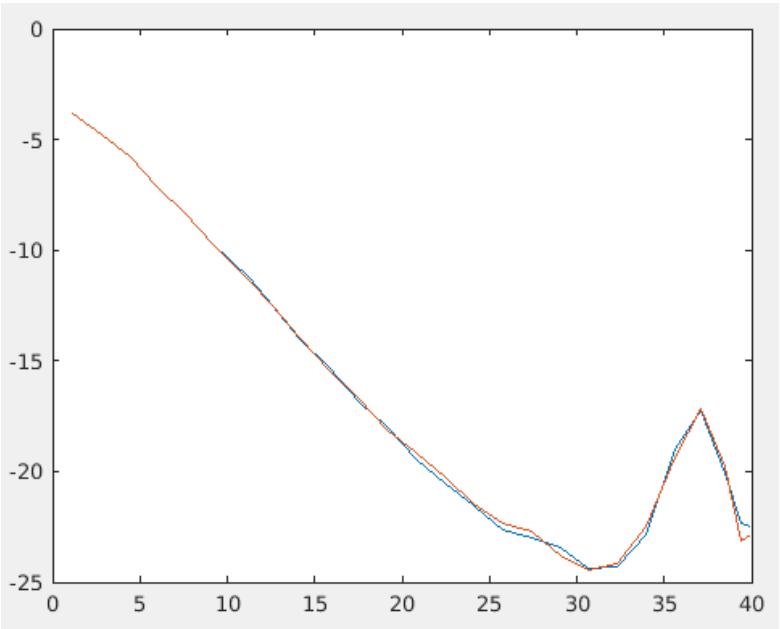
5.5 mix_amp/Fivenonlinear5

```
Fivenonlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 60
```



5.6 mix_amp/Fivenonlinear6

```
Fivenonlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 70
```



5.7 mix_amp/Fivenonlinear7

```
Fivenonlinear ,
ini learningRate = 1.000000e-02 ,
min batch size = 400 ,
DropPeriod = 5 ,
DropFactor = 0.100000 ,
amp begin = -4 , amp end = 46 , amp step = 2
data_num = 100
validationFrequency has changed from floor(size(xTrain{1},2)/100 to floor(numel(xTrain)/miniBatchSize/5) (9 to 6)
Hidden Units = 80
```