0728-small_classical_model_1q_measurement

July 28, 2023

```python
import torch
import torch.nn as nn
import torch.optim as optim
```

```python
import numpy as np
```

```python
import sys
sys.path.append('peptide-QML/')

from my_code import functions as f
```

1 Data

```python
file_path = 'peptide-QML/data/energies/PET/generated/
 ↪bb14_Strings_Energies_10_000_4_aa.txt'  # Replace with the actual path to
 ↪your 'data.txt' file
string_list, number_list = f.read_data_file(file_path)
score_list = np.array(number_list)/100
vector_list = np.array([f.string_to_vector(string) for string in string_list])
 ↪# one hot encoding
```

```python
n_aminoacids = len(string_list[0])
```

```python
X, Y, X_validation, Y_validation = f.create_validating_set(vector_list,
 ↪score_list, percentage=0.1)
```

```python
X = X.reshape(X.shape[0], X.shape[1]*X.shape[2]) # flatten
X_validation = X_validation.reshape(X_validation.shape[0], X_validation.
 ↪shape[1]*X_validation.shape[2]) # flatten
```

```python
# Define the dataset
input_data = torch.tensor(X, dtype=torch.float32)
target_data = torch.tensor(Y, dtype=torch.float32).view(-1, 1)

# Define the validation set
input_validation = torch.tensor(X_validation, dtype=torch.float32)
target_validation = torch.tensor(Y_validation, dtype=torch.float32).view(-1, 1)
```

2 Hybrid model

```
[ ]: input_dim = input_data.size(1)
```

```
[ ]: n_pre_classical_layers = 4
     layers_dim = np.linspace(4, input_dim, 4).astype(int)
```

```
[ ]: layers = []
     for i in range(1, len(layers_dim)):
         layers += [nn.Linear(layers_dim[-1*i], layers_dim[-1*(i+1)]), nn.ReLU()]
     layers += [nn.Linear(layers_dim[0], layers_dim[0])]
     layers += [nn.Linear(layers_dim[0], 1)]


     Net = nn.Sequential(*layers)
```

```
[ ]: # Create an instance of the network
     model = Net
```

```
[ ]: import time
```

```
[ ]: # time
     start_time = time.time()


     # Define the loss function and optimizer
     criterion = nn.MSELoss()   # Mean Squared Error loss
     optimizer = optim.Adam(model.parameters(), lr=0.05)   # Adam optimizer with␣
      ↪learning rate 0.001
     # optimizer = optim.SGD(model.parameters(), lr=0.05)

     # Training loop
     num_epochs = 25
     batch_size = 32

     #validation data
     i_validation = input_validation[::10] #we take only 10% of the validation data,␣
      ↪to speed up the process
     t_validation = target_validation[::10]

     losses = []
     losses_epochs = [0]
     losses_epochs_validation = [0]

     losses_epochs[-1] = criterion(model(input_data), target_data).item()
     losses_epochs_validation[-1] = criterion(model(i_validation), t_validation).
      ↪item()
```

```python
print('Epoch [{}/{}], Loss: {:.4f}, Loss validation: {:.4f}'.format(0,
 num_epochs, losses_epochs[-1], losses_epochs_validation[-1]))

for epoch in range(num_epochs):
    # Shuffle the dataset
    indices = torch.randperm(input_data.size(0))
    input_data = input_data[indices]
    target_data = target_data[indices]

    losses_epochs.append(0)

    # Mini-batch training
    for i in range(0, input_data.size(0), batch_size):
        inputs = input_data[i:i+batch_size]
        targets = target_data[i:i+batch_size]

        # Forward pass
        outputs = model(inputs)

        # Compute the loss
        loss = criterion(outputs, targets)

        # Backward pass and optimization
        optimizer.zero_grad()
        loss.backward()
        optimizer.step()

        # Store the loss
        losses.append(loss.item())

        print('- Epoch [{}/{}], i: [{}/{}], Loss: {:.4f}'.format(epoch+1,
 num_epochs, i, input_data.size(0), loss.item()), end='\r')

        # add to the epoch loss
        losses_epochs[-1] += loss.item()

    # divide the epoch loss by the number of batches, to get the average loss
    losses_epochs[-1] /= (input_data.size(0)/batch_size)

    # Validation
    losses_epochs_validation.append(criterion(model(i_validation),
 t_validation).item())

    # time
    # Compute elapsed time and remaining time
    elapsed_time = time.time() - start_time
    avg_time_per_epoch = elapsed_time / (epoch + 1)
```

```
    remaining_epochs = num_epochs - (epoch + 1)
    estimated_remaining_time = avg_time_per_epoch * remaining_epochs

    # Convert remaining time to hours, minutes, and seconds for better␣
↪readability
    hours, remainder = divmod(estimated_remaining_time, 3600)
    minutes, seconds = divmod(remainder, 60)

    # Print the loss and remaining time for this epoch
    print('Epoch [{}/{}], Loss: {:.4f}, Loss validation: {:.4f}, Time remaining:
↪ ~{}h {}m {:.0f}s'.format(
        epoch+1, num_epochs, losses_epochs[-1], losses_epochs_validation[-1],␣
↪hours, minutes, seconds))
```

Epoch [0/25], Loss: 2.0451, Loss validation: 2.9102
Epoch [1/25], Loss: 0.1812, Loss validation: 0.0773, Time remaining: ~0.0h 0.0m
11s
Epoch [2/25], Loss: 0.0435, Loss validation: 0.0455, Time remaining: ~0.0h 0.0m
9s
Epoch [3/25], Loss: 0.0136, Loss validation: 0.0143, Time remaining: ~0.0h 0.0m
8s
Epoch [4/25], Loss: 0.0119, Loss validation: 0.0058, Time remaining: ~0.0h 0.0m
8s
Epoch [5/25], Loss: 0.0140, Loss validation: 0.0228, Time remaining: ~0.0h 0.0m
7s
Epoch [6/25], Loss: 0.0129, Loss validation: 0.0100, Time remaining: ~0.0h 0.0m
7s
Epoch [7/25], Loss: 0.0171, Loss validation: 0.2052, Time remaining: ~0.0h 0.0m
6s
Epoch [8/25], Loss: 0.0756, Loss validation: 0.0253, Time remaining: ~0.0h 0.0m
6s
Epoch [9/25], Loss: 0.0150, Loss validation: 0.0114, Time remaining: ~0.0h 0.0m
5s
Epoch [10/25], Loss: 0.0074, Loss validation: 0.0092, Time remaining: ~0.0h 0.0m
5s
Epoch [11/25], Loss: 0.0055, Loss validation: 0.0072, Time remaining: ~0.0h 0.0m
5s
Epoch [12/25], Loss: 0.0085, Loss validation: 0.0084, Time remaining: ~0.0h 0.0m
4s
Epoch [13/25], Loss: 0.0089, Loss validation: 0.0227, Time remaining: ~0.0h 0.0m
4s
Epoch [14/25], Loss: 0.0187, Loss validation: 0.0170, Time remaining: ~0.0h 0.0m
4s
Epoch [15/25], Loss: 0.0121, Loss validation: 0.0094, Time remaining: ~0.0h 0.0m
3s
Epoch [16/25], Loss: 0.0094, Loss validation: 0.0073, Time remaining: ~0.0h 0.0m
3s

```
Epoch [17/25], Loss: 0.0060, Loss validation: 0.0101, Time remaining: ~0.0h 0.0m
3s
Epoch [18/25], Loss: 0.0391, Loss validation: 0.1063, Time remaining: ~0.0h 0.0m
2s
Epoch [19/25], Loss: 0.0297, Loss validation: 0.0431, Time remaining: ~0.0h 0.0m
2s
Epoch [20/25], Loss: 0.0201, Loss validation: 0.0110, Time remaining: ~0.0h 0.0m
2s
Epoch [21/25], Loss: 0.0085, Loss validation: 0.0047, Time remaining: ~0.0h 0.0m
1s
Epoch [22/25], Loss: 0.0043, Loss validation: 0.0064, Time remaining: ~0.0h 0.0m
1s
Epoch [23/25], Loss: 0.0051, Loss validation: 0.0049, Time remaining: ~0.0h 0.0m
1s
Epoch [24/25], Loss: 0.0066, Loss validation: 0.0083, Time remaining: ~0.0h 0.0m
0s
Epoch [25/25], Loss: 0.0056, Loss validation: 0.0119, Time remaining: ~0.0h 0.0m
0s
```
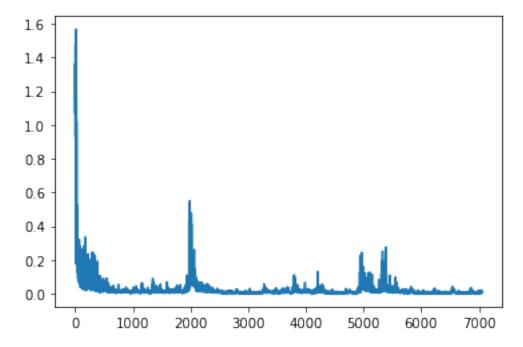
[ ]:
```python
#plot the loss
import matplotlib.pyplot as plt
plt.plot(losses)
plt.show()
```


[ ]:
```python
#plot the loss
import matplotlib.pyplot as plt
```

```
plt.plot(losses_epochs)
plt.show()
```



```
avg_loss = 0
for x, (i, t) in enumerate(zip((input_validation), target_validation)):
    loss = criterion(model(i), t)
    avg_loss += loss/len(target_validation)
    print('i: {}, \t target: {:.3f}, \t output: {:.3f}, \t loss: {:.3f}'.
 ↪format(x, t.item(), model(i).item(), loss))

print('Average loss: {:.3f}'.format(avg_loss))
```

```
i: 0,    target: 1.640,        output: 1.655,        loss: 0.000
i: 1,    target: 4.086,        output: 4.079,        loss: 0.000
i: 2,    target: 1.949,        output: 1.954,        loss: 0.000
i: 3,    target: -0.406,       output: -0.272,       loss: 0.018
i: 4,    target: 1.846,        output: 1.795,        loss: 0.003
i: 5,    target: -0.773,       output: -0.793,       loss: 0.000
i: 6,    target: 0.433,        output: 0.354,        loss: 0.006
i: 7,    target: 1.709,        output: 1.818,        loss: 0.012
i: 8,    target: -0.465,       output: -0.495,       loss: 0.001
i: 9,    target: 3.100,        output: 3.228,        loss: 0.016
i: 10,   target: 0.625,        output: 0.593,        loss: 0.001
i: 11,   target: -0.522,       output: -0.585,       loss: 0.004
i: 12,   target: -0.760,       output: -0.809,       loss: 0.002
i: 13,   target: -0.563,       output: -0.620,       loss: 0.003
```

```
i: 14,    target: 2.350,       output: 2.392,       loss: 0.002
i: 15,    target: 1.913,       output: 2.008,       loss: 0.009
i: 16,    target: 0.525,       output: 0.476,       loss: 0.002
i: 17,    target: -0.377,      output: -0.418,      loss: 0.002
i: 18,    target: -0.903,      output: -0.865,      loss: 0.001
i: 19,    target: -0.527,      output: -0.576,      loss: 0.002
i: 20,    target: 1.924,       output: 1.811,       loss: 0.013
i: 21,    target: -0.791,      output: -0.854,      loss: 0.004
i: 22,    target: 2.728,       output: 2.747,       loss: 0.000
i: 23,    target: 3.034,       output: 2.872,       loss: 0.026
i: 24,    target: -0.801,      output: -0.810,      loss: 0.000
i: 25,    target: 1.665,       output: 1.654,       loss: 0.000
i: 26,    target: 2.938,       output: 2.781,       loss: 0.025
i: 27,    target: 1.794,       output: 1.811,       loss: 0.000
i: 28,    target: 0.964,       output: 0.952,       loss: 0.000
i: 29,    target: 2.098,       output: 2.039,       loss: 0.004
i: 30,    target: -0.671,      output: -0.730,      loss: 0.003
i: 31,    target: 2.021,       output: 1.942,       loss: 0.006
i: 32,    target: 1.016,       output: 1.048,       loss: 0.001
i: 33,    target: 2.265,       output: 2.403,       loss: 0.019
i: 34,    target: -0.422,      output: -0.455,      loss: 0.001
i: 35,    target: 0.038,       output: 0.089,       loss: 0.003
i: 36,    target: -0.733,      output: -0.754,      loss: 0.000
i: 37,    target: -0.629,      output: -0.703,      loss: 0.006
i: 38,    target: -0.748,      output: -0.776,      loss: 0.001
i: 39,    target: -0.765,      output: -0.808,      loss: 0.002
i: 40,    target: -0.718,      output: -0.793,      loss: 0.006
i: 41,    target: 2.753,       output: 2.633,       loss: 0.014
i: 42,    target: 0.945,       output: 0.974,       loss: 0.001
i: 43,    target: 1.693,       output: 1.760,       loss: 0.004
i: 44,    target: 0.708,       output: 0.739,       loss: 0.001
i: 45,    target: 1.979,       output: 2.043,       loss: 0.004
i: 46,    target: -1.000,      output: -1.087,      loss: 0.008
i: 47,    target: 1.759,       output: 1.719,       loss: 0.002
i: 48,    target: -0.823,      output: -0.866,      loss: 0.002
i: 49,    target: 2.145,       output: 2.183,       loss: 0.001
i: 50,    target: -0.603,      output: -0.615,      loss: 0.000
i: 51,    target: 2.001,       output: 2.042,       loss: 0.002
i: 52,    target: 0.183,       output: 0.130,       loss: 0.003
i: 53,    target: 1.439,       output: 1.435,       loss: 0.000
i: 54,    target: -0.526,      output: -0.491,      loss: 0.001
i: 55,    target: -0.615,      output: -0.697,      loss: 0.007
i: 56,    target: -0.067,      output: -0.061,      loss: 0.000
i: 57,    target: 1.754,       output: 1.727,       loss: 0.001
i: 58,    target: 1.351,       output: 1.284,       loss: 0.004
i: 59,    target: 1.637,       output: 1.699,       loss: 0.004
i: 60,    target: -0.296,      output: -0.343,      loss: 0.002
i: 61,    target: 1.544,       output: 1.565,       loss: 0.000
```

```
i: 62,    target: -0.779,          output: -0.840,          loss: 0.004
i: 63,    target: 0.316,           output: 0.330,           loss: 0.000
i: 64,    target: 0.280,           output: 0.285,           loss: 0.000
i: 65,    target: -0.303,          output: -0.283,          loss: 0.000
i: 66,    target: 0.844,           output: 0.922,           loss: 0.006
i: 67,    target: -0.615,          output: -0.680,          loss: 0.004
i: 68,    target: 0.326,           output: 0.340,           loss: 0.000
i: 69,    target: 0.467,           output: 0.439,           loss: 0.001
i: 70,    target: -0.641,          output: -0.690,          loss: 0.002
i: 71,    target: -0.665,          output: -0.704,          loss: 0.002
i: 72,    target: -0.755,          output: -0.782,          loss: 0.001
i: 73,    target: 0.391,           output: 0.380,           loss: 0.000
i: 74,    target: -0.859,          output: -0.965,          loss: 0.011
i: 75,    target: -0.742,          output: -0.856,          loss: 0.013
i: 76,    target: -0.275,          output: -0.277,          loss: 0.000
i: 77,    target: 1.299,           output: 1.295,           loss: 0.000
i: 78,    target: -0.982,          output: -1.032,          loss: 0.003
i: 79,    target: 2.053,           output: 2.069,           loss: 0.000
i: 80,    target: 0.868,           output: 0.863,           loss: 0.000
i: 81,    target: 1.101,           output: 1.159,           loss: 0.003
i: 82,    target: 1.778,           output: 1.757,           loss: 0.000
i: 83,    target: -0.713,          output: -0.756,          loss: 0.002
i: 84,    target: -0.730,          output: -0.783,          loss: 0.003
i: 85,    target: 1.937,           output: 1.991,           loss: 0.003
i: 86,    target: -1.019,          output: -1.076,          loss: 0.003
i: 87,    target: 1.958,           output: 1.959,           loss: 0.000
i: 88,    target: 4.616,           output: 4.683,           loss: 0.004
i: 89,    target: 1.859,           output: 1.807,           loss: 0.003
i: 90,    target: 1.066,           output: 1.220,           loss: 0.024
i: 91,    target: -0.751,          output: -0.796,          loss: 0.002
i: 92,    target: -0.439,          output: -0.469,          loss: 0.001
i: 93,    target: 4.230,           output: 4.469,           loss: 0.057
i: 94,    target: 1.936,           output: 1.889,           loss: 0.002
i: 95,    target: -0.890,          output: -0.967,          loss: 0.006
i: 96,    target: 0.446,           output: 0.440,           loss: 0.000
i: 97,    target: 0.129,           output: 0.086,           loss: 0.002
i: 98,    target: -0.310,          output: -0.256,          loss: 0.003
i: 99,    target: -0.960,          output: -0.996,          loss: 0.001
i: 100,        target: 1.655,          output: 1.781,          loss: 0.016
i: 101,        target: -0.653,         output: -0.693,         loss: 0.002
i: 102,        target: -0.600,         output: -0.652,         loss: 0.003
i: 103,        target: 4.930,          output: 5.102,          loss: 0.030
i: 104,        target: -0.602,         output: -0.668,         loss: 0.004
i: 105,        target: -0.809,         output: -0.903,         loss: 0.009
i: 106,        target: -0.528,         output: -0.465,         loss: 0.004
i: 107,        target: -0.840,         output: -0.874,         loss: 0.001
i: 108,        target: 2.025,          output: 2.034,          loss: 0.000
i: 109,        target: -0.632,         output: -0.664,         loss: 0.001
```

```
i: 110,        target: -0.732,        output: -0.765,        loss: 0.001
i: 111,        target: 0.409,         output: 0.363,         loss: 0.002
i: 112,        target: -0.095,        output: -0.104,        loss: 0.000
i: 113,        target: -0.686,        output: -0.732,        loss: 0.002
i: 114,        target: -0.730,        output: -0.778,        loss: 0.002
i: 115,        target: 1.575,         output: 1.702,         loss: 0.016
i: 116,        target: 0.306,         output: 0.391,         loss: 0.007
i: 117,        target: 1.619,         output: 1.579,         loss: 0.002
i: 118,        target: -0.308,        output: -0.369,        loss: 0.004
i: 119,        target: -0.002,        output: 0.014,         loss: 0.000
i: 120,        target: -0.784,        output: -0.856,        loss: 0.005
i: 121,        target: 3.226,         output: 3.212,         loss: 0.000
i: 122,        target: 2.039,         output: 2.035,         loss: 0.000
i: 123,        target: -0.490,        output: -0.481,        loss: 0.000
i: 124,        target: 3.958,         output: 4.292,         loss: 0.112
i: 125,        target: -0.631,        output: -0.656,        loss: 0.001
i: 126,        target: 0.319,         output: 0.355,         loss: 0.001
i: 127,        target: -0.578,        output: -0.592,        loss: 0.000
i: 128,        target: -1.008,        output: -1.082,        loss: 0.005
i: 129,        target: -0.896,        output: -0.869,        loss: 0.001
i: 130,        target: 0.899,         output: 0.900,         loss: 0.000
i: 131,        target: 1.414,         output: 1.454,         loss: 0.002
i: 132,        target: -0.170,        output: -0.217,        loss: 0.002
i: 133,        target: 0.548,         output: 0.368,         loss: 0.033
i: 134,        target: -0.727,        output: -0.761,        loss: 0.001
i: 135,        target: 0.665,         output: 0.640,         loss: 0.001
i: 136,        target: -0.668,        output: -0.677,        loss: 0.000
i: 137,        target: 0.589,         output: 0.582,         loss: 0.000
i: 138,        target: 1.547,         output: 1.590,         loss: 0.002
i: 139,        target: -0.885,        output: -0.939,        loss: 0.003
i: 140,        target: -0.692,        output: -0.721,        loss: 0.001
i: 141,        target: 1.879,         output: 1.875,         loss: 0.000
i: 142,        target: 0.987,         output: 0.957,         loss: 0.001
i: 143,        target: 1.612,         output: 1.589,         loss: 0.001
i: 144,        target: -0.794,        output: -0.825,        loss: 0.001
i: 145,        target: -0.326,        output: -0.340,        loss: 0.000
i: 146,        target: -1.222,        output: -1.267,        loss: 0.002
i: 147,        target: 1.216,         output: 1.183,         loss: 0.001
i: 148,        target: -0.414,        output: -0.465,        loss: 0.003
i: 149,        target: -0.394,        output: -0.448,        loss: 0.003
i: 150,        target: -0.588,        output: -0.662,        loss: 0.006
i: 151,        target: -0.607,        output: -0.660,        loss: 0.003
i: 152,        target: 1.107,         output: 1.179,         loss: 0.005
i: 153,        target: 2.262,         output: 2.380,         loss: 0.014
i: 154,        target: -0.584,        output: -0.639,        loss: 0.003
i: 155,        target: -0.733,        output: -0.784,        loss: 0.003
i: 156,        target: 0.717,         output: 0.739,         loss: 0.000
i: 157,        target: -0.800,        output: -0.898,        loss: 0.010
```

```
i: 158,          target: 0.353,       output: 0.319,       loss: 0.001
i: 159,          target: -0.503,      output: -0.559,      loss: 0.003
i: 160,          target: 4.772,       output: 4.956,       loss: 0.034
i: 161,          target: 1.794,       output: 1.974,       loss: 0.032
i: 162,          target: -0.292,      output: -0.248,      loss: 0.002
i: 163,          target: -0.693,      output: -0.738,      loss: 0.002
i: 164,          target: 0.333,       output: 0.351,       loss: 0.000
i: 165,          target: -0.577,      output: -0.657,      loss: 0.007
i: 166,          target: -0.821,      output: -0.842,      loss: 0.000
i: 167,          target: 1.885,       output: 1.872,       loss: 0.000
i: 168,          target: 0.351,       output: 0.251,       loss: 0.010
i: 169,          target: -0.540,      output: -0.599,      loss: 0.003
i: 170,          target: 0.694,       output: 0.713,       loss: 0.000
i: 171,          target: -0.718,      output: -0.789,      loss: 0.005
i: 172,          target: 1.271,       output: 1.362,       loss: 0.008
i: 173,          target: -0.748,      output: -0.730,      loss: 0.000
i: 174,          target: 0.954,       output: 0.972,       loss: 0.000
i: 175,          target: -0.674,      output: -0.717,      loss: 0.002
i: 176,          target: -0.779,      output: -0.842,      loss: 0.004
i: 177,          target: 0.738,       output: 0.778,       loss: 0.002
i: 178,          target: -0.538,      output: -0.540,      loss: 0.000
i: 179,          target: 1.609,       output: 1.697,       loss: 0.008
i: 180,          target: 0.088,       output: 0.059,       loss: 0.001
i: 181,          target: -0.817,      output: -0.873,      loss: 0.003
i: 182,          target: 2.197,       output: 2.285,       loss: 0.008
i: 183,          target: 1.754,       output: 1.747,       loss: 0.000
i: 184,          target: -0.927,      output: -1.022,      loss: 0.009
i: 185,          target: -1.137,      output: -1.186,      loss: 0.002
i: 186,          target: -0.702,      output: -0.714,      loss: 0.000
i: 187,          target: 2.307,       output: 2.305,       loss: 0.000
i: 188,          target: -0.668,      output: -0.712,      loss: 0.002
i: 189,          target: 0.655,       output: 0.594,       loss: 0.004
i: 190,          target: -0.687,      output: -0.741,      loss: 0.003
i: 191,          target: -0.350,      output: -0.363,      loss: 0.000
i: 192,          target: -0.869,      output: -0.949,      loss: 0.006
i: 193,          target: -0.620,      output: -0.670,      loss: 0.003
i: 194,          target: 0.137,       output: 0.144,       loss: 0.000
i: 195,          target: -0.872,      output: -0.966,      loss: 0.009
i: 196,          target: -0.665,      output: -0.704,      loss: 0.002
i: 197,          target: -0.896,      output: -0.939,      loss: 0.002
i: 198,          target: 1.270,       output: 1.410,       loss: 0.020
i: 199,          target: 0.382,       output: 0.340,       loss: 0.002
i: 200,          target: -0.787,      output: -0.854,      loss: 0.004
i: 201,          target: -0.766,      output: -0.756,      loss: 0.000
i: 202,          target: 0.267,       output: 0.254,       loss: 0.000
i: 203,          target: 1.900,       output: 1.915,       loss: 0.000
i: 204,          target: 0.582,       output: 0.633,       loss: 0.003
i: 205,          target: 1.972,       output: 2.005,       loss: 0.001
```

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i: 206,          target: 2.105,          output: 2.082,          loss: 0.001
i: 207,          target: 2.138,          output: 2.290,          loss: 0.023
i: 208,          target: 1.307,          output: 1.258,          loss: 0.002
i: 209,          target: -1.039,         output: -1.122,         loss: 0.007
i: 210,          target: 0.537,          output: 0.586,          loss: 0.002
i: 211,          target: 1.739,          output: 1.690,          loss: 0.002
i: 212,          target: 1.944,          output: 2.062,          loss: 0.014
i: 213,          target: 0.967,          output: 0.974,          loss: 0.000
i: 214,          target: -0.985,         output: -1.056,         loss: 0.005
i: 215,          target: -0.620,         output: -0.659,         loss: 0.002
i: 216,          target: -0.510,         output: -0.611,         loss: 0.010
i: 217,          target: -0.837,         output: -0.900,         loss: 0.004
i: 218,          target: -0.253,         output: -0.264,         loss: 0.000
i: 219,          target: -0.766,         output: -0.821,         loss: 0.003
i: 220,          target: 0.697,          output: 0.717,          loss: 0.000
i: 221,          target: 1.167,          output: 1.250,          loss: 0.007
i: 222,          target: -0.863,         output: -0.890,         loss: 0.001
i: 223,          target: -0.745,         output: -0.773,         loss: 0.001
i: 224,          target: -0.565,         output: -0.587,         loss: 0.001
i: 225,          target: -0.944,         output: -1.010,         loss: 0.004
i: 226,          target: -0.836,         output: -0.886,         loss: 0.002
i: 227,          target: 0.958,          output: 1.016,          loss: 0.003
i: 228,          target: -0.598,         output: -0.643,         loss: 0.002
i: 229,          target: -0.767,         output: -0.768,         loss: 0.000
i: 230,          target: 1.990,          output: 1.937,          loss: 0.003
i: 231,          target: 1.917,          output: 1.908,          loss: 0.000
i: 232,          target: 0.485,          output: 0.491,          loss: 0.000
i: 233,          target: 1.439,          output: 1.448,          loss: 0.000
i: 234,          target: -0.158,         output: -0.277,         loss: 0.014
i: 235,          target: -0.768,         output: -0.857,         loss: 0.008
i: 236,          target: 0.054,          output: 0.036,          loss: 0.000
i: 237,          target: -0.753,         output: -0.794,         loss: 0.002
i: 238,          target: 1.574,          output: 1.616,          loss: 0.002
i: 239,          target: -0.609,         output: -0.628,         loss: 0.000
i: 240,          target: -0.704,         output: -0.746,         loss: 0.002
i: 241,          target: -0.464,         output: -0.493,         loss: 0.001
i: 242,          target: 2.565,          output: 2.597,          loss: 0.001
i: 243,          target: -0.462,         output: -0.456,         loss: 0.000
i: 244,          target: -0.785,         output: -0.831,         loss: 0.002
i: 245,          target: 0.638,          output: 0.655,          loss: 0.000
i: 246,          target: -0.572,         output: -0.632,         loss: 0.004
i: 247,          target: -0.660,         output: -0.736,         loss: 0.006
i: 248,          target: -0.613,         output: -0.672,         loss: 0.003
i: 249,          target: 2.289,          output: 2.568,          loss: 0.078
i: 250,          target: 2.233,          output: 2.240,          loss: 0.000
i: 251,          target: -0.560,         output: -0.619,         loss: 0.003
i: 252,          target: 0.334,          output: 0.243,          loss: 0.008
i: 253,          target: 1.645,          output: 1.758,          loss: 0.013
```

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i: 254,        target: -0.676,        output: -0.702,        loss: 0.001
i: 255,        target: 0.813,         output: 0.833,         loss: 0.000
i: 256,        target: -0.393,        output: -0.323,        loss: 0.005
i: 257,        target: -0.961,        output: -1.072,        loss: 0.012
i: 258,        target: -0.367,        output: -0.164,        loss: 0.041
i: 259,        target: -0.284,        output: -0.317,        loss: 0.001
i: 260,        target: 1.908,         output: 1.910,         loss: 0.000
i: 261,        target: -0.558,        output: -0.563,        loss: 0.000
i: 262,        target: -0.185,        output: -0.224,        loss: 0.002
i: 263,        target: -0.745,        output: -0.735,        loss: 0.000
i: 264,        target: -0.773,        output: -0.758,        loss: 0.000
i: 265,        target: -0.529,        output: -0.525,        loss: 0.000
i: 266,        target: -0.540,        output: -0.547,        loss: 0.000
i: 267,        target: 2.472,         output: 2.394,         loss: 0.006
i: 268,        target: 0.837,         output: 0.830,         loss: 0.000
i: 269,        target: 0.468,         output: 0.460,         loss: 0.000
i: 270,        target: 2.099,         output: 2.026,         loss: 0.005
i: 271,        target: 1.886,         output: 2.012,         loss: 0.016
i: 272,        target: 0.007,         output: -0.046,        loss: 0.003
i: 273,        target: 3.542,         output: 3.659,         loss: 0.014
i: 274,        target: -0.118,        output: -0.104,        loss: 0.000
i: 275,        target: -0.893,        output: -0.790,        loss: 0.011
i: 276,        target: 2.366,         output: 2.423,         loss: 0.003
i: 277,        target: 0.626,         output: 0.621,         loss: 0.000
i: 278,        target: -0.292,        output: -0.313,        loss: 0.000
i: 279,        target: 1.810,         output: 1.708,         loss: 0.011
i: 280,        target: -0.366,        output: -0.396,        loss: 0.001
i: 281,        target: -0.503,        output: -0.518,        loss: 0.000
i: 282,        target: -0.770,        output: -0.830,        loss: 0.004
i: 283,        target: 0.921,         output: 0.986,         loss: 0.004
i: 284,        target: 1.899,         output: 2.015,         loss: 0.013
i: 285,        target: 1.933,         output: 1.997,         loss: 0.004
i: 286,        target: -0.408,        output: -0.409,        loss: 0.000
i: 287,        target: -0.778,        output: -0.826,        loss: 0.002
i: 288,        target: 1.599,         output: 1.629,         loss: 0.001
i: 289,        target: 0.098,         output: 0.062,         loss: 0.001
i: 290,        target: 0.355,         output: 0.343,         loss: 0.000
i: 291,        target: 0.870,         output: 0.908,         loss: 0.001
i: 292,        target: 1.699,         output: 1.678,         loss: 0.000
i: 293,        target: 2.148,         output: 2.177,         loss: 0.001
i: 294,        target: -0.274,        output: -0.230,        loss: 0.002
i: 295,        target: -0.551,        output: -0.557,        loss: 0.000
i: 296,        target: 2.091,         output: 2.111,         loss: 0.000
i: 297,        target: 1.947,         output: 2.099,         loss: 0.023
i: 298,        target: 0.091,         output: 0.077,         loss: 0.000
i: 299,        target: 0.334,         output: 0.334,         loss: 0.000
i: 300,        target: 1.417,         output: 1.481,         loss: 0.004
i: 301,        target: -0.360,        output: -0.332,        loss: 0.001
```

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i: 302,        target: -0.729,     output: -0.795,     loss: 0.004
i: 303,        target: -0.989,     output: -1.039,     loss: 0.002
i: 304,        target: 0.641,      output: 0.648,      loss: 0.000
i: 305,        target: -0.886,     output: -0.946,     loss: 0.004
i: 306,        target: 1.690,      output: 1.698,      loss: 0.000
i: 307,        target: 0.664,      output: 0.497,      loss: 0.028
i: 308,        target: 0.391,      output: 0.390,      loss: 0.000
i: 309,        target: -0.003,     output: 0.547,      loss: 0.302
i: 310,        target: -0.782,     output: -0.809,     loss: 0.001
i: 311,        target: -0.804,     output: -0.835,     loss: 0.001
i: 312,        target: 4.100,      output: 4.331,      loss: 0.053
i: 313,        target: -0.762,     output: -0.772,     loss: 0.000
i: 314,        target: 0.050,      output: -0.015,     loss: 0.004
i: 315,        target: 2.459,      output: 2.448,      loss: 0.000
i: 316,        target: -0.881,     output: -0.895,     loss: 0.000
i: 317,        target: -0.657,     output: -0.654,     loss: 0.000
i: 318,        target: -0.515,     output: -0.559,     loss: 0.002
i: 319,        target: 0.157,      output: 0.120,      loss: 0.001
i: 320,        target: -0.629,     output: -0.740,     loss: 0.012
i: 321,        target: -1.024,     output: -1.092,     loss: 0.005
i: 322,        target: 1.818,      output: 1.752,      loss: 0.004
i: 323,        target: -0.685,     output: -0.714,     loss: 0.001
i: 324,        target: 4.579,      output: 4.533,      loss: 0.002
i: 325,        target: -0.364,     output: -0.387,     loss: 0.001
i: 326,        target: -0.820,     output: -0.867,     loss: 0.002
i: 327,        target: 1.533,      output: 1.599,      loss: 0.004
i: 328,        target: 1.631,      output: 1.671,      loss: 0.002
i: 329,        target: 0.382,      output: 0.350,      loss: 0.001
i: 330,        target: -0.767,     output: -0.872,     loss: 0.011
i: 331,        target: -0.380,     output: -0.598,     loss: 0.047
i: 332,        target: 4.830,      output: 4.931,      loss: 0.010
i: 333,        target: 4.359,      output: 4.383,      loss: 0.001
i: 334,        target: -0.484,     output: -0.473,     loss: 0.000
i: 335,        target: 0.549,      output: 0.532,      loss: 0.000
i: 336,        target: -1.011,     output: -1.109,     loss: 0.010
i: 337,        target: -0.563,     output: -0.520,     loss: 0.002
i: 338,        target: -0.711,     output: -0.762,     loss: 0.003
i: 339,        target: 0.271,      output: 0.243,      loss: 0.001
i: 340,        target: 0.811,      output: 0.757,      loss: 0.003
i: 341,        target: -0.721,     output: -0.743,     loss: 0.001
i: 342,        target: 3.051,      output: 3.130,      loss: 0.006
i: 343,        target: -0.428,     output: -0.420,     loss: 0.000
i: 344,        target: -0.804,     output: -0.818,     loss: 0.000
i: 345,        target: 0.923,      output: 0.856,      loss: 0.004
i: 346,        target: 1.172,      output: 1.156,      loss: 0.000
i: 347,        target: -0.777,     output: -0.791,     loss: 0.000
i: 348,        target: 0.070,      output: 0.062,      loss: 0.000
i: 349,        target: 3.335,      output: 3.325,      loss: 0.000
```

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i: 350,          target: -0.534,          output: -0.573,          loss: 0.001
i: 351,          target: 1.433,           output: 1.432,           loss: 0.000
i: 352,          target: 0.358,           output: 0.266,           loss: 0.008
i: 353,          target: 1.328,           output: 1.287,           loss: 0.002
i: 354,          target: 0.439,           output: 0.393,           loss: 0.002
i: 355,          target: -0.599,          output: -0.635,          loss: 0.001
i: 356,          target: -1.011,          output: -1.139,          loss: 0.016
i: 357,          target: -0.951,          output: -1.008,          loss: 0.003
i: 358,          target: -0.461,          output: -0.479,          loss: 0.000
i: 359,          target: -0.736,          output: -0.772,          loss: 0.001
i: 360,          target: -0.345,          output: -0.364,          loss: 0.000
i: 361,          target: 2.789,           output: 2.778,           loss: 0.000
i: 362,          target: -0.671,          output: -0.697,          loss: 0.001
i: 363,          target: 1.781,           output: 1.723,           loss: 0.003
i: 364,          target: 1.065,           output: 1.112,           loss: 0.002
i: 365,          target: -0.823,          output: -0.887,          loss: 0.004
i: 366,          target: 1.567,           output: 1.640,           loss: 0.005
i: 367,          target: -0.707,          output: -0.784,          loss: 0.006
i: 368,          target: -0.177,          output: -0.193,          loss: 0.000
i: 369,          target: -0.008,          output: 0.031,           loss: 0.002
i: 370,          target: 3.317,           output: 3.411,           loss: 0.009
i: 371,          target: -0.548,          output: -0.593,          loss: 0.002
i: 372,          target: 0.327,           output: 0.396,           loss: 0.005
i: 373,          target: -0.429,          output: -0.486,          loss: 0.003
i: 374,          target: -0.531,          output: -0.519,          loss: 0.000
i: 375,          target: -0.708,          output: -0.768,          loss: 0.004
i: 376,          target: -0.823,          output: -0.894,          loss: 0.005
i: 377,          target: -0.487,          output: -0.558,          loss: 0.005
i: 378,          target: 1.685,           output: 1.657,           loss: 0.001
i: 379,          target: -0.768,          output: -0.823,          loss: 0.003
i: 380,          target: -0.158,          output: -0.201,          loss: 0.002
i: 381,          target: -0.146,          output: -0.175,          loss: 0.001
i: 382,          target: -0.859,          output: -0.965,          loss: 0.011
i: 383,          target: 1.293,           output: 1.383,           loss: 0.008
i: 384,          target: -0.430,          output: -0.440,          loss: 0.000
i: 385,          target: 0.753,           output: 0.663,           loss: 0.008
i: 386,          target: -0.346,          output: -0.442,          loss: 0.009
i: 387,          target: -0.666,          output: -0.678,          loss: 0.000
i: 388,          target: -0.911,          output: -0.979,          loss: 0.005
i: 389,          target: -0.659,          output: -0.693,          loss: 0.001
i: 390,          target: 4.133,           output: 4.499,           loss: 0.134
i: 391,          target: -0.563,          output: -0.600,          loss: 0.001
i: 392,          target: 0.203,           output: 0.201,           loss: 0.000
i: 393,          target: -0.722,          output: -0.832,          loss: 0.012
i: 394,          target: 0.997,           output: 0.901,           loss: 0.009
i: 395,          target: -0.726,          output: -0.774,          loss: 0.002
i: 396,          target: -0.711,          output: -0.755,          loss: 0.002
i: 397,          target: -1.141,          output: -1.165,          loss: 0.001
```

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i: 398,        target: -0.130,      output: -0.173,      loss: 0.002
i: 399,        target: 2.623,       output: 2.790,       loss: 0.028
i: 400,        target: 1.571,       output: 1.495,       loss: 0.006
i: 401,        target: 0.093,       output: 0.114,       loss: 0.000
i: 402,        target: -0.907,      output: -0.927,      loss: 0.000
i: 403,        target: -0.797,      output: -0.897,      loss: 0.010
i: 404,        target: 1.193,       output: 1.345,       loss: 0.023
i: 405,        target: 1.939,       output: 1.956,       loss: 0.000
i: 406,        target: -0.721,      output: -0.774,      loss: 0.003
i: 407,        target: 2.248,       output: 2.254,       loss: 0.000
i: 408,        target: 1.950,       output: 2.061,       loss: 0.012
i: 409,        target: 1.952,       output: 1.914,       loss: 0.002
i: 410,        target: -0.749,      output: -0.797,      loss: 0.002
i: 411,        target: -0.823,      output: -0.807,      loss: 0.000
i: 412,        target: 2.004,       output: 1.980,       loss: 0.001
i: 413,        target: -0.762,      output: -0.804,      loss: 0.002
i: 414,        target: 0.874,       output: 0.821,       loss: 0.003
i: 415,        target: 2.320,       output: 2.376,       loss: 0.003
i: 416,        target: -0.705,      output: -0.737,      loss: 0.001
i: 417,        target: 0.460,       output: 0.472,       loss: 0.000
i: 418,        target: -1.043,      output: -1.052,      loss: 0.000
i: 419,        target: -0.808,      output: -0.863,      loss: 0.003
i: 420,        target: -0.994,      output: -1.002,      loss: 0.000
i: 421,        target: -0.821,      output: -0.865,      loss: 0.002
i: 422,        target: 0.344,       output: 0.279,       loss: 0.004
i: 423,        target: 1.913,       output: 1.886,       loss: 0.001
i: 424,        target: -0.575,      output: -0.516,      loss: 0.003
i: 425,        target: 2.430,       output: 2.554,       loss: 0.015
i: 426,        target: 1.528,       output: 1.548,       loss: 0.000
i: 427,        target: -0.546,      output: -0.622,      loss: 0.006
i: 428,        target: -0.820,      output: -0.834,      loss: 0.000
i: 429,        target: -0.559,      output: -0.661,      loss: 0.010
i: 430,        target: 1.793,       output: 1.849,       loss: 0.003
i: 431,        target: -0.692,      output: -0.758,      loss: 0.004
i: 432,        target: 1.299,       output: 1.404,       loss: 0.011
i: 433,        target: 4.166,       output: 4.182,       loss: 0.000
i: 434,        target: 1.061,       output: 1.117,       loss: 0.003
i: 435,        target: 0.441,       output: 0.391,       loss: 0.003
i: 436,        target: 2.445,       output: 2.496,       loss: 0.003
i: 437,        target: -0.769,      output: -0.813,      loss: 0.002
i: 438,        target: 3.917,       output: 4.012,       loss: 0.009
i: 439,        target: -0.828,      output: -0.856,      loss: 0.001
i: 440,        target: -0.458,      output: -0.440,      loss: 0.000
i: 441,        target: 0.436,       output: 0.403,       loss: 0.001
i: 442,        target: -0.821,      output: -0.827,      loss: 0.000
i: 443,        target: -0.483,      output: -0.430,      loss: 0.003
i: 444,        target: -0.557,      output: -0.597,      loss: 0.002
i: 445,        target: 2.099,       output: 2.296,       loss: 0.039
```

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i: 446,        target: 2.037,        output: 2.110,        loss: 0.005
i: 447,        target: 1.230,        output: 1.126,        loss: 0.011
i: 448,        target: -0.566,       output: -0.617,       loss: 0.003
i: 449,        target: -0.690,       output: -0.744,       loss: 0.003
i: 450,        target: -0.212,       output: -0.237,       loss: 0.001
i: 451,        target: -0.689,       output: -0.709,       loss: 0.000
i: 452,        target: 1.568,        output: 1.575,        loss: 0.000
i: 453,        target: 0.894,        output: 0.852,        loss: 0.002
i: 454,        target: 1.836,        output: 1.770,        loss: 0.004
i: 455,        target: -0.363,       output: -0.401,       loss: 0.001
i: 456,        target: -0.713,       output: -0.803,       loss: 0.008
i: 457,        target: -0.422,       output: -0.504,       loss: 0.007
i: 458,        target: -0.872,       output: -0.943,       loss: 0.005
i: 459,        target: 0.908,        output: 0.888,        loss: 0.000
i: 460,        target: -0.473,       output: -0.501,       loss: 0.001
i: 461,        target: -0.383,       output: -0.406,       loss: 0.001
i: 462,        target: -0.749,       output: -0.816,       loss: 0.004
i: 463,        target: -0.748,       output: -0.805,       loss: 0.003
i: 464,        target: -0.181,       output: -0.209,       loss: 0.001
i: 465,        target: 2.419,        output: 2.544,        loss: 0.016
i: 466,        target: 1.323,        output: 1.507,        loss: 0.034
i: 467,        target: -0.863,       output: -0.931,       loss: 0.005
i: 468,        target: -0.423,       output: -0.506,       loss: 0.007
i: 469,        target: 1.696,        output: 1.752,        loss: 0.003
i: 470,        target: -0.761,       output: -0.776,       loss: 0.000
i: 471,        target: -0.741,       output: -0.781,       loss: 0.002
i: 472,        target: -0.660,       output: -0.672,       loss: 0.000
i: 473,        target: -0.560,       output: -0.593,       loss: 0.001
i: 474,        target: 1.869,        output: 1.887,        loss: 0.000
i: 475,        target: -0.501,       output: -0.522,       loss: 0.000
i: 476,        target: -0.860,       output: -0.918,       loss: 0.003
i: 477,        target: 0.688,        output: 0.681,        loss: 0.000
i: 478,        target: 0.427,        output: 0.387,        loss: 0.002
i: 479,        target: 1.952,        output: 2.047,        loss: 0.009
i: 480,        target: 1.263,        output: 1.171,        loss: 0.008
i: 481,        target: 1.151,        output: 1.104,        loss: 0.002
i: 482,        target: 0.739,        output: 0.666,        loss: 0.005
i: 483,        target: 1.602,        output: 1.687,        loss: 0.007
i: 484,        target: -0.564,       output: -0.625,       loss: 0.004
i: 485,        target: 1.859,        output: 1.859,        loss: 0.000
i: 486,        target: 0.067,        output: 0.074,        loss: 0.000
i: 487,        target: -0.779,       output: -0.793,       loss: 0.000
i: 488,        target: 0.848,        output: 0.909,        loss: 0.004
i: 489,        target: -0.584,       output: -0.607,       loss: 0.001
i: 490,        target: -0.643,       output: -0.691,       loss: 0.002
i: 491,        target: 0.600,        output: 0.605,        loss: 0.000
i: 492,        target: -0.782,       output: -0.822,       loss: 0.002
i: 493,        target: -0.693,       output: -0.751,       loss: 0.003
```

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i: 494,        target: -1.039,        output: -1.095,        loss: 0.003
i: 495,        target: -0.807,        output: -0.908,        loss: 0.010
i: 496,        target: -0.413,        output: -0.443,        loss: 0.001
i: 497,        target: -0.492,        output: -0.530,        loss: 0.002
i: 498,        target: 1.897,         output: 1.926,         loss: 0.001
i: 499,        target: -0.642,        output: -0.632,        loss: 0.000
i: 500,        target: -0.546,        output: -0.565,        loss: 0.000
i: 501,        target: -0.398,        output: -0.374,        loss: 0.001
i: 502,        target: 2.165,         output: 2.372,         loss: 0.043
i: 503,        target: 1.420,         output: 1.448,         loss: 0.001
i: 504,        target: 1.124,         output: 1.139,         loss: 0.000
i: 505,        target: 1.531,         output: 1.557,         loss: 0.001
i: 506,        target: -0.160,        output: -0.118,        loss: 0.002
i: 507,        target: -0.326,        output: -0.372,        loss: 0.002
i: 508,        target: -0.851,        output: -0.930,        loss: 0.006
i: 509,        target: -0.772,        output: -0.790,        loss: 0.000
i: 510,        target: -0.686,        output: -0.733,        loss: 0.002
i: 511,        target: -0.603,        output: -0.657,        loss: 0.003
i: 512,        target: 2.656,         output: 2.688,         loss: 0.001
i: 513,        target: -0.485,        output: -0.534,        loss: 0.002
i: 514,        target: -0.665,        output: -0.720,        loss: 0.003
i: 515,        target: 1.082,         output: 1.141,         loss: 0.003
i: 516,        target: -0.104,        output: -0.064,        loss: 0.002
i: 517,        target: -0.349,        output: -0.368,        loss: 0.000
i: 518,        target: 0.058,         output: -0.002,        loss: 0.004
i: 519,        target: 1.926,         output: 1.943,         loss: 0.000
i: 520,        target: 3.905,         output: 4.075,         loss: 0.029
i: 521,        target: 0.495,         output: 0.468,         loss: 0.001
i: 522,        target: 1.802,         output: 1.779,         loss: 0.001
i: 523,        target: -0.482,        output: -0.500,        loss: 0.000
i: 524,        target: 1.454,         output: 1.432,         loss: 0.000
i: 525,        target: 1.266,         output: 1.275,         loss: 0.000
i: 526,        target: -0.301,        output: -0.315,        loss: 0.000
i: 527,        target: -0.764,        output: -0.808,        loss: 0.002
i: 528,        target: -0.388,        output: -0.429,        loss: 0.002
i: 529,        target: -0.460,        output: -0.515,        loss: 0.003
i: 530,        target: 2.906,         output: 2.842,         loss: 0.004
i: 531,        target: -0.777,        output: -0.867,        loss: 0.008
i: 532,        target: -0.402,        output: -0.455,        loss: 0.003
i: 533,        target: 1.453,         output: 1.442,         loss: 0.000
i: 534,        target: -0.873,        output: -0.962,        loss: 0.008
i: 535,        target: 1.236,         output: 1.183,         loss: 0.003
i: 536,        target: 0.588,         output: 0.688,         loss: 0.010
i: 537,        target: -0.916,        output: -0.988,        loss: 0.005
i: 538,        target: -0.564,        output: -0.571,        loss: 0.000
i: 539,        target: -0.626,        output: -0.661,        loss: 0.001
i: 540,        target: 1.644,         output: 1.676,         loss: 0.001
i: 541,        target: 0.004,         output: -0.019,        loss: 0.001
```

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i: 542,          target: 1.998,          output: 2.045,          loss: 0.002
i: 543,          target: -0.556,         output: -0.577,         loss: 0.000
i: 544,          target: 4.487,          output: 4.528,          loss: 0.002
i: 545,          target: -0.680,         output: -0.723,         loss: 0.002
i: 546,          target: -0.430,         output: -0.448,         loss: 0.000
i: 547,          target: -0.755,         output: -0.802,         loss: 0.002
i: 548,          target: -0.945,         output: -0.968,         loss: 0.000
i: 549,          target: 2.177,          output: 2.276,          loss: 0.010
i: 550,          target: 1.240,          output: 1.350,          loss: 0.012
i: 551,          target: 1.714,          output: 1.726,          loss: 0.000
i: 552,          target: -0.655,         output: -0.700,         loss: 0.002
i: 553,          target: -0.443,         output: -0.670,         loss: 0.052
i: 554,          target: -0.893,         output: -0.996,         loss: 0.011
i: 555,          target: 2.329,          output: 2.409,          loss: 0.006
i: 556,          target: -0.768,         output: -0.869,         loss: 0.010
i: 557,          target: 0.848,          output: 0.789,          loss: 0.003
i: 558,          target: -0.710,         output: -0.643,         loss: 0.004
i: 559,          target: 1.908,          output: 1.925,          loss: 0.000
i: 560,          target: -0.711,         output: -0.748,         loss: 0.001
i: 561,          target: -0.476,         output: -0.493,         loss: 0.000
i: 562,          target: 1.829,          output: 1.861,          loss: 0.001
i: 563,          target: 3.420,          output: 3.494,          loss: 0.006
i: 564,          target: -0.951,         output: -0.985,         loss: 0.001
i: 565,          target: 4.020,          output: 4.139,          loss: 0.014
i: 566,          target: 1.979,          output: 1.910,          loss: 0.005
i: 567,          target: -0.511,         output: -0.586,         loss: 0.006
i: 568,          target: 0.909,          output: 0.907,          loss: 0.000
i: 569,          target: 3.037,          output: 3.114,          loss: 0.006
i: 570,          target: -0.482,         output: -0.650,         loss: 0.028
i: 571,          target: 0.854,          output: 0.825,          loss: 0.001
i: 572,          target: -0.297,         output: -0.333,         loss: 0.001
i: 573,          target: 1.377,          output: 1.398,          loss: 0.000
i: 574,          target: 0.291,          output: 0.254,          loss: 0.001
i: 575,          target: 2.081,          output: 2.175,          loss: 0.009
i: 576,          target: 0.375,          output: 0.353,          loss: 0.000
i: 577,          target: -0.616,         output: -0.642,         loss: 0.001
i: 578,          target: 1.660,          output: 1.593,          loss: 0.004
i: 579,          target: -0.809,         output: -0.895,         loss: 0.007
i: 580,          target: 1.894,          output: 1.880,          loss: 0.000
i: 581,          target: -1.042,         output: -1.127,         loss: 0.007
i: 582,          target: -0.467,         output: -0.504,         loss: 0.001
i: 583,          target: 1.596,          output: 1.621,          loss: 0.001
i: 584,          target: -0.655,         output: -0.691,         loss: 0.001
i: 585,          target: -0.716,         output: -0.749,         loss: 0.001
i: 586,          target: -0.206,         output: -0.204,         loss: 0.000
i: 587,          target: 1.929,          output: 2.057,          loss: 0.017
i: 588,          target: -0.448,         output: -0.461,         loss: 0.000
i: 589,          target: -0.269,         output: -0.317,         loss: 0.002
```

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i: 590,          target: -0.789,     output: -0.834,     loss: 0.002
i: 591,          target: 2.143,      output: 2.252,      loss: 0.012
i: 592,          target: -0.862,     output: -0.894,     loss: 0.001
i: 593,          target: 0.260,      output: 0.251,      loss: 0.000
i: 594,          target: 1.255,      output: 1.275,      loss: 0.000
i: 595,          target: 3.095,      output: 3.107,      loss: 0.000
i: 596,          target: -0.174,     output: -0.204,     loss: 0.001
i: 597,          target: 0.040,      output: -0.052,     loss: 0.008
i: 598,          target: -0.392,     output: -0.446,     loss: 0.003
i: 599,          target: -0.285,     output: -0.277,     loss: 0.000
i: 600,          target: 0.464,      output: 0.294,      loss: 0.029
i: 601,          target: -0.547,     output: -0.622,     loss: 0.006
i: 602,          target: -0.559,     output: -0.582,     loss: 0.001
i: 603,          target: 1.558,      output: 1.758,      loss: 0.040
i: 604,          target: -0.446,     output: -0.482,     loss: 0.001
i: 605,          target: -0.737,     output: -0.783,     loss: 0.002
i: 606,          target: 1.951,      output: 2.108,      loss: 0.025
i: 607,          target: -0.510,     output: -0.544,     loss: 0.001
i: 608,          target: -0.786,     output: -0.837,     loss: 0.003
i: 609,          target: -0.596,     output: -0.621,     loss: 0.001
i: 610,          target: -0.323,     output: -0.332,     loss: 0.000
i: 611,          target: 1.845,      output: 1.820,      loss: 0.001
i: 612,          target: 2.912,      output: 2.840,      loss: 0.005
i: 613,          target: -0.396,     output: -0.387,     loss: 0.000
i: 614,          target: -0.718,     output: -0.807,     loss: 0.008
i: 615,          target: -0.913,     output: -0.996,     loss: 0.007
i: 616,          target: 1.881,      output: 1.961,      loss: 0.006
i: 617,          target: 2.202,      output: 2.253,      loss: 0.003
i: 618,          target: 1.843,      output: 1.735,      loss: 0.012
i: 619,          target: -0.612,     output: -0.624,     loss: 0.000
i: 620,          target: -0.727,     output: -0.789,     loss: 0.004
i: 621,          target: -0.548,     output: -0.595,     loss: 0.002
i: 622,          target: 1.414,      output: 1.366,      loss: 0.002
i: 623,          target: -0.618,     output: -0.682,     loss: 0.004
i: 624,          target: 1.303,      output: 1.340,      loss: 0.001
i: 625,          target: -0.454,     output: -0.461,     loss: 0.000
i: 626,          target: 0.287,      output: 0.243,      loss: 0.002
i: 627,          target: 0.180,      output: 0.144,      loss: 0.001
i: 628,          target: 1.040,      output: 1.031,      loss: 0.000
i: 629,          target: 4.666,      output: 4.983,      loss: 0.101
i: 630,          target: -0.457,     output: -0.513,     loss: 0.003
i: 631,          target: -0.558,     output: -0.534,     loss: 0.001
i: 632,          target: -0.808,     output: -0.841,     loss: 0.001
i: 633,          target: -0.465,     output: -0.411,     loss: 0.003
i: 634,          target: -0.759,     output: -0.811,     loss: 0.003
i: 635,          target: 1.938,      output: 1.902,      loss: 0.001
i: 636,          target: 1.022,      output: 0.989,      loss: 0.001
i: 637,          target: -0.660,     output: -0.739,     loss: 0.006
```

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i: 638,        target: -0.687,        output: -0.732,        loss: 0.002
i: 639,        target: 0.063,         output: 0.034,         loss: 0.001
i: 640,        target: -0.351,        output: -0.437,        loss: 0.007
i: 641,        target: -0.774,        output: -0.818,        loss: 0.002
i: 642,        target: -0.723,        output: -0.776,        loss: 0.003
i: 643,        target: 1.694,         output: 1.844,         loss: 0.023
i: 644,        target: 0.372,         output: 0.339,         loss: 0.001
i: 645,        target: -0.833,        output: -0.867,        loss: 0.001
i: 646,        target: -0.168,        output: -0.206,        loss: 0.001
i: 647,        target: -0.590,        output: -0.607,        loss: 0.000
i: 648,        target: -0.727,        output: -0.794,        loss: 0.005
i: 649,        target: -0.696,        output: -0.774,        loss: 0.006
i: 650,        target: -0.811,        output: -0.912,        loss: 0.010
i: 651,        target: -0.428,        output: -0.440,        loss: 0.000
i: 652,        target: 1.918,         output: 1.931,         loss: 0.000
i: 653,        target: 2.002,         output: 2.002,         loss: 0.000
i: 654,        target: -0.526,        output: -0.567,        loss: 0.002
i: 655,        target: 1.907,         output: 1.883,         loss: 0.001
i: 656,        target: -0.393,        output: -0.410,        loss: 0.000
i: 657,        target: -0.320,        output: -0.402,        loss: 0.007
i: 658,        target: -0.450,        output: -0.498,        loss: 0.002
i: 659,        target: -0.652,        output: -0.677,        loss: 0.001
i: 660,        target: -0.759,        output: -0.783,        loss: 0.001
i: 661,        target: 0.652,         output: 0.544,         loss: 0.012
i: 662,        target: 4.538,         output: 4.775,         loss: 0.056
i: 663,        target: 0.142,         output: 0.116,         loss: 0.001
i: 664,        target: 1.756,         output: 1.670,         loss: 0.007
i: 665,        target: 1.847,         output: 1.816,         loss: 0.001
i: 666,        target: -0.813,        output: -0.888,        loss: 0.006
i: 667,        target: -0.772,        output: -0.859,        loss: 0.007
i: 668,        target: -0.673,        output: -0.699,        loss: 0.001
i: 669,        target: -0.402,        output: -0.461,        loss: 0.003
i: 670,        target: -0.659,        output: -0.728,        loss: 0.005
i: 671,        target: -0.755,        output: -0.818,        loss: 0.004
i: 672,        target: 1.649,         output: 1.639,         loss: 0.000
i: 673,        target: -0.653,        output: -0.698,        loss: 0.002
i: 674,        target: -0.789,        output: -0.848,        loss: 0.004
i: 675,        target: -0.687,        output: -0.755,        loss: 0.005
i: 676,        target: -0.362,        output: -0.407,        loss: 0.002
i: 677,        target: -0.366,        output: -0.397,        loss: 0.001
i: 678,        target: -0.701,        output: -0.768,        loss: 0.005
i: 679,        target: -0.935,        output: -0.887,        loss: 0.002
i: 680,        target: -0.957,        output: -1.008,        loss: 0.003
i: 681,        target: -0.137,        output: -0.109,        loss: 0.001
i: 682,        target: 1.367,         output: 1.405,         loss: 0.001
i: 683,        target: 2.016,         output: 2.019,         loss: 0.000
i: 684,        target: 1.735,         output: 1.703,         loss: 0.001
i: 685,        target: 1.497,         output: 1.527,         loss: 0.001
```

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i: 686,          target: 0.137,          output: 0.085,          loss: 0.003
i: 687,          target: -0.654,         output: -0.702,         loss: 0.002
i: 688,          target: 1.882,          output: 1.838,          loss: 0.002
i: 689,          target: 1.402,          output: 1.432,          loss: 0.001
i: 690,          target: 0.721,          output: 0.778,          loss: 0.003
i: 691,          target: -0.767,         output: -0.783,         loss: 0.000
i: 692,          target: 1.881,          output: 1.931,          loss: 0.002
i: 693,          target: -0.799,         output: -0.778,         loss: 0.000
i: 694,          target: -0.497,         output: -0.560,         loss: 0.004
i: 695,          target: 0.387,          output: 0.344,          loss: 0.002
i: 696,          target: 1.117,          output: 1.183,          loss: 0.004
i: 697,          target: -0.530,         output: -0.626,         loss: 0.009
i: 698,          target: -0.741,         output: -0.765,         loss: 0.001
i: 699,          target: -0.316,         output: -0.372,         loss: 0.003
i: 700,          target: -0.679,         output: -0.748,         loss: 0.005
i: 701,          target: -0.768,         output: -0.865,         loss: 0.009
i: 702,          target: 0.272,          output: 0.227,          loss: 0.002
i: 703,          target: -0.766,         output: -0.856,         loss: 0.008
i: 704,          target: 1.059,          output: 1.171,          loss: 0.012
i: 705,          target: -0.615,         output: -0.674,         loss: 0.004
i: 706,          target: 1.127,          output: 1.146,          loss: 0.000
i: 707,          target: 1.949,          output: 2.059,          loss: 0.012
i: 708,          target: -0.811,         output: -0.860,         loss: 0.002
i: 709,          target: 1.449,          output: 1.435,          loss: 0.000
i: 710,          target: -0.597,         output: -0.639,         loss: 0.002
i: 711,          target: -0.843,         output: -0.890,         loss: 0.002
i: 712,          target: -1.098,         output: -1.122,         loss: 0.001
i: 713,          target: -0.408,         output: -0.458,         loss: 0.003
i: 714,          target: -0.797,         output: -0.839,         loss: 0.002
i: 715,          target: -0.420,         output: -0.439,         loss: 0.000
i: 716,          target: -0.701,         output: -0.759,         loss: 0.003
i: 717,          target: 1.967,          output: 2.031,          loss: 0.004
i: 718,          target: 0.206,          output: 0.171,          loss: 0.001
i: 719,          target: -0.311,         output: -0.363,         loss: 0.003
i: 720,          target: 2.073,          output: 2.057,          loss: 0.000
i: 721,          target: 1.485,          output: 1.491,          loss: 0.000
i: 722,          target: 0.263,          output: 0.229,          loss: 0.001
i: 723,          target: 1.272,          output: 1.247,          loss: 0.001
i: 724,          target: 1.916,          output: 1.919,          loss: 0.000
i: 725,          target: -0.403,         output: -0.471,         loss: 0.005
i: 726,          target: 1.934,          output: 1.934,          loss: 0.000
i: 727,          target: -0.453,         output: -0.454,         loss: 0.000
i: 728,          target: -0.822,         output: -0.872,         loss: 0.003
i: 729,          target: 1.915,          output: 1.940,          loss: 0.001
i: 730,          target: 1.778,          output: 1.749,          loss: 0.001
i: 731,          target: 1.516,          output: 1.542,          loss: 0.001
i: 732,          target: -0.764,         output: -0.793,         loss: 0.001
i: 733,          target: 0.038,          output: 0.008,          loss: 0.001
```

```
i: 734,        target: 1.839,        output: 1.748,        loss: 0.008
i: 735,        target: -0.770,       output: -0.799,       loss: 0.001
i: 736,        target: 1.002,        output: 0.956,        loss: 0.002
i: 737,        target: -0.606,       output: -0.664,       loss: 0.003
i: 738,        target: 1.231,        output: 1.311,        loss: 0.006
i: 739,        target: -0.720,       output: -0.776,       loss: 0.003
i: 740,        target: -0.840,       output: -0.887,       loss: 0.002
i: 741,        target: -0.423,       output: -0.433,       loss: 0.000
i: 742,        target: 0.437,        output: 0.471,        loss: 0.001
i: 743,        target: 2.061,        output: 2.060,        loss: 0.000
i: 744,        target: 0.941,        output: 0.876,        loss: 0.004
i: 745,        target: 0.872,        output: 0.892,        loss: 0.000
i: 746,        target: -1.005,       output: -0.987,       loss: 0.000
i: 747,        target: -0.762,       output: -0.772,       loss: 0.000
i: 748,        target: -0.726,       output: -0.722,       loss: 0.000
i: 749,        target: -0.990,       output: -1.031,       loss: 0.002
i: 750,        target: -0.304,       output: -0.315,       loss: 0.000
i: 751,        target: 2.436,        output: 2.504,        loss: 0.005
i: 752,        target: 1.381,        output: 1.339,        loss: 0.002
i: 753,        target: -0.924,       output: -0.993,       loss: 0.005
i: 754,        target: 1.665,        output: 1.677,        loss: 0.000
i: 755,        target: -0.651,       output: -0.727,       loss: 0.006
i: 756,        target: 0.113,        output: 0.138,        loss: 0.001
i: 757,        target: -0.845,       output: -0.884,       loss: 0.002
i: 758,        target: -0.589,       output: -0.582,       loss: 0.000
i: 759,        target: -0.820,       output: -0.897,       loss: 0.006
i: 760,        target: 1.190,        output: 1.222,        loss: 0.001
i: 761,        target: 1.978,        output: 1.990,        loss: 0.000
i: 762,        target: -0.739,       output: -0.845,       loss: 0.011
i: 763,        target: -0.446,       output: -0.339,       loss: 0.011
i: 764,        target: -0.766,       output: -0.757,       loss: 0.000
i: 765,        target: -0.016,       output: -0.014,       loss: 0.000
i: 766,        target: -0.643,       output: -0.692,       loss: 0.002
i: 767,        target: 0.730,        output: 0.717,        loss: 0.000
i: 768,        target: -0.544,       output: -0.576,       loss: 0.001
i: 769,        target: 0.287,        output: 0.230,        loss: 0.003
i: 770,        target: 2.186,        output: 2.448,        loss: 0.069
i: 771,        target: -0.650,       output: -0.705,       loss: 0.003
i: 772,        target: -0.576,       output: -0.628,       loss: 0.003
i: 773,        target: 0.959,        output: 0.957,        loss: 0.000
i: 774,        target: 1.782,        output: 1.891,        loss: 0.012
i: 775,        target: -0.772,       output: -0.859,       loss: 0.007
i: 776,        target: -0.856,       output: -0.894,       loss: 0.001
i: 777,        target: 0.083,        output: 0.044,        loss: 0.002
i: 778,        target: -0.701,       output: -0.726,       loss: 0.001
i: 779,        target: -0.177,       output: -0.160,       loss: 0.000
i: 780,        target: -0.934,       output: -0.858,       loss: 0.006
i: 781,        target: -0.775,       output: -0.810,       loss: 0.001
```

```
i: 782,          target: 1.457,          output: 1.445,          loss: 0.000
i: 783,          target: -0.487,         output: -0.520,         loss: 0.001
i: 784,          target: -0.620,         output: -0.676,         loss: 0.003
i: 785,          target: 0.024,          output: -0.039,         loss: 0.004
i: 786,          target: -0.374,         output: -0.340,         loss: 0.001
i: 787,          target: 1.622,          output: 1.640,          loss: 0.000
i: 788,          target: 2.458,          output: 2.280,          loss: 0.032
i: 789,          target: -0.353,         output: -0.355,         loss: 0.000
i: 790,          target: -0.715,         output: -0.804,         loss: 0.008
i: 791,          target: 1.757,          output: 1.743,          loss: 0.000
i: 792,          target: 2.181,          output: 2.266,          loss: 0.007
i: 793,          target: -0.694,         output: -0.717,         loss: 0.001
i: 794,          target: -0.178,         output: -0.226,         loss: 0.002
i: 795,          target: 1.301,          output: 1.395,          loss: 0.009
i: 796,          target: -0.699,         output: -0.774,         loss: 0.006
i: 797,          target: 0.974,          output: 0.954,          loss: 0.000
i: 798,          target: -0.654,         output: -0.683,         loss: 0.001
i: 799,          target: -0.744,         output: -0.786,         loss: 0.002
i: 800,          target: -0.671,         output: -0.701,         loss: 0.001
i: 801,          target: 1.426,          output: 1.520,          loss: 0.009
i: 802,          target: -0.709,         output: -0.768,         loss: 0.004
i: 803,          target: 1.349,          output: 1.277,          loss: 0.005
i: 804,          target: 1.725,          output: 1.734,          loss: 0.000
i: 805,          target: 2.148,          output: 2.341,          loss: 0.037
i: 806,          target: 0.056,          output: 0.093,          loss: 0.001
i: 807,          target: -0.811,         output: -0.876,         loss: 0.004
i: 808,          target: 1.885,          output: 1.873,          loss: 0.000
i: 809,          target: 0.735,          output: 0.641,          loss: 0.009
i: 810,          target: 3.111,          output: 3.176,          loss: 0.004
i: 811,          target: -0.840,         output: -0.893,         loss: 0.003
i: 812,          target: -1.043,         output: -1.106,         loss: 0.004
i: 813,          target: -0.597,         output: -0.632,         loss: 0.001
i: 814,          target: -0.931,         output: -0.995,         loss: 0.004
i: 815,          target: -0.737,         output: -0.779,         loss: 0.002
i: 816,          target: -0.842,         output: -0.896,         loss: 0.003
i: 817,          target: -0.583,         output: -0.607,         loss: 0.001
i: 818,          target: -0.995,         output: -1.005,         loss: 0.000
i: 819,          target: -0.533,         output: -0.603,         loss: 0.005
i: 820,          target: 1.934,          output: 2.007,          loss: 0.005
i: 821,          target: 2.153,          output: 2.145,          loss: 0.000
i: 822,          target: -0.488,         output: -0.568,         loss: 0.006
i: 823,          target: -0.575,         output: -0.569,         loss: 0.000
i: 824,          target: -0.870,         output: -0.910,         loss: 0.002
i: 825,          target: 3.287,          output: 3.411,          loss: 0.015
i: 826,          target: -0.586,         output: -0.623,         loss: 0.001
i: 827,          target: -0.813,         output: -0.898,         loss: 0.007
i: 828,          target: 0.668,          output: 0.615,          loss: 0.003
i: 829,          target: 0.465,          output: 0.427,          loss: 0.001
```

```
i: 830,          target: 6.005,          output: 6.261,          loss: 0.065
i: 831,          target: -0.237,         output: -0.285,         loss: 0.002
i: 832,          target: -0.847,         output: -0.913,         loss: 0.004
i: 833,          target: -0.109,         output: -0.170,         loss: 0.004
i: 834,          target: 0.113,          output: 0.144,          loss: 0.001
i: 835,          target: -0.155,         output: -0.221,         loss: 0.004
i: 836,          target: 2.280,          output: 2.360,          loss: 0.006
i: 837,          target: -0.902,         output: -0.982,         loss: 0.006
i: 838,          target: -0.364,         output: -0.358,         loss: 0.000
i: 839,          target: 2.224,          output: 2.355,          loss: 0.017
i: 840,          target: 1.184,          output: 1.175,          loss: 0.000
i: 841,          target: -0.901,         output: -0.913,         loss: 0.000
i: 842,          target: 1.789,          output: 1.881,          loss: 0.009
i: 843,          target: 2.233,          output: 2.142,          loss: 0.008
i: 844,          target: 1.400,          output: 1.432,          loss: 0.001
i: 845,          target: -0.836,         output: -0.882,         loss: 0.002
i: 846,          target: -0.480,         output: -0.567,         loss: 0.008
i: 847,          target: 1.454,          output: 1.532,          loss: 0.006
i: 848,          target: -0.611,         output: -0.712,         loss: 0.010
i: 849,          target: 1.975,          output: 2.000,          loss: 0.001
i: 850,          target: 1.147,          output: 1.125,          loss: 0.000
i: 851,          target: -0.532,         output: -0.570,         loss: 0.001
i: 852,          target: 1.932,          output: 1.940,          loss: 0.000
i: 853,          target: -0.647,         output: -0.702,         loss: 0.003
i: 854,          target: 1.375,          output: 1.434,          loss: 0.003
i: 855,          target: 2.293,          output: 2.321,          loss: 0.001
i: 856,          target: -0.585,         output: -0.675,         loss: 0.008
i: 857,          target: 0.478,          output: 0.473,          loss: 0.000
i: 858,          target: 3.940,          output: 4.115,          loss: 0.031
i: 859,          target: -0.388,         output: -0.293,         loss: 0.009
i: 860,          target: 1.606,          output: 1.740,          loss: 0.018
i: 861,          target: -0.567,         output: -0.563,         loss: 0.000
i: 862,          target: 3.059,          output: 3.336,          loss: 0.077
i: 863,          target: 2.553,          output: 2.562,          loss: 0.000
i: 864,          target: -0.545,         output: -0.529,         loss: 0.000
i: 865,          target: -0.867,         output: -0.968,         loss: 0.010
i: 866,          target: 1.469,          output: 1.550,          loss: 0.007
i: 867,          target: -0.270,         output: -0.318,         loss: 0.002
i: 868,          target: -0.445,         output: -0.441,         loss: 0.000
i: 869,          target: -1.132,         output: -1.156,         loss: 0.001
i: 870,          target: 1.742,          output: 1.799,          loss: 0.003
i: 871,          target: -0.589,         output: -0.675,         loss: 0.007
i: 872,          target: 1.358,          output: 1.455,          loss: 0.009
i: 873,          target: 0.975,          output: 1.001,          loss: 0.001
i: 874,          target: -0.559,         output: -0.578,         loss: 0.000
i: 875,          target: -0.725,         output: -0.774,         loss: 0.002
i: 876,          target: 0.158,          output: 0.143,          loss: 0.000
i: 877,          target: 2.166,          output: 2.128,          loss: 0.001
```

```
i: 878,          target: -0.763,      output: -0.776,      loss: 0.000
i: 879,          target: 2.043,       output: 2.114,       loss: 0.005
i: 880,          target: -0.232,      output: -0.186,      loss: 0.002
i: 881,          target: -0.555,      output: -0.573,      loss: 0.000
i: 882,          target: 2.473,       output: 2.554,       loss: 0.007
i: 883,          target: -0.816,      output: -0.866,      loss: 0.002
i: 884,          target: 1.703,       output: 1.725,       loss: 0.000
i: 885,          target: 2.156,       output: 2.121,       loss: 0.001
i: 886,          target: -0.778,      output: -0.854,      loss: 0.006
i: 887,          target: -0.712,      output: -0.760,      loss: 0.002
i: 888,          target: -0.717,      output: -0.775,      loss: 0.003
i: 889,          target: -0.534,      output: -0.566,      loss: 0.001
i: 890,          target: 0.272,       output: 0.965,       loss: 0.480
i: 891,          target: 0.217,       output: 0.201,       loss: 0.000
i: 892,          target: 3.678,       output: 3.799,       loss: 0.015
i: 893,          target: 1.355,       output: 1.432,       loss: 0.006
i: 894,          target: 1.919,       output: 1.880,       loss: 0.002
i: 895,          target: -0.674,      output: -0.724,      loss: 0.003
i: 896,          target: 1.832,       output: 1.876,       loss: 0.002
i: 897,          target: -0.688,      output: -0.751,      loss: 0.004
i: 898,          target: 0.995,       output: 0.972,       loss: 0.001
i: 899,          target: -0.683,      output: -0.712,      loss: 0.001
i: 900,          target: 0.730,       output: 0.717,       loss: 0.000
i: 901,          target: -0.761,      output: -0.822,      loss: 0.004
i: 902,          target: 0.534,       output: 0.477,       loss: 0.003
i: 903,          target: -0.711,      output: -0.792,      loss: 0.007
i: 904,          target: -0.799,      output: -0.837,      loss: 0.001
i: 905,          target: -0.510,      output: -0.586,      loss: 0.006
i: 906,          target: 0.408,       output: 0.406,       loss: 0.000
i: 907,          target: -0.034,      output: -0.047,      loss: 0.000
i: 908,          target: -0.909,      output: -1.018,      loss: 0.012
i: 909,          target: 1.434,       output: 1.488,       loss: 0.003
i: 910,          target: 2.233,       output: 2.314,       loss: 0.007
i: 911,          target: 2.268,       output: 2.403,       loss: 0.018
i: 912,          target: -0.640,      output: -0.660,      loss: 0.000
i: 913,          target: 1.101,       output: 1.119,       loss: 0.000
i: 914,          target: -0.390,      output: -0.419,      loss: 0.001
i: 915,          target: -0.552,      output: -0.518,      loss: 0.001
i: 916,          target: -0.569,      output: -0.624,      loss: 0.003
i: 917,          target: 0.900,       output: 0.912,       loss: 0.000
i: 918,          target: -0.173,      output: -0.182,      loss: 0.000
i: 919,          target: 0.441,       output: 0.417,       loss: 0.001
i: 920,          target: 2.033,       output: 2.071,       loss: 0.001
i: 921,          target: 1.062,       output: 1.012,       loss: 0.003
i: 922,          target: 0.060,       output: 0.085,       loss: 0.001
i: 923,          target: 2.050,       output: 1.990,       loss: 0.004
i: 924,          target: -0.793,      output: -0.851,      loss: 0.003
i: 925,          target: 1.332,       output: 1.183,       loss: 0.022
```

```
i: 926,          target: 0.175,       output: 0.119,       loss: 0.003
i: 927,          target: 0.216,       output: 0.211,       loss: 0.000
i: 928,          target: 0.513,       output: 0.526,       loss: 0.000
i: 929,          target: 0.224,       output: 0.253,       loss: 0.001
i: 930,          target: -0.699,      output: -0.741,      loss: 0.002
i: 931,          target: 2.317,       output: 2.379,       loss: 0.004
i: 932,          target: 1.805,       output: 1.780,       loss: 0.001
i: 933,          target: -0.767,      output: -0.808,      loss: 0.002
i: 934,          target: -0.551,      output: -0.534,      loss: 0.000
i: 935,          target: -0.661,      output: -0.738,      loss: 0.006
i: 936,          target: 2.152,       output: 2.189,       loss: 0.001
i: 937,          target: 2.170,       output: 2.257,       loss: 0.008
i: 938,          target: -0.939,      output: -0.994,      loss: 0.003
i: 939,          target: -0.808,      output: -0.845,      loss: 0.001
i: 940,          target: -0.504,      output: -0.494,      loss: 0.000
i: 941,          target: 2.073,       output: 2.115,       loss: 0.002
i: 942,          target: -0.765,      output: -0.829,      loss: 0.004
i: 943,          target: 1.924,       output: 2.040,       loss: 0.013
i: 944,          target: -0.766,      output: -0.804,      loss: 0.001
i: 945,          target: -0.517,      output: -0.593,      loss: 0.006
i: 946,          target: -0.875,      output: -0.869,      loss: 0.000
i: 947,          target: -0.569,      output: -0.589,      loss: 0.000
i: 948,          target: 0.999,       output: 1.027,       loss: 0.001
i: 949,          target: -1.008,      output: -1.055,      loss: 0.002
i: 950,          target: -0.800,      output: -0.847,      loss: 0.002
i: 951,          target: 3.135,       output: 3.065,       loss: 0.005
i: 952,          target: -0.699,      output: -0.723,      loss: 0.001
i: 953,          target: -0.748,      output: -0.798,      loss: 0.002
i: 954,          target: 2.071,       output: 2.204,       loss: 0.018
i: 955,          target: -0.927,      output: -0.958,      loss: 0.001
i: 956,          target: 1.105,       output: 1.183,       loss: 0.006
i: 957,          target: 1.355,       output: 1.432,       loss: 0.006
i: 958,          target: -1.159,      output: -1.196,      loss: 0.001
i: 959,          target: -0.322,      output: -0.371,      loss: 0.002
i: 960,          target: 0.357,       output: 0.305,       loss: 0.003
i: 961,          target: -0.173,      output: -0.201,      loss: 0.001
i: 962,          target: 1.861,       output: 1.953,       loss: 0.008
i: 963,          target: -0.395,      output: -0.453,      loss: 0.003
i: 964,          target: -0.489,      output: -0.564,      loss: 0.006
i: 965,          target: -0.810,      output: -0.872,      loss: 0.004
i: 966,          target: -0.983,      output: -1.042,      loss: 0.003
i: 967,          target: 0.659,       output: 0.664,       loss: 0.000
i: 968,          target: 1.455,       output: 1.436,       loss: 0.000
i: 969,          target: -0.648,      output: -0.711,      loss: 0.004
i: 970,          target: 2.523,       output: 2.538,       loss: 0.000
i: 971,          target: -0.737,      output: -0.788,      loss: 0.003
i: 972,          target: -0.354,      output: -0.375,      loss: 0.000
i: 973,          target: -0.803,      output: -0.822,      loss: 0.000
```

```
i: 974,          target: -0.912,          output: -1.008,          loss: 0.009
i: 975,          target: -0.911,          output: -0.959,          loss: 0.002
i: 976,          target: -0.919,          output: -0.946,          loss: 0.001
i: 977,          target: 1.017,           output: 1.074,           loss: 0.003
i: 978,          target: 0.408,           output: 0.304,           loss: 0.011
i: 979,          target: -0.908,          output: -0.975,          loss: 0.005
i: 980,          target: -0.717,          output: -0.806,          loss: 0.008
i: 981,          target: 1.472,           output: 1.432,           loss: 0.002
i: 982,          target: 3.610,           output: 3.708,           loss: 0.010
i: 983,          target: 0.444,           output: 0.419,           loss: 0.001
i: 984,          target: -0.892,          output: -0.944,          loss: 0.003
i: 985,          target: 3.091,           output: 3.153,           loss: 0.004
i: 986,          target: -0.665,          output: -0.627,          loss: 0.001
i: 987,          target: -0.587,          output: -0.607,          loss: 0.000
i: 988,          target: 2.087,           output: 2.176,           loss: 0.008
i: 989,          target: 1.895,           output: 1.949,           loss: 0.003
i: 990,          target: 1.993,           output: 2.094,           loss: 0.010
i: 991,          target: -0.439,          output: -0.385,          loss: 0.003
i: 992,          target: 3.421,           output: 3.548,           loss: 0.016
i: 993,          target: 1.424,           output: 1.549,           loss: 0.016
i: 994,          target: 2.010,           output: 2.076,           loss: 0.004
i: 995,          target: -0.699,          output: -0.775,          loss: 0.006
i: 996,          target: 1.811,           output: 1.794,           loss: 0.000
i: 997,          target: 3.036,           output: 2.943,           loss: 0.009
i: 998,          target: -0.794,          output: -0.868,          loss: 0.005
i: 999,          target: -0.741,          output: -0.797,          loss: 0.003
Average loss: 0.005
```

3 Save the Notebook as a PDF

```python
import subprocess
import os

name_notebook = "0728-small_hybrid_model_1q_measurement_v1.ipynb"

output_filename = "peptide-QML/Notebooks/results/"+ name_notebook[:4] +"/" + name_notebook[:-6] + "_0.pdf"

#check if the output file already exists
while os.path.exists(output_filename):
    print("The file {} already exists".format(output_filename))
    output_filename = output_filename[:-5] + str(int(output_filename[-5]) + 1) + ".pdf"
    print("Trying to save the file as {}".format(output_filename))
```

```python
subprocess.run(["jupyter", "nbconvert", "--to", "pdf", "--output",
 ↪output_filename, name_notebook])
```

```
[ ]: CompletedProcess(args=['jupyter', 'nbconvert', '--to', 'pdf', '--output',
     'peptide-
     QML/Notebooks/results/0728/0728-small_hybrid_model_1q_measurement_v1_0.pdf',
     '0728-small_hybrid_model_1q_measurement_v1.ipynb'], returncode=255)
```

[ ]: