

0809-sh_e_1qm

August 10, 2023

```
[ ]: initial_path = 'peptide-QML/'  
# initial_path = '../'
```

```
[ ]: day = "0809"  
name_notebook = day + "-sh_e_1qm.ipynb"  
  
#ask the user if that is correct, if he says yes kkeep going, otherwise stop  
import sys  
answer = input("{} is the name of the notebook | Is that correct? (y/n): ".  
↳format(name_notebook))  
if answer != "y":  
    print("Please, change the name of the notebook")  
    sys.exit()
```

```
[ ]: import numpy as np
```

```
[ ]: import sys  
sys.path.append(initial_path)  
  
%load_ext autoreload  
%autoreload 2  
from my_code import functions as f  
from my_code import pytorch_model as ptm  
from my_code import quantum_nodes as qn  
from my_code import pytorch_wrappers as pw
```

1 Data

```
[ ]: data_file_path = initial_path + 'data/Scores/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(data_file_path)  
score_list = np.array(number_list)/1000  
vector_list = np.array([f.string_to_numbers(string) for string in string_list])_  
↳# one hot encoding
```

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

[ ]: # Define the dataset
input_data = ptm.torch.tensor(X)
target_data = ptm.torch.tensor(Y).view(-1, 1)

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

[ ]: input_data.shape, target_data.shape, input_validation.shape, target_validation.
    ↪shape

[ ]: (torch.Size([9000, 4]),
    torch.Size([9000, 1]),
    torch.Size([1000, 4]),
    torch.Size([1000, 1]))
```

2 Quantum node

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

[ ]: quantum_layer = qn.circuit(
    n_qubits = n_aminoacids,
    device = "default.qubit.torch",
    device_options = {'shots': None},
    embedding = qn.parts.AngleEmbedding,
    # embedding_ansatz = qn.parts.Ansatz_11,
    block_ansatz = qn.parts.Ansatz_11,
    measurement = qn.parts.Measurement('Z', 1),
    # embedding_n_layers = 4,
    # different_inputs_per_layer = False,
    block_n_layers = 50,
    # wrapper_qlayer = pw.QLayer,
    wrapper_qlayer = None,
)

[ ]: quantum_layer.weights_shape, quantum_layer.input_shape

[ ]: ({'block_weights': (600,)}, (4,))

[ ]: quantum_layer.draw(size=(50,3))
```

/usr/lib/python3.8/_collections_abc.py:832: MatplotlibDeprecationWarning:
The examples.directory rcparam was deprecated in Matplotlib 3.0 and will be
removed in 3.2. In the future, examples will be found relative to the 'datapath'

```

self[key] = other[key]
/usr/lib/python3.8/_collections_abc.py:832: MatplotlibDeprecationWarning:
The savefig.frameon rcparam was deprecated in Matplotlib 3.1 and will be removed
in 3.3.
    self[key] = other[key]
/usr/lib/python3.8/_collections_abc.py:832: MatplotlibDeprecationWarning:
The text.latex.unicode rcparam was deprecated in Matplotlib 3.0 and will be
removed in 3.2.
    self[key] = other[key]
/usr/lib/python3.8/_collections_abc.py:832: MatplotlibDeprecationWarning:
The verbose.fileo rcparam was deprecated in Matplotlib 3.1 and will be removed
in 3.3.
    self[key] = other[key]
/usr/lib/python3.8/_collections_abc.py:832: MatplotlibDeprecationWarning:
The verbose.level rcparam was deprecated in Matplotlib 3.1 and will be removed
in 3.3.
    self[key] = other[key]

```

3 Hybrid model

```
[ ]: import torch.nn as nn
import torch
class ClippedReLU(nn.Module):
    def __init__(self, clip_val=1):
        super(ClippedReLU, self).__init__()
        self.clip_val = clip_val

    def forward(self, x):
        return torch.clamp(x, 0, self.clip_val)

class Reshape(nn.Module):
    def __init__(self):
        super(Reshape, self).__init__()

    def forward(self, x):
```

```

        dims = len(x.shape)
        return torch.transpose(x, dims-2, dims-1).reshape(x.shape[-3] if
↪dims==3 else 1, x.shape[-2]*x.shape[-1]).squeeze()

```

```

[ ]: layers = [ptm.nn.Embedding(num_embeddings=19, embedding_dim=quantum_layer.
↪input_shape[0]//n_aminoacids), Reshape()]
layers += [quantum_layer()]

```

```

[ ]: # layers = []
# for i in range(1, len(layers_dim)):
#     layers += [ptm.nn.Linear(layers_dim[-1*i], layers_dim[-1*(i+1)]), ptm.nn.
↪ReLU()]
# layers += [ptm.nn.Linear(layers_dim[0], layers_dim[0]), ClippedReLU()]
# layers += [quantum_layer()]
# # layers += [nn.Linear(1, 1)]
# # layers += [nn.Linear(2, 4), nn.ReLU()]
# # layers += [nn.Linear(4, 1)]

```

```

[ ]: # Create model and set data:
model = ptm.pytorch_model(
    layers,
    save_options = {'initial_path': initial_path, 'name_notebook':
↪name_notebook},
)
model.set_data(
    data_X=input_data,
    data_Y=target_data,
    data_X_validation=input_validation,
    data_Y_validation=target_validation
)

```

```

[ ]: x = model.model[0](input_data[0:2])
print(x, x.shape)

x = model.model[1](x)
print(x, x.shape)

x = model.model[2](x)
print(x)

```

```

tensor([[[[-0.1427],
          [-0.1178],
          [ 1.4030],
          [ 0.8262]],

         [[-0.2626],
          [-0.9759],
          [-1.0906],

```

```

        [ 1.4030]]], grad_fn=<EmbeddingBackward>) torch.Size([2, 4, 1])
tensor([[[-0.1427, -0.1178,  1.4030,  0.8262],
        [-0.2626, -0.9759, -1.0906,  1.4030]], grad_fn=<SqueezeBackward0>)
torch.Size([2, 4])
tensor([[0.1724],
        [0.5419]], grad_fn=<ViewBackward>)

```

```

[ ]: for i in range(2):
    x = model.model[0](input_data[i])
    print(x, x.shape)

    x = model.model[1](x)
    print(x, x.shape)

    x = model.model[2](x)
    print(i, x)

```

```

tensor([[[-0.1427],
        [-0.1178],
        [ 1.4030],
        [ 0.8262]], grad_fn=<EmbeddingBackward>) torch.Size([4, 1])
tensor([[-0.1427, -0.1178,  1.4030,  0.8262], grad_fn=<SqueezeBackward0>)
torch.Size([4])
0 tensor([0.1724], grad_fn=<CatBackward>)
tensor([[[-0.2626],
        [-0.9759],
        [-1.0906],
        [ 1.4030]], grad_fn=<EmbeddingBackward>) torch.Size([4, 1])
tensor([[-0.2626, -0.9759, -1.0906,  1.4030], grad_fn=<SqueezeBackward0>)
torch.Size([4])
1 tensor([0.5419], grad_fn=<CatBackward>)

```

```

[ ]: print(model(input_data[0:2]))
    print(model(input_data[1]))

```

```

tensor([[0.1724],
        [0.5419]], grad_fn=<ViewBackward>)
tensor([0.5419], grad_fn=<CatBackward>)

```

```

[ ]: model.keep_track_params=True,

```

```

[ ]: import torch.optim as optim

# ask the user if he wants to start the training
out = input("Do you want to start the training? (y/n) ")
if out != 'y':
    sys.exit()

# train the model

```

```

model.train(
    optimizer= optim.Adam,
    optimizer_options={'lr': 0.05},
    num_epochs = 50,
    batch_size = 32,
)

```

Epoch [0/50], Loss: 2.1546, Loss validation: 2.3195

/usr/lib/python3/dist-packages/torch/autograd/__init__.py:147: UserWarning: CUDA initialization: Unexpected error from cudaGetDeviceCount(). Did you run some cuda functions before calling NumCudaDevices() that might have already set an error? Error 804: forward compatibility was attempted on non supported HW (Triggered internally at ../c10/cuda/CUDAFunctions.cpp:115.)

Variable._execution_engine.run_backward(

Validation string, i: 0; prediction: -0.3795, target:
-0.0452, loss: 7.3993

Validation string, i: 1; prediction: 0.2067, target: 0.1771,
loss: 0.1673

Validation string, i: 2; prediction: 0.0453, target: 0.1785,
loss: 0.7463

Epoch [1/50], Loss: 1.8486, Loss validation: 2.0567, Time remaining: ~1.0h 28.0m
28s

Validation string, i: 0; prediction: 0.3009, target:
-0.0452, loss: 7.6589

Validation string, i: 1; prediction: -0.1199, target: 0.1771,
loss: 1.6771

Validation string, i: 2; prediction: -0.0701, target: 0.1785,
loss: 1.3926

Epoch [2/50], Loss: 1.7586, Loss validation: 2.0570, Time remaining: ~1.0h 26.0m
46s

Validation string, i: 0; prediction: -0.0507, target:
-0.0452, loss: 0.1224

Validation string, i: 1; prediction: 0.3476, target: 0.1771,
loss: 0.9626

Validation string, i: 2; prediction: 0.2509, target: 0.1785,
loss: 0.4053

Epoch [3/50], Loss: 1.7214, Loss validation: 1.4094, Time remaining: ~1.0h 23.0m
51s

Validation string, i: 0; prediction: 0.2706, target:
-0.0452, loss: 6.9888

Validation string, i: 1; prediction: -0.2336, target: 0.1771,
loss: 2.3191

Validation string, i: 2; prediction: -0.2971, target: 0.1785,
loss: 2.6645

Epoch [4/50], Loss: 1.8039, Loss validation: 2.2380, Time remaining: ~1.0h 21.0m
30s

Validation string, i: 0; prediction: 0.4010, target:

```

-0.0452,          loss: 9.8742
      Validation string,      i: 1;  prediction: -0.0273,  target: 0.1771,
loss: 1.1540
      Validation string,      i: 2;  prediction: 0.0970,  target: 0.1785,
loss: 0.4565
Epoch [5/50], Loss: 1.6849, Loss validation: 2.0797, Time remaining: ~1.0h 19.0m
29s
      Validation string,      i: 0;  prediction: 0.0402,  target:
-0.0452,          loss: 1.8886
      Validation string,      i: 1;  prediction: 0.2624,  target: 0.1771,
loss: 0.4816
      Validation string,      i: 2;  prediction: 0.1975,  target: 0.1785,
loss: 0.1064
Epoch [6/50], Loss: 1.6717, Loss validation: 1.6121, Time remaining: ~1.0h 17.0m
33s
      Validation string,      i: 0;  prediction: -0.4907,  target:
-0.0452,          loss: 9.8599
      Validation string,      i: 1;  prediction: 0.3662,  target: 0.1771,
loss: 1.0680
      Validation string,      i: 2;  prediction: -0.0649,  target: 0.1785,
loss: 1.3638
Epoch [7/50], Loss: 1.7347, Loss validation: 2.2880, Time remaining: ~1.0h 15.0m
42s
      Validation string,      i: 0;  prediction: 0.3103,  target:
-0.0452,          loss: 7.8676
      Validation string,      i: 1;  prediction: -0.2196,  target: 0.1771,
loss: 2.2399
      Validation string,      i: 2;  prediction: -0.0673,  target: 0.1785,
loss: 1.3771
Epoch [8/50], Loss: 1.6916, Loss validation: 2.1934, Time remaining: ~1.0h 13.0m
52s
      Validation string,      i: 0;  prediction: 0.0017,  target:
-0.0452,          loss: 1.0366
      Validation string,      i: 1;  prediction: 0.0890,  target: 0.1771,
loss: 0.4975
      Validation string,      i: 2;  prediction: -0.0959,  target: 0.1785,
loss: 1.5372
Epoch [9/50], Loss: 1.6617, Loss validation: 1.7307, Time remaining: ~1.0h 12.0m
5s
      Validation string,      i: 0;  prediction: -0.2048,  target:
-0.0452,          loss: 3.5324
      Validation string,      i: 1;  prediction: -0.0587,  target: 0.1771,
loss: 1.3313
      Validation string,      i: 2;  prediction: -0.2133,  target: 0.1785,
loss: 2.1949
Epoch [10/50], Loss: 1.5790, Loss validation: 2.1253, Time remaining: ~1.0h
10.0m 16s
      Validation string,      i: 0;  prediction: 0.1239,  target:

```

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-0.0452,          loss: 3.7411
      Validation string,      i: 1;  prediction: 0.2634,      target: 0.1771,
loss: 0.4876
      Validation string,      i: 2;  prediction: 0.1217,      target: 0.1785,
loss: 0.3184
Epoch [11/50], Loss: 1.5105, Loss validation: 1.4358, Time remaining: ~1.0h 8.0m
31s
      Validation string,      i: 0;  prediction: -0.4612,      target:
-0.0452,          loss: 9.2068
      Validation string,      i: 1;  prediction: 0.3309,      target: 0.1771,
loss: 0.8687
      Validation string,      i: 2;  prediction: -0.0298,      target: 0.1785,
loss: 1.1670
Epoch [12/50], Loss: 1.4888, Loss validation: 2.6410, Time remaining: ~1.0h 6.0m
45s
      Validation string,      i: 0;  prediction: 0.0189,      target:
-0.0452,          loss: 1.4189
      Validation string,      i: 1;  prediction: -0.1704,      target: 0.1771,
loss: 1.9620
      Validation string,      i: 2;  prediction: -0.0672,      target: 0.1785,
loss: 1.3766
Epoch [13/50], Loss: 1.5902, Loss validation: 2.1803, Time remaining: ~1.0h 4.0m
59s
      Validation string,      i: 0;  prediction: 0.0228,      target:
-0.0452,          loss: 1.5056
      Validation string,      i: 1;  prediction: -0.1271,      target: 0.1771,
loss: 1.7179
      Validation string,      i: 2;  prediction: 0.1989,      target: 0.1785,
loss: 0.1140
Epoch [14/50], Loss: 1.4900, Loss validation: 1.4251, Time remaining: ~1.0h 3.0m
13s
      Validation string,      i: 0;  prediction: -0.4506,      target:
-0.0452,          loss: 8.9723
      Validation string,      i: 1;  prediction: 0.2330,      target: 0.1771,
loss: 0.3159
      Validation string,      i: 2;  prediction: -0.0288,      target: 0.1785,
loss: 1.1613
Epoch [15/50], Loss: 1.3424, Loss validation: 1.5631, Time remaining: ~1.0h 1.0m
26s
      Validation string,      i: 0;  prediction: -0.0397,      target:
-0.0452,          loss: 0.1205
      Validation string,      i: 1;  prediction: 0.2703,      target: 0.1771,
loss: 0.5261
      Validation string,      i: 2;  prediction: 0.2472,      target: 0.1785,
loss: 0.3847
Epoch [16/50], Loss: 1.4944, Loss validation: 1.1118, Time remaining: ~0.0h
59.0m 40s
      Validation string,      i: 0;  prediction: -0.3191,      target:

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-0.0452,          loss: 6.0612
      Validation string,      i: 1;  prediction: 0.1075,      target: 0.1771,
loss: 0.3929
      Validation string,      i: 2;  prediction: -0.0792,      target: 0.1785,
loss: 1.4434
Epoch [17/50], Loss: 1.3449, Loss validation: 1.5954, Time remaining: ~0.0h
57.0m 56s
      Validation string,      i: 0;  prediction: -0.1935,      target:
-0.0452,          loss: 3.2829
      Validation string,      i: 1;  prediction: -0.0814,      target: 0.1771,
loss: 1.4595
      Validation string,      i: 2;  prediction: 0.1367,      target: 0.1785,
loss: 0.2342
Epoch [18/50], Loss: 1.1933, Loss validation: 0.8628, Time remaining: ~0.0h
56.0m 11s
      Validation string,      i: 0;  prediction: -0.0748,      target:
-0.0452,          loss: 0.6562
      Validation string,      i: 1;  prediction: -0.0656,      target: 0.1771,
loss: 1.3702
      Validation string,      i: 2;  prediction: 0.0629,      target: 0.1785,
loss: 0.6474
Epoch [19/50], Loss: 1.0413, Loss validation: 0.8668, Time remaining: ~0.0h
54.0m 26s
      Validation string,      i: 0;  prediction: 0.0475,      target:
-0.0452,          loss: 2.0505
      Validation string,      i: 1;  prediction: 0.0576,      target: 0.1771,
loss: 0.6749
      Validation string,      i: 2;  prediction: 0.1848,      target: 0.1785,
loss: 0.0353
Epoch [20/50], Loss: 0.8246, Loss validation: 0.6781, Time remaining: ~0.0h
52.0m 41s
      Validation string,      i: 0;  prediction: -0.0626,      target:
-0.0452,          loss: 0.3843
      Validation string,      i: 1;  prediction: -0.0188,      target: 0.1771,
loss: 1.1062
      Validation string,      i: 2;  prediction: 0.1169,      target: 0.1785,
loss: 0.3452
Epoch [21/50], Loss: 0.7805, Loss validation: 0.5863, Time remaining: ~0.0h
50.0m 57s
      Validation string,      i: 0;  prediction: -0.1232,      target:
-0.0452,          loss: 1.7271
      Validation string,      i: 1;  prediction: -0.2014,      target: 0.1771,
loss: 2.1372
      Validation string,      i: 2;  prediction: 0.1072,      target: 0.1785,
loss: 0.3994
Epoch [22/50], Loss: 0.8473, Loss validation: 1.3382, Time remaining: ~0.0h
49.0m 12s
      Validation string,      i: 0;  prediction: -0.0846,      target:

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-0.0452,          loss: 0.8724
      Validation string,      i: 1;  prediction: 0.1477,      target: 0.1771,
loss: 0.1659
      Validation string,      i: 2;  prediction: 0.1839,      target: 0.1785,
loss: 0.0302
Epoch [23/50], Loss: 0.8057, Loss validation: 0.6904, Time remaining: ~0.0h
47.0m 27s
      Validation string,      i: 0;  prediction: -0.0862,      target:
-0.0452,          loss: 0.9075
      Validation string,      i: 1;  prediction: 0.0519,      target: 0.1771,
loss: 0.7068
      Validation string,      i: 2;  prediction: 0.0395,      target: 0.1785,
loss: 0.7785
Epoch [24/50], Loss: 0.8481, Loss validation: 0.7529, Time remaining: ~0.0h
45.0m 42s
      Validation string,      i: 0;  prediction: 0.0029,      target:
-0.0452,          loss: 1.0634
      Validation string,      i: 1;  prediction: 0.2494,      target: 0.1771,
loss: 0.4083
      Validation string,      i: 2;  prediction: 0.0305,      target: 0.1785,
loss: 0.8292
Epoch [25/50], Loss: 0.7446, Loss validation: 0.6277, Time remaining: ~0.0h
43.0m 57s
      Validation string,      i: 0;  prediction: 0.1993,      target:
-0.0452,          loss: 5.4102
      Validation string,      i: 1;  prediction: 0.2119,      target: 0.1771,
loss: 0.1963
      Validation string,      i: 2;  prediction: 0.0756,      target: 0.1785,
loss: 0.5764
Epoch [26/50], Loss: 0.7271, Loss validation: 0.9380, Time remaining: ~0.0h
42.0m 13s
      Validation string,      i: 0;  prediction: -0.0419,      target:
-0.0452,          loss: 0.0720
      Validation string,      i: 1;  prediction: 0.0005,      target: 0.1771,
loss: 0.9969
      Validation string,      i: 2;  prediction: 0.1469,      target: 0.1785,
loss: 0.1769
Epoch [27/50], Loss: 0.7545, Loss validation: 0.6277, Time remaining: ~0.0h
40.0m 28s
      Validation string,      i: 0;  prediction: -0.0276,      target:
-0.0452,          loss: 0.3887
      Validation string,      i: 1;  prediction: 0.0998,      target: 0.1771,
loss: 0.4367
      Validation string,      i: 2;  prediction: 0.1927,      target: 0.1785,
loss: 0.0795
Epoch [28/50], Loss: 0.6909, Loss validation: 0.7349, Time remaining: ~0.0h
38.0m 43s
      Validation string,      i: 0;  prediction: -0.1014,      target:

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-0.0452,          loss: 1.2430
      Validation string,      i: 1;  prediction: 0.2321,      target: 0.1771,
loss: 0.3104
      Validation string,      i: 2;  prediction: 0.0614,      target: 0.1785,
loss: 0.6558
Epoch [29/50], Loss: 0.6625, Loss validation: 0.6285, Time remaining: ~0.0h
36.0m 58s
      Validation string,      i: 0;  prediction: -0.1044,      target:
-0.0452,          loss: 1.3114
      Validation string,      i: 1;  prediction: 0.0939,      target: 0.1771,
loss: 0.4698
      Validation string,      i: 2;  prediction: 0.1550,      target: 0.1785,
loss: 0.1316
Epoch [30/50], Loss: 0.6416, Loss validation: 0.6119, Time remaining: ~0.0h
35.0m 12s
      Validation string,      i: 0;  prediction: -0.1402,      target:
-0.0452,          loss: 2.1033
      Validation string,      i: 1;  prediction: 0.1900,      target: 0.1771,
loss: 0.0729
      Validation string,      i: 2;  prediction: 0.0605,      target: 0.1785,
loss: 0.6608
Epoch [31/50], Loss: 0.6209, Loss validation: 0.7689, Time remaining: ~0.0h
33.0m 27s
      Validation string,      i: 0;  prediction: -0.1448,      target:
-0.0452,          loss: 2.2045
      Validation string,      i: 1;  prediction: 0.1637,      target: 0.1771,
loss: 0.0758
      Validation string,      i: 2;  prediction: 0.1755,      target: 0.1785,
loss: 0.0169
Epoch [32/50], Loss: 0.6907, Loss validation: 0.5978, Time remaining: ~0.0h
31.0m 42s
      Validation string,      i: 0;  prediction: -0.0932,      target:
-0.0452,          loss: 1.0632
      Validation string,      i: 1;  prediction: 0.1534,      target: 0.1771,
loss: 0.1339
      Validation string,      i: 2;  prediction: 0.2378,      target: 0.1785,
loss: 0.3321
Epoch [33/50], Loss: 0.6291, Loss validation: 0.6333, Time remaining: ~0.0h
29.0m 57s
      Validation string,      i: 0;  prediction: -0.0965,      target:
-0.0452,          loss: 1.1353
      Validation string,      i: 1;  prediction: 0.1797,      target: 0.1771,
loss: 0.0145
      Validation string,      i: 2;  prediction: 0.1732,      target: 0.1785,
loss: 0.0297
Epoch [34/50], Loss: 0.6651, Loss validation: 0.5728, Time remaining: ~0.0h
28.0m 12s
      Validation string,      i: 0;  prediction: -0.0513,      target:

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-0.0452,          loss: 0.1351
      Validation string,      i: 1;  prediction: 0.1079,      target: 0.1771,
loss: 0.3910
      Validation string,      i: 2;  prediction: 0.1136,      target: 0.1785,
loss: 0.3636
Epoch [35/50], Loss: 0.6637, Loss validation: 0.6051, Time remaining: ~0.0h
26.0m 26s
      Validation string,      i: 0;  prediction: 0.0861,      target:
-0.0452,          loss: 2.9055
      Validation string,      i: 1;  prediction: 0.0289,      target: 0.1771,
loss: 0.8366
      Validation string,      i: 2;  prediction: 0.1046,      target: 0.1785,
loss: 0.4144
Epoch [36/50], Loss: 0.6627, Loss validation: 0.7367, Time remaining: ~0.0h
24.0m 41s
      Validation string,      i: 0;  prediction: 0.0025,      target:
-0.0452,          loss: 1.0553
      Validation string,      i: 1;  prediction: 0.2631,      target: 0.1771,
loss: 0.4856
      Validation string,      i: 2;  prediction: 0.2982,      target: 0.1785,
loss: 0.6702
Epoch [37/50], Loss: 0.6892, Loss validation: 0.7998, Time remaining: ~0.0h
22.0m 56s
      Validation string,      i: 0;  prediction: 0.0040,      target:
-0.0452,          loss: 1.0883
      Validation string,      i: 1;  prediction: 0.0635,      target: 0.1771,
loss: 0.6417
      Validation string,      i: 2;  prediction: 0.2506,      target: 0.1785,
loss: 0.4039
Epoch [38/50], Loss: 0.6673, Loss validation: 0.9368, Time remaining: ~0.0h
21.0m 10s
      Validation string,      i: 0;  prediction: 0.2115,      target:
-0.0452,          loss: 5.6814
      Validation string,      i: 1;  prediction: 0.0799,      target: 0.1771,
loss: 0.5489
      Validation string,      i: 2;  prediction: 0.1396,      target: 0.1785,
loss: 0.2182
Epoch [39/50], Loss: 0.7133, Loss validation: 1.0839, Time remaining: ~0.0h
19.0m 25s
      Validation string,      i: 0;  prediction: -0.0788,      target:
-0.0452,          loss: 0.7440
      Validation string,      i: 1;  prediction: 0.2085,      target: 0.1771,
loss: 0.1774
      Validation string,      i: 2;  prediction: 0.2360,      target: 0.1785,
loss: 0.3221
Epoch [40/50], Loss: 0.6487, Loss validation: 0.7562, Time remaining: ~0.0h
17.0m 39s
      Validation string,      i: 0;  prediction: 0.0492,      target:

```

```

-0.0452,          loss: 2.0898
      Validation string,      i: 1;  prediction: 0.0231,      target: 0.1771,
loss: 0.8696
      Validation string,      i: 2;  prediction: 0.1480,      target: 0.1785,
loss: 0.1708
Epoch [41/50], Loss: 0.6537, Loss validation: 0.8668, Time remaining: ~0.0h
15.0m 53s
      Validation string,      i: 0;  prediction: 0.0607,      target:
-0.0452,          loss: 2.3443
      Validation string,      i: 1;  prediction: 0.1182,      target: 0.1771,
loss: 0.3323
      Validation string,      i: 2;  prediction: 0.0561,      target: 0.1785,
loss: 0.6856
Epoch [42/50], Loss: 0.6962, Loss validation: 0.7064, Time remaining: ~0.0h
14.0m 8s
      Validation string,      i: 0;  prediction: -0.0473,      target:
-0.0452,          loss: 0.0471
      Validation string,      i: 1;  prediction: 0.2840,      target: 0.1771,
loss: 0.6035
      Validation string,      i: 2;  prediction: 0.1555,      target: 0.1785,
loss: 0.1292
Epoch [43/50], Loss: 0.6612, Loss validation: 0.6383, Time remaining: ~0.0h
12.0m 22s
      Validation string,      i: 0;  prediction: -0.1550,      target:
-0.0452,          loss: 2.4303
      Validation string,      i: 1;  prediction: 0.1812,      target: 0.1771,
loss: 0.0229
      Validation string,      i: 2;  prediction: 0.0701,      target: 0.1785,
loss: 0.6072
Epoch [44/50], Loss: 0.6155, Loss validation: 0.5973, Time remaining: ~0.0h
10.0m 36s
      Validation string,      i: 0;  prediction: 0.0039,      target:
-0.0452,          loss: 1.0853
      Validation string,      i: 1;  prediction: 0.1743,      target: 0.1771,
loss: 0.0158
      Validation string,      i: 2;  prediction: 0.3400,      target: 0.1785,
loss: 0.9044
Epoch [45/50], Loss: 0.6700, Loss validation: 0.9768, Time remaining: ~0.0h 8.0m
50s
      Validation string,      i: 0;  prediction: -0.1748,      target:
-0.0452,          loss: 2.8694
      Validation string,      i: 1;  prediction: 0.1804,      target: 0.1771,
loss: 0.0186
      Validation string,      i: 2;  prediction: 0.1258,      target: 0.1785,
loss: 0.2953
Epoch [46/50], Loss: 0.6683, Loss validation: 0.6062, Time remaining: ~0.0h 7.0m
4s
      Validation string,      i: 0;  prediction: -0.0464,      target:

```

```

-0.0452,          loss: 0.0262
      Validation string,      i: 1;  prediction: 0.0484,      target: 0.1771,
loss: 0.7267
      Validation string,      i: 2;  prediction: 0.0575,      target: 0.1785,
loss: 0.6782
Epoch [47/50], Loss: 0.6230, Loss validation: 0.6476, Time remaining: ~0.0h 5.0m
18s
      Validation string,      i: 0;  prediction: -0.2326,      target:
-0.0452,          loss: 4.1467
      Validation string,      i: 1;  prediction: 0.0669,      target: 0.1771,
loss: 0.6221
      Validation string,      i: 2;  prediction: 0.0221,      target: 0.1785,
loss: 0.8763
Epoch [48/50], Loss: 0.7191, Loss validation: 0.8838, Time remaining: ~0.0h 3.0m
32s
      Validation string,      i: 0;  prediction: -0.1451,      target:
-0.0452,          loss: 2.2115
      Validation string,      i: 1;  prediction: 0.1576,      target: 0.1771,
loss: 0.1101
      Validation string,      i: 2;  prediction: 0.0667,      target: 0.1785,
loss: 0.6267
Epoch [49/50], Loss: 0.7167, Loss validation: 0.5762, Time remaining: ~0.0h 1.0m
46s
      Validation string,      i: 0;  prediction: 0.0945,      target:
-0.0452,          loss: 3.0912
      Validation string,      i: 1;  prediction: 0.2198,      target: 0.1771,
loss: 0.2409
      Validation string,      i: 2;  prediction: 0.1698,      target: 0.1785,
loss: 0.0487
Epoch [50/50], Loss: 0.6454, Loss validation: 0.8310, Time remaining: ~0.0h 0.0m
0s

```

```

[ ]: # save string of the model
model.save_str(
    metadata={
        "data_file_path": data_file_path,
    }
)

```

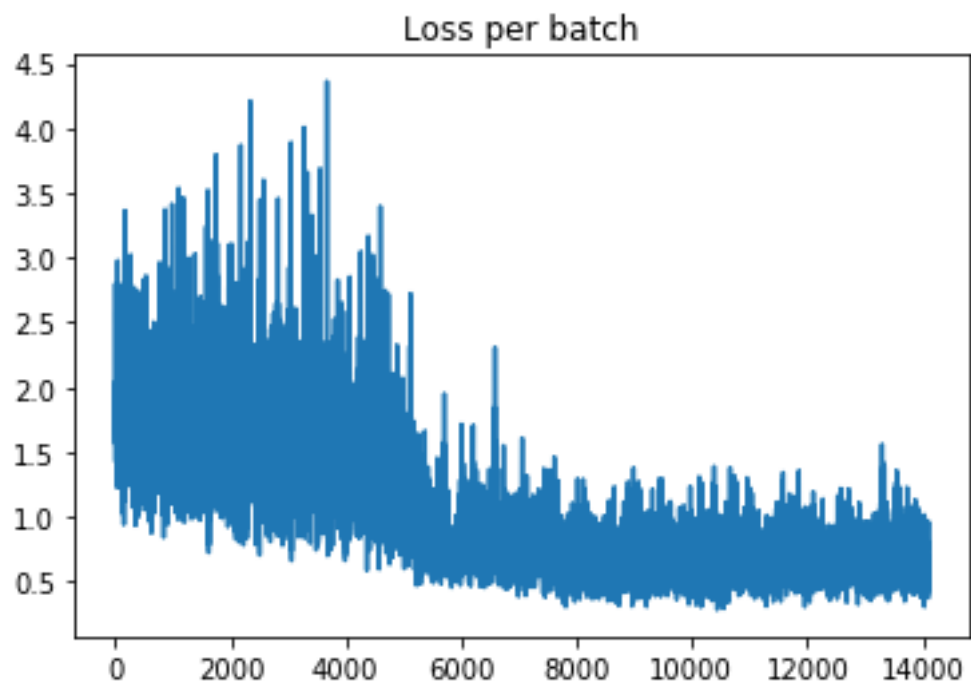
Saved in: peptide-QML/checkpoints/0809/txts/0809-sh_e_1qm_model_str_3.txt

```

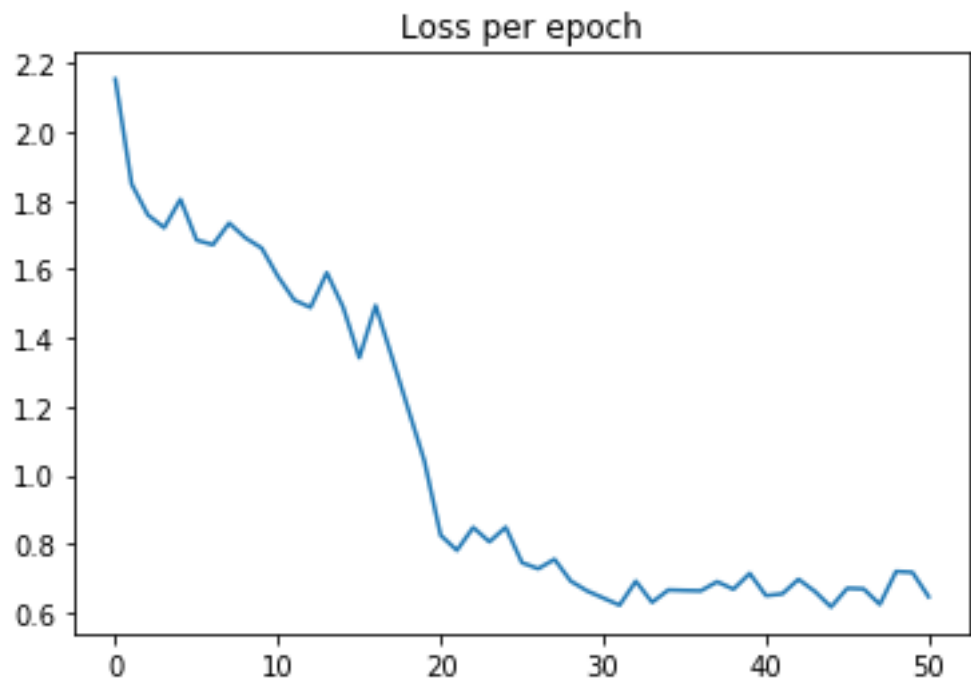
[ ]: # plot the losses of the training loop and save the figures
model.plot_losses(save=True)

```

Saved in: peptide-QML/checkpoints/0809/plots/0809-sh_e_1qm_losses_batches_3.png

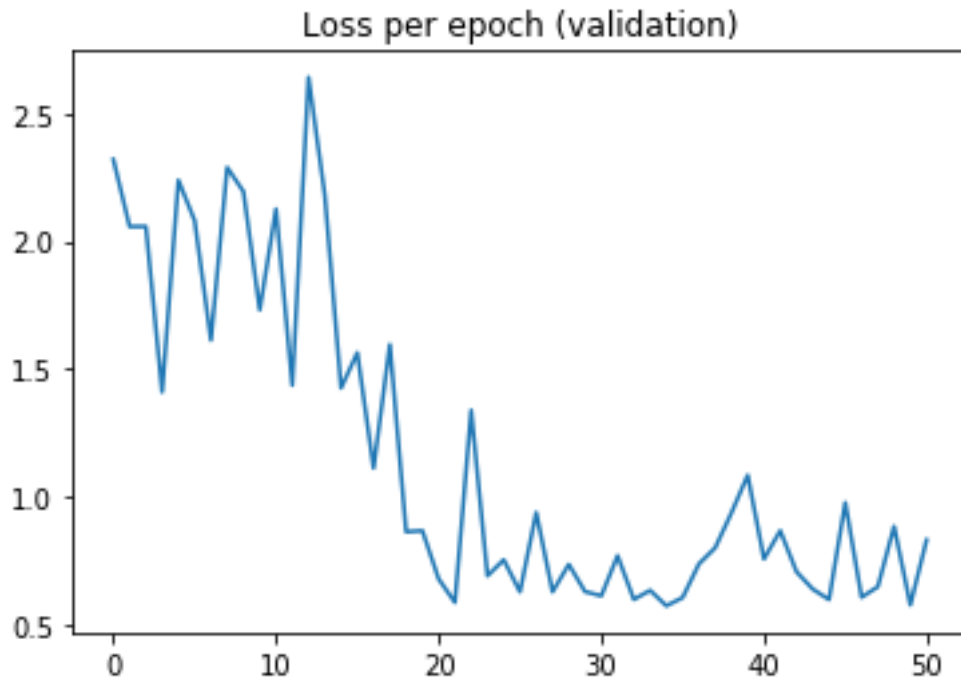


Saved in: peptide-QML/checkpoints/0809/plots/0809-sh_e_1qm_losses_epoch_3.png



Saved in: peptide-

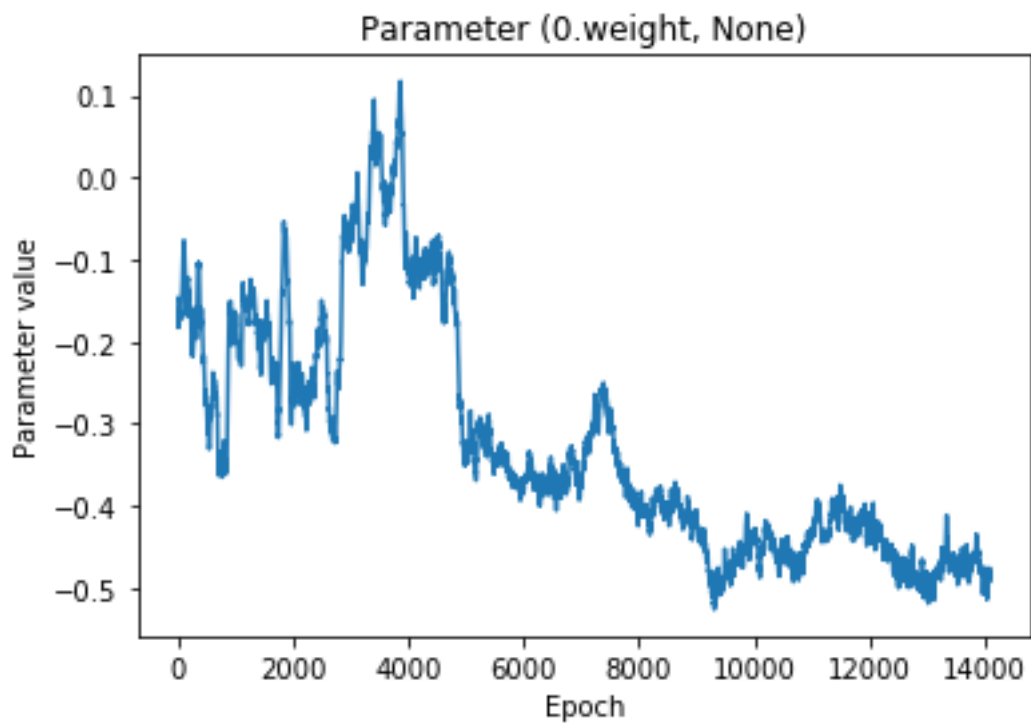
QML/checkpoints/0809/plots/0809-sh_e_1qm_losses_epoch_validation_3.png



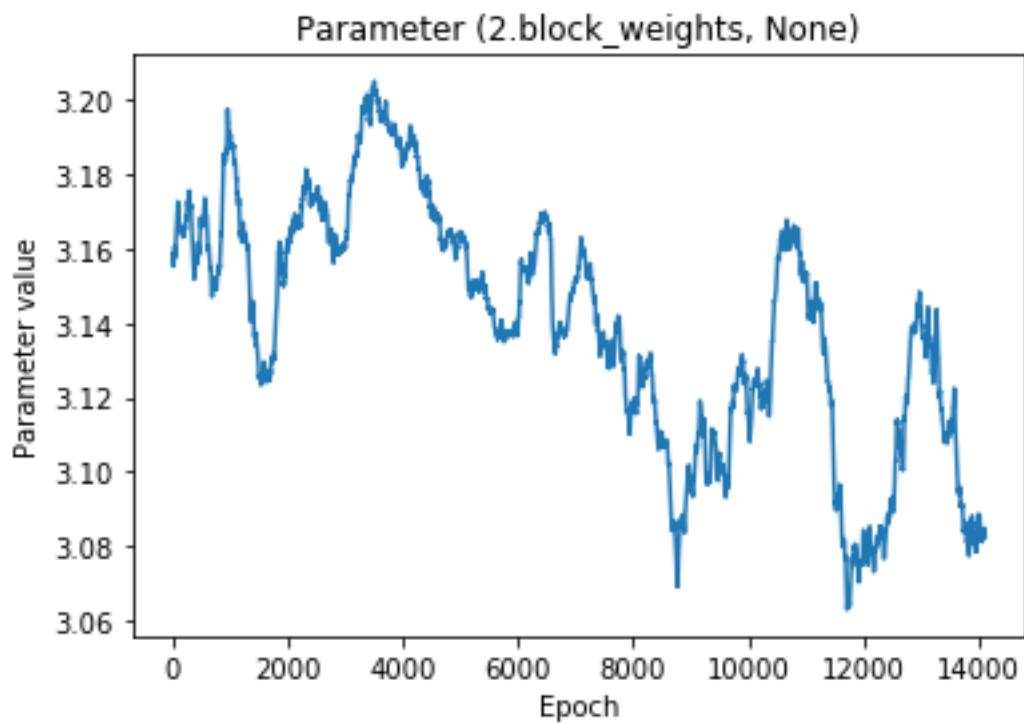
```
[ ]: # plot how the average of the parameters in each layer changes over time, and
      ↪ save that
for layer in model.model.state_dict().keys():
    model.plot_parameter(layer=layer, save=True)
```

Saved in: peptide-

QML/checkpoints/0809/plots/0809-sh_e_1qm_parameter_0.weight_None_3.png



Saved in: peptide-
QML/checkpoints/0809/plots/0809-sh_e_1qm_parameter_2.block_weights_None_3.png



```
[ ]: # model.plot_parameter(layer='7.weights', index=50)
```

```
[ ]: #save all the parameters of the model and the intermediate parameters of the_
      ↪model
model.save_state_dict(intermediate=False)
```

Model saved as peptide-QML/checkpoints/0809/models/0809-sh_e_1qm_3.pth

```
[ ]: # print validation and save it
model.print_validation(save=True, precision=4, percentatge=1)
```

i: 0,	target: -0.0452,	output: 0.0945,	loss: 3.0912
i: 1,	target: -0.0559,	output: 0.1306,	loss: 3.3350
i: 2,	target: 0.0430,	output: 0.3130,	loss: 6.2709
i: 3,	target: -0.0277,	output: 0.1193,	loss: 5.3052
i: 4,	target: 0.2232,	output: 0.2898,	loss: 0.2981
i: 5,	target: -0.0573,	output: 0.0537,	loss: 1.9359
i: 6,	target: 0.1384,	output: 0.1311,	loss: 0.0527
i: 7,	target: 0.1190,	output: 0.1703,	loss: 0.4318
i: 8,	target: 0.1735,	output: 0.0119,	loss: 0.9314
i: 9,	target: -0.0484,	output: 0.0448,	loss: 1.9254
i: 10,	target: 0.1771,	output: 0.2198,	loss: 0.2409
i: 11,	target: 0.3934,	output: 0.1268,	loss: 0.6776
i: 12,	target: 0.1829,	output: 0.2747,	loss: 0.5014
i: 13,	target: 0.1262,	output: 0.1736,	loss: 0.3764
i: 14,	target: -0.0687,	output: 0.0196,	loss: 1.2859
i: 15,	target: -0.0415,	output: -0.0780,	loss: 0.8794
i: 16,	target: 0.1364,	output: 0.0972,	loss: 0.2871
i: 17,	target: -0.0417,	output: -0.0426,	loss: 0.0228
i: 18,	target: 0.1401,	output: 0.1330,	loss: 0.0503
i: 19,	target: 0.1338,	output: 0.1176,	loss: 0.1208
i: 20,	target: 0.1785,	output: 0.1698,	loss: 0.0487
i: 21,	target: 0.0876,	output: 0.1729,	loss: 0.9728
i: 22,	target: 0.1602,	output: 0.0153,	loss: 0.9042
i: 23,	target: -0.0350,	output: -0.1162,	loss: 2.3215
i: 24,	target: -0.0250,	output: -0.0650,	loss: 1.6019
i: 25,	target: -0.0855,	output: -0.1600,	loss: 0.8722
i: 26,	target: -0.0827,	output: -0.1293,	loss: 0.5631
i: 27,	target: -0.0492,	output: -0.1378,	loss: 1.7990
i: 28,	target: -0.0146,	output: 0.1071,	loss: 8.3294
i: 29,	target: -0.0753,	output: 0.0005,	loss: 1.0060
i: 30,	target: -0.0790,	output: -0.0328,	loss: 0.5845
i: 31,	target: -0.0660,	output: -0.1494,	loss: 1.2639
i: 32,	target: -0.0748,	output: -0.1690,	loss: 1.2597
i: 33,	target: -0.0564,	output: -0.0058,	loss: 0.8976
i: 34,	target: -0.1085,	output: 0.0985,	loss: 1.9081

i: 35,	target: -0.0205,	output: -0.1623,	loss: 6.9013
i: 36,	target: 0.0067,	output: 0.1389,	loss: 19.8233
i: 37,	target: 0.0813,	output: 0.0150,	loss: 0.8152
i: 38,	target: 0.2076,	output: 0.3102,	loss: 0.4941
i: 39,	target: -0.0335,	output: -0.1150,	loss: 2.4339
i: 40,	target: -0.0446,	output: 0.1149,	loss: 3.5759
i: 41,	target: -0.0651,	output: 0.0304,	loss: 1.4669
i: 42,	target: -0.0557,	output: -0.1250,	loss: 1.2455
i: 43,	target: -0.0721,	output: -0.0751,	loss: 0.0406
i: 44,	target: -0.0952,	output: -0.0043,	loss: 0.9553
i: 45,	target: 0.0047,	output: 0.1517,	loss: 31.4860
i: 46,	target: -0.0768,	output: 0.0180,	loss: 1.2340
i: 47,	target: 0.1362,	output: 0.1375,	loss: 0.0092
i: 48,	target: -0.0431,	output: 0.0205,	loss: 1.4767
i: 49,	target: 0.1102,	output: -0.1232,	loss: 2.1181
i: 50,	target: 0.1382,	output: 0.2197,	loss: 0.5903
i: 51,	target: -0.0299,	output: -0.0118,	loss: 0.6063
i: 52,	target: 0.1419,	output: 0.1725,	loss: 0.2150
i: 53,	target: 0.0087,	output: 0.0077,	loss: 0.1150
i: 54,	target: -0.0377,	output: -0.0232,	loss: 0.3845
i: 55,	target: 0.1000,	output: 0.1457,	loss: 0.4575
i: 56,	target: 0.0427,	output: 0.1774,	loss: 3.1549
i: 57,	target: -0.0489,	output: 0.0598,	loss: 2.2222
i: 58,	target: -0.0532,	output: -0.1207,	loss: 1.2666
i: 59,	target: -0.0696,	output: 0.0452,	loss: 1.6492
i: 60,	target: -0.0854,	output: 0.0900,	loss: 2.0533
i: 61,	target: -0.0837,	output: -0.1772,	loss: 1.1180
i: 62,	target: -0.0741,	output: -0.1012,	loss: 0.3665
i: 63,	target: 0.1872,	output: 0.2061,	loss: 0.1009
i: 64,	target: 0.1179,	output: 0.2285,	loss: 0.9376
i: 65,	target: 0.1081,	output: 0.2284,	loss: 1.1131
i: 66,	target: -0.0182,	output: 0.1275,	loss: 8.0095
i: 67,	target: -0.0861,	output: -0.1202,	loss: 0.3947
i: 68,	target: -0.0890,	output: -0.0113,	loss: 0.8735
i: 69,	target: -0.0318,	output: -0.0041,	loss: 0.8714
i: 70,	target: -0.0696,	output: 0.0173,	loss: 1.2480
i: 71,	target: 0.0595,	output: 0.2815,	loss: 3.7330
i: 72,	target: 0.2277,	output: 0.2716,	loss: 0.1925
i: 73,	target: 0.1436,	output: 0.1685,	loss: 0.1733
i: 74,	target: -0.0350,	output: -0.1210,	loss: 2.4522
i: 75,	target: -0.0867,	output: 0.1181,	loss: 2.3620
i: 76,	target: 0.1979,	output: 0.1308,	loss: 0.3391
i: 77,	target: 0.1870,	output: 0.1409,	loss: 0.2465
i: 78,	target: -0.0498,	output: 0.1261,	loss: 3.5296
i: 79,	target: -0.0894,	output: -0.0841,	loss: 0.0597
i: 80,	target: 0.1986,	output: 0.1367,	loss: 0.3120
i: 81,	target: 0.1888,	output: 0.1159,	loss: 0.3864
i: 82,	target: -0.0724,	output: 0.0316,	loss: 1.4369

i: 83,	target: -0.0745,	output: -0.1458,	loss: 0.9572
i: 84,	target: -0.0795,	output: 0.0041,	loss: 1.0518
i: 85,	target: -0.0363,	output: -0.0597,	loss: 0.6465
i: 86,	target: -0.0797,	output: 0.0259,	loss: 1.3253
i: 87,	target: -0.0690,	output: -0.0037,	loss: 0.9467
i: 88,	target: -0.0372,	output: 0.0166,	loss: 1.4458
i: 89,	target: 0.0974,	output: 0.1559,	loss: 0.5996
i: 90,	target: 0.1406,	output: 0.1717,	loss: 0.2211
i: 91,	target: -0.0736,	output: 0.0469,	loss: 1.6373
i: 92,	target: 0.1900,	output: 0.1693,	loss: 0.1088
i: 93,	target: -0.0514,	output: 0.0153,	loss: 1.2976
i: 94,	target: -0.0711,	output: -0.0828,	loss: 0.1644
i: 95,	target: 0.1974,	output: 0.1915,	loss: 0.0301
i: 96,	target: -0.0714,	output: 0.1135,	loss: 2.5885
i: 97,	target: 0.1287,	output: 0.1859,	loss: 0.4443
i: 98,	target: 0.1939,	output: 0.0849,	loss: 0.5621
i: 99,	target: 0.0435,	output: 0.0934,	loss: 1.1465
i: 100,	target: 0.4181,	output: 0.4570,	loss:
0.0930			
i: 101,	target: -0.0693,	output: -0.0775,	loss:
0.1172			
i: 102,	target: -0.0420,	output: -0.2046,	loss:
3.8699			
i: 103,	target: -0.0807,	output: 0.0885,	loss:
2.0969			
i: 104,	target: -0.0654,	output: 0.0967,	loss:
2.4787			
i: 105,	target: 0.2371,	output: 0.2445,	loss:
0.0311			
i: 106,	target: -0.0376,	output: -0.1621,	loss:
3.3111			
i: 107,	target: -0.0673,	output: 0.0034,	loss:
1.0500			
i: 108,	target: 0.1918,	output: 0.2586,	loss:
0.3486			
i: 109,	target: 0.1676,	output: 0.1505,	loss:
0.1024			
i: 110,	target: -0.0759,	output: -0.1220,	loss:
0.6081			
i: 111,	target: -0.1023,	output: 0.0275,	loss:
1.2687			
i: 112,	target: -0.0750,	output: -0.1643,	loss:
1.1899			
i: 113,	target: 0.2094,	output: 0.3396,	loss:
0.6219			
i: 114,	target: -0.0476,	output: -0.1505,	loss:
2.1607			
i: 115,	target: 0.0200,	output: 0.1814,	loss:

8.0705			
i: 116,	target: 0.1512,	output: 0.2107,	loss:
0.3932			
i: 117,	target: 0.1919,	output: 0.2739,	loss:
0.4276			
i: 118,	target: -0.0616,	output: 0.0126,	loss:
1.2043			
i: 119,	target: 0.0460,	output: 0.1655,	loss:
2.5937			
i: 120,	target: 0.2524,	output: 0.3136,	loss:
0.2422			
i: 121,	target: -0.0317,	output: -0.0677,	loss:
1.1372			
i: 122,	target: 0.0272,	output: 0.0475,	loss:
0.7442			
i: 123,	target: 0.0792,	output: 0.1712,	loss:
1.1620			
i: 124,	target: -0.0596,	output: -0.0633,	loss:
0.0630			
i: 125,	target: -0.0343,	output: -0.1424,	loss:
3.1497			
i: 126,	target: -0.0881,	output: 0.0318,	loss:
1.3610			
i: 127,	target: 0.1758,	output: 0.2806,	loss:
0.5966			
i: 128,	target: -0.1080,	output: -0.0488,	loss:
0.5479			
i: 129,	target: -0.0553,	output: 0.0240,	loss:
1.4347			
i: 130,	target: -0.0744,	output: -0.0842,	loss:
0.1309			
i: 131,	target: -0.0427,	output: -0.1125,	loss:
1.6323			
i: 132,	target: -0.0755,	output: 0.0916,	loss:
2.2123			
i: 133,	target: -0.0744,	output: -0.0529,	loss:
0.2886			
i: 134,	target: 0.3133,	output: 0.2467,	loss:
0.2126			
i: 135,	target: -0.0843,	output: 0.0825,	loss:
1.9789			
i: 136,	target: -0.0741,	output: -0.1081,	loss:
0.4582			
i: 137,	target: -0.0720,	output: 0.0500,	loss:
1.6945			
i: 138,	target: 0.0155,	output: 0.1504,	loss:
8.7094			
i: 139,	target: -0.0721,	output: 0.0929,	loss:

2.2896			
i: 140,	target: 0.0712,	output: 0.1418,	loss:
0.9902			
i: 141,	target: -0.0733,	output: 0.0026,	loss:
1.0350			
i: 142,	target: 0.0473,	output: 0.1361,	loss:
1.8781			
i: 143,	target: 0.0222,	output: 0.0874,	loss:
2.9323			
i: 144,	target: -0.0557,	output: -0.1171,	loss:
1.1034			
i: 145,	target: 0.0421,	output: 0.0766,	loss:
0.8184			
i: 146,	target: 0.0455,	output: 0.0941,	loss:
1.0660			
i: 147,	target: -0.0734,	output: 0.0670,	loss:
1.9129			
i: 148,	target: 0.1577,	output: 0.1548,	loss:
0.0186			
i: 149,	target: -0.0023,	output: 0.0226,	loss:
10.8790			
i: 150,	target: -0.0873,	output: -0.0494,	loss:
0.4342			
i: 151,	target: -0.0773,	output: -0.0557,	loss:
0.2794			
i: 152,	target: -0.0514,	output: 0.0835,	loss:
2.6226			
i: 153,	target: -0.0958,	output: -0.1103,	loss:
0.1512			
i: 154,	target: -0.0795,	output: 0.0760,	loss:
1.9550			
i: 155,	target: 0.1440,	output: -0.0659,	loss:
1.4577			
i: 156,	target: -0.0863,	output: -0.1203,	loss:
0.3949			
i: 157,	target: -0.0540,	output: -0.1601,	loss:
1.9649			
i: 158,	target: 0.1417,	output: 0.1374,	loss:
0.0304			
i: 159,	target: 0.0964,	output: 0.1567,	loss:
0.6248			
i: 160,	target: 0.0181,	output: 0.1747,	loss:
8.6460			
i: 161,	target: -0.0625,	output: -0.1077,	loss:
0.7249			
i: 162,	target: 0.0118,	output: 0.0005,	loss:
0.9576			
i: 163,	target: -0.0598,	output: -0.0407,	loss:

0.3194			
i: 164,	target: 0.1645,	output: 0.2825,	loss:
0.7170			
i: 165,	target: -0.0825,	output: 0.0182,	loss:
1.2212			
i: 166,	target: 0.3100,	output: 0.2520,	loss:
0.1871			
i: 167,	target: -0.0761,	output: 0.1201,	loss:
2.5781			
i: 168,	target: 0.0013,	output: -0.0164,	loss:
13.8184			
i: 169,	target: -0.1181,	output: 0.1055,	loss:
1.8929			
i: 170,	target: -0.0795,	output: 0.1164,	loss:
2.4648			
i: 171,	target: 0.1825,	output: 0.0940,	loss:
0.4852			
i: 172,	target: 0.3107,	output: 0.2686,	loss:
0.1354			
i: 173,	target: -0.0590,	output: 0.0782,	loss:
2.3256			
i: 174,	target: -0.0515,	output: -0.1448,	loss:
1.8104			
i: 175,	target: -0.0770,	output: 0.0230,	loss:
1.2979			
i: 176,	target: -0.0755,	output: 0.1120,	loss:
2.4837			
i: 177,	target: 0.3436,	output: 0.3583,	loss:
0.0428			
i: 178,	target: -0.0233,	output: 0.0260,	loss:
2.1143			
i: 179,	target: -0.0892,	output: 0.0905,	loss:
2.0146			
i: 180,	target: 0.1734,	output: 0.0895,	loss:
0.4835			
i: 181,	target: 0.0449,	output: 0.0370,	loss:
0.1745			
i: 182,	target: 0.1826,	output: 0.1861,	loss:
0.0192			
i: 183,	target: -0.0787,	output: -0.1344,	loss:
0.7073			
i: 184,	target: -0.0449,	output: -0.0558,	loss:
0.2422			
i: 185,	target: 0.1934,	output: 0.2394,	loss:
0.2379			
i: 186,	target: -0.0611,	output: -0.1256,	loss:
1.0557			
i: 187,	target: 0.2091,	output: 0.1620,	loss:

0.2252			
i: 188,	target: 0.0634,	output: -0.1249,	loss:
2.9710			
i: 189,	target: 0.0217,	output: 0.1911,	loss:
7.7860			
i: 190,	target: 0.1887,	output: 0.2800,	loss:
0.4834			
i: 191,	target: -0.0768,	output: 0.0007,	loss:
1.0085			
i: 192,	target: -0.0847,	output: -0.1276,	loss:
0.5055			
i: 193,	target: -0.0141,	output: 0.0142,	loss:
2.0115			
i: 194,	target: -0.0708,	output: 0.0688,	loss:
1.9720			
i: 195,	target: 0.0439,	output: 0.0225,	loss:
0.4881			
i: 196,	target: 0.1898,	output: 0.2355,	loss:
0.2407			
i: 197,	target: -0.0788,	output: 0.1114,	loss:
2.4125			
i: 198,	target: 0.1705,	output: 0.1562,	loss:
0.0841			
i: 199,	target: -0.0644,	output: -0.1664,	loss:
1.5843			
i: 200,	target: -0.0167,	output: -0.0484,	loss:
1.9001			
i: 201,	target: -0.0095,	output: -0.0472,	loss:
3.9463			
i: 202,	target: -0.0710,	output: -0.1648,	loss:
1.3223			
i: 203,	target: 0.2475,	output: 0.2961,	loss:
0.1965			
i: 204,	target: -0.0718,	output: 0.0253,	loss:
1.3528			
i: 205,	target: 0.0668,	output: -0.0493,	loss:
1.7374			
i: 206,	target: -0.0459,	output: 0.0643,	loss:
2.4032			
i: 207,	target: 0.1354,	output: 0.1454,	loss:
0.0739			
i: 208,	target: -0.0773,	output: -0.1634,	loss:
1.1147			
i: 209,	target: 0.2071,	output: 0.0258,	loss:
0.8756			
i: 210,	target: -0.0622,	output: 0.0236,	loss:
1.3796			
i: 211,	target: 0.1976,	output: 0.1686,	loss:

0.1470			
i: 212,	target: -0.0698,	output: 0.0255,	loss:
1.3650			
i: 213,	target: -0.0721,	output: 0.0459,	loss:
1.6362			
i: 214,	target: 0.1139,	output: 0.0317,	loss:
0.7213			
i: 215,	target: 0.1157,	output: 0.1032,	loss:
0.1084			
i: 216,	target: -0.0636,	output: -0.1599,	loss:
1.5138			
i: 217,	target: -0.0638,	output: 0.0182,	loss:
1.2852			
i: 218,	target: 0.1575,	output: 0.2762,	loss:
0.7538			
i: 219,	target: -0.0739,	output: 0.1119,	loss:
2.5143			
i: 220,	target: 0.0885,	output: 0.0953,	loss:
0.0774			
i: 221,	target: 0.0386,	output: 0.0092,	loss:
0.7607			
i: 222,	target: -0.0241,	output: 0.0021,	loss:
1.0880			
i: 223,	target: 0.0297,	output: -0.0018,	loss:
1.0610			
i: 224,	target: 0.1758,	output: 0.1607,	loss:
0.0855			
i: 225,	target: -0.0812,	output: 0.0984,	loss:
2.2114			
i: 226,	target: -0.0851,	output: -0.1091,	loss:
0.2821			
i: 227,	target: -0.0538,	output: 0.0761,	loss:
2.4152			
i: 228,	target: 0.1699,	output: 0.0545,	loss:
0.6789			
i: 229,	target: 0.0202,	output: 0.2647,	loss:
12.0972			
i: 230,	target: 0.2058,	output: 0.0371,	loss:
0.8198			
i: 231,	target: -0.0685,	output: 0.0452,	loss:
1.6593			
i: 232,	target: -0.0902,	output: -0.0626,	loss:
0.3054			
i: 233,	target: -0.0372,	output: 0.0641,	loss:
2.7231			
i: 234,	target: 0.1512,	output: 0.1897,	loss:
0.2549			
i: 235,	target: 0.0169,	output: 0.2045,	loss:

11.1071			
i: 236,	target: -0.0775,	output: -0.0965,	loss:
0.2456			
i: 237,	target: 0.0612,	output: 0.2192,	loss:
2.5837			
i: 238,	target: 0.1690,	output: 0.0927,	loss:
0.4513			
i: 239,	target: 0.2082,	output: 0.1328,	loss:
0.3621			
i: 240,	target: 0.1789,	output: 0.1973,	loss:
0.1031			
i: 241,	target: 0.1322,	output: 0.2522,	loss:
0.9076			
i: 242,	target: 0.1554,	output: 0.1666,	loss:
0.0724			
i: 243,	target: -0.0784,	output: 0.0434,	loss:
1.5529			
i: 244,	target: -0.1046,	output: 0.0244,	loss:
1.2335			
i: 245,	target: 0.1977,	output: 0.1717,	loss:
0.1318			
i: 246,	target: -0.0720,	output: 0.0073,	loss:
1.1010			
i: 247,	target: 0.2235,	output: 0.3019,	loss:
0.3506			
i: 248,	target: -0.0612,	output: -0.0129,	loss:
0.7891			
i: 249,	target: -0.0688,	output: -0.1356,	loss:
0.9710			
i: 250,	target: 0.0078,	output: 0.2561,	loss:
31.6453			
i: 251,	target: -0.0779,	output: -0.0028,	loss:
0.9637			
i: 252,	target: -0.0650,	output: 0.1262,	loss:
2.9416			
i: 253,	target: -0.0745,	output: -0.1314,	loss:
0.7649			
i: 254,	target: 0.1806,	output: 0.2242,	loss:
0.2414			
i: 255,	target: -0.0526,	output: 0.0569,	loss:
2.0806			
i: 256,	target: 0.1406,	output: 0.1684,	loss:
0.1974			
i: 257,	target: -0.0959,	output: -0.1133,	loss:
0.1812			
i: 258,	target: 0.0946,	output: 0.1579,	loss:
0.6691			
i: 259,	target: 0.1781,	output: 0.1605,	loss:

0.0990			
i: 260,	target: -0.0554,	output: -0.1514,	loss:
1.7337			
i: 261,	target: 0.1019,	output: 0.1613,	loss:
0.5824			
i: 262,	target: -0.0587,	output: 0.1314,	loss:
3.2408			
i: 263,	target: -0.0863,	output: -0.0913,	loss:
0.0584			
i: 264,	target: 0.1024,	output: 0.2025,	loss:
0.9787			
i: 265,	target: 0.1847,	output: 0.0430,	loss:
0.7672			
i: 266,	target: -0.0648,	output: 0.0968,	loss:
2.4951			
i: 267,	target: -0.0921,	output: -0.1901,	loss:
1.0638			
i: 268,	target: -0.0355,	output: -0.0113,	loss:
0.6826			
i: 269,	target: 0.2485,	output: 0.2927,	loss:
0.1781			
i: 270,	target: -0.0414,	output: 0.0535,	loss:
2.2914			
i: 271,	target: -0.0786,	output: -0.0043,	loss:
0.9452			
i: 272,	target: -0.0576,	output: -0.0242,	loss:
0.5799			
i: 273,	target: 0.0078,	output: 0.1630,	loss:
19.9186			
i: 274,	target: 0.2421,	output: 0.2707,	loss:
0.1183			
i: 275,	target: -0.1039,	output: -0.0569,	loss:
0.4522			
i: 276,	target: -0.0450,	output: -0.1644,	loss:
2.6566			
i: 277,	target: -0.0285,	output: -0.1463,	loss:
4.1253			
i: 278,	target: -0.0726,	output: 0.0310,	loss:
1.4270			
i: 279,	target: -0.0611,	output: -0.0546,	loss:
0.1060			
i: 280,	target: 0.2007,	output: 0.2046,	loss:
0.0193			
i: 281,	target: 0.1652,	output: 0.1350,	loss:
0.1825			
i: 282,	target: 0.1387,	output: 0.1231,	loss:
0.1120			
i: 283,	target: -0.0328,	output: 0.0228,	loss:

1.6934			
i: 284,	target: 0.2004,	output: 0.2487,	loss:
0.2410			
i: 285,	target: 0.1139,	output: 0.1524,	loss:
0.3381			
i: 286,	target: -0.0664,	output: 0.0053,	loss:
1.0800			
i: 287,	target: -0.0399,	output: 0.0345,	loss:
1.8642			
i: 288,	target: 0.0735,	output: 0.1009,	loss:
0.3730			
i: 289,	target: -0.0620,	output: -0.0720,	loss:
0.1610			
i: 290,	target: -0.0991,	output: 0.0896,	loss:
1.9043			
i: 291,	target: -0.0763,	output: 0.0230,	loss:
1.3007			
i: 292,	target: -0.0679,	output: -0.0804,	loss:
0.1856			
i: 293,	target: -0.0432,	output: 0.0665,	loss:
2.5411			
i: 294,	target: -0.0314,	output: 0.0625,	loss:
2.9876			
i: 295,	target: -0.0543,	output: 0.1044,	loss:
2.9232			
i: 296,	target: -0.0155,	output: 0.0900,	loss:
6.8210			
i: 297,	target: 0.0441,	output: 0.2204,	loss:
3.9978			
i: 298,	target: 0.1028,	output: 0.1949,	loss:
0.8957			
i: 299,	target: -0.0744,	output: -0.0020,	loss:
0.9725			
i: 300,	target: 0.0355,	output: 0.1498,	loss:
3.2164			
i: 301,	target: -0.0630,	output: 0.0698,	loss:
2.1090			
i: 302,	target: -0.0166,	output: 0.2374,	loss:
15.2732			
i: 303,	target: 0.1469,	output: 0.0972,	loss:
0.3386			
i: 304,	target: -0.0924,	output: 0.0776,	loss:
1.8398			
i: 305,	target: 0.0069,	output: 0.2925,	loss:
41.1884			
i: 306,	target: -0.0483,	output: 0.0333,	loss:
1.6894			
i: 307,	target: 0.3935,	output: 0.5443,	loss:

0.3834			
i: 308,	target: 0.3097,	output: 0.2467,	loss:
0.2037			
i: 309,	target: -0.0584,	output: -0.0657,	loss:
0.1245			
i: 310,	target: 0.1915,	output: 0.1257,	loss:
0.3435			
i: 311,	target: -0.0856,	output: 0.0821,	loss:
1.9591			
i: 312,	target: -0.0449,	output: -0.0875,	loss:
0.9510			
i: 313,	target: 0.1794,	output: 0.1424,	loss:
0.2062			
i: 314,	target: -0.0861,	output: 0.1160,	loss:
2.3467			
i: 315,	target: 0.2007,	output: 0.2971,	loss:
0.4807			
i: 316,	target: 0.1514,	output: 0.3254,	loss:
1.1492			
i: 317,	target: 0.1190,	output: 0.1287,	loss:
0.0818			
i: 318,	target: -0.0745,	output: -0.0761,	loss:
0.0222			
i: 319,	target: -0.0724,	output: -0.1603,	loss:
1.2148			
i: 320,	target: -0.0672,	output: 0.0689,	loss:
2.0245			
i: 321,	target: -0.0192,	output: -0.1338,	loss:
5.9781			
i: 322,	target: 0.0495,	output: 0.0165,	loss:
0.6671			
i: 323,	target: 0.2854,	output: 0.2931,	loss:
0.0270			
i: 324,	target: 0.1202,	output: 0.2235,	loss:
0.8588			
i: 325,	target: -0.0784,	output: -0.0517,	loss:
0.3409			
i: 326,	target: -0.0593,	output: -0.1462,	loss:
1.4675			
i: 327,	target: -0.0971,	output: -0.0653,	loss:
0.3282			
i: 328,	target: 0.0228,	output: 0.1374,	loss:
5.0140			
i: 329,	target: 0.0374,	output: -0.0061,	loss:
1.1630			
i: 330,	target: 0.0463,	output: 0.0113,	loss:
0.7564			
i: 331,	target: -0.0727,	output: 0.0223,	loss:

1.3074			
i: 332,	target: -0.0421,	output: -0.0548,	loss:
0.3003			
i: 333,	target: -0.0407,	output: 0.0456,	loss:
2.1201			
i: 334,	target: -0.1007,	output: 0.0534,	loss:
1.5304			
i: 335,	target: -0.0528,	output: -0.0146,	loss:
0.7226			
i: 336,	target: 0.0408,	output: 0.2822,	loss:
5.9148			
i: 337,	target: -0.0809,	output: 0.1207,	loss:
2.4917			
i: 338,	target: -0.0781,	output: -0.1127,	loss:
0.4430			
i: 339,	target: -0.0607,	output: -0.1598,	loss:
1.6308			
i: 340,	target: 0.0446,	output: 0.1282,	loss:
1.8768			
i: 341,	target: -0.0666,	output: 0.0437,	loss:
1.6560			
i: 342,	target: 0.0050,	output: 0.1075,	loss:
20.5861			
i: 343,	target: 0.1146,	output: 0.1663,	loss:
0.4502			
i: 344,	target: 0.1878,	output: 0.1150,	loss:
0.3880			
i: 345,	target: 0.1454,	output: 0.1652,	loss:
0.1361			
i: 346,	target: -0.0638,	output: -0.1190,	loss:
0.8641			
i: 347,	target: 0.0267,	output: 0.2354,	loss:
7.8252			
i: 348,	target: -0.0636,	output: 0.0247,	loss:
1.3888			
i: 349,	target: 0.4086,	output: 0.5397,	loss:
0.3210			
i: 350,	target: -0.0437,	output: -0.2208,	loss:
4.0546			
i: 351,	target: 0.1455,	output: 0.1767,	loss:
0.2140			
i: 352,	target: 0.0985,	output: 0.1970,	loss:
1.0003			
i: 353,	target: -0.0745,	output: -0.0024,	loss:
0.9680			
i: 354,	target: 0.2252,	output: 0.1789,	loss:
0.2057			
i: 355,	target: -0.0543,	output: -0.0729,	loss:

0.3433			
i: 356,	target: 0.0093,	output: 0.1533,	loss:
15.5537			
i: 357,	target: -0.0692,	output: -0.1702,	loss:
1.4582			
i: 358,	target: -0.0862,	output: -0.1160,	loss:
0.3447			
i: 359,	target: 0.1915,	output: 0.2720,	loss:
0.4206			
i: 360,	target: -0.0844,	output: 0.0880,	loss:
2.0415			
i: 361,	target: -0.0202,	output: -0.0039,	loss:
0.8079			
i: 362,	target: -0.0530,	output: -0.1098,	loss:
1.0693			
i: 363,	target: -0.0807,	output: -0.0992,	loss:
0.2292			
i: 364,	target: 0.2149,	output: 0.0170,	loss:
0.9208			
i: 365,	target: 0.0145,	output: 0.0416,	loss:
1.8718			
i: 366,	target: 0.3122,	output: 0.2764,	loss:
0.1148			
i: 367,	target: -0.0687,	output: -0.0088,	loss:
0.8725			
i: 368,	target: -0.0461,	output: 0.0839,	loss:
2.8193			
i: 369,	target: 0.2565,	output: 0.2802,	loss:
0.0922			
i: 370,	target: 0.1525,	output: 0.2790,	loss:
0.8297			
i: 371,	target: -0.0551,	output: -0.1300,	loss:
1.3588			
i: 372,	target: 0.1715,	output: 0.2256,	loss:
0.3152			
i: 373,	target: -0.0433,	output: -0.0937,	loss:
1.1639			
i: 374,	target: -0.0616,	output: 0.0976,	loss:
2.5855			
i: 375,	target: -0.0719,	output: 0.0192,	loss:
1.2672			
i: 376,	target: -0.0583,	output: 0.0540,	loss:
1.9267			
i: 377,	target: -0.0560,	output: 0.0429,	loss:
1.7657			
i: 378,	target: -0.0079,	output: 0.0475,	loss:
6.9835			
i: 379,	target: 0.1611,	output: 0.0601,	loss:

0.6268			
i: 380,	target: 0.0909,	output: 0.1486,	loss:
0.6354			
i: 381,	target: -0.0615,	output: 0.0911,	loss:
2.4814			
i: 382,	target: -0.0770,	output: 0.0609,	loss:
1.7915			
i: 383,	target: 0.0263,	output: -0.1102,	loss:
5.1947			
i: 384,	target: 0.1531,	output: 0.1625,	loss:
0.0616			
i: 385,	target: -0.0305,	output: -0.1405,	loss:
3.6003			
i: 386,	target: -0.0723,	output: -0.0904,	loss:
0.2497			
i: 387,	target: -0.0597,	output: 0.1149,	loss:
2.9238			
i: 388,	target: -0.0674,	output: -0.1070,	loss:
0.5877			
i: 389,	target: -0.0771,	output: 0.0399,	loss:
1.5180			
i: 390,	target: 0.1869,	output: 0.0235,	loss:
0.8745			
i: 391,	target: 0.0390,	output: -0.1310,	loss:
4.3549			
i: 392,	target: -0.0695,	output: -0.0660,	loss:
0.0510			
i: 393,	target: -0.0694,	output: -0.1513,	loss:
1.1805			
i: 394,	target: 0.1284,	output: 0.1667,	loss:
0.2984			
i: 395,	target: 0.1413,	output: 0.0217,	loss:
0.8465			
i: 396,	target: -0.0978,	output: -0.0662,	loss:
0.3226			
i: 397,	target: 0.0918,	output: 0.2082,	loss:
1.2680			
i: 398,	target: -0.0686,	output: -0.1986,	loss:
1.8952			
i: 399,	target: 0.5027,	output: 0.4617,	loss:
0.0816			
i: 400,	target: 0.0976,	output: 0.1759,	loss:
0.8019			
i: 401,	target: 0.1857,	output: 0.1853,	loss:
0.0020			
i: 402,	target: 0.1961,	output: 0.2746,	loss:
0.4000			
i: 403,	target: -0.0207,	output: 0.1018,	loss:

5.9266			
i: 404,	target: 0.1938,	output: 0.0626,	loss:
0.6772			
i: 405,	target: 0.2509,	output: 0.2717,	loss:
0.0829			
i: 406,	target: -0.0826,	output: -0.0916,	loss:
0.1085			
i: 407,	target: 0.0778,	output: 0.2388,	loss:
2.0688			
i: 408,	target: 0.1831,	output: 0.2819,	loss:
0.5395			
i: 409,	target: -0.0952,	output: 0.0006,	loss:
1.0063			
i: 410,	target: 0.2213,	output: 0.2983,	loss:
0.3479			
i: 411,	target: -0.0649,	output: 0.0040,	loss:
1.0615			
i: 412,	target: 0.0405,	output: 0.0272,	loss:
0.3271			
i: 413,	target: 0.2208,	output: 0.1211,	loss:
0.4515			
i: 414,	target: -0.0100,	output: -0.0703,	loss:
5.9998			
i: 415,	target: -0.0885,	output: 0.0960,	loss:
2.0855			
i: 416,	target: 0.1811,	output: 0.0059,	loss:
0.9676			
i: 417,	target: -0.0383,	output: 0.0703,	loss:
2.8356			
i: 418,	target: -0.0775,	output: 0.0908,	loss:
2.1724			
i: 419,	target: -0.0756,	output: 0.0872,	loss:
2.1535			
i: 420,	target: 0.2122,	output: 0.2803,	loss:
0.3205			
i: 421,	target: -0.0569,	output: -0.1011,	loss:
0.7746			
i: 422,	target: 0.4137,	output: 0.4101,	loss:
0.0087			
i: 423,	target: 0.1793,	output: 0.2731,	loss:
0.5228			
i: 424,	target: 0.1155,	output: 0.1572,	loss:
0.3617			
i: 425,	target: -0.0808,	output: 0.0973,	loss:
2.2046			
i: 426,	target: 0.0998,	output: 0.0262,	loss:
0.7379			
i: 427,	target: -0.0530,	output: -0.1220,	loss:

1.3004			
i: 428,	target: -0.0616,	output: 0.0918,	loss:
2.4903			
i: 429,	target: 0.1103,	output: 0.0069,	loss:
0.9371			
i: 430,	target: -0.0786,	output: 0.0832,	loss:
2.0582			
i: 431,	target: -0.0479,	output: 0.0158,	loss:
1.3309			
i: 432,	target: 0.0820,	output: 0.1656,	loss:
1.0197			
i: 433,	target: 0.1968,	output: 0.1849,	loss:
0.0606			
i: 434,	target: -0.0699,	output: -0.0012,	loss:
0.9833			
i: 435,	target: 0.1449,	output: 0.1407,	loss:
0.0287			
i: 436,	target: -0.0586,	output: -0.0116,	loss:
0.8012			
i: 437,	target: 0.0209,	output: 0.0994,	loss:
3.7530			
i: 438,	target: 0.1466,	output: 0.1620,	loss:
0.1049			
i: 439,	target: -0.0158,	output: -0.1782,	loss:
10.2952			
i: 440,	target: 0.1216,	output: 0.1613,	loss:
0.3262			
i: 441,	target: 0.0045,	output: 0.0969,	loss:
20.3209			
i: 442,	target: -0.0637,	output: -0.1587,	loss:
1.4902			
i: 443,	target: -0.0749,	output: 0.0215,	loss:
1.2872			
i: 444,	target: -0.0394,	output: -0.1014,	loss:
1.5754			
i: 445,	target: 0.1471,	output: 0.1553,	loss:
0.0553			
i: 446,	target: -0.0909,	output: -0.0745,	loss:
0.1811			
i: 447,	target: 0.1122,	output: 0.0915,	loss:
0.1844			
i: 448,	target: 0.2309,	output: 0.3139,	loss:
0.3595			
i: 449,	target: -0.0733,	output: 0.1108,	loss:
2.5128			
i: 450,	target: -0.0819,	output: -0.1548,	loss:
0.8890			
i: 451,	target: 0.1374,	output: 0.1226,	loss:

0.1072			
i: 452,	target: 0.1408,	output: 0.2607,	loss:
0.8513			
i: 453,	target: -0.0995,	output: 0.0899,	loss:
1.9034			
i: 454,	target: -0.0769,	output: -0.1076,	loss:
0.3979			
i: 455,	target: -0.0631,	output: 0.0589,	loss:
1.9341			
i: 456,	target: 0.0890,	output: 0.1422,	loss:
0.5979			
i: 457,	target: 0.0373,	output: 0.1908,	loss:
4.1122			
i: 458,	target: 0.0215,	output: 0.1658,	loss:
6.7085			
i: 459,	target: -0.0681,	output: 0.0807,	loss:
2.1844			
i: 460,	target: -0.0731,	output: 0.0959,	loss:
2.3110			
i: 461,	target: -0.0703,	output: 0.0240,	loss:
1.3417			
i: 462,	target: -0.0604,	output: -0.1719,	loss:
1.8450			
i: 463,	target: -0.0516,	output: -0.0055,	loss:
0.8942			
i: 464,	target: 0.2281,	output: 0.2660,	loss:
0.1664			
i: 465,	target: -0.0748,	output: -0.1183,	loss:
0.5822			
i: 466,	target: -0.0617,	output: -0.1452,	loss:
1.3540			
i: 467,	target: -0.0766,	output: -0.1578,	loss:
1.0610			
i: 468,	target: 0.2212,	output: 0.2887,	loss:
0.3052			
i: 469,	target: -0.0804,	output: -0.1509,	loss:
0.8785			
i: 470,	target: -0.0729,	output: 0.0524,	loss:
1.7193			
i: 471,	target: 0.1930,	output: 0.0282,	loss:
0.8540			
i: 472,	target: -0.0612,	output: -0.1650,	loss:
1.6965			
i: 473,	target: -0.0511,	output: -0.1569,	loss:
2.0710			
i: 474,	target: -0.1050,	output: 0.0924,	loss:
1.8799			
i: 475,	target: 0.0407,	output: -0.1195,	loss:

3.9371			
i: 476,	target: -0.0919,	output: -0.1788,	loss:
0.9456			
i: 477,	target: 0.2067,	output: 0.2999,	loss:
0.4509			
i: 478,	target: -0.0805,	output: -0.1563,	loss:
0.9415			
i: 479,	target: -0.0661,	output: -0.0334,	loss:
0.4950			
i: 480,	target: -0.0637,	output: 0.0028,	loss:
1.0447			
i: 481,	target: -0.0686,	output: -0.0866,	loss:
0.2627			
i: 482,	target: 0.2550,	output: 0.2765,	loss:
0.0843			
i: 483,	target: -0.0343,	output: -0.1555,	loss:
3.5399			
i: 484,	target: 0.1571,	output: 0.2774,	loss:
0.7656			
i: 485,	target: 0.2358,	output: 0.2866,	loss:
0.2153			
i: 486,	target: -0.1046,	output: 0.0870,	loss:
1.8320			
i: 487,	target: -0.0718,	output: 0.0319,	loss:
1.4448			
i: 488,	target: -0.0129,	output: 0.1807,	loss:
14.9652			
i: 489,	target: -0.0539,	output: -0.1201,	loss:
1.2277			
i: 490,	target: -0.0377,	output: -0.2038,	loss:
4.4137			
i: 491,	target: -0.0729,	output: 0.0449,	loss:
1.6168			
i: 492,	target: -0.0963,	output: -0.0058,	loss:
0.9400			
i: 493,	target: -0.0785,	output: 0.0088,	loss:
1.1125			
i: 494,	target: -0.0572,	output: 0.0557,	loss:
1.9739			
i: 495,	target: -0.0701,	output: 0.0436,	loss:
1.6230			
i: 496,	target: 0.0153,	output: 0.0933,	loss:
5.0892			
i: 497,	target: 0.1867,	output: 0.1557,	loss:
0.1661			
i: 498,	target: 0.1665,	output: 0.2067,	loss:
0.2418			
i: 499,	target: -0.0692,	output: 0.0546,	loss:

1.7879			
i: 500,	target: -0.1036,	output: -0.0973,	loss:
0.0607			
i: 501,	target: 0.2300,	output: 0.2396,	loss:
0.0416			
i: 502,	target: 0.1574,	output: 0.1313,	loss:
0.1657			
i: 503,	target: 0.1558,	output: 0.1511,	loss:
0.0301			
i: 504,	target: -0.0452,	output: -0.1344,	loss:
1.9721			
i: 505,	target: -0.0615,	output: 0.0427,	loss:
1.6953			
i: 506,	target: 0.0063,	output: 0.1303,	loss:
19.5716			
i: 507,	target: -0.0751,	output: -0.0077,	loss:
0.8981			
i: 508,	target: -0.0711,	output: 0.0020,	loss:
1.0281			
i: 509,	target: -0.0453,	output: 0.0933,	loss:
3.0619			
i: 510,	target: -0.0420,	output: 0.1146,	loss:
3.7282			
i: 511,	target: 0.1103,	output: 0.2575,	loss:
1.3349			
i: 512,	target: 0.2083,	output: 0.2316,	loss:
0.1116			
i: 513,	target: -0.0433,	output: -0.1801,	loss:
3.1610			
i: 514,	target: -0.0196,	output: -0.1628,	loss:
7.3151			
i: 515,	target: -0.0785,	output: 0.0025,	loss:
1.0321			
i: 516,	target: -0.0711,	output: -0.0153,	loss:
0.7852			
i: 517,	target: 0.1700,	output: 0.1651,	loss:
0.0290			
i: 518,	target: -0.0387,	output: 0.0506,	loss:
2.3084			
i: 519,	target: -0.0828,	output: 0.0309,	loss:
1.3729			
i: 520,	target: -0.0860,	output: 0.0024,	loss:
1.0283			
i: 521,	target: 0.6039,	output: 0.5299,	loss:
0.1226			
i: 522,	target: 0.1566,	output: 0.2416,	loss:
0.5429			
i: 523,	target: -0.0693,	output: 0.0444,	loss:

1.6400			
i: 524,	target: 0.1917,	output: 0.1102,	loss:
0.4249			
i: 525,	target: -0.0551,	output: -0.1046,	loss:
0.8997			
i: 526,	target: -0.0697,	output: 0.0680,	loss:
1.9759			
i: 527,	target: -0.0938,	output: 0.0292,	loss:
1.3112			
i: 528,	target: 0.2537,	output: 0.2799,	loss:
0.1035			
i: 529,	target: -0.0774,	output: 0.0397,	loss:
1.5130			
i: 530,	target: -0.0172,	output: 0.1180,	loss:
7.8682			
i: 531,	target: 0.1528,	output: 0.1832,	loss:
0.1987			
i: 532,	target: -0.0759,	output: -0.1376,	loss:
0.8131			
i: 533,	target: -0.0464,	output: 0.0176,	loss:
1.3801			
i: 534,	target: -0.0542,	output: -0.0625,	loss:
0.1526			
i: 535,	target: -0.0818,	output: -0.1565,	loss:
0.9141			
i: 536,	target: -0.0749,	output: 0.0259,	loss:
1.3457			
i: 537,	target: -0.0088,	output: -0.0154,	loss:
0.7576			
i: 538,	target: 0.1952,	output: 0.3089,	loss:
0.5827			
i: 539,	target: -0.0700,	output: 0.0476,	loss:
1.6802			
i: 540,	target: -0.0729,	output: -0.1270,	loss:
0.7417			
i: 541,	target: -0.0057,	output: 0.1640,	loss:
29.9921			
i: 542,	target: 0.2074,	output: 0.0147,	loss:
0.9292			
i: 543,	target: -0.1115,	output: 0.1185,	loss:
2.0635			
i: 544,	target: 0.1651,	output: 0.1410,	loss:
0.1458			
i: 545,	target: -0.0768,	output: -0.0602,	loss:
0.2161			
i: 546,	target: -0.0644,	output: -0.0116,	loss:
0.8193			
i: 547,	target: 0.1900,	output: 0.2229,	loss:

0.1731			
i: 548,	target: 0.2222,	output: 0.1409,	loss:
0.3657			
i: 549,	target: 0.1467,	output: 0.0228,	loss:
0.8449			
i: 550,	target: -0.0779,	output: 0.0536,	loss:
1.6882			
i: 551,	target: -0.0646,	output: -0.1638,	loss:
1.5363			
i: 552,	target: -0.0714,	output: -0.0004,	loss:
0.9950			
i: 553,	target: 0.0282,	output: 0.1474,	loss:
4.2316			
i: 554,	target: -0.1056,	output: 0.0874,	loss:
1.8271			
i: 555,	target: -0.0795,	output: 0.1337,	loss:
2.6809			
i: 556,	target: 0.2821,	output: 0.0760,	loss:
0.7306			
i: 557,	target: -0.0753,	output: 0.1113,	loss:
2.4784			
i: 558,	target: -0.0609,	output: 0.1388,	loss:
3.2795			
i: 559,	target: -0.0712,	output: 0.0440,	loss:
1.6186			
i: 560,	target: -0.0775,	output: -0.1764,	loss:
1.2777			
i: 561,	target: 0.2319,	output: 0.1555,	loss:
0.3297			
i: 562,	target: 0.1296,	output: 0.2472,	loss:
0.9075			
i: 563,	target: -0.0635,	output: 0.1453,	loss:
3.2892			
i: 564,	target: -0.0883,	output: 0.0456,	loss:
1.5161			
i: 565,	target: 0.1914,	output: 0.0039,	loss:
0.9794			
i: 566,	target: 0.3470,	output: 0.2276,	loss:
0.3440			
i: 567,	target: 0.1944,	output: 0.1597,	loss:
0.1784			
i: 568,	target: -0.0524,	output: -0.1193,	loss:
1.2780			
i: 569,	target: -0.0841,	output: -0.0618,	loss:
0.2658			
i: 570,	target: -0.0124,	output: 0.0458,	loss:
4.6829			
i: 571,	target: -0.1011,	output: -0.0424,	loss:

0.5804			
i: 572,	target: -0.0468,	output: 0.0011,	loss:
1.0230			
i: 573,	target: 0.2475,	output: 0.1736,	loss:
0.2985			
i: 574,	target: -0.0660,	output: 0.0132,	loss:
1.2000			
i: 575,	target: 0.1172,	output: 0.1436,	loss:
0.2254			
i: 576,	target: 0.0934,	output: 0.1503,	loss:
0.6087			
i: 577,	target: -0.0805,	output: 0.0065,	loss:
1.0804			
i: 578,	target: 0.0084,	output: 0.0214,	loss:
1.5389			
i: 579,	target: -0.0511,	output: -0.1471,	loss:
1.8773			
i: 580,	target: 0.1849,	output: -0.0600,	loss:
1.3247			
i: 581,	target: 0.2121,	output: 0.0487,	loss:
0.7701			
i: 582,	target: -0.0872,	output: -0.0298,	loss:
0.6590			
i: 583,	target: 0.1278,	output: 0.2298,	loss:
0.7990			
i: 584,	target: 0.1879,	output: 0.1364,	loss:
0.2742			
i: 585,	target: -0.0580,	output: -0.0265,	loss:
0.5435			
i: 586,	target: 0.0180,	output: -0.0887,	loss:
5.9381			
i: 587,	target: -0.0529,	output: 0.0227,	loss:
1.4297			
i: 588,	target: -0.0276,	output: 0.1002,	loss:
4.6267			
i: 589,	target: -0.0537,	output: 0.0212,	loss:
1.3951			
i: 590,	target: 0.1375,	output: 0.1863,	loss:
0.3542			
i: 591,	target: 0.0090,	output: 0.2533,	loss:
27.1895			
i: 592,	target: 0.0291,	output: 0.1778,	loss:
5.1178			
i: 593,	target: -0.0664,	output: -0.0034,	loss:
0.9492			
i: 594,	target: 0.0068,	output: 0.2628,	loss:
37.6466			
i: 595,	target: -0.0433,	output: -0.1301,	loss:

2.0012			
i: 596,	target: 0.1474,	output: 0.1645,	loss:
0.1161			
i: 597,	target: 0.1908,	output: 0.3386,	loss:
0.7747			
i: 598,	target: -0.0836,	output: 0.0020,	loss:
1.0236			
i: 599,	target: 0.1811,	output: 0.2205,	loss:
0.2173			
i: 600,	target: -0.0806,	output: -0.1443,	loss:
0.7897			
i: 601,	target: 0.0002,	output: -0.0881,	loss:
412.5176			
i: 602,	target: -0.0699,	output: 0.0891,	loss:
2.2744			
i: 603,	target: -0.0488,	output: 0.1511,	loss:
4.0977			
i: 604,	target: 0.1035,	output: 0.1590,	loss:
0.5362			
i: 605,	target: -0.0528,	output: -0.0437,	loss:
0.1734			
i: 606,	target: 0.0939,	output: 0.2813,	loss:
1.9946			
i: 607,	target: 0.1225,	output: 0.1494,	loss:
0.2202			
i: 608,	target: -0.0831,	output: 0.0231,	loss:
1.2777			
i: 609,	target: 0.0452,	output: 0.0042,	loss:
0.9071			
i: 610,	target: 0.1228,	output: 0.1999,	loss:
0.6284			
i: 611,	target: -0.0457,	output: -0.1230,	loss:
1.6918			
i: 612,	target: 0.1456,	output: 0.2294,	loss:
0.5752			
i: 613,	target: -0.0715,	output: -0.1189,	loss:
0.6637			
i: 614,	target: 0.2309,	output: -0.0055,	loss:
1.0239			
i: 615,	target: -0.0417,	output: 0.0732,	loss:
2.7546			
i: 616,	target: 0.2102,	output: 0.2830,	loss:
0.3462			
i: 617,	target: 0.1992,	output: 0.0330,	loss:
0.8343			
i: 618,	target: 0.1631,	output: 0.1391,	loss:
0.1470			
i: 619,	target: -0.0794,	output: -0.0812,	loss:

0.0227			
i: 620,	target: -0.0144,	output: 0.0830,	loss:
6.7542			
i: 621,	target: 0.1722,	output: 0.2129,	loss:
0.2364			
i: 622,	target: 0.0975,	output: 0.1277,	loss:
0.3093			
i: 623,	target: 0.0526,	output: 0.0893,	loss:
0.6985			
i: 624,	target: 0.1986,	output: 0.1576,	loss:
0.2064			
i: 625,	target: -0.0458,	output: 0.0199,	loss:
1.4341			
i: 626,	target: -0.0691,	output: 0.0803,	loss:
2.1631			
i: 627,	target: -0.0733,	output: -0.0791,	loss:
0.0796			
i: 628,	target: 0.1054,	output: 0.1067,	loss:
0.0119			
i: 629,	target: 0.1944,	output: 0.1797,	loss:
0.0757			
i: 630,	target: -0.0746,	output: 0.0800,	loss:
2.0725			
i: 631,	target: 0.1918,	output: 0.2433,	loss:
0.2682			
i: 632,	target: -0.0787,	output: -0.1134,	loss:
0.4410			
i: 633,	target: 0.1283,	output: 0.2269,	loss:
0.7689			
i: 634,	target: 0.2318,	output: 0.2246,	loss:
0.0308			
i: 635,	target: 0.2175,	output: -0.0610,	loss:
1.2805			
i: 636,	target: -0.0564,	output: 0.0997,	loss:
2.7678			
i: 637,	target: -0.0553,	output: -0.0505,	loss:
0.0874			
i: 638,	target: -0.0354,	output: -0.0364,	loss:
0.0290			
i: 639,	target: 0.2168,	output: 0.1382,	loss:
0.3625			
i: 640,	target: 0.1580,	output: 0.1707,	loss:
0.0805			
i: 641,	target: -0.0969,	output: 0.0870,	loss:
1.8974			
i: 642,	target: 0.0271,	output: 0.1713,	loss:
5.3319			
i: 643,	target: 0.0069,	output: 0.0523,	loss:

6.5777			
i: 644,	target: -0.0658,	output: -0.1524,	loss:
1.3146			
i: 645,	target: -0.0837,	output: 0.0742,	loss:
1.8871			
i: 646,	target: 0.0198,	output: 0.0925,	loss:
3.6814			
i: 647,	target: 0.1767,	output: 0.1698,	loss:
0.0394			
i: 648,	target: 0.1300,	output: 0.0892,	loss:
0.3138			
i: 649,	target: 0.4579,	output: 0.5300,	loss:
0.1575			
i: 650,	target: 0.0476,	output: 0.0109,	loss:
0.7720			
i: 651,	target: -0.0637,	output: -0.1012,	loss:
0.5893			
i: 652,	target: -0.0457,	output: -0.1533,	loss:
2.3527			
i: 653,	target: -0.0691,	output: 0.0415,	loss:
1.5997			
i: 654,	target: 0.0190,	output: 0.0160,	loss:
0.1609			
i: 655,	target: 0.2154,	output: 0.0201,	loss:
0.9068			
i: 656,	target: 0.1559,	output: 0.1493,	loss:
0.0422			
i: 657,	target: -0.0811,	output: -0.1204,	loss:
0.4848			
i: 658,	target: 0.2221,	output: 0.2848,	loss:
0.2824			
i: 659,	target: 0.2085,	output: 0.2705,	loss:
0.2973			
i: 660,	target: -0.0571,	output: -0.0119,	loss:
0.7910			
i: 661,	target: -0.0435,	output: 0.0959,	loss:
3.2064			
i: 662,	target: 0.2361,	output: 0.1737,	loss:
0.2643			
i: 663,	target: -0.0569,	output: -0.1452,	loss:
1.5501			
i: 664,	target: -0.0106,	output: -0.0463,	loss:
3.3790			
i: 665,	target: -0.0812,	output: 0.0942,	loss:
2.1599			
i: 666,	target: -0.1004,	output: -0.0611,	loss:
0.3910			
i: 667,	target: -0.0597,	output: -0.1011,	loss:

0.6949			
i: 668,	target: 0.0460,	output: 0.1655,	loss:
2.5937			
i: 669,	target: -0.0578,	output: 0.0726,	loss:
2.2552			
i: 670,	target: -0.0785,	output: -0.1245,	loss:
0.5860			
i: 671,	target: -0.0388,	output: 0.0437,	loss:
2.1254			
i: 672,	target: 0.4324,	output: 0.5157,	loss:
0.1927			
i: 673,	target: -0.0523,	output: 0.0470,	loss:
1.8985			
i: 674,	target: -0.0761,	output: 0.1211,	loss:
2.5900			
i: 675,	target: 0.1422,	output: 0.1992,	loss:
0.4014			
i: 676,	target: -0.0306,	output: -0.0202,	loss:
0.3396			
i: 677,	target: -0.0579,	output: 0.0325,	loss:
1.5619			
i: 678,	target: -0.0761,	output: -0.0860,	loss:
0.1309			
i: 679,	target: 0.1733,	output: 0.2027,	loss:
0.1696			
i: 680,	target: -0.0685,	output: -0.1719,	loss:
1.5100			
i: 681,	target: -0.0708,	output: 0.0105,	loss:
1.1485			
i: 682,	target: -0.0581,	output: 0.1199,	loss:
3.0625			
i: 683,	target: -0.0724,	output: -0.1498,	loss:
1.0686			
i: 684,	target: -0.0550,	output: 0.0524,	loss:
1.9525			
i: 685,	target: -0.0332,	output: 0.1700,	loss:
6.1265			
i: 686,	target: -0.0694,	output: 0.0670,	loss:
1.9658			
i: 687,	target: -0.0979,	output: 0.0550,	loss:
1.5613			
i: 688,	target: 0.1069,	output: 0.1467,	loss:
0.3717			
i: 689,	target: -0.1026,	output: -0.1424,	loss:
0.3886			
i: 690,	target: -0.0702,	output: -0.1521,	loss:
1.1645			
i: 691,	target: -0.0804,	output: -0.0220,	loss:

0.7264			
i: 692,	target: 0.1150,	output: 0.1002,	loss:
0.1285			
i: 693,	target: -0.0058,	output: 0.1437,	loss:
25.6541			
i: 694,	target: -0.0423,	output: -0.0264,	loss:
0.3769			
i: 695,	target: -0.0974,	output: -0.0668,	loss:
0.3146			
i: 696,	target: -0.0863,	output: -0.0725,	loss:
0.1601			
i: 697,	target: -0.0690,	output: -0.0615,	loss:
0.1087			
i: 698,	target: 0.0128,	output: 0.2197,	loss:
16.1689			
i: 699,	target: 0.0349,	output: 0.1265,	loss:
2.6230			
i: 700,	target: -0.0965,	output: 0.1172,	loss:
2.2150			
i: 701,	target: 0.2163,	output: 0.2303,	loss:
0.0647			
i: 702,	target: -0.0729,	output: -0.1149,	loss:
0.5759			
i: 703,	target: -0.0716,	output: 0.0309,	loss:
1.4313			
i: 704,	target: 0.1127,	output: 0.1724,	loss:
0.5291			
i: 705,	target: 0.1581,	output: 0.2807,	loss:
0.7754			
i: 706,	target: 0.1632,	output: 0.1270,	loss:
0.2223			
i: 707,	target: -0.0454,	output: -0.0646,	loss:
0.4229			
i: 708,	target: -0.0094,	output: -0.0979,	loss:
9.4085			
i: 709,	target: 0.0085,	output: 0.2043,	loss:
23.0456			
i: 710,	target: 0.1703,	output: 0.2254,	loss:
0.3231			
i: 711,	target: 0.1890,	output: 0.2865,	loss:
0.5158			
i: 712,	target: 0.1163,	output: 0.0143,	loss:
0.8768			
i: 713,	target: -0.0733,	output: 0.0739,	loss:
2.0071			
i: 714,	target: -0.0350,	output: 0.0718,	loss:
3.0524			
i: 715,	target: 0.1883,	output: 0.2888,	loss:

0.5333			
i: 716,	target: -0.1078,	output: 0.0718,	loss:
1.6660			
i: 717,	target: -0.0612,	output: 0.1089,	loss:
2.7787			
i: 718,	target: 0.2535,	output: 0.2604,	loss:
0.0269			
i: 719,	target: 0.0937,	output: 0.1550,	loss:
0.6547			
i: 720,	target: -0.0915,	output: 0.0252,	loss:
1.2757			
i: 721,	target: -0.0416,	output: -0.0596,	loss:
0.4332			
i: 722,	target: 0.1748,	output: 0.3008,	loss:
0.7211			
i: 723,	target: -0.0301,	output: -0.1328,	loss:
3.4111			
i: 724,	target: -0.0844,	output: 0.0239,	loss:
1.2830			
i: 725,	target: 0.0668,	output: 0.2365,	loss:
2.5399			
i: 726,	target: 0.0958,	output: 0.0375,	loss:
0.6084			
i: 727,	target: -0.0809,	output: 0.1018,	loss:
2.2584			
i: 728,	target: -0.0478,	output: -0.1398,	loss:
1.9242			
i: 729,	target: -0.0778,	output: -0.1599,	loss:
1.0567			
i: 730,	target: -0.0573,	output: -0.0021,	loss:
0.9627			
i: 731,	target: -0.0765,	output: -0.0909,	loss:
0.1874			
i: 732,	target: -0.0632,	output: 0.0464,	loss:
1.7334			
i: 733,	target: -0.0636,	output: -0.1606,	loss:
1.5240			
i: 734,	target: 0.1627,	output: 0.1288,	loss:
0.2080			
i: 735,	target: 0.1772,	output: 0.1557,	loss:
0.1213			
i: 736,	target: 0.0106,	output: -0.0658,	loss:
7.1779			
i: 737,	target: 0.2167,	output: 0.1435,	loss:
0.3378			
i: 738,	target: -0.0534,	output: 0.0589,	loss:
2.1037			
i: 739,	target: 0.2401,	output: 0.2599,	loss:

0.0825			
i: 740,	target: -0.0170,	output: 0.1921,	loss:
12.2722			
i: 741,	target: -0.0949,	output: 0.0108,	loss:
1.1137			
i: 742,	target: -0.0611,	output: -0.0948,	loss:
0.5514			
i: 743,	target: -0.0844,	output: -0.0527,	loss:
0.3753			
i: 744,	target: -0.0625,	output: -0.0539,	loss:
0.1374			
i: 745,	target: 0.0442,	output: 0.0244,	loss:
0.4485			
i: 746,	target: -0.0619,	output: 0.0408,	loss:
1.6592			
i: 747,	target: -0.0534,	output: 0.0578,	loss:
2.0815			
i: 748,	target: 0.1953,	output: 0.2729,	loss:
0.3970			
i: 749,	target: 0.2228,	output: 0.1759,	loss:
0.2108			
i: 750,	target: 0.4082,	output: 0.4067,	loss:
0.0037			
i: 751,	target: -0.0280,	output: -0.1001,	loss:
2.5770			
i: 752,	target: -0.0794,	output: 0.1295,	loss:
2.6303			
i: 753,	target: 0.0292,	output: 0.2680,	loss:
8.1818			
i: 754,	target: -0.0321,	output: -0.1590,	loss:
3.9570			
i: 755,	target: 0.1689,	output: 0.0669,	loss:
0.6039			
i: 756,	target: -0.0769,	output: -0.1331,	loss:
0.7301			
i: 757,	target: -0.0700,	output: -0.1525,	loss:
1.1799			
i: 758,	target: -0.0703,	output: -0.1100,	loss:
0.5658			
i: 759,	target: -0.0602,	output: 0.0257,	loss:
1.4271			
i: 760,	target: 0.2276,	output: 0.0099,	loss:
0.9566			
i: 761,	target: -0.0875,	output: -0.0272,	loss:
0.6891			
i: 762,	target: -0.0756,	output: 0.0089,	loss:
1.1176			
i: 763,	target: 0.1400,	output: 0.0649,	loss:

0.5368			
i: 764,	target: 0.0975,	output: 0.2712,	loss:
1.7815			
i: 765,	target: 0.1706,	output: 0.1122,	loss:
0.3426			
i: 766,	target: 0.2154,	output: -0.0573,	loss:
1.2661			
i: 767,	target: -0.1084,	output: 0.0985,	loss:
1.9079			
i: 768,	target: 0.1417,	output: 0.1167,	loss:
0.1760			
i: 769,	target: 0.2063,	output: 0.1029,	loss:
0.5011			
i: 770,	target: -0.0656,	output: 0.0031,	loss:
1.0479			
i: 771,	target: -0.0569,	output: 0.1420,	loss:
3.4944			
i: 772,	target: 0.0222,	output: -0.1498,	loss:
7.7598			
i: 773,	target: 0.1913,	output: 0.2149,	loss:
0.1236			
i: 774,	target: 0.0211,	output: 0.1302,	loss:
5.1649			
i: 775,	target: 0.1716,	output: 0.2117,	loss:
0.2339			
i: 776,	target: -0.0439,	output: 0.0317,	loss:
1.7224			
i: 777,	target: 0.2015,	output: 0.2744,	loss:
0.3617			
i: 778,	target: -0.0984,	output: -0.0953,	loss:
0.0317			
i: 779,	target: -0.0554,	output: 0.0743,	loss:
2.3420			
i: 780,	target: 0.1919,	output: 0.0187,	loss:
0.9024			
i: 781,	target: 0.2158,	output: 0.2623,	loss:
0.2157			
i: 782,	target: 0.1113,	output: 0.1635,	loss:
0.4686			
i: 783,	target: -0.0810,	output: 0.0811,	loss:
2.0005			
i: 784,	target: 0.1316,	output: 0.2514,	loss:
0.9107			
i: 785,	target: -0.0584,	output: -0.1241,	loss:
1.1250			
i: 786,	target: -0.0829,	output: -0.1094,	loss:
0.3198			
i: 787,	target: 0.0271,	output: 0.2323,	loss:

7.5689			
i: 788,	target: 0.1821,	output: 0.1303,	loss:
0.2847			
i: 789,	target: 0.0158,	output: -0.1257,	loss:
8.9353			
i: 790,	target: 0.1809,	output: 0.0279,	loss:
0.8456			
i: 791,	target: -0.0832,	output: -0.1569,	loss:
0.8851			
i: 792,	target: 0.1643,	output: 0.2794,	loss:
0.7007			
i: 793,	target: 0.1450,	output: 0.0522,	loss:
0.6402			
i: 794,	target: -0.0984,	output: -0.0603,	loss:
0.3872			
i: 795,	target: -0.0711,	output: -0.0055,	loss:
0.9227			
i: 796,	target: -0.0957,	output: -0.1091,	loss:
0.1398			
i: 797,	target: -0.0680,	output: 0.0448,	loss:
1.6589			
i: 798,	target: -0.0467,	output: 0.0252,	loss:
1.5394			
i: 799,	target: -0.0822,	output: -0.1132,	loss:
0.3779			
i: 800,	target: 0.4621,	output: 0.5386,	loss:
0.1654			
i: 801,	target: -0.0540,	output: -0.0243,	loss:
0.5500			
i: 802,	target: 0.4988,	output: 0.3905,	loss:
0.2171			
i: 803,	target: -0.0697,	output: -0.0070,	loss:
0.8996			
i: 804,	target: 0.0900,	output: 0.1279,	loss:
0.4204			
i: 805,	target: -0.0487,	output: 0.0537,	loss:
2.1040			
i: 806,	target: -0.0601,	output: 0.0242,	loss:
1.4033			
i: 807,	target: -0.0710,	output: 0.0900,	loss:
2.2664			
i: 808,	target: -0.0522,	output: -0.1601,	loss:
2.0668			
i: 809,	target: 0.0033,	output: 0.0130,	loss:
2.8985			
i: 810,	target: 0.1332,	output: 0.0273,	loss:
0.7952			
i: 811,	target: -0.0238,	output: -0.1834,	loss:

6.7204			
i: 812,	target: -0.0178,	output: -0.0688,	loss:
2.8629			
i: 813,	target: 0.1995,	output: 0.2339,	loss:
0.1721			
i: 814,	target: -0.0259,	output: -0.0237,	loss:
0.0829			
i: 815,	target: -0.0243,	output: -0.1733,	loss:
6.1228			
i: 816,	target: -0.0526,	output: 0.0917,	loss:
2.7425			
i: 817,	target: -0.0804,	output: 0.0002,	loss:
1.0021			
i: 818,	target: -0.0761,	output: -0.0039,	loss:
0.9490			
i: 819,	target: 0.1888,	output: 0.2140,	loss:
0.1332			
i: 820,	target: -0.0718,	output: -0.1338,	loss:
0.8623			
i: 821,	target: -0.0281,	output: -0.1254,	loss:
3.4607			
i: 822,	target: -0.0306,	output: -0.1441,	loss:
3.7059			
i: 823,	target: -0.0631,	output: 0.0504,	loss:
1.7996			
i: 824,	target: 0.1776,	output: 0.2299,	loss:
0.2945			
i: 825,	target: -0.0734,	output: -0.0094,	loss:
0.8725			
i: 826,	target: 0.0039,	output: 0.1322,	loss:
32.6366			
i: 827,	target: -0.0810,	output: -0.0906,	loss:
0.1188			
i: 828,	target: -0.0239,	output: -0.1357,	loss:
4.6776			
i: 829,	target: 0.2339,	output: 0.1414,	loss:
0.3954			
i: 830,	target: -0.0975,	output: 0.0853,	loss:
1.8745			
i: 831,	target: -0.0856,	output: -0.1518,	loss:
0.7738			
i: 832,	target: -0.0676,	output: -0.1532,	loss:
1.2655			
i: 833,	target: -0.0703,	output: 0.0934,	loss:
2.3283			
i: 834,	target: -0.0454,	output: -0.1536,	loss:
2.3846			
i: 835,	target: -0.0364,	output: -0.1258,	loss:

2.4579			
i: 836,	target: -0.0533,	output: 0.0839,	loss:
2.5737			
i: 837,	target: 0.3421,	output: 0.2903,	loss:
0.1513			
i: 838,	target: 0.2035,	output: 0.1738,	loss:
0.1463			
i: 839,	target: -0.0938,	output: 0.0089,	loss:
1.0951			
i: 840,	target: -0.0610,	output: -0.0602,	loss:
0.0141			
i: 841,	target: -0.0787,	output: -0.1689,	loss:
1.1463			
i: 842,	target: -0.0667,	output: -0.0988,	loss:
0.4814			
i: 843,	target: -0.0115,	output: -0.1180,	loss:
9.2768			
i: 844,	target: 0.0879,	output: 0.1439,	loss:
0.6365			
i: 845,	target: -0.0683,	output: 0.0207,	loss:
1.3029			
i: 846,	target: -0.0683,	output: -0.1904,	loss:
1.7889			
i: 847,	target: 0.1223,	output: 0.1814,	loss:
0.4832			
i: 848,	target: -0.0322,	output: -0.1056,	loss:
2.2778			
i: 849,	target: -0.0606,	output: -0.0077,	loss:
0.8722			
i: 850,	target: -0.0554,	output: 0.0633,	loss:
2.1423			
i: 851,	target: -0.0620,	output: 0.0911,	loss:
2.4690			
i: 852,	target: 0.1929,	output: 0.2340,	loss:
0.2128			
i: 853,	target: -0.0472,	output: -0.1071,	loss:
1.2678			
i: 854,	target: -0.0484,	output: -0.1282,	loss:
1.6481			
i: 855,	target: -0.0962,	output: 0.0567,	loss:
1.5897			
i: 856,	target: -0.0590,	output: -0.0265,	loss:
0.5515			
i: 857,	target: 0.1135,	output: 0.0577,	loss:
0.4915			
i: 858,	target: -0.0686,	output: 0.0423,	loss:
1.6169			
i: 859,	target: -0.0741,	output: -0.1804,	loss:

1.4335			
i: 860,	target: 0.2017,	output: 0.2827,	loss:
0.4013			
i: 861,	target: -0.0775,	output: -0.1186,	loss:
0.5299			
i: 862,	target: -0.0686,	output: -0.0346,	loss:
0.4951			
i: 863,	target: 0.2155,	output: 0.1968,	loss:
0.0870			
i: 864,	target: 0.1959,	output: 0.2963,	loss:
0.5124			
i: 865,	target: 0.1549,	output: 0.2831,	loss:
0.8271			
i: 866,	target: -0.0361,	output: 0.0237,	loss:
1.6553			
i: 867,	target: -0.0741,	output: -0.0669,	loss:
0.0972			
i: 868,	target: -0.1008,	output: 0.0228,	loss:
1.2260			
i: 869,	target: -0.0824,	output: -0.1191,	loss:
0.4462			
i: 870,	target: -0.0550,	output: -0.1201,	loss:
1.1819			
i: 871,	target: -0.0912,	output: -0.1392,	loss:
0.5254			
i: 872,	target: 0.0032,	output: -0.0124,	loss:
4.9108			
i: 873,	target: -0.0365,	output: -0.0319,	loss:
0.1280			
i: 874,	target: -0.0812,	output: 0.0856,	loss:
2.0544			
i: 875,	target: -0.0789,	output: -0.0050,	loss:
0.9361			
i: 876,	target: 0.1929,	output: 0.2684,	loss:
0.3910			
i: 877,	target: -0.0774,	output: 0.0136,	loss:
1.1761			
i: 878,	target: 0.1396,	output: 0.1945,	loss:
0.3932			
i: 879,	target: -0.0403,	output: 0.0205,	loss:
1.5085			
i: 880,	target: 0.0363,	output: -0.1239,	loss:
4.4146			
i: 881,	target: -0.0502,	output: 0.0070,	loss:
1.1405			
i: 882,	target: 0.0482,	output: 0.0188,	loss:
0.6104			
i: 883,	target: 0.2471,	output: 0.1854,	loss:

0.2496			
i: 884,	target: 0.1424,	output: 0.1828,	loss:
0.2838			
i: 885,	target: 0.2210,	output: 0.3138,	loss:
0.4201			
i: 886,	target: -0.0443,	output: -0.0643,	loss:
0.4498			
i: 887,	target: 0.1268,	output: 0.1486,	loss:
0.1719			
i: 888,	target: -0.0641,	output: -0.0272,	loss:
0.5763			
i: 889,	target: -0.0319,	output: -0.2590,	loss:
7.1314			
i: 890,	target: -0.0345,	output: -0.0452,	loss:
0.3098			
i: 891,	target: -0.0533,	output: 0.0309,	loss:
1.5790			
i: 892,	target: -0.0796,	output: -0.0676,	loss:
0.1511			
i: 893,	target: -0.0718,	output: -0.0093,	loss:
0.8708			
i: 894,	target: -0.0654,	output: -0.1494,	loss:
1.2863			
i: 895,	target: -0.0492,	output: 0.0310,	loss:
1.6288			
i: 896,	target: 0.0534,	output: 0.0730,	loss:
0.3673			
i: 897,	target: -0.0498,	output: -0.0027,	loss:
0.9461			
i: 898,	target: 0.1416,	output: 0.1654,	loss:
0.1680			
i: 899,	target: -0.0713,	output: 0.0766,	loss:
2.0746			
i: 900,	target: 0.1904,	output: 0.0905,	loss:
0.5246			
i: 901,	target: -0.0375,	output: 0.0843,	loss:
3.2474			
i: 902,	target: -0.0607,	output: 0.0457,	loss:
1.7521			
i: 903,	target: 0.2010,	output: 0.0689,	loss:
0.6573			
i: 904,	target: 0.3405,	output: 0.2656,	loss:
0.2200			
i: 905,	target: 0.2600,	output: 0.1619,	loss:
0.3774			
i: 906,	target: -0.0930,	output: 0.0381,	loss:
1.4096			
i: 907,	target: -0.0323,	output: 0.0265,	loss:

1.8215			
i: 908,	target: 0.2037,	output: 0.3094,	loss:
0.5192			
i: 909,	target: -0.0519,	output: -0.1681,	loss:
2.2371			
i: 910,	target: -0.0741,	output: 0.0675,	loss:
1.9111			
i: 911,	target: -0.0839,	output: 0.0050,	loss:
1.0600			
i: 912,	target: 0.4666,	output: 0.5576,	loss:
0.1950			
i: 913,	target: 0.1357,	output: 0.0313,	loss:
0.7690			
i: 914,	target: 0.0093,	output: 0.1671,	loss:
16.9323			
i: 915,	target: 0.0506,	output: 0.1629,	loss:
2.2205			
i: 916,	target: -0.0226,	output: 0.1070,	loss:
5.7312			
i: 917,	target: 0.0280,	output: 0.1713,	loss:
5.1190			
i: 918,	target: -0.0671,	output: 0.1274,	loss:
2.8980			
i: 919,	target: 0.0276,	output: 0.0233,	loss:
0.1555			
i: 920,	target: 0.1949,	output: 0.1190,	loss:
0.3893			
i: 921,	target: 0.0136,	output: 0.1517,	loss:
10.1799			
i: 922,	target: -0.0292,	output: -0.0711,	loss:
1.4300			
i: 923,	target: 0.1350,	output: 0.1327,	loss:
0.0172			
i: 924,	target: 0.1198,	output: 0.0383,	loss:
0.6801			
i: 925,	target: -0.0641,	output: -0.0241,	loss:
0.6240			
i: 926,	target: -0.0559,	output: 0.0346,	loss:
1.6178			
i: 927,	target: 0.0232,	output: 0.1475,	loss:
5.3615			
i: 928,	target: -0.0669,	output: -0.1580,	loss:
1.3633			
i: 929,	target: -0.0821,	output: -0.0929,	loss:
0.1318			
i: 930,	target: -0.0282,	output: -0.0967,	loss:
2.4242			
i: 931,	target: 0.2339,	output: 0.0952,	loss:

0.5931			
i: 932,	target: -0.0685,	output: 0.0249,	loss:
1.3633			
i: 933,	target: 0.2148,	output: 0.1954,	loss:
0.0903			
i: 934,	target: 0.3086,	output: 0.1130,	loss:
0.6337			
i: 935,	target: -0.0911,	output: -0.0133,	loss:
0.8543			
i: 936,	target: -0.0673,	output: -0.1894,	loss:
1.8145			
i: 937,	target: -0.0588,	output: -0.2473,	loss:
3.2036			
i: 938,	target: -0.0639,	output: -0.1066,	loss:
0.6681			
i: 939,	target: -0.0789,	output: -0.1105,	loss:
0.4004			
i: 940,	target: -0.0729,	output: 0.0901,	loss:
2.2356			
i: 941,	target: 0.0076,	output: 0.1631,	loss:
20.4663			
i: 942,	target: 0.1280,	output: 0.2371,	loss:
0.8525			
i: 943,	target: 0.1303,	output: 0.1112,	loss:
0.1463			
i: 944,	target: 0.1881,	output: 0.0726,	loss:
0.6141			
i: 945,	target: 0.1827,	output: 0.2810,	loss:
0.5377			
i: 946,	target: 0.1899,	output: 0.2483,	loss:
0.3072			
i: 947,	target: -0.0650,	output: 0.0225,	loss:
1.3465			
i: 948,	target: 0.0383,	output: -0.0023,	loss:
1.0602			
i: 949,	target: -0.0859,	output: -0.0324,	loss:
0.6230			
i: 950,	target: -0.0606,	output: 0.0082,	loss:
1.1350			
i: 951,	target: 0.0297,	output: 0.0436,	loss:
0.4698			
i: 952,	target: 0.0785,	output: 0.1805,	loss:
1.2989			
i: 953,	target: -0.0620,	output: 0.0197,	loss:
1.3177			
i: 954,	target: -0.0848,	output: 0.0878,	loss:
2.0355			
i: 955,	target: -0.0606,	output: -0.1677,	loss:

1.7698			
i: 956,	target: 0.0951,	output: 0.2728,	loss:
1.8675			
i: 957,	target: -0.0808,	output: 0.1129,	loss:
2.3977			
i: 958,	target: 0.1423,	output: 0.0278,	loss:
0.8044			
i: 959,	target: -0.0784,	output: 0.0203,	loss:
1.2584			
i: 960,	target: -0.0501,	output: -0.1218,	loss:
1.4299			
i: 961,	target: -0.0808,	output: 0.0707,	loss:
1.8742			
i: 962,	target: -0.0779,	output: -0.0234,	loss:
0.6998			
i: 963,	target: 0.2205,	output: 0.3030,	loss:
0.3740			
i: 964,	target: -0.0520,	output: 0.0291,	loss:
1.5602			
i: 965,	target: 0.1420,	output: 0.1808,	loss:
0.2738			
i: 966,	target: -0.0502,	output: 0.0574,	loss:
2.1424			
i: 967,	target: -0.0968,	output: 0.0517,	loss:
1.5345			
i: 968,	target: -0.0346,	output: -0.0358,	loss:
0.0357			
i: 969,	target: 0.0033,	output: 0.2147,	loss:
63.1185			
i: 970,	target: -0.0290,	output: 0.0675,	loss:
3.3291			
i: 971,	target: -0.0766,	output: -0.1051,	loss:
0.3734			
i: 972,	target: -0.0523,	output: -0.1494,	loss:
1.8599			
i: 973,	target: -0.0285,	output: -0.1173,	loss:
3.1198			
i: 974,	target: 0.1400,	output: 0.1328,	loss:
0.0508			
i: 975,	target: 0.1862,	output: 0.1583,	loss:
0.1498			
i: 976,	target: 0.0551,	output: 0.0039,	loss:
0.9297			
i: 977,	target: -0.0495,	output: -0.1637,	loss:
2.3055			
i: 978,	target: 0.1281,	output: 0.1532,	loss:
0.1963			
i: 979,	target: -0.0575,	output: -0.1703,	loss:

1.9591			
i: 980,	target: 0.1503,	output: 0.1843,	loss:
0.2259			
i: 981,	target: -0.0770,	output: -0.0146,	loss:
0.8103			
i: 982,	target: 0.1900,	output: 0.1168,	loss:
0.3854			
i: 983,	target: -0.0853,	output: 0.0251,	loss:
1.2942			
i: 984,	target: 0.1831,	output: 0.2859,	loss:
0.5612			
i: 985,	target: -0.0758,	output: 0.0843,	loss:
2.1121			
i: 986,	target: 0.2233,	output: 0.2875,	loss:
0.2879			
i: 987,	target: -0.0746,	output: 0.0602,	loss:
1.8065			
i: 988,	target: -0.0391,	output: -0.1263,	loss:
2.2296			
i: 989,	target: 0.3547,	output: 0.2917,	loss:
0.1776			
i: 990,	target: -0.0007,	output: -0.1543,	loss:
209.7415			
i: 991,	target: -0.0402,	output: 0.0975,	loss:
3.4255			
i: 992,	target: 0.0420,	output: 0.0245,	loss:
0.4172			
i: 993,	target: -0.0717,	output: 0.1317,	loss:
2.8380			
i: 994,	target: 0.3952,	output: 0.5499,	loss:
0.3913			
i: 995,	target: 0.0391,	output: 0.0899,	loss:
1.3005			
i: 996,	target: -0.0562,	output: -0.1369,	loss:
1.4374			
i: 997,	target: -0.0579,	output: 0.0860,	loss:
2.4833			
i: 998,	target: 0.3930,	output: 0.5268,	loss:
0.3405			
i: 999,	target: 0.0282,	output: 0.2205,	loss:
6.8295			

Average loss: 2.5848

Saved in: peptide-QML/checkpoints/0809/txts/0809-sh_e_1qm_validation_3.txt

```
[ ]: # push changes to git
    if initial_path != '..':
```

```
!cd peptide-QML && git add . && git commit -m "data trained model" && git_
↪push
```

```
[main ce936269] data trained model
21 files changed, 1080 insertions(+), 1 deletion(-)
create mode 100644 checkpoints/0809/models/0809-sh_e_1qm_3.pth
create mode 100644 checkpoints/0809/models/0809-sh_e_1qm_v2_1.pth
create mode 100644 checkpoints/0809/plots/0809-sh_e_1qm_losses_batches_3.png
create mode 100644 checkpoints/0809/plots/0809-sh_e_1qm_losses_epoch_3.png
create mode 100644
checkpoints/0809/plots/0809-sh_e_1qm_losses_epoch_validation_3.png
create mode 100644
checkpoints/0809/plots/0809-sh_e_1qm_parameter_0.weight_None_3.png
create mode 100644
checkpoints/0809/plots/0809-sh_e_1qm_parameter_2.block_weights_None_3.png
create mode 100644 checkpoints/0809/plots/0809-sh_e_1qm_v2_losses_batches_1.png
create mode 100644 checkpoints/0809/plots/0809-sh_e_1qm_v2_losses_epoch_1.png
create mode 100644
checkpoints/0809/plots/0809-sh_e_1qm_v2_losses_epoch_validation_1.png
create mode 100644
checkpoints/0809/plots/0809-sh_e_1qm_v2_parameter_0.weight_None_1.png
create mode 100644
checkpoints/0809/plots/0809-sh_e_1qm_v2_parameter_2.block_weights_None_1.png
create mode 100644
checkpoints/0809/plots/0809-sh_e_1qm_v2_parameter_3.bias_None_1.png
create mode 100644
checkpoints/0809/plots/0809-sh_e_1qm_v2_parameter_3.weight_None_1.png
create mode 100644 checkpoints/0809/txts/0809-sh_e_1qm_model_str_3.txt
create mode 100644 checkpoints/0809/txts/0809-sh_e_1qm_v2_model_str_1.txt
create mode 100644 checkpoints/0809/txts/0809-sh_e_1qm_validation_3.txt
create mode 100644 checkpoints/0809/versions/0809-sh_e_1qm_v2.version
create mode 100644 checkpoints/0809/versions/0809-sh_em_1qm.version
create mode 100644 checkpoints/0809/versions/0809-sh_em_1qm_v2.version
Enumerating objects: 32, done.
Counting objects: 100% (30/30), done.
Delta compression using up to 24 threads
Compressing objects: 100% (25/25), done.
Writing objects: 100% (25/25), 242.34 KiB | 10.10 MiB/s, done.
Total 25 (delta 3), reused 0 (delta 0)
remote: Resolving deltas: 100% (3/3), completed with 2 local objects.
To github.com:raulconchello/peptide-QML.git
4ee5765c..ce936269 main -> main
```