

# Regression\_v2

November 29, 2020

## 1 Regression

```
[ ]: iterations = 20

for i in range(iterations):

    # choose hyperparams
    net_type = Net4

    Nh1 = np.random.choice(Nh1s)
    Nh2 = np.random.choice(Nh2s)
    Nh3 = np.random.choice(Nh3s)
    Nh4 = np.random.choice(Nh4s)
    activation_function = np.random.choice(activation_functions)
    net_params = [Ni, Nh1, Nh2, Nh3, Nh4, No, activation_function]

    optimizer_type = optim.Adam
    lr = np.random.choice(lrs)
    weight_decay = np.random.choice(weight_decays)
    optimizer_params = {'lr': lr, 'weight_decay': weight_decay}

    loss_function = nn.MSELoss()

    train_batch_size = int(np.random.choice(train_batch_sizes))

    evolver_type = Evolver_es
    patience = np.random.choice(patiences)
    evolver_additional_params = [patience]

    # K fold
    kf = KFoldCrossValidator(k, shuffle=True, all_train_df=all_train_df,
    ↪ net_type=net_type, net_params=net_params,
    ↪ optimizer_type=optimizer_type,
    ↪ optimizer_params=optimizer_params, loss_function=loss_function,
    ↪ train_batch_size=train_batch_size,
    ↪ evolver_type=evolver_type,
    ↪ evolver_additional_params=evolver_additional_params)
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avg_train_loss, avg_val_loss = kf.run(10000)
# avg_train_loss, avg_val_loss = 0,0

df.loc[len(df)] = [Nh1,Nh2,Nh3,Nh4,activation_function,
↳lr,weight_decay,train_batch_size,patience, avg_train_loss,avg_val_loss]
df.to_csv('random_search.csv')
files.download('random_search.csv')
print(df.loc[len(df) - 1])

idx = 0
kf.evolvers[idx].plot_losses()
kf.evolvers[idx].plot(kf.train_dfs[idx],kf.val_dfs[idx])

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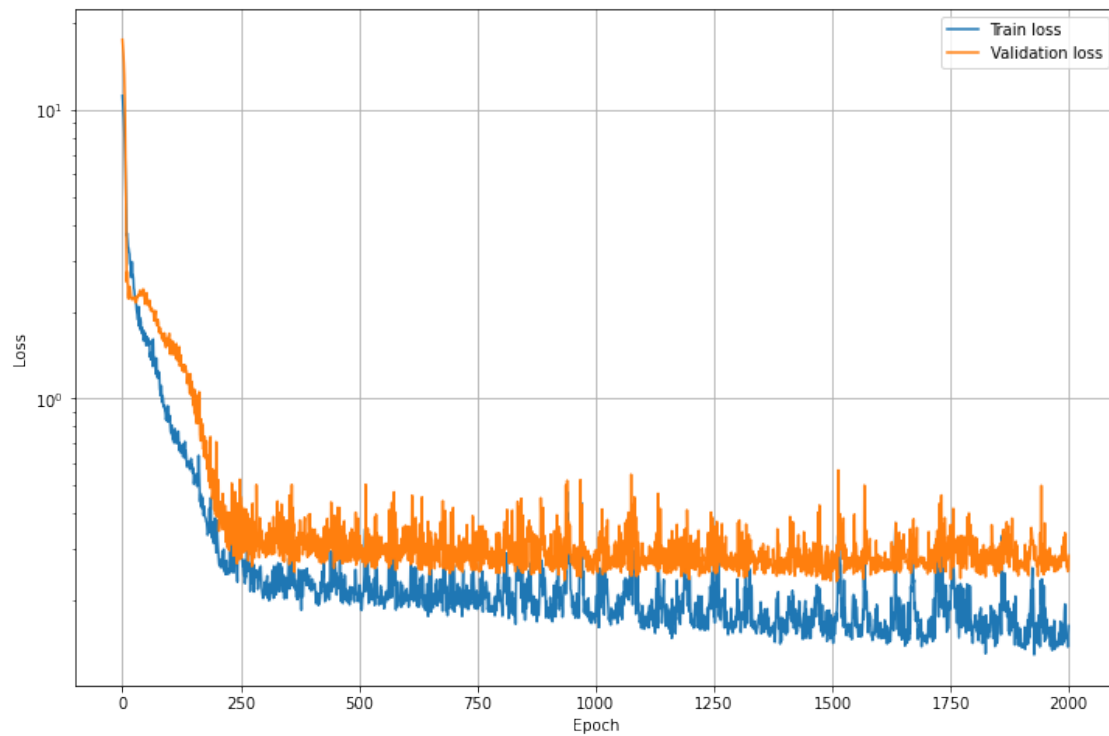
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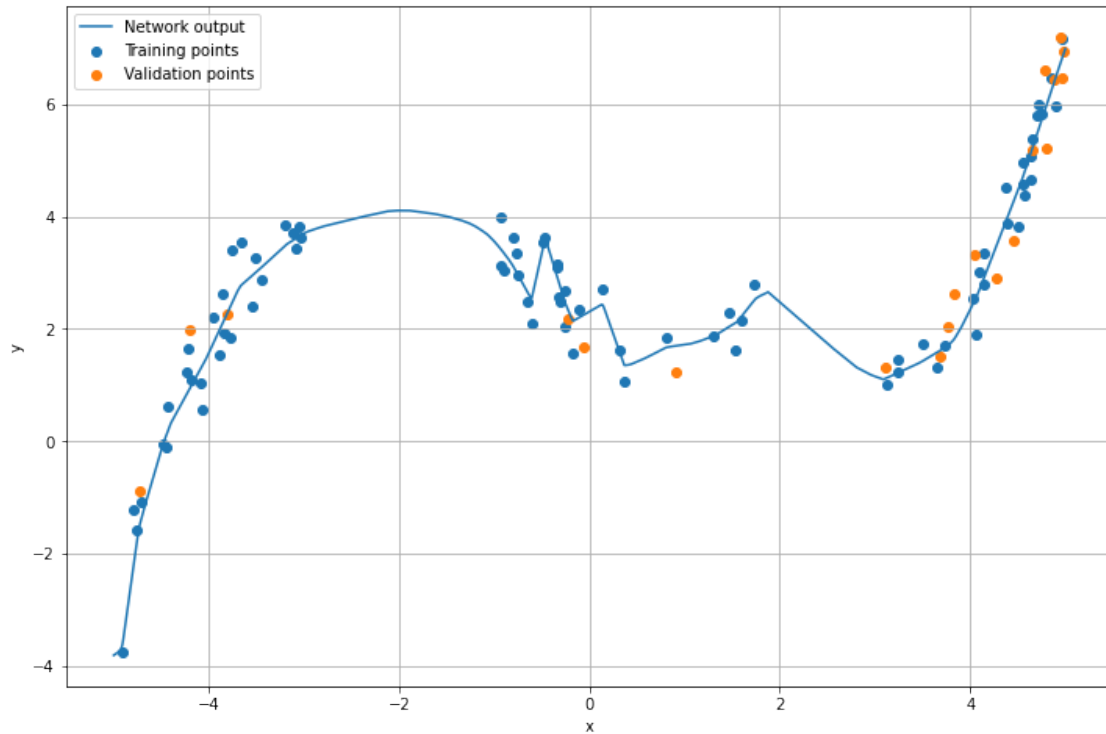
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Nh1	128
Nh2	64
Nh3	32
Nh4	32
activation_function	ReLU()
lr	0.001
weight_decay	0.001
train_batch_size	30
patience	500
avg_train_loss	0.167427

avg\_val\_loss 0.331604  
Name: 2, dtype: object



Average train loss in the last 10 epochs: 0.1610  
Average validation loss in the last 10 epochs: 0.2823



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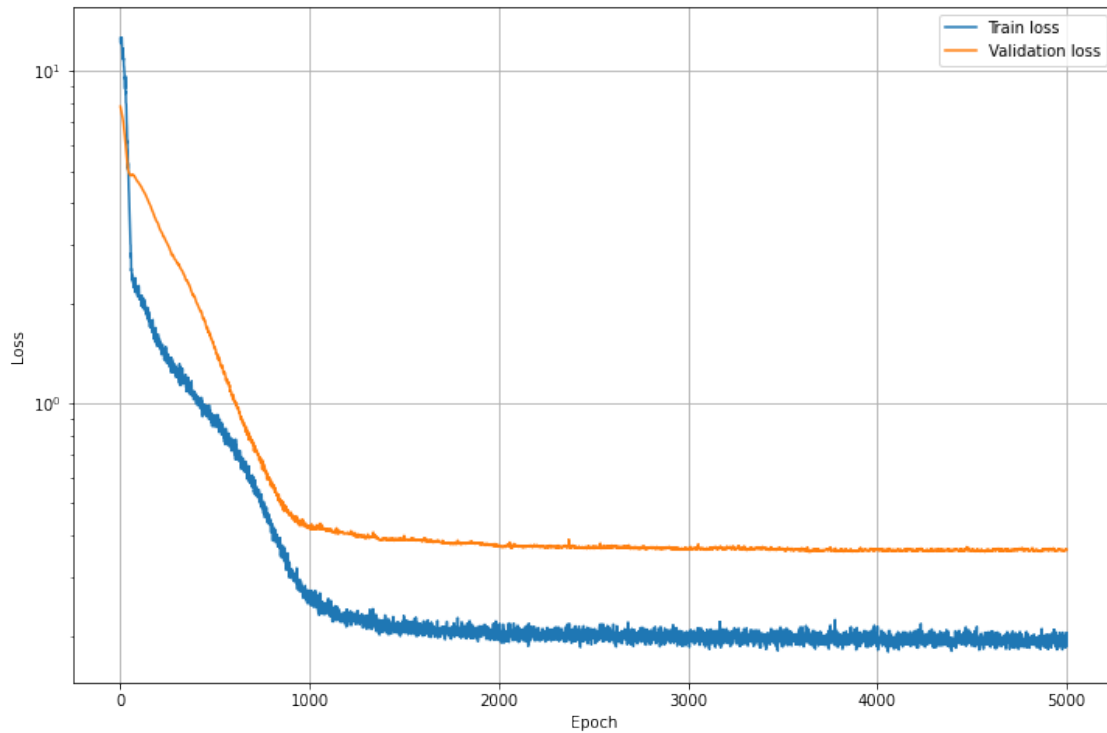
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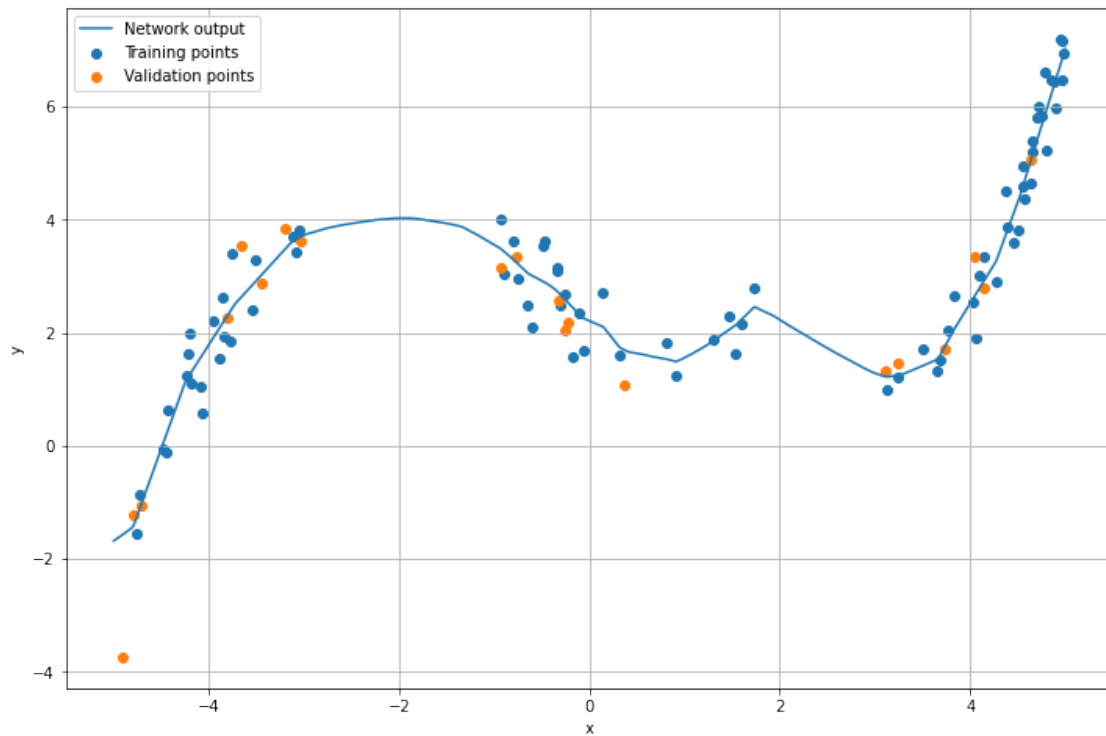
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Nh1	256
Nh2	16
Nh3	64
Nh4	32
activation_function	ReLU()
lr	0.0001
weight_decay	0.001
train_batch_size	30
patience	500
avg_train_loss	0.172864
avg_val_loss	0.276304

Name: 3, dtype: object



Average train loss in the last 10 epochs: 0.1913  
Average validation loss in the last 10 epochs: 0.3628



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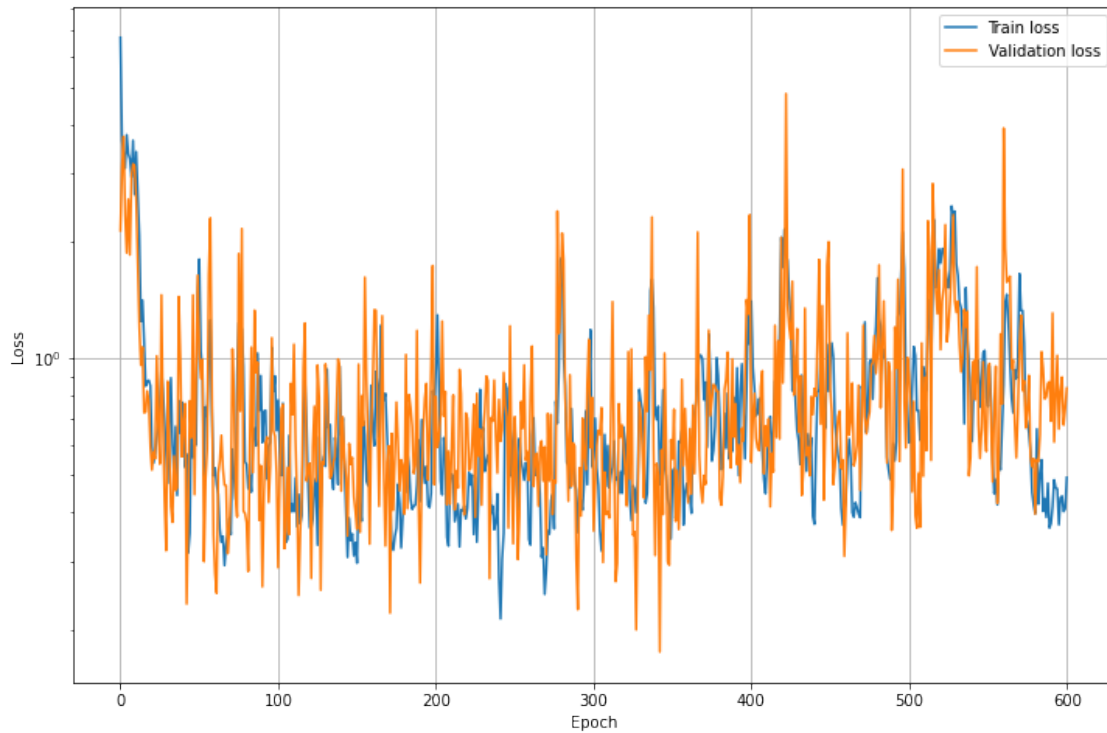
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Nh1                64
Nh2                64
Nh3                64
Nh4                128
activation_function  Tanh()
lr                 0.01
weight_decay       0
train_batch_size   10
patience          200
avg_train_loss     1.97571
avg_val_loss       1.90064
Name: 4, dtype: object

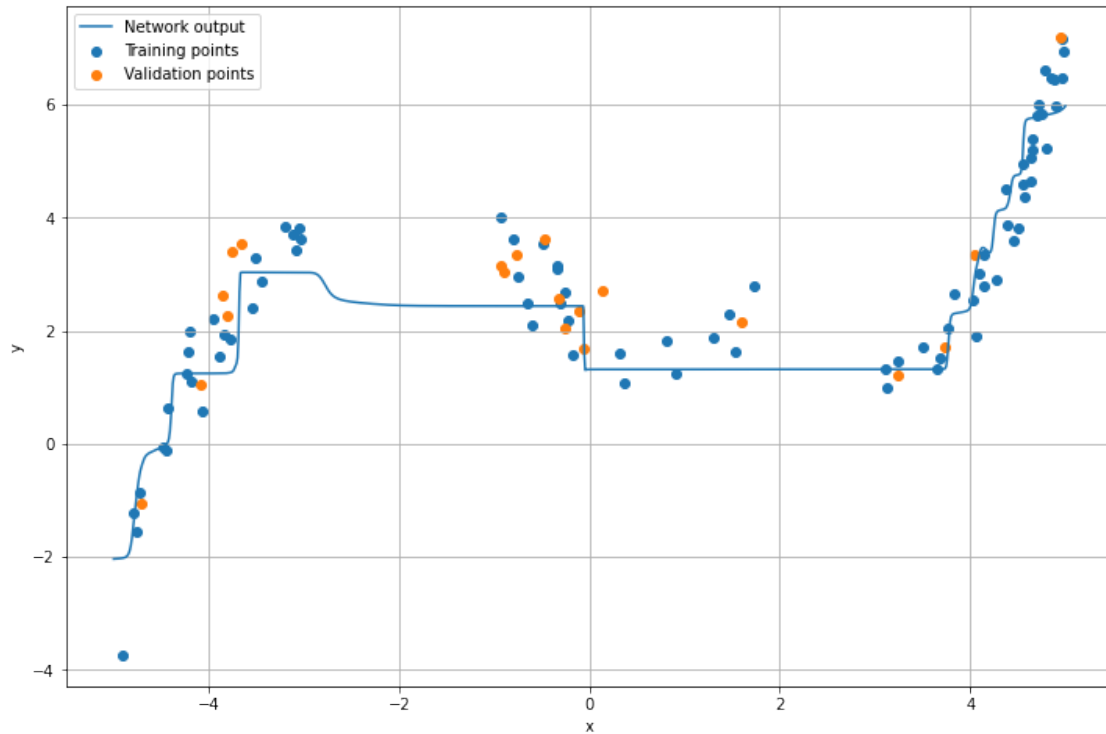
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Average train      loss in the last 10 epochs: 0.4379
Average validation loss in the last 10 epochs: 0.8352

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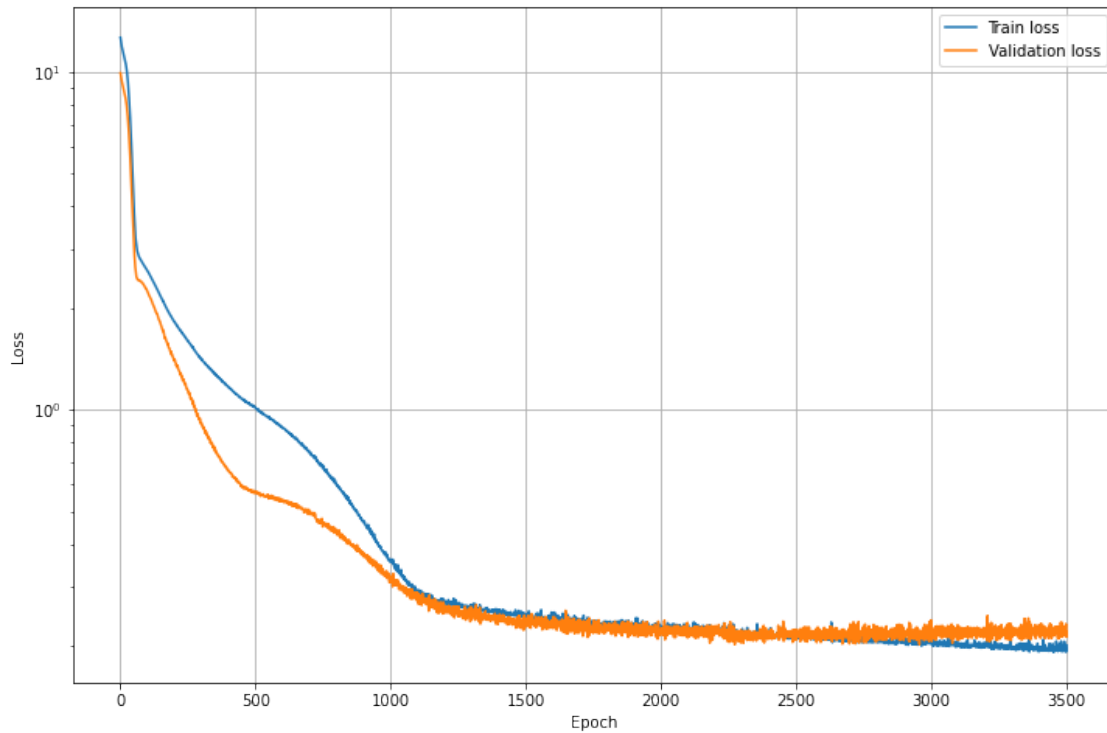
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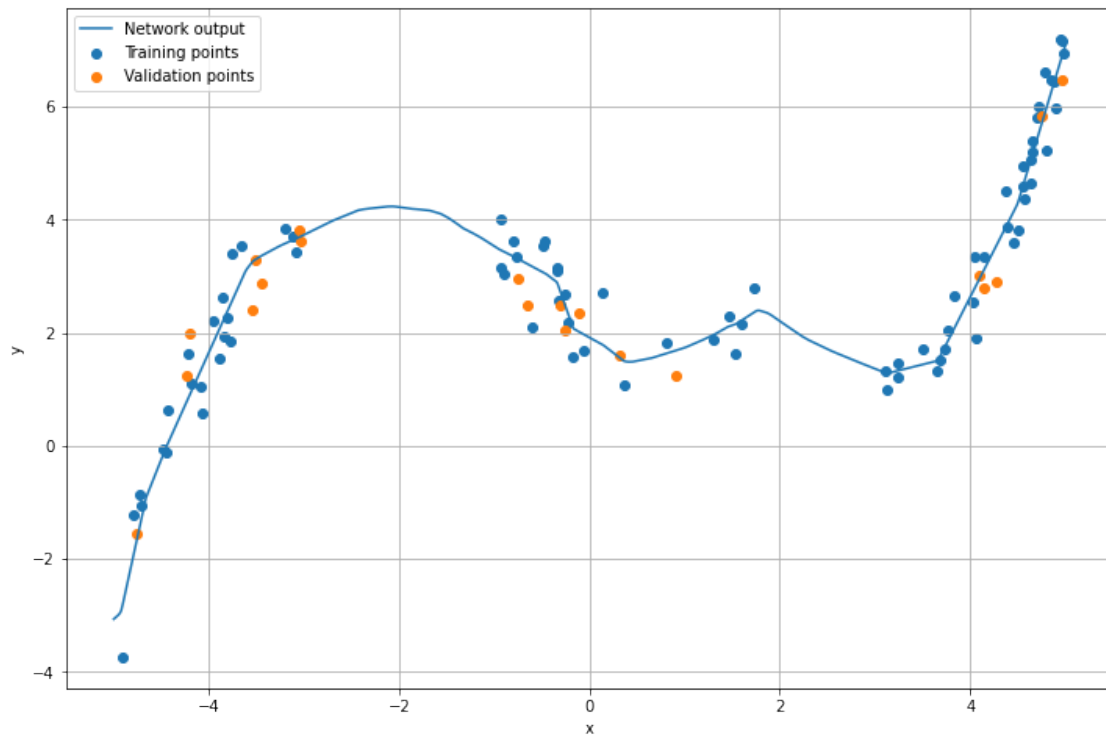
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Nh1 32  
Nh2 64  
Nh3 128  
Nh4 32  
activation\_function ReLU()  
lr 0.0001  
weight\_decay 0  
train\_batch\_size 20  
patience 500  
avg\_train\_loss 0.170384  
avg\_val\_loss 0.289367  
Name: 5, dtype: object



Average train loss in the last 10 epochs: 0.1973  
Average validation loss in the last 10 epochs: 0.2220



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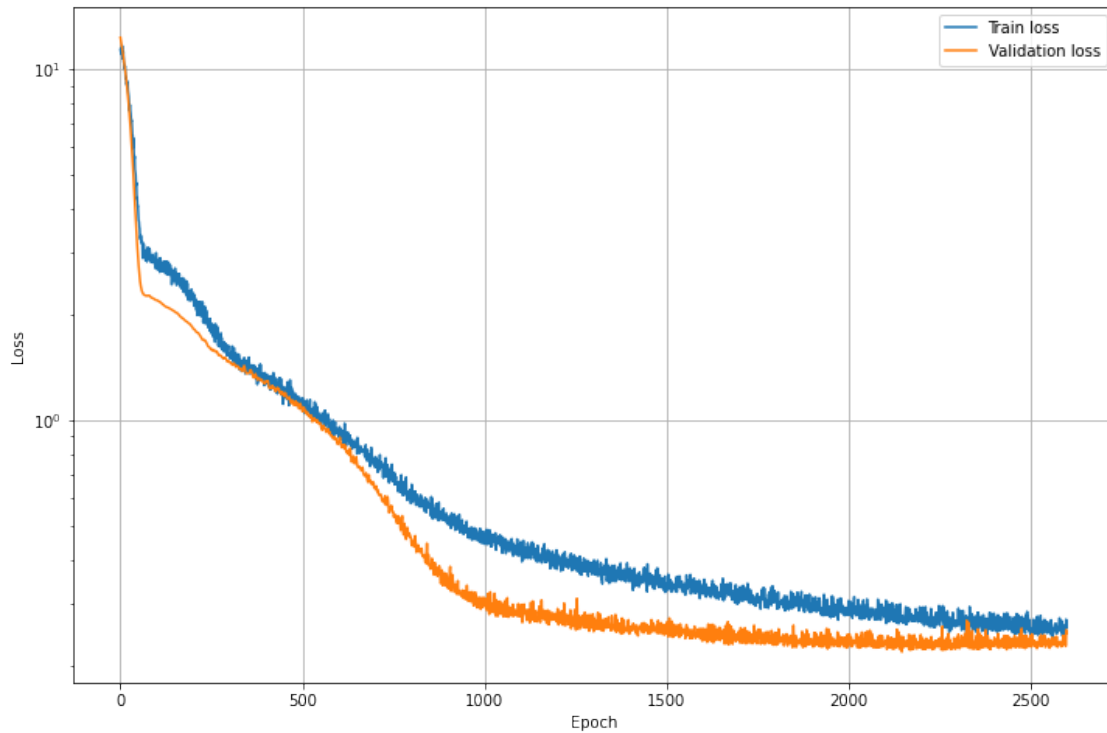
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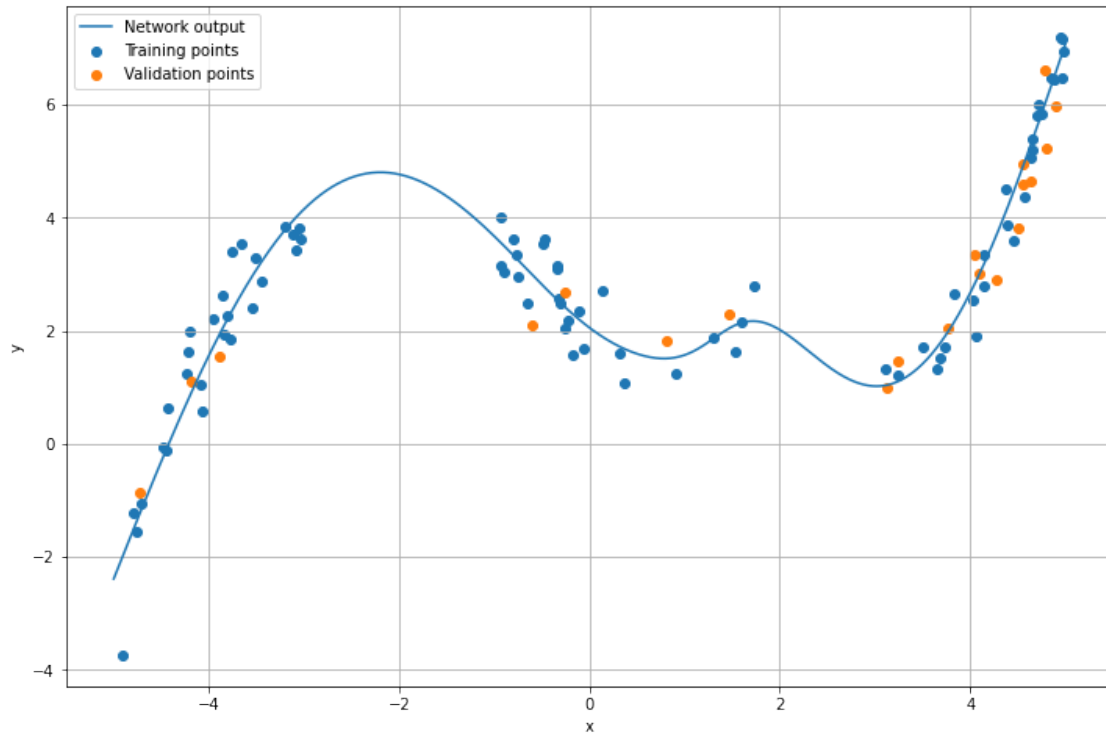
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Nh1 32  
Nh2 64  
Nh3 32  
Nh4 256  
activation\_function Tanh()  
lr 0.0001  
weight\_decay 0.001  
train\_batch\_size 30  
patience 200  
avg\_train\_loss 0.243282  
avg\_val\_loss 0.304429  
Name: 6, dtype: object



Average train loss in the last 10 epochs: 0.2562  
Average validation loss in the last 10 epochs: 0.2368



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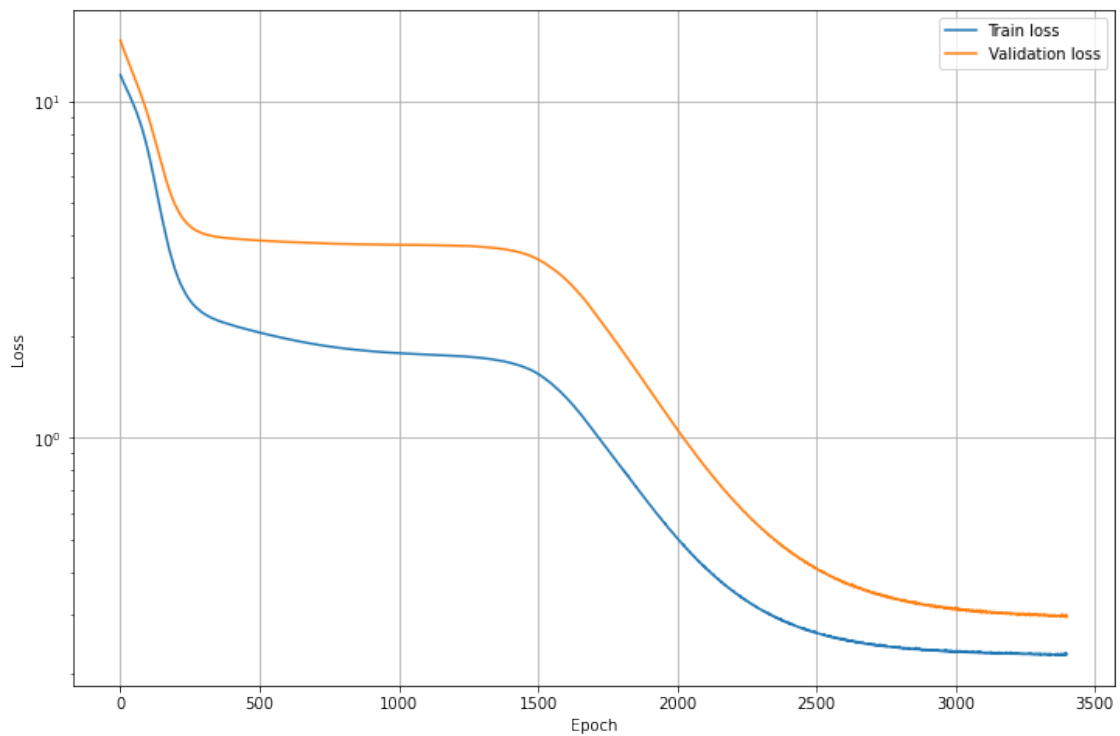
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Nh1                32
Nh2                64
Nh3                16
Nh4                32
activation_function Tanh()
lr                 0.0001
weight_decay       0.001
train_batch_size   40
patience           20
avg_train_loss     0.689234
avg_val_loss       0.550953
Name: 7, dtype: object

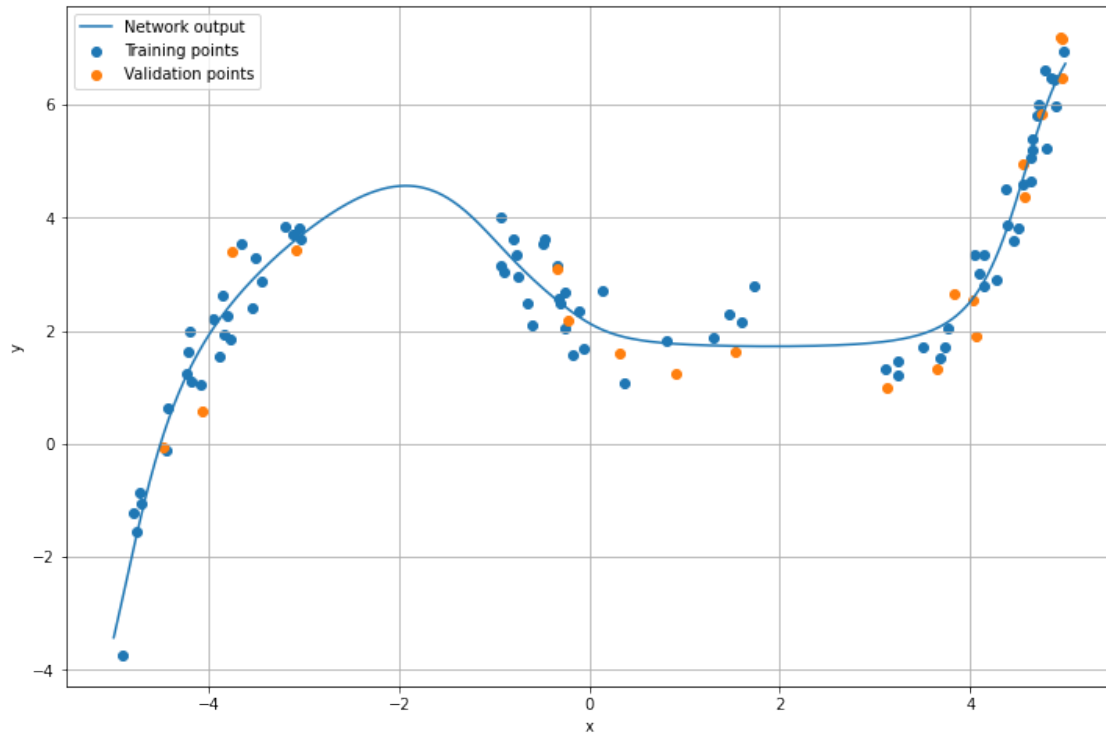
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Average train      loss in the last 10 epochs: 0.2277
Average validation loss in the last 10 epochs: 0.2962

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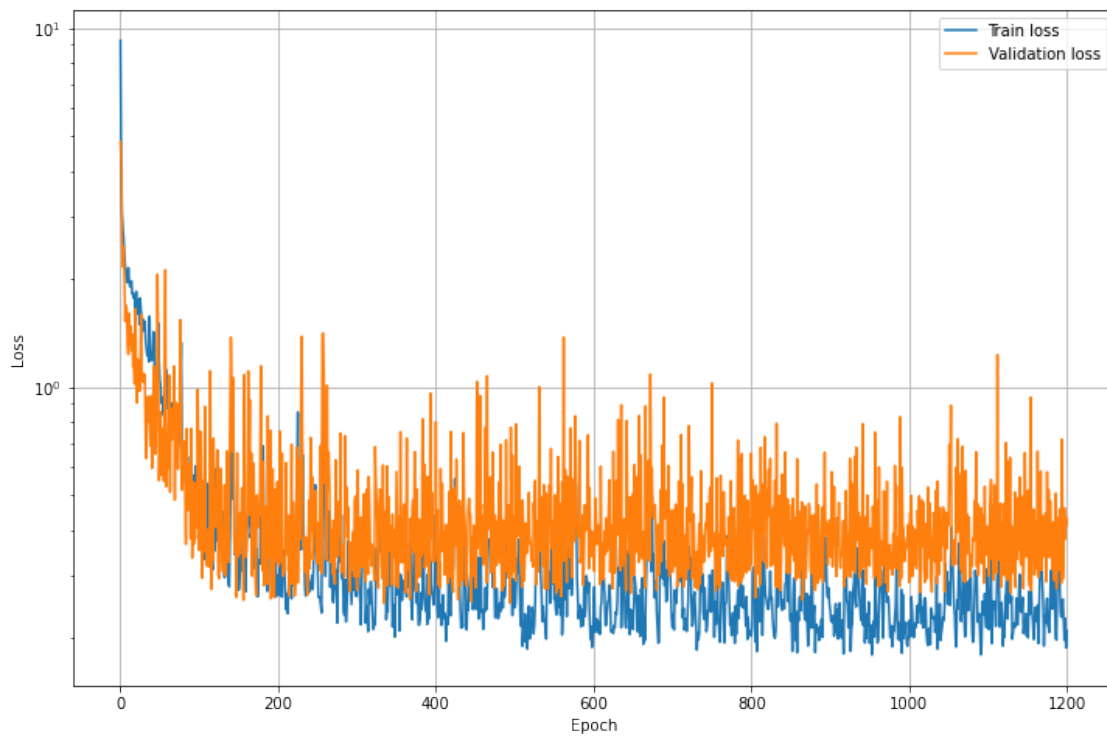
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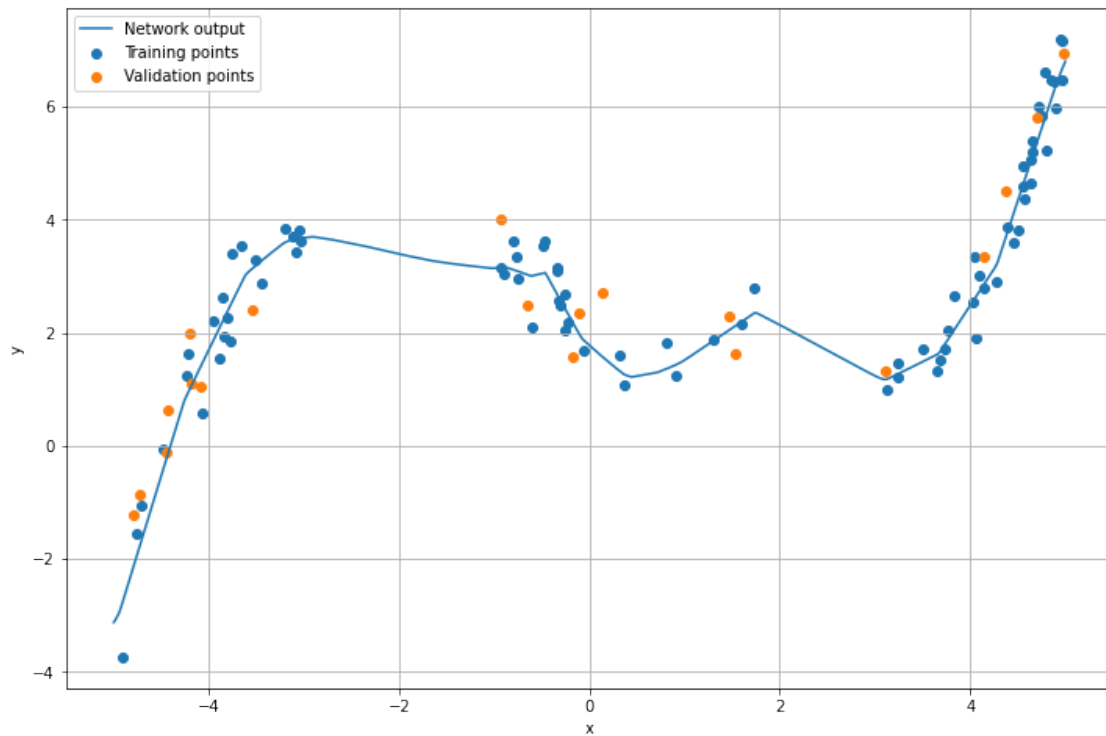
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Nh1 16  
Nh2 256  
Nh3 128  
Nh4 256  
activation\_function ReLU()  
lr 0.001  
weight\_decay 0.01  
train\_batch\_size 10  
patience 200  
avg\_train\_loss 0.245566  
avg\_val\_loss 0.367664  
Name: 8, dtype: object



Average train loss in the last 10 epochs: 0.2307  
Average validation loss in the last 10 epochs: 0.4131



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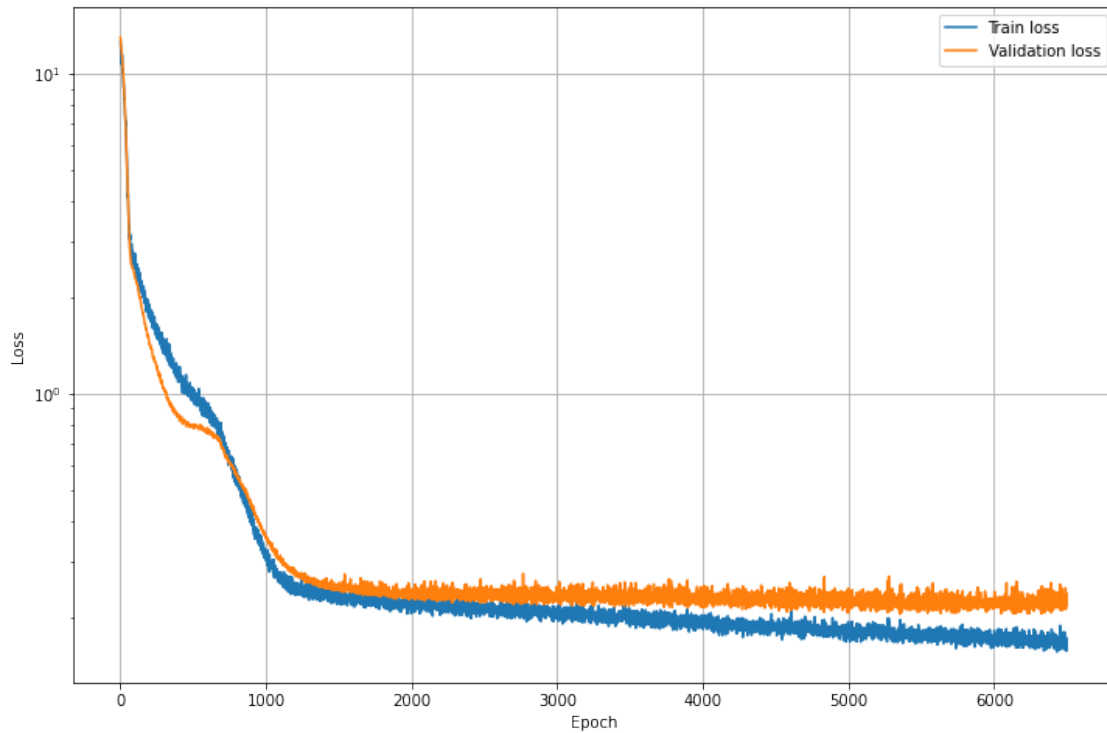
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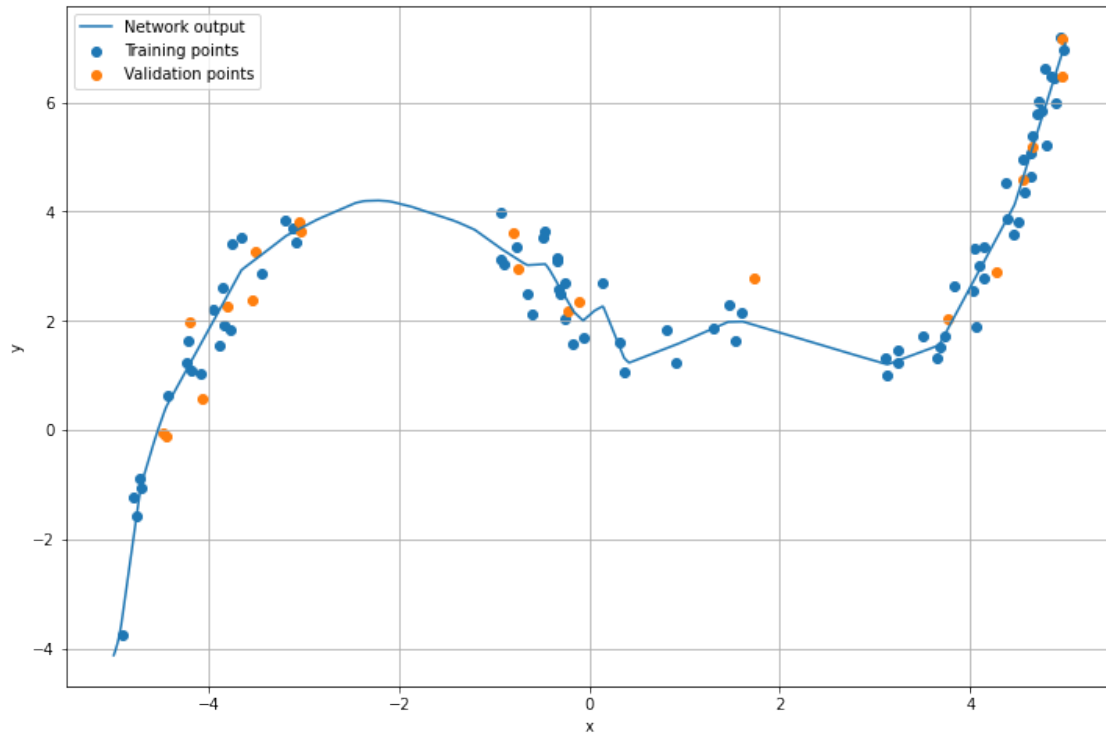
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Nh1 16  
Nh2 128  
Nh3 128  
Nh4 32  
activation\_function ReLU()  
lr 0.0001  
weight\_decay 0.001  
train\_batch\_size 30  
patience 500  
avg\_train\_loss 0.185616  
avg\_val\_loss 0.306546  
Name: 9, dtype: object



Average train loss in the last 10 epochs: 0.1655  
Average validation loss in the last 10 epochs: 0.2256



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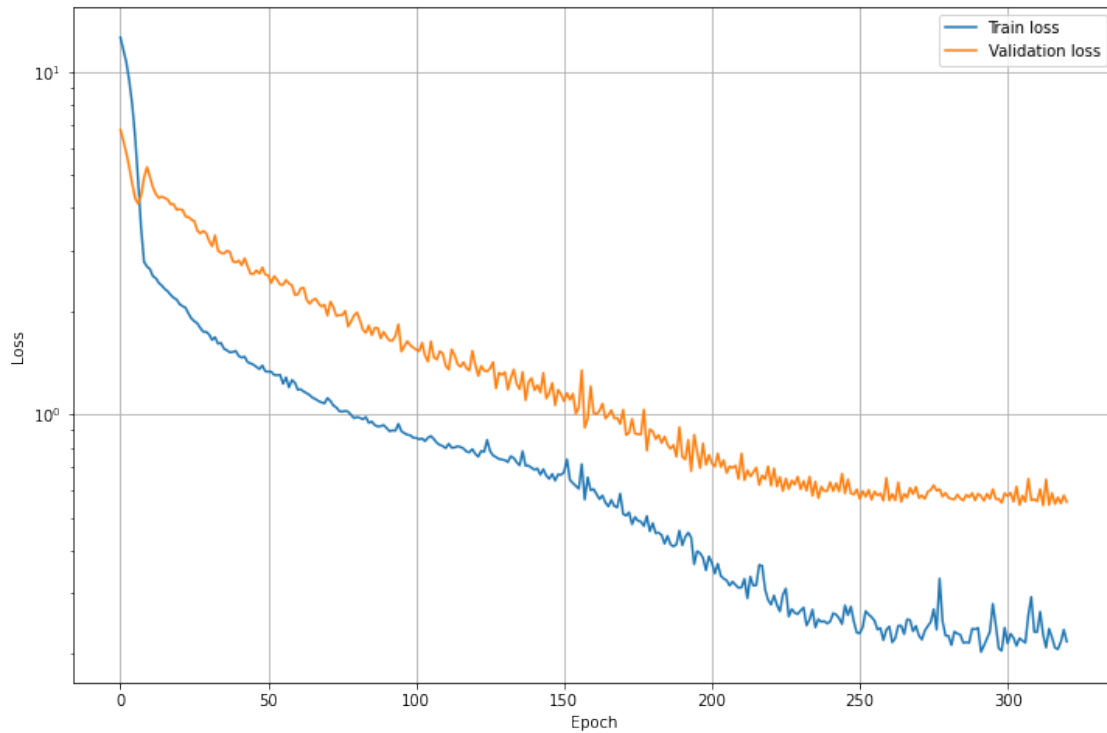
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Nh1                256
Nh2                128
Nh3                128
Nh4                256
activation_function ReLU()
lr                 0.0001
weight_decay       0
train_batch_size   10
patience          20
avg_train_loss     0.280807
avg_val_loss       0.34684
Name: 10, dtype: object

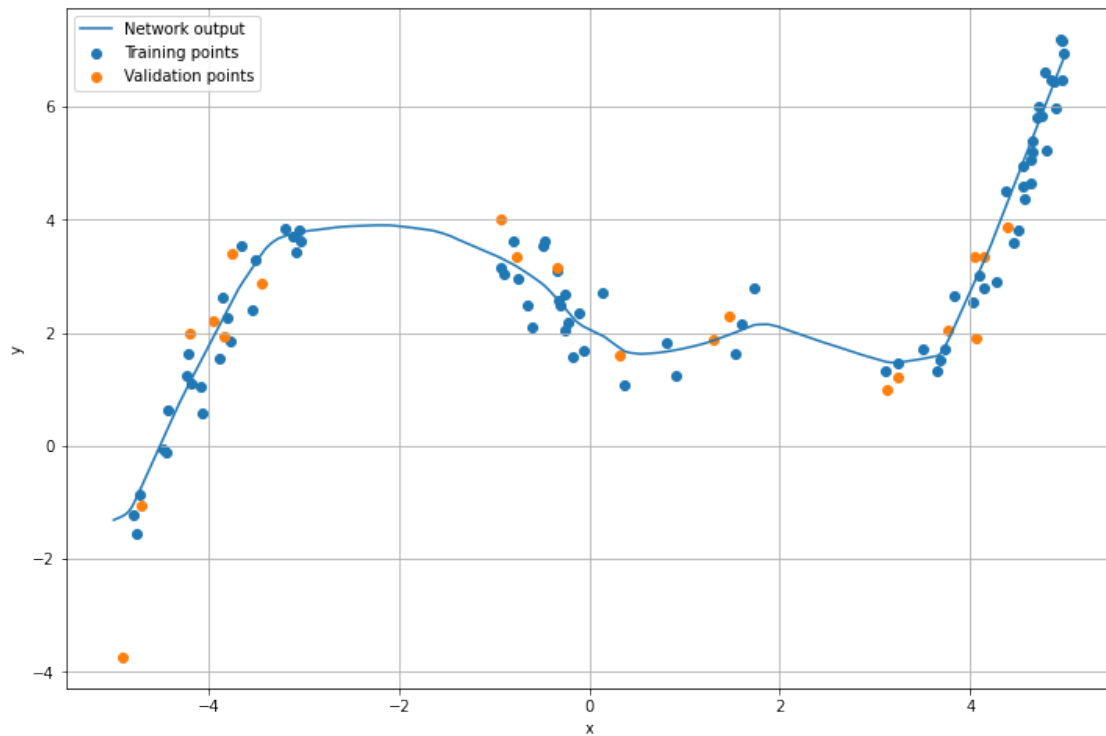
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Average train      loss in the last 10 epochs: 0.2246
Average validation loss in the last 10 epochs: 0.5729

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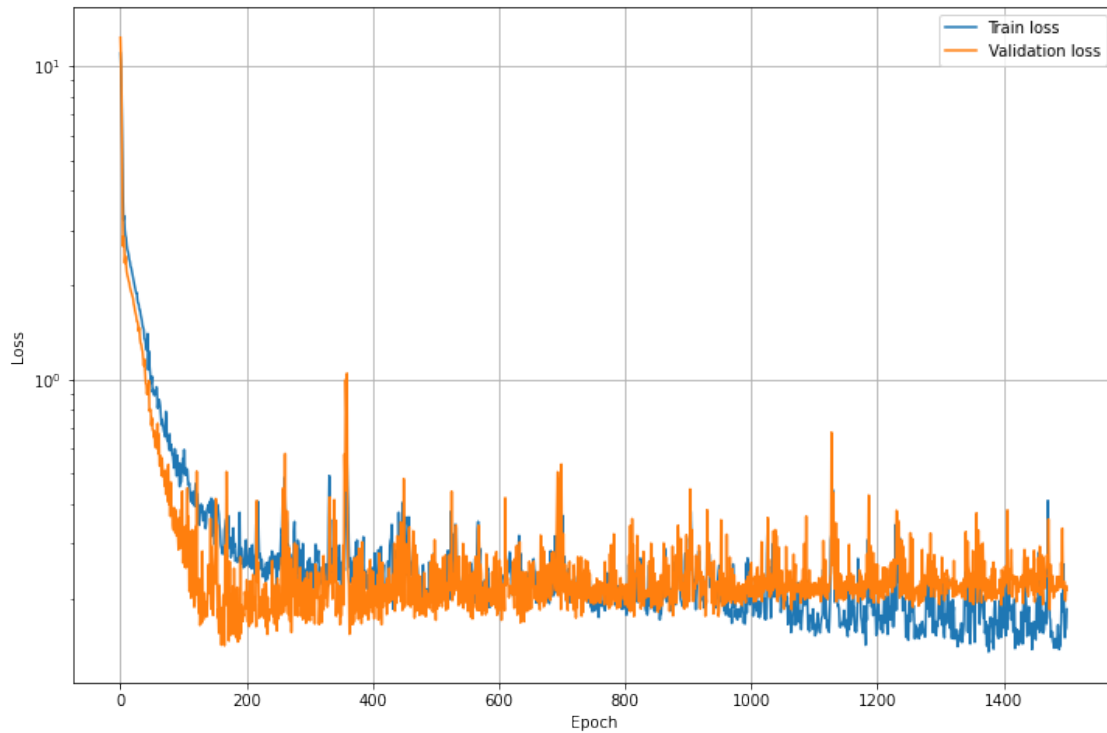
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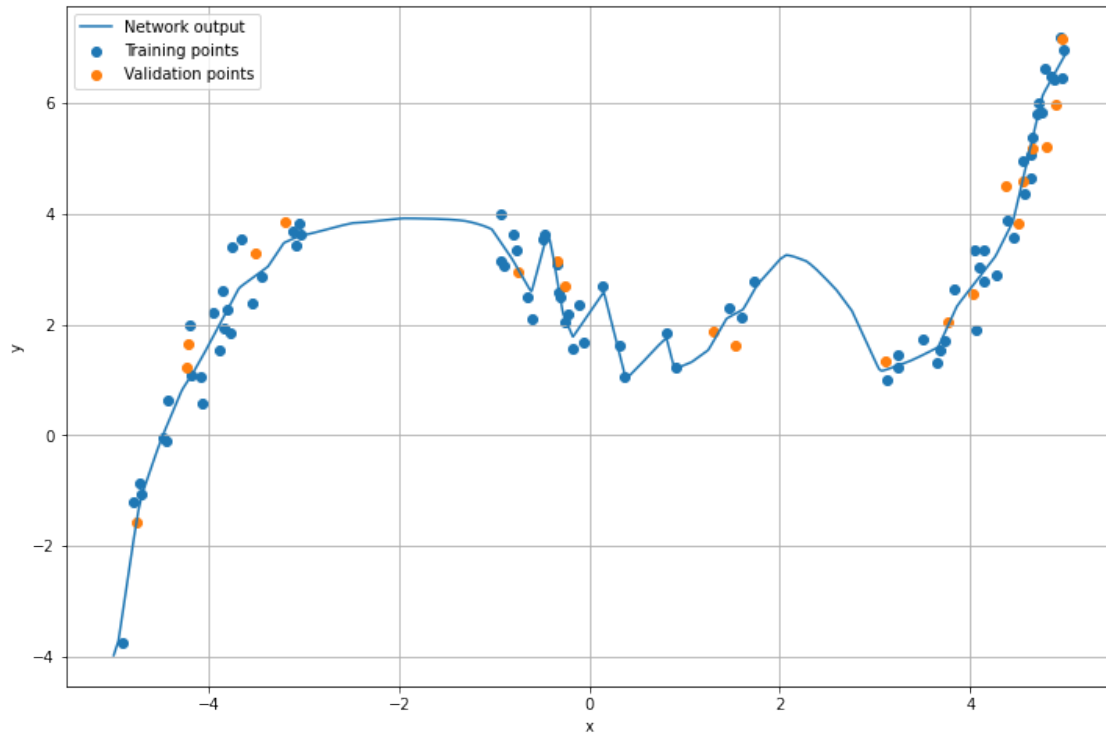
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Nh1 256  
Nh2 16  
Nh3 16  
Nh4 256  
activation\_function ReLU()  
lr 0.001  
weight\_decay 0  
train\_batch\_size 20  
patience 500  
avg\_train\_loss 0.159131  
avg\_val\_loss 0.358745  
Name: 11, dtype: object



Average train loss in the last 10 epochs: 0.1845  
Average validation loss in the last 10 epochs: 0.2319



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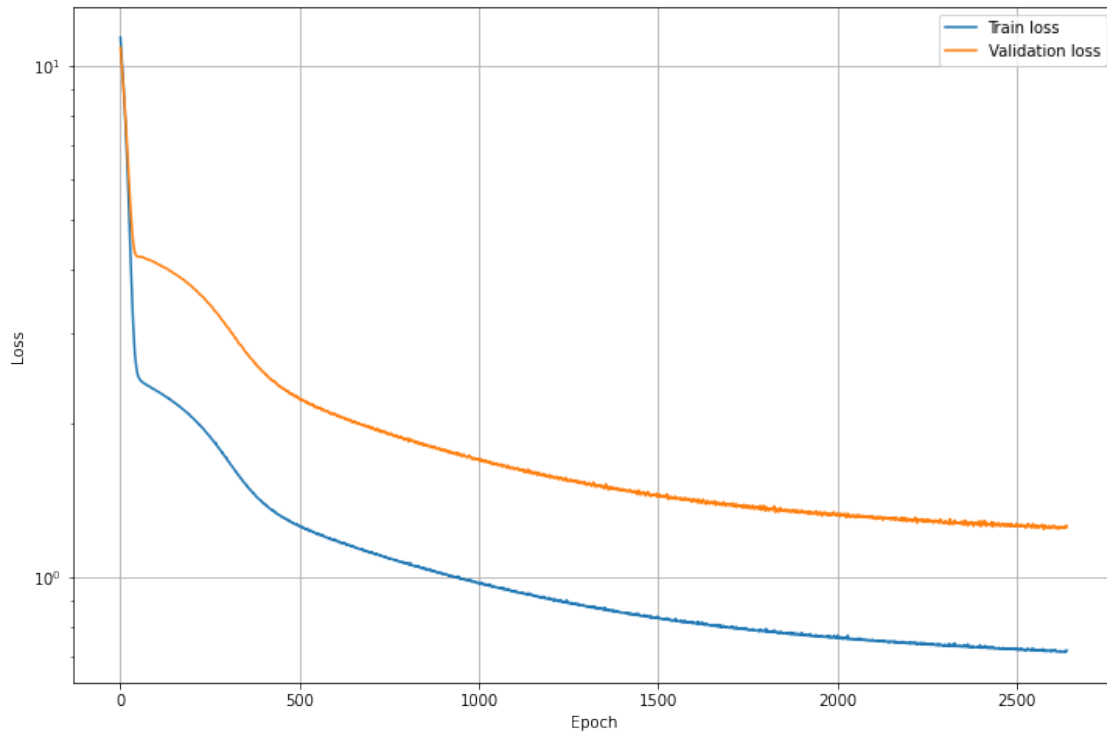
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Nh1                16
Nh2                16
Nh3               128
Nh4               128
activation_function Tanh()
lr                 0.0001
weight_decay       0.1
train_batch_size   20
patience           20
avg_train_loss     0.707933
avg_val_loss       0.793041
Name: 12, dtype: object

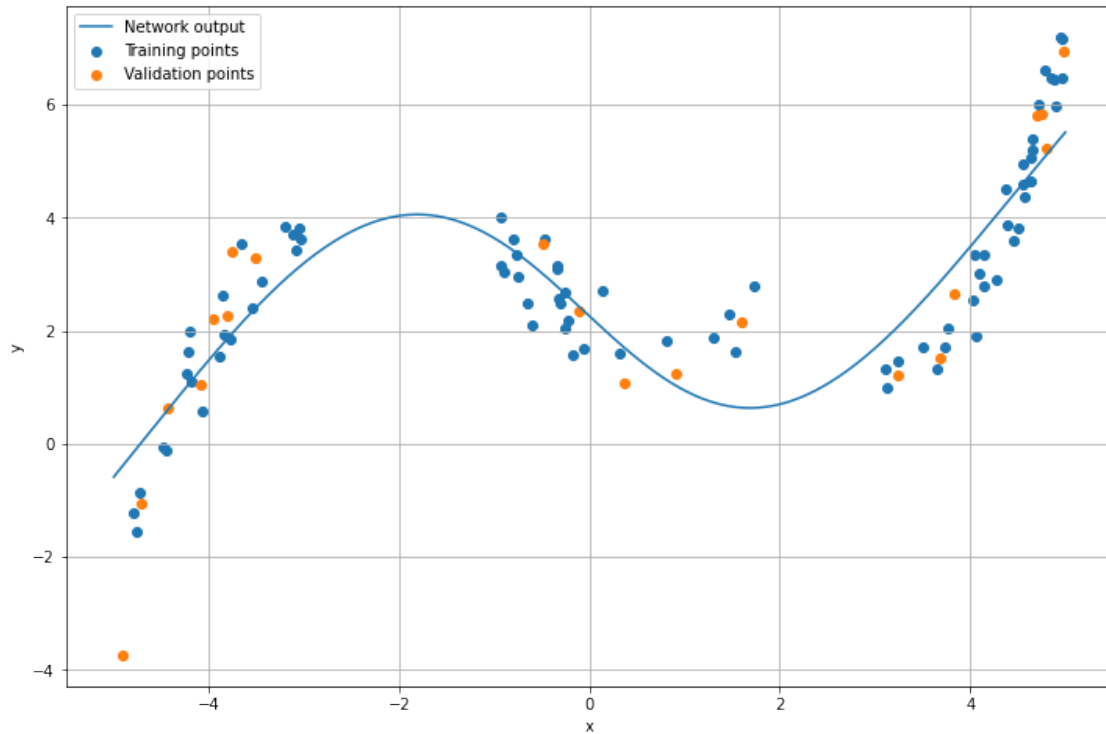
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Average train      loss in the last 10 epochs: 0.7177
Average validation loss in the last 10 epochs: 1.2543

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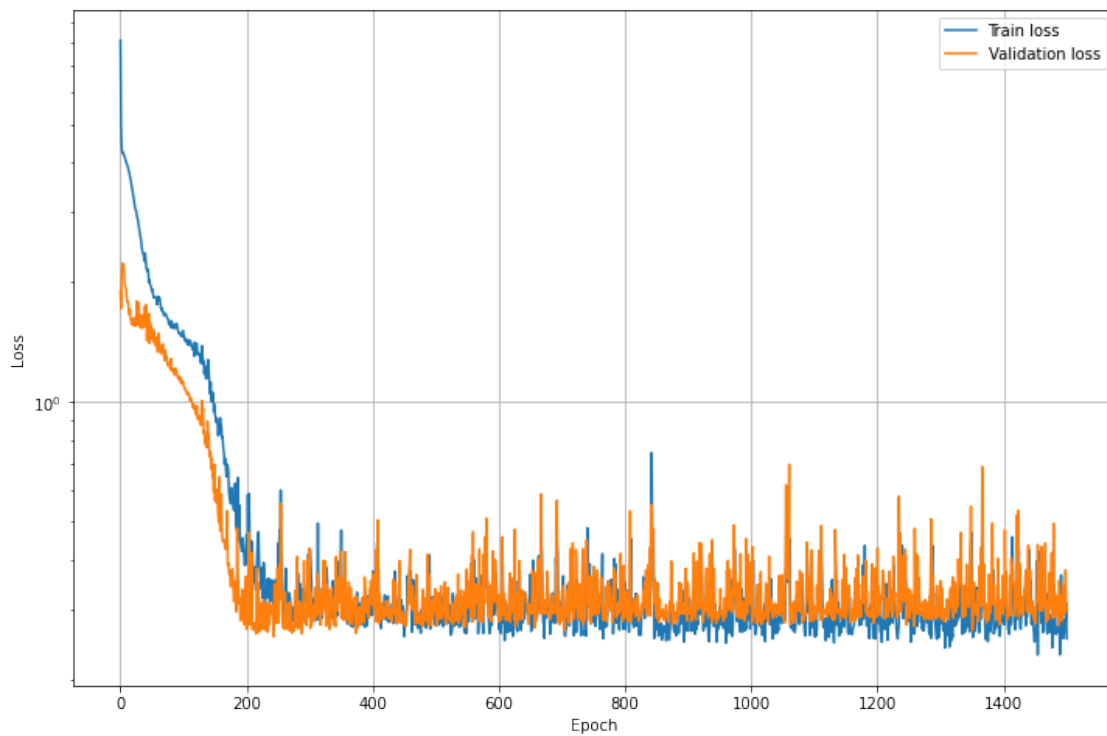
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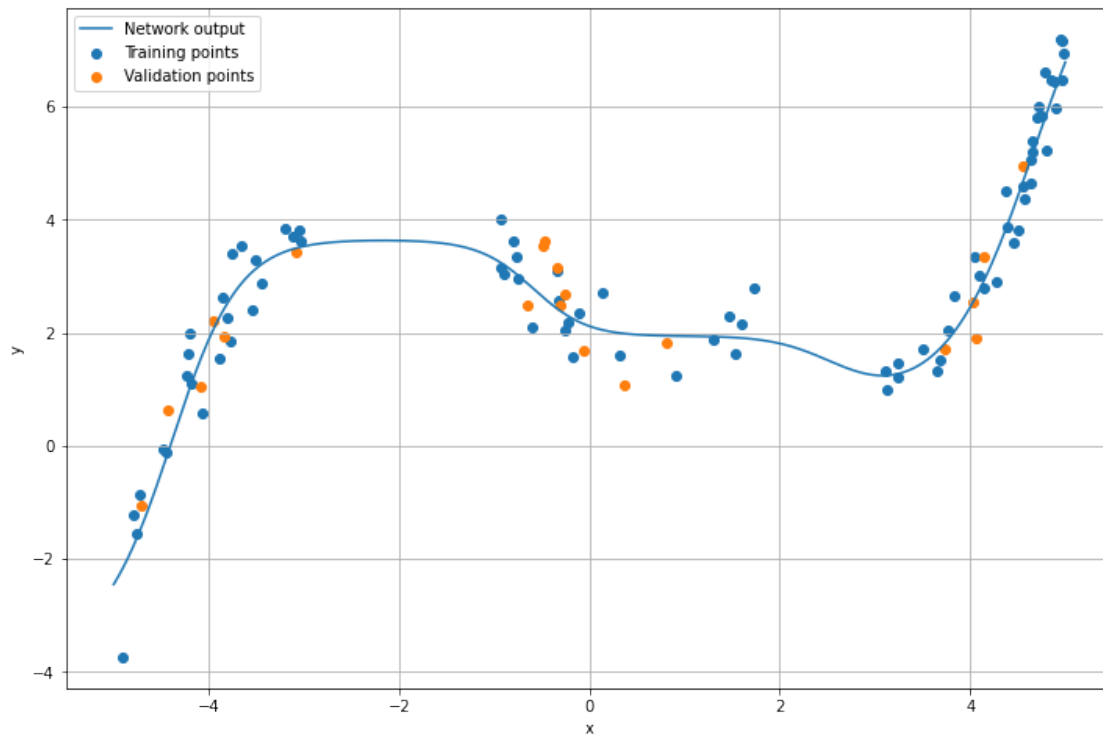
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Nh1 256  
Nh2 128  
Nh3 256  
Nh4 64  
activation\_function Sigmoid()  
lr 0.001  
weight\_decay 0.001  
train\_batch\_size 10  
patience 500  
avg\_train\_loss 0.299253  
avg\_val\_loss 0.366582  
Name: 13, dtype: object



Average train loss in the last 10 epochs: 0.2843  
Average validation loss in the last 10 epochs: 0.3125



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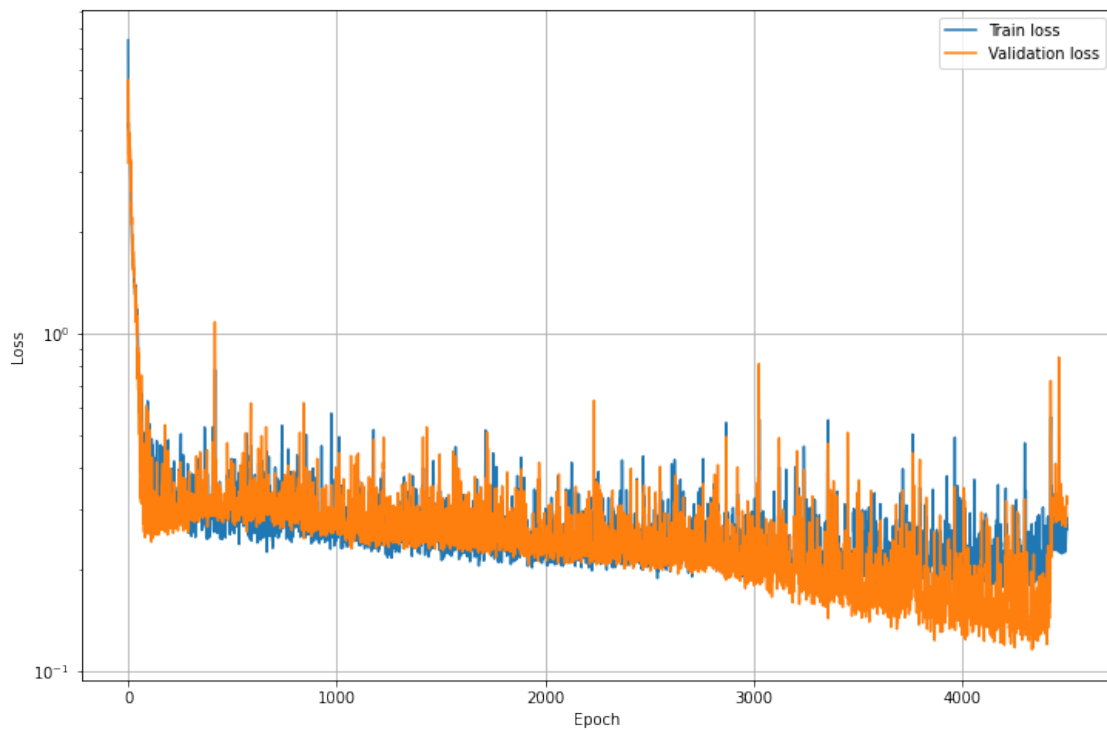
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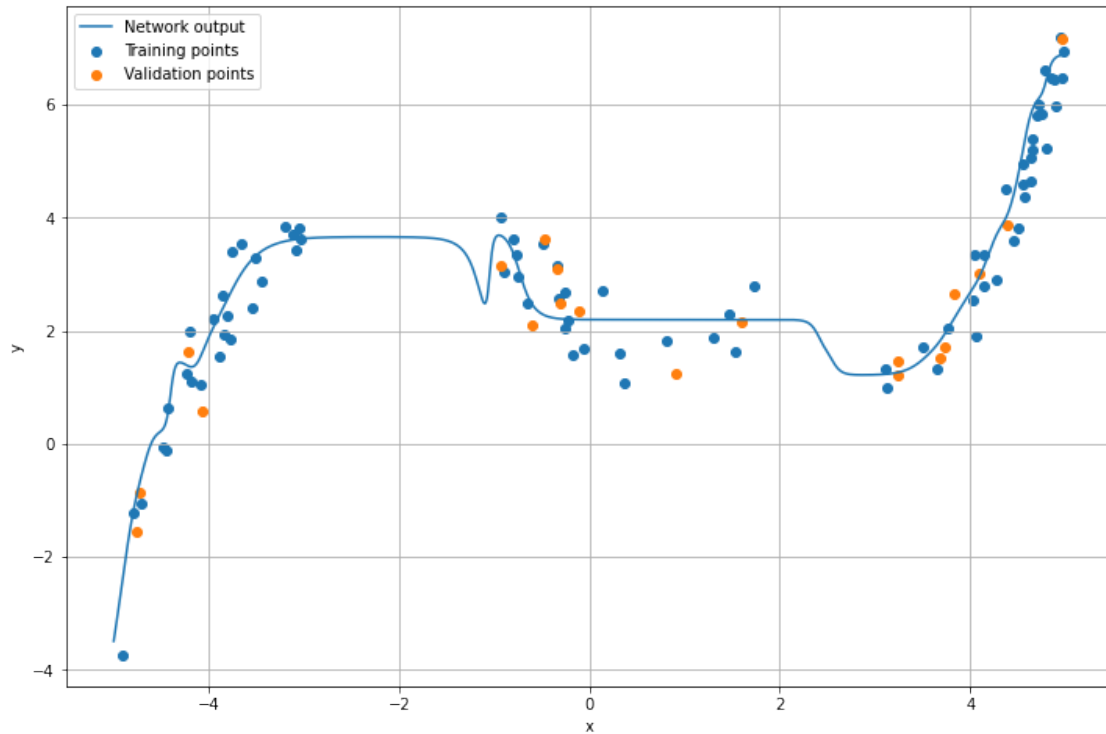
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Nh1 32  
Nh2 32  
Nh3 32  
Nh4 32  
activation\_function Sigmoid()  
lr 0.01  
weight\_decay 0  
train\_batch\_size 10  
patience 500  
avg\_train\_loss 0.234041  
avg\_val\_loss 0.35619  
Name: 14, dtype: object



Average train loss in the last 10 epochs: 0.2470  
Average validation loss in the last 10 epochs: 0.2957



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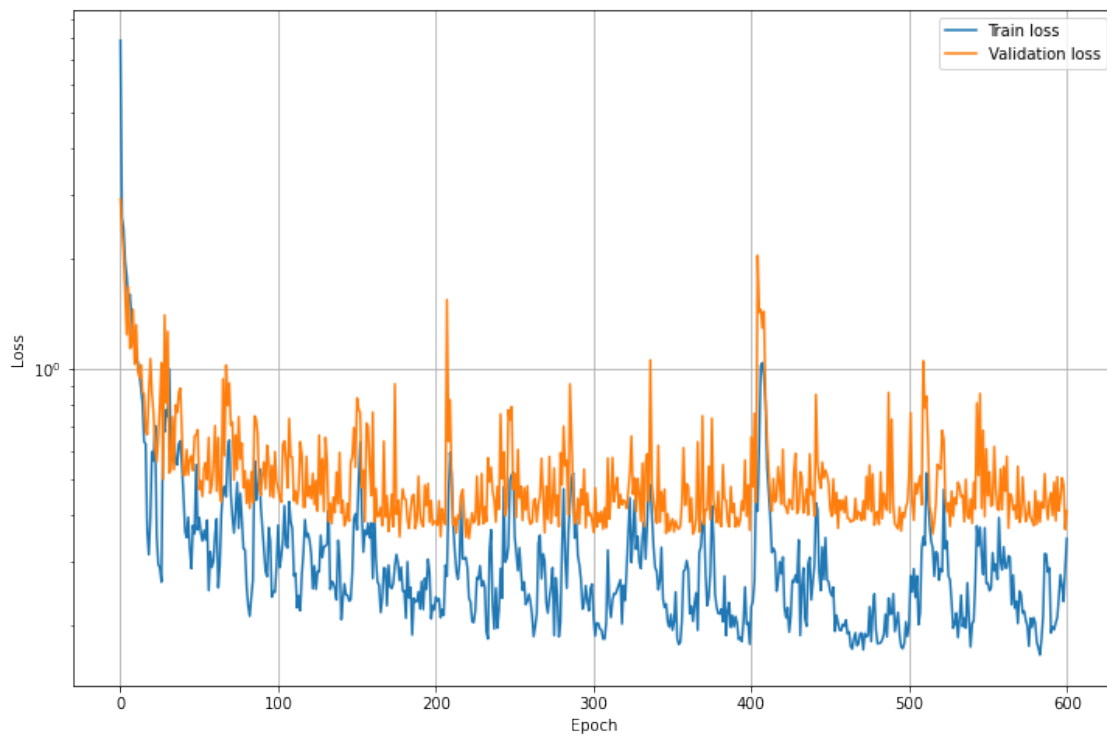
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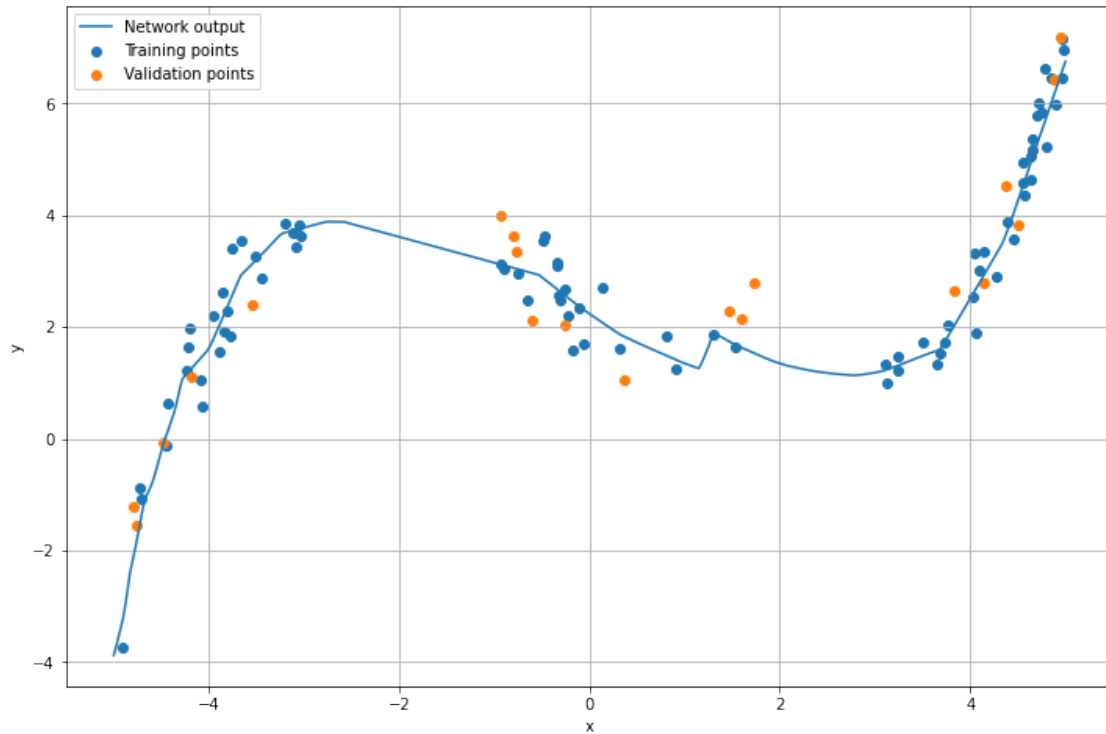
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Nh1 16  
Nh2 256  
Nh3 128  
Nh4 128  
activation\_function ReLU()  
lr 0.01  
weight\_decay 0  
train\_batch\_size 20  
patience 200  
avg\_train\_loss 0.247641  
avg\_val\_loss 0.410864  
Name: 15, dtype: object



Average train loss in the last 10 epochs: 0.2445  
Average validation loss in the last 10 epochs: 0.4405



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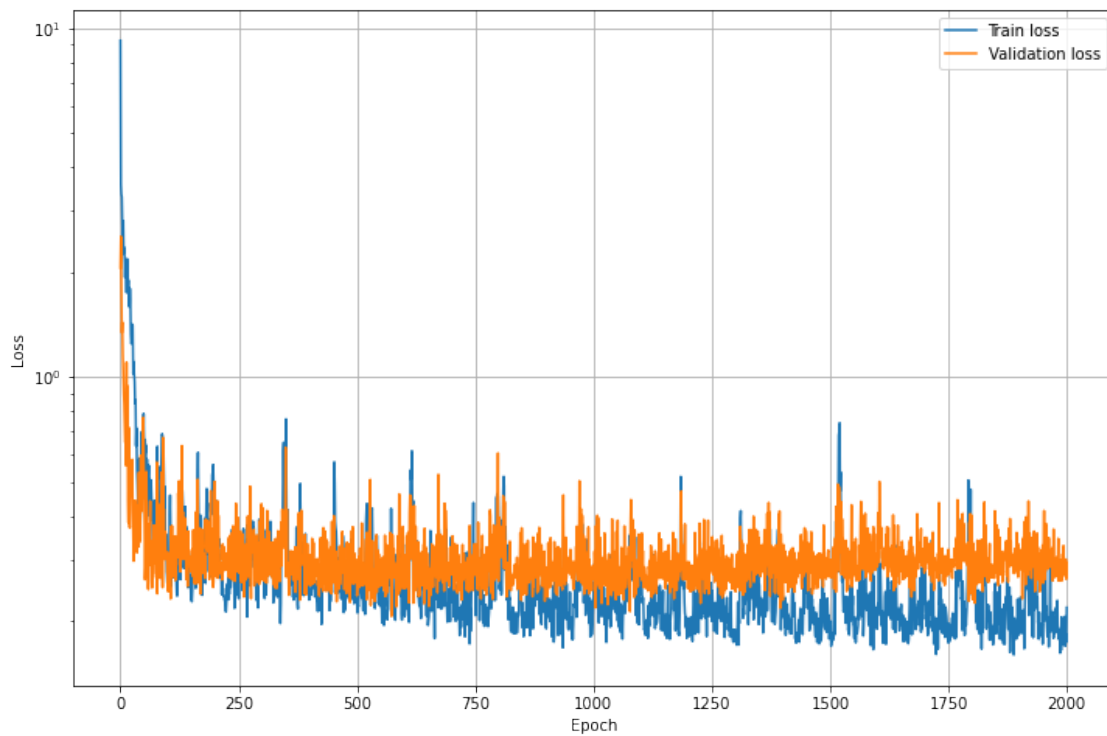
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HBox(children=(FloatProgress(value=0.0, max=10000.0), HTML(value='')))
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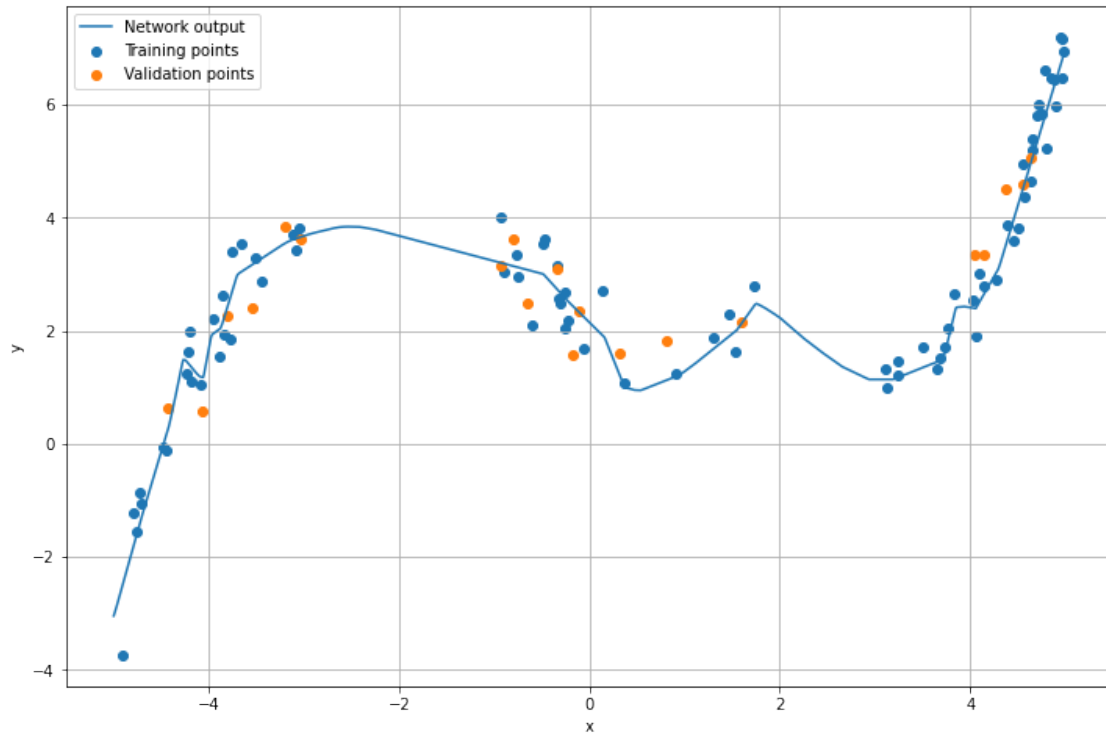
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<IPython.core.display.Javascript object>
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<IPython.core.display.Javascript object>
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Nh1 256  
Nh2 32  
Nh3 32  
Nh4 64  
activation\_function ReLU()  
lr 0.01  
weight\_decay 0.001  
train\_batch\_size 30  
patience 500  
avg\_train\_loss 0.186796  
avg\_val\_loss 0.340892  
Name: 16, dtype: object



Average train loss in the last 10 epochs: 0.1865  
Average validation loss in the last 10 epochs: 0.2884



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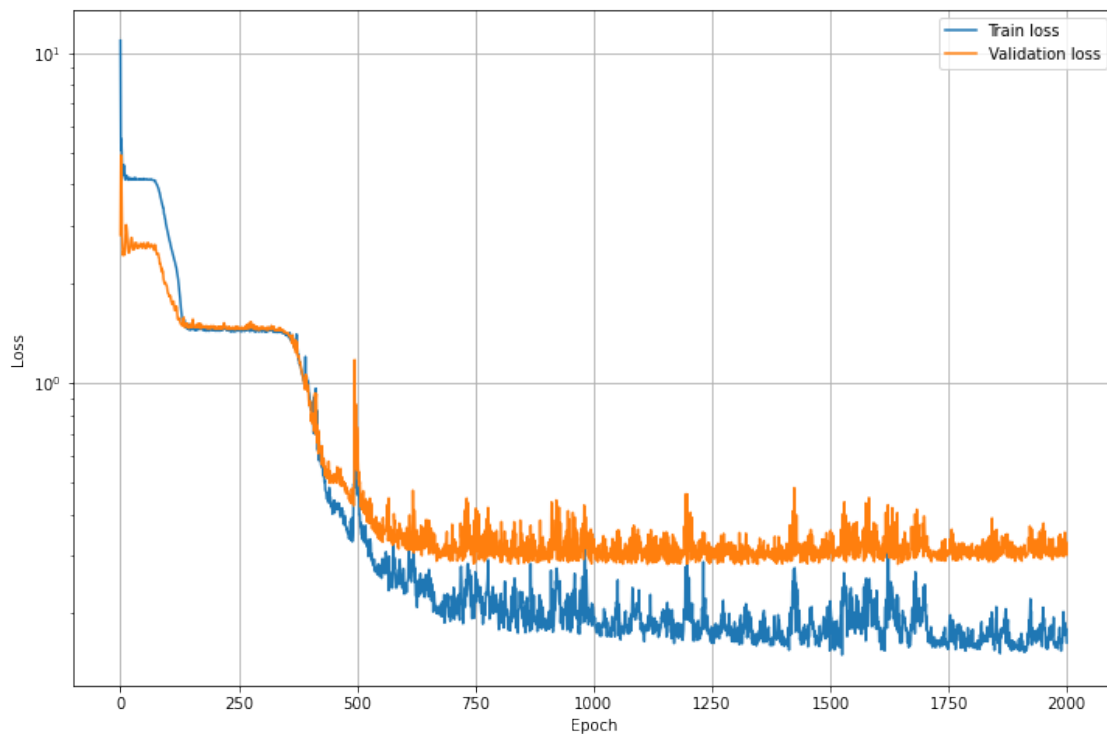
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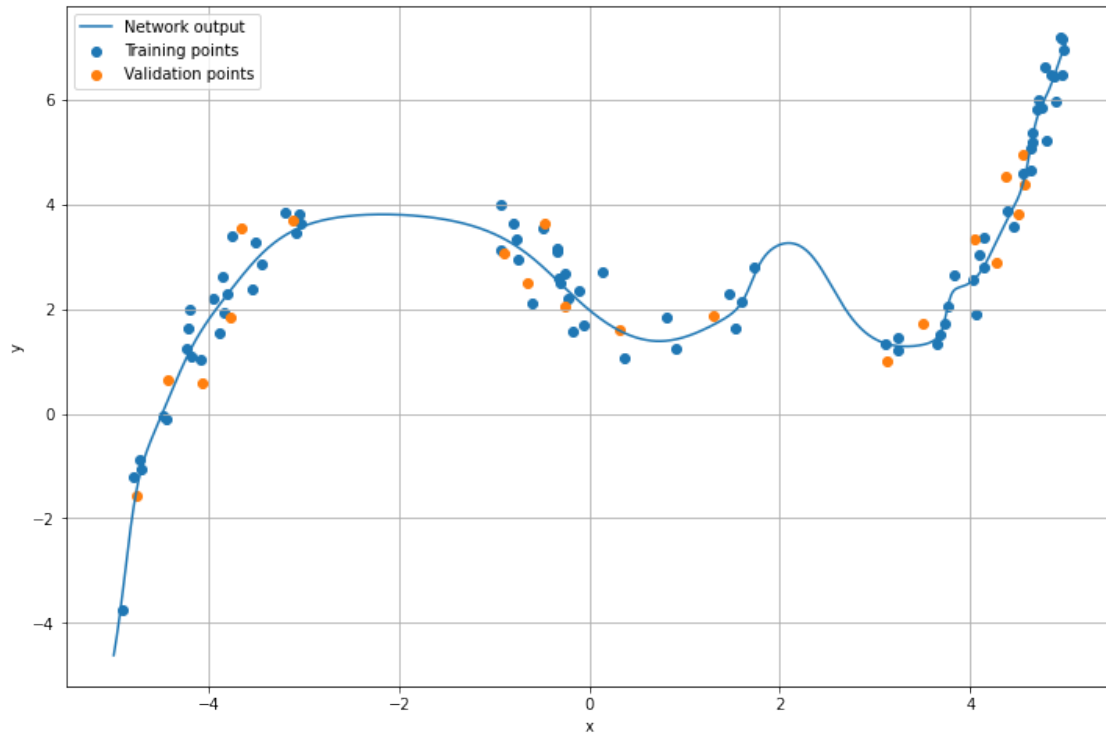
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<IPython.core.display.Javascript object>
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Nh1 16  
Nh2 16  
Nh3 256  
Nh4 128  
activation\_function Sigmoid()  
lr 0.01  
weight\_decay 0  
train\_batch\_size 40  
patience 500  
avg\_train\_loss 0.383538  
avg\_val\_loss 0.78589  
Name: 17, dtype: object



Average train loss in the last 10 epochs: 0.1788  
Average validation loss in the last 10 epochs: 0.3196



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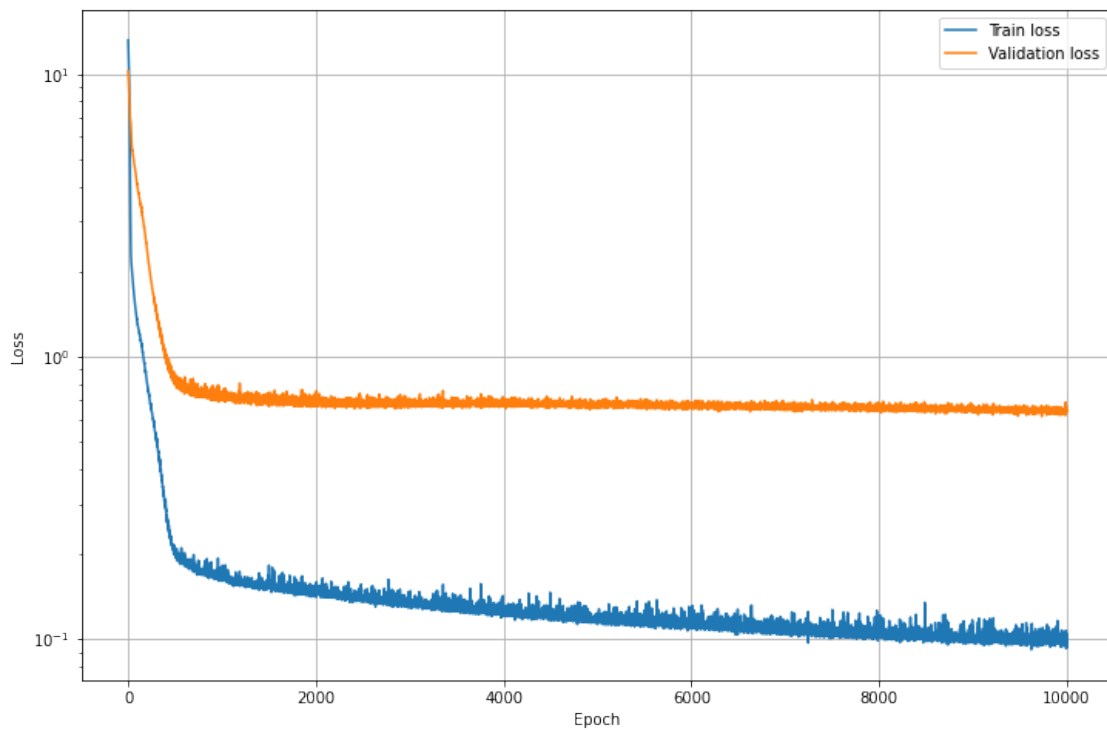
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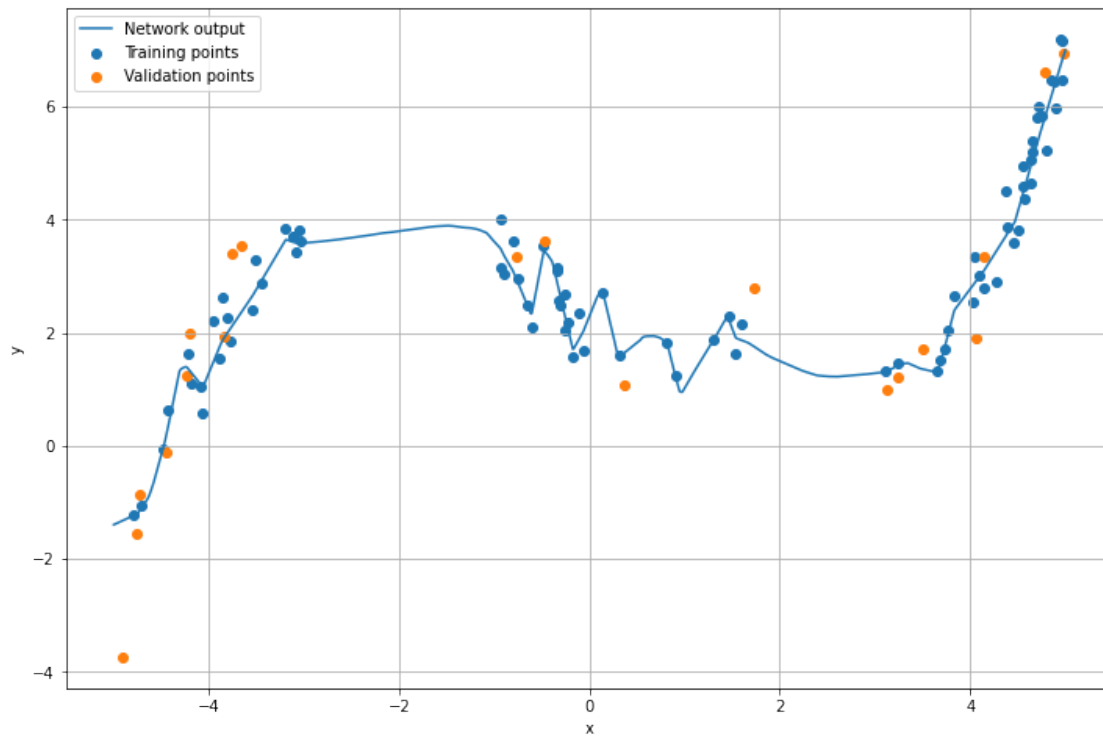
<IPython.core.display.Javascript object>

<IPython.core.display.Javascript object>

Nh1 64  
Nh2 64  
Nh3 256  
Nh4 128  
activation\_function ReLU()  
lr 0.0001  
weight\_decay 0  
train\_batch\_size 20  
patience 500  
avg\_train\_loss 0.175615  
avg\_val\_loss 0.315668  
Name: 18, dtype: object



Average train loss in the last 10 epochs: 0.0990  
Average validation loss in the last 10 epochs: 0.6416



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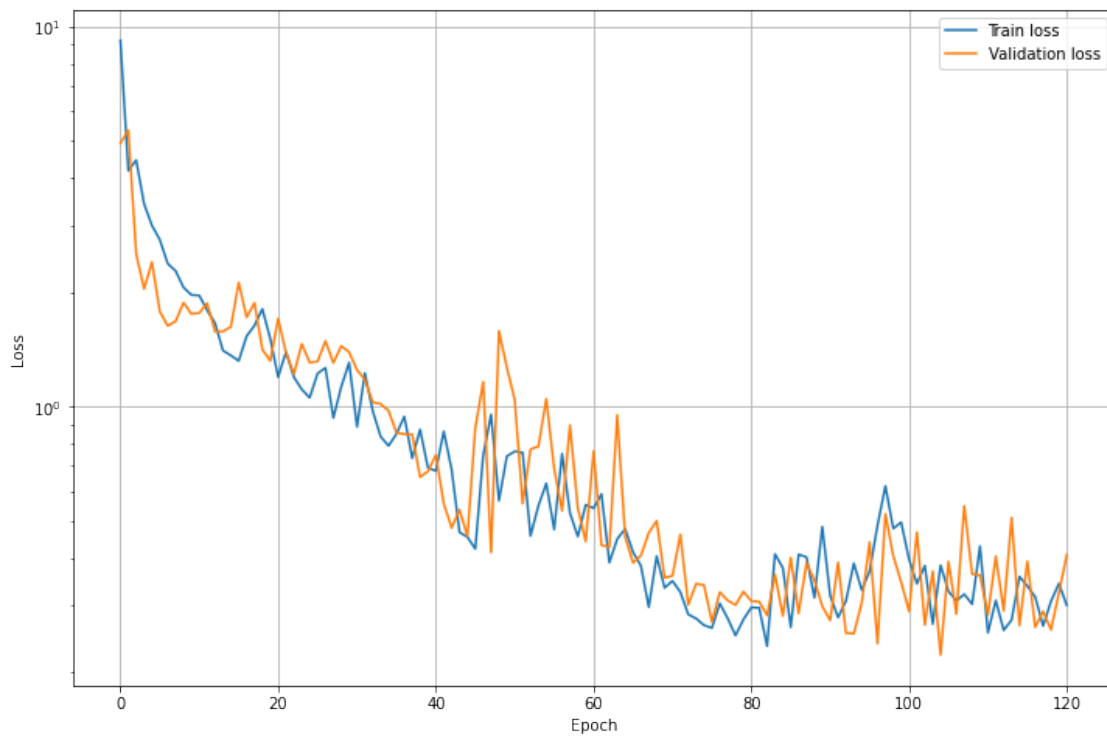
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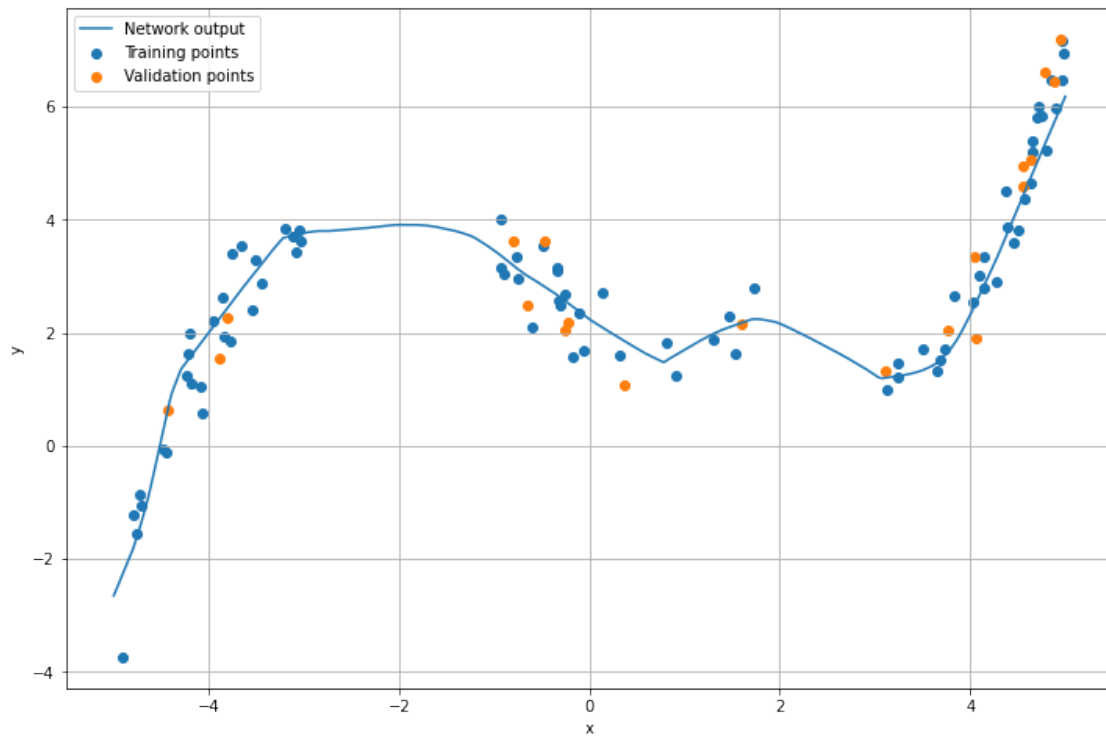
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<IPython.core.display.Javascript object>
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Nh1 256  
Nh2 256  
Nh3 16  
Nh4 128  
activation\_function ReLU()  
lr 0.01  
weight\_decay 0.001  
train\_batch\_size 40  
patience 20  
avg\_train\_loss 0.344549  
avg\_val\_loss 0.46284  
Name: 19, dtype: object



Average train loss in the last 10 epochs: 0.3070  
Average validation loss in the last 10 epochs: 0.3408



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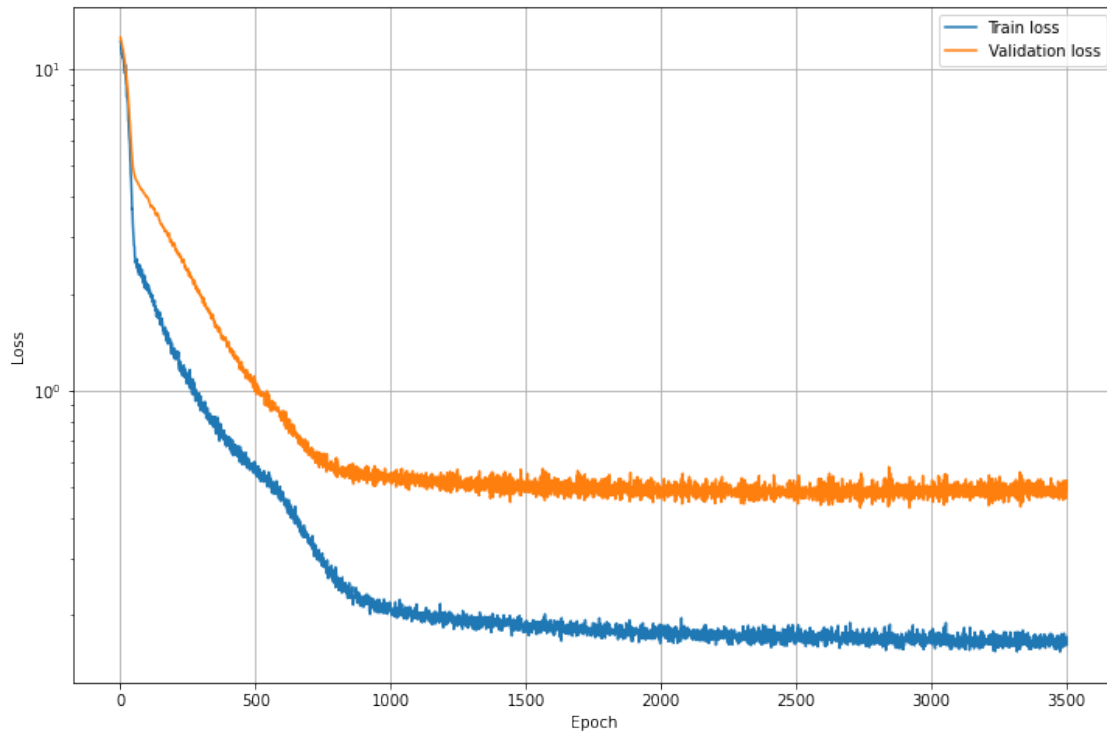
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Nh1                128
Nh2                32
Nh3                32
Nh4                256
activation_function  ReLU()
lr                 0.0001
weight_decay       0
train_batch_size   30
patience          500
avg_train_loss     0.181587
avg_val_loss       0.338306
Name: 20, dtype: object

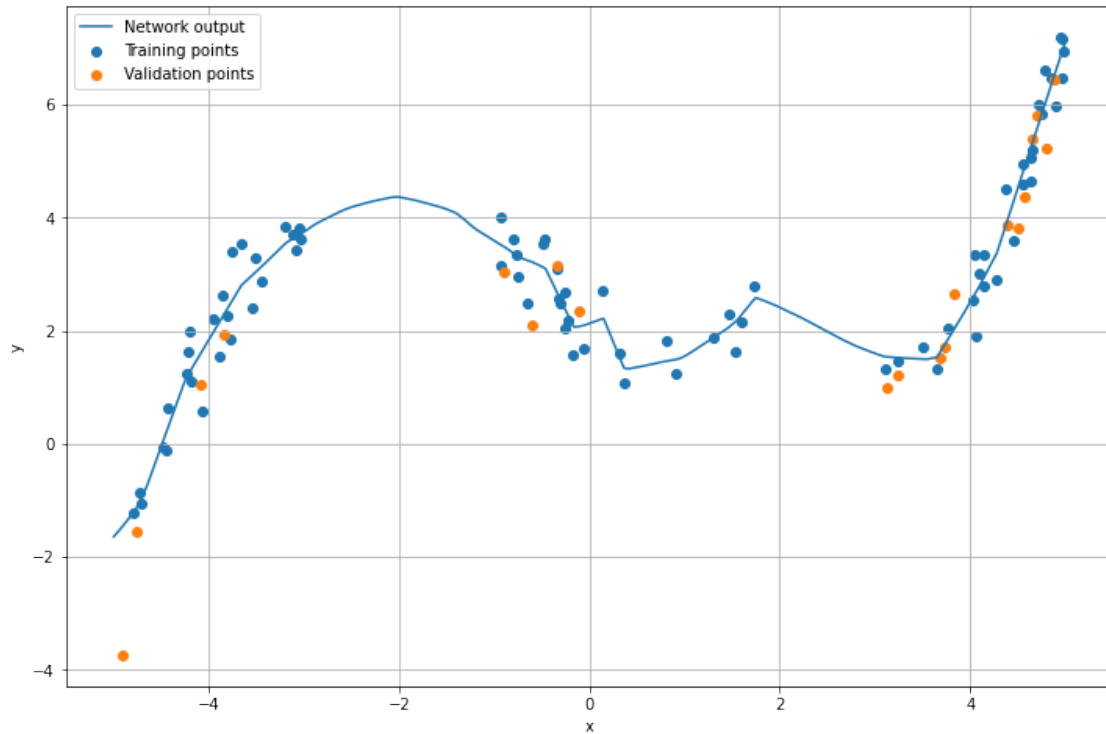
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Average train      loss in the last 10 epochs: 0.1635
Average validation loss in the last 10 epochs: 0.4926

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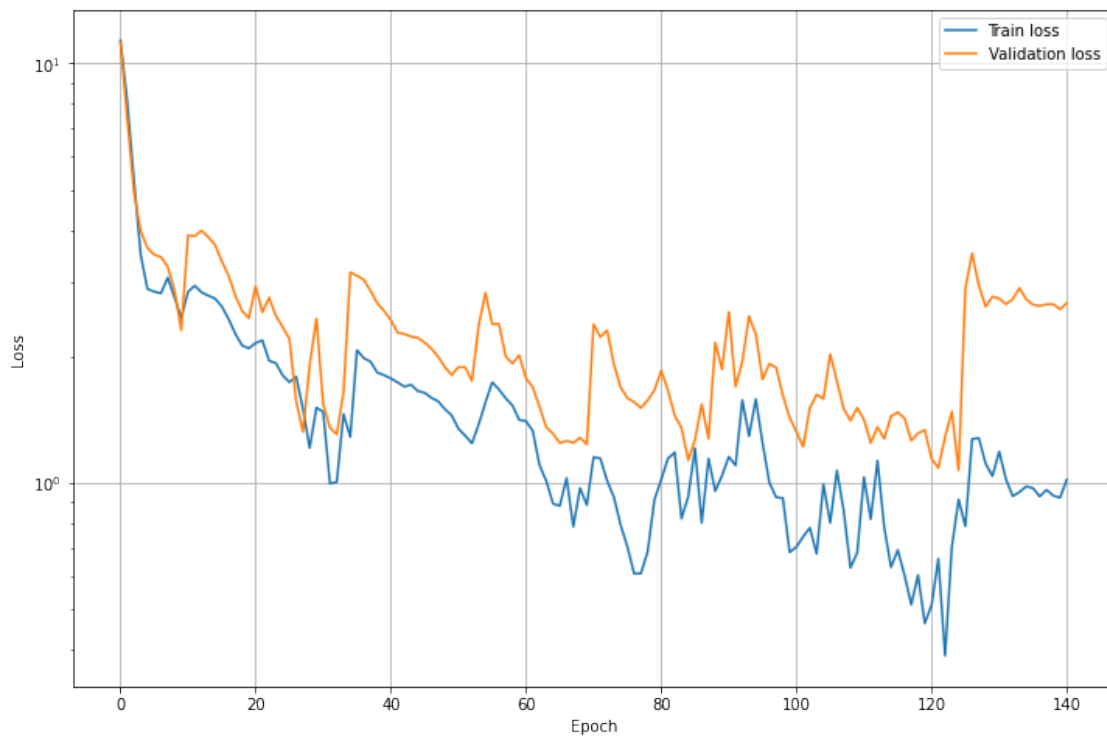
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HBox(children=(FloatProgress(value=0.0, max=10000.0), HTML(value='')))
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<IPython.core.display.Javascript object>
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<IPython.core.display.Javascript object>
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Nh1 256  
Nh2 256  
Nh3 16  
Nh4 32  
activation\_function Tanh()  
lr 0.01  
weight\_decay 0  
train\_batch\_size 40  
patience 20  
avg\_train\_loss 0.979166  
avg\_val\_loss 1.36051  
Name: 21, dtype: object



Average train loss in the last 10 epochs: 0.9624  
Average validation loss in the last 10 epochs: 2.6980

