

Problem3

November 24, 2022

```
[973]: import torch
import pandas as pd
from sklearn.model_selection import train_test_split
import torch
from matplotlib import pyplot
import math
import numpy as np
from sklearn import preprocessing
import torch.optim as optim
import torch.nn as nn
```

```
[974]: DS = pd.read_csv("C:\\Users\\dhruv\\Downloads\\Housing.csv")
```

```
[975]: train=DS.sample(frac=0.8,random_state=0)
test=DS.drop(train.index)
```

```
[976]: DS
```

```
[976]:
```

	price	area	bedrooms	bathrooms	stories	mainroad	guestroom	basement	\
0	13300000	7420	4	2	3	yes	no	no	
1	12250000	8960	4	4	4	yes	no	no	
2	12250000	9960	3	2	2	yes	no	yes	
3	12215000	7500	4	2	2	yes	no	yes	
4	11410000	7420	4	1	2	yes	yes	yes	
..	
540	1820000	3000	2	1	1	yes	no	yes	
541	1767150	2400	3	1	1	no	no	no	
542	1750000	3620	2	1	1	yes	no	no	
543	1750000	2910	3	1	1	no	no	no	
544	1750000	3850	3	1	2	yes	no	no	
	hotwaterheating	airconditioning	parking	prefarea	furnishingstatus				
0		no	yes	2	yes	furnished			
1		no	yes	3	no	furnished			
2		no	no	2	yes	semi-furnished			
3		no	yes	3	yes	furnished			
4		no	yes	2	no	furnished			
..				

540	no	no	2	no	unfurnished
541	no	no	0	no	semi-furnished
542	no	no	0	no	unfurnished
543	no	no	0	no	furnished
544	no	no	0	no	unfurnished

[545 rows x 13 columns]

```
[977]: train = train[['price', 'area', 'bedrooms', 'bathrooms', 'stories', 'parking']]
test = test[['price', 'area', 'bedrooms', 'bathrooms', 'stories', 'parking']]
```

```
[978]: scaler = preprocessing.MinMaxScaler()
```

```
[979]: X1_t = np.array(train.area)
X2_t = np.array(train.bedrooms)
X3_t = np.array(train.bathrooms)
X4_t = np.array(train.stories)
X5_t = np.array(train.parking)

X0_t= np.ones(436)

X = np.vstack([X0_t,X1_t,X2_t,X3_t,X4_t,X5_t])
X = X.T
X = np.array(X)
x = scaler.fit_transform(X)
X= x
X
```

```
[979]: array([[0.          , 0.16151203, 0.4          , 0.          , 0.33333333,
0.33333333],
[0.          , 0.54776632, 0.4          , 0.          , 0.          ,
0.66666667],
[0.          , 0.12439863, 0.6          , 0.          , 0.33333333,
0.          ],
...,
[0.          , 0.13402062, 0.4          , 0.          , 0.33333333,
0.33333333],
[0.          , 0.08247423, 0.4          , 0.33333333, 0.33333333,
0.          ],
[0.          , 0.21649485, 0.4          , 0.          , 0.          ,
0.          ]])
```

```
[980]: Y_t = np.array(train.price)
Y = Y_t
Y = Y_t.reshape(436,1)
y = scaler.fit_transform(Y)
Y=y
```

```
[981]: #weights and bias column
theta = np.array([0., 0., 0., 0., 0., 0.])
theta = theta.reshape(6,1)
theta
```

```
[981]: array([[0.],
             [0.],
             [0.],
             [0.],
             [0.],
             [0.]])
```

```
[982]: #Data Array
t_c = Y #PRICE(Actual Y's or Data(price))
t_u = X #Epochs(Actual X's ...multidimensional)
```

```
[983]: t_c = torch.tensor(t_c, dtype=torch.float64).to_numpy()
t_u = torch.tensor(t_u, dtype=torch.float64)
```

```
[984]: t_c= np.array(t_c)
t_u= np.array(t_u)
t_c = torch.tensor(t_c)
t_u = torch.tensor(t_u)
```

```
[985]: #Weights and Bias as column
b = torch.zeros(1)
w5 = torch.ones(1)
w4 = torch.ones(1)
w3 = torch.ones(1)
w2 = torch.ones(1)
w1 = torch.ones(1)
```

```
[986]: theta = [b, w1,w2, w3, w4, w5]
theta = torch.tensor(theta).reshape(6,1)
```

```
[987]: #Model definition linear
def model(X, theta):
    return np.matmul(X, theta)
```

```
[988]: #Loss function
def loss_func(t_p, t_c):
    var = (t_p - t_c)**2
    return var.mean()
```

```
[989]: t_p = model(X, theta)
#t_p = torch.tensor(t_p)
```

```
[990]: loss = loss_func(t_p, t_c)
loss
```

```
[990]: tensor(1.1408, dtype=torch.float64)
```

```
[991]: def b_del(delta):
    b_del = [delta, 0,0,0,0,0]
    b_del = torch.tensor(b_del).reshape(6,1)
    return b_del
def w5_del(delta):
    b_del = [0, delta,0,0,0,0]
    b_del = torch.tensor(b_del).reshape(6,1)
    return b_del
def w4_del(delta):
    b_del = [0, 0,delta,0,0,0]
    b_del = torch.tensor(b_del).reshape(6,1)
    return b_del
def w3_del(delta):
    b_del = [0, 0,0,delta,0,0]
    b_del = torch.tensor(b_del).reshape(6,1)
    return b_del
def w2_del(delta):
    b_del = [0, 0,0,0,delta,0]
    b_del = torch.tensor(b_del).reshape(6,1)
    return b_del
def w1_del(delta):
    b_del = [0, 0,0,0,0,delta]
    b_del = torch.tensor(b_del).reshape(6,1)
    return b_del
```

```
[992]: delta = 0.7

loss_rate_of_change_b = (loss_func(model(t_u, theta+b_del(delta)), t_c) -
loss_func(model(t_u, theta-b_del(delta)), t_c))/(2.0 * delta)

loss_rate_of_change_w1 = (loss_func(model(t_u, theta+w1_del(delta)), t_c) -
loss_func(model(t_u, theta-w1_del(delta)), t_c))/(2.0 * delta)

loss_rate_of_change_w2 = (loss_func(model(t_u, theta+w2_del(delta)), t_c) -
loss_func(model(t_u, theta-w2_del(delta)), t_c))/(2.0 * delta)

loss_rate_of_change_w3 = (loss_func(model(t_u, theta+w3_del(delta)), t_c) -
loss_func(model(t_u, theta-w3_del(delta)), t_c))/(2.0 * delta)

loss_rate_of_change_w4 = (loss_func(model(t_u, theta+w4_del(delta)), t_c) -
loss_func(model(t_u, theta-w4_del(delta)), t_c))/(2.0 * delta)
```

```
loss_rate_of_change_w5 = (loss_func(model(t_u, theta+w5_del(delta)), t_c) -
loss_func(model(t_u, theta-w5_del(delta)), t_c))/(2.0 * delta)
```

```
[993]: learning_rate = 1e-2
w1 = w1 - learning_rate * loss_rate_of_change_w1
w2 = w2 - learning_rate * loss_rate_of_change_w2
w3 = w3 - learning_rate * loss_rate_of_change_w3
w4 = w4 - learning_rate * loss_rate_of_change_w4
w5 = w5 - learning_rate * loss_rate_of_change_w5
b = b - learning_rate * loss_rate_of_change_b
```

```
[994]: #Partial deriv of loss function
def dloss_fn(t_p, t_c):
    dsq_diffs=2* (t_p - t_c) / t_p.size(0)
    return dsq_diffs
```

```
[995]: #dm/dw5
def dmodel_dw5(t_u, w5, w4, w3, w2, w1, b):
    return t_u
```

```
[996]: #dm/dw4
def dmodel_dw4(t_u, w5, w4, w3, w2, w1, b):
    return t_u
```

```
[997]: #dm/dw3
def dmodel_dw3(t_u, w5, w4, w3, w2, w1, b):
    return t_u
```

```
[998]: #dm/dw2
def dmodel_dw2(t_u, w5, w4, w3, w2, w1, b):
    return t_u
```

```
[999]: #dm/dw1
def dmodel_dw1(t_u, w5, w4, w3, w2, w1, b):
    return t_u
```

```
[1000]: #dm/db
def dmodel_db(t_u, w5, w4, w3, w2, w1, b):
    return 1.0
```

```
[1001]: def grad_fn(t_u, t_c, t_p, w5, w4, w3, w2, w1, b):
    dloss_dtp = dloss_fn(t_p, t_c)
    dloss_dw5 = dloss_dtp * dmodel_dw2(t_u, w5, w4, w3, w2, w1, b)
    dloss_dw4 = dloss_dtp * dmodel_dw1(t_u, w5, w4, w3, w2, w1, b)
    dloss_dw3 = dloss_dtp * dmodel_db(t_u, w5, w4, w3, w2, w1, b)
    dloss_dw2 = dloss_dtp * dmodel_dw2(t_u, w5, w4, w3, w2, w1, b)
    dloss_dw1 = dloss_dtp * dmodel_dw1(t_u, w5, w4, w3, w2, w1, b)
```

```

        dloss_db = dloss_dtp * dmodel_db(t_u, w5, w4, w3, w2, w1, b)
        return torch.stack([dloss_dw5.sum(), dloss_dw4.sum(), dloss_dw3.sum(),
↪dloss_dw2.sum(), dloss_dw1.sum(), dloss_db.sum()])

```

```

[1002]: def training_loop(n_epochs, learning_rate, params, t_u, t_c):
        for epoch in range(1, n_epochs + 1):
            w5, w4, w3, w2, w1, b = params
            theta = [b, w1, w2, w3, w4, w5]
            theta = torch.tensor(theta).reshape(6,1)
            t_p = model(t_u, theta)
            loss = loss_func(t_p, t_c)
            grad = grad_fn(t_u, t_c, t_p, w5, w4, w3, w2, w1, b)
            params = params - learning_rate * grad
            print('Epoch %d, Loss %f' % (epoch, float(loss)))
            print('Params: %f', params)
            print("Grad: %f", grad)
            print('-----')
        return params

```

```

[1003]: #In this part I was getting na numbers...I HAD to reduce the learning rate to
        ↪that level.....
        #rest of the training for LR=0.1,0.01,0.001,0.0001 is done in the following
        ↪sub-parts of the HW like Problem 1.1,1.2,etc.
        training_loop(
        n_epochs = 500,
        learning_rate = 1e-4,
        params = torch.tensor([1,1,1,0.5, 0.1, 0.5]),
        t_u = t_u,
        t_c = t_c)

```

```

Epoch 1, Loss 0.454918
Params: %f tensor([0.9998, 0.9998, 0.9999, 0.4998, 0.0998, 0.4999],
dtype=torch.float64)
Grad: %f tensor([1.7521, 1.7521, 1.0286, 1.7521, 1.7521, 1.0286],
dtype=torch.float64)
-----
Epoch 2, Loss 0.454624
Params: %f tensor([0.9996, 0.9996, 0.9998, 0.4996, 0.0996, 0.4998],
dtype=torch.float64)
Grad: %f tensor([1.7515, 1.7515, 1.0282, 1.7515, 1.7515, 1.0282],
dtype=torch.float64)
-----
Epoch 3, Loss 0.454331
Params: %f tensor([0.9995, 0.9995, 0.9997, 0.4995, 0.0995, 0.4997],
dtype=torch.float64)
Grad: %f tensor([1.7509, 1.7509, 1.0278, 1.7509, 1.7509, 1.0278],
dtype=torch.float64)
-----

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Epoch 4, Loss 0.454038
Params: %f tensor([0.9993, 0.9993, 0.9996, 0.4993, 0.0993, 0.4996],
dtype=torch.float64)
Grad: %f tensor([1.7502, 1.7502, 1.0274, 1.7502, 1.7502, 1.0274],
dtype=torch.float64)
-----

Epoch 5, Loss 0.453745
Params: %f tensor([0.9991, 0.9991, 0.9995, 0.4991, 0.0991, 0.4995],
dtype=torch.float64)
Grad: %f tensor([1.7496, 1.7496, 1.0270, 1.7496, 1.7496, 1.0270],
dtype=torch.float64)
-----

Epoch 6, Loss 0.453452
Params: %f tensor([0.9989, 0.9989, 0.9994, 0.4989, 0.0989, 0.4994],
dtype=torch.float64)
Grad: %f tensor([1.7490, 1.7490, 1.0265, 1.7490, 1.7490, 1.0265],
dtype=torch.float64)
-----

Epoch 7, Loss 0.453160
Params: %f tensor([0.9988, 0.9988, 0.9993, 0.4988, 0.0988, 0.4993],
dtype=torch.float64)
Grad: %f tensor([1.7483, 1.7483, 1.0261, 1.7483, 1.7483, 1.0261],
dtype=torch.float64)
-----

Epoch 8, Loss 0.452868
Params: %f tensor([0.9986, 0.9986, 0.9992, 0.4986, 0.0986, 0.4992],
dtype=torch.float64)
Grad: %f tensor([1.7477, 1.7477, 1.0257, 1.7477, 1.7477, 1.0257],
dtype=torch.float64)
-----

Epoch 9, Loss 0.452575
Params: %f tensor([0.9984, 0.9984, 0.9991, 0.4984, 0.0984, 0.4991],
dtype=torch.float64)
Grad: %f tensor([1.7471, 1.7471, 1.0253, 1.7471, 1.7471, 1.0253],
dtype=torch.float64)
-----

Epoch 10, Loss 0.452284
Params: %f tensor([0.9983, 0.9983, 0.9990, 0.4983, 0.0983, 0.4990],
dtype=torch.float64)
Grad: %f tensor([1.7464, 1.7464, 1.0249, 1.7464, 1.7464, 1.0249],
dtype=torch.float64)
-----

Epoch 11, Loss 0.451992
Params: %f tensor([0.9981, 0.9981, 0.9989, 0.4981, 0.0981, 0.4989],
dtype=torch.float64)
Grad: %f tensor([1.7458, 1.7458, 1.0245, 1.7458, 1.7458, 1.0245],
dtype=torch.float64)
-----

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Epoch 12, Loss 0.451701
Params: %f tensor([0.9979, 0.9979, 0.9988, 0.4979, 0.0979, 0.4988],
dtype=torch.float64)
Grad: %f tensor([1.7452, 1.7452, 1.0241, 1.7452, 1.7452, 1.0241],
dtype=torch.float64)
-----

Epoch 13, Loss 0.451409
Params: %f tensor([0.9977, 0.9977, 0.9987, 0.4977, 0.0977, 0.4987],
dtype=torch.float64)
Grad: %f tensor([1.7445, 1.7445, 1.0237, 1.7445, 1.7445, 1.0237],
dtype=torch.float64)
-----

Epoch 14, Loss 0.451118
Params: %f tensor([0.9976, 0.9976, 0.9986, 0.4976, 0.0976, 0.4986],
dtype=torch.float64)
Grad: %f tensor([1.7439, 1.7439, 1.0233, 1.7439, 1.7439, 1.0233],
dtype=torch.float64)
-----

Epoch 15, Loss 0.450828
Params: %f tensor([0.9974, 0.9974, 0.9985, 0.4974, 0.0974, 0.4985],
dtype=torch.float64)
Grad: %f tensor([1.7433, 1.7433, 1.0228, 1.7433, 1.7433, 1.0228],
dtype=torch.float64)
-----

Epoch 16, Loss 0.450537
Params: %f tensor([0.9972, 0.9972, 0.9984, 0.4972, 0.0972, 0.4984],
dtype=torch.float64)
Grad: %f tensor([1.7426, 1.7426, 1.0224, 1.7426, 1.7426, 1.0224],
dtype=torch.float64)
-----

Epoch 17, Loss 0.450247
Params: %f tensor([0.9970, 0.9970, 0.9983, 0.4970, 0.0970, 0.4983],
dtype=torch.float64)
Grad: %f tensor([1.7420, 1.7420, 1.0220, 1.7420, 1.7420, 1.0220],
dtype=torch.float64)
-----

Epoch 18, Loss 0.449957
Params: %f tensor([0.9969, 0.9969, 0.9982, 0.4969, 0.0969, 0.4982],
dtype=torch.float64)
Grad: %f tensor([1.7414, 1.7414, 1.0216, 1.7414, 1.7414, 1.0216],
dtype=torch.float64)
-----

Epoch 19, Loss 0.449667
Params: %f tensor([0.9967, 0.9967, 0.9981, 0.4967, 0.0967, 0.4981],
dtype=torch.float64)
Grad: %f tensor([1.7407, 1.7407, 1.0212, 1.7407, 1.7407, 1.0212],
dtype=torch.float64)
-----

```



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Epoch 20, Loss 0.449377
Params: %f tensor([0.9965, 0.9965, 0.9980, 0.4965, 0.0965, 0.4980],
dtype=torch.float64)
Grad: %f tensor([1.7401, 1.7401, 1.0208, 1.7401, 1.7401, 1.0208],
dtype=torch.float64)
-----

Epoch 21, Loss 0.449087
Params: %f tensor([0.9963, 0.9963, 0.9978, 0.4963, 0.0963, 0.4978],
dtype=torch.float64)
Grad: %f tensor([1.7395, 1.7395, 1.0204, 1.7395, 1.7395, 1.0204],
dtype=torch.float64)
-----

Epoch 22, Loss 0.448798
Params: %f tensor([0.9962, 0.9962, 0.9977, 0.4962, 0.0962, 0.4977],
dtype=torch.float64)
Grad: %f tensor([1.7389, 1.7389, 1.0200, 1.7389, 1.7389, 1.0200],
dtype=torch.float64)
-----

Epoch 23, Loss 0.448509
Params: %f tensor([0.9960, 0.9960, 0.9976, 0.4960, 0.0960, 0.4976],
dtype=torch.float64)
Grad: %f tensor([1.7382, 1.7382, 1.0196, 1.7382, 1.7382, 1.0196],
dtype=torch.float64)
-----

Epoch 24, Loss 0.448220
Params: %f tensor([0.9958, 0.9958, 0.9975, 0.4958, 0.0958, 0.4975],
dtype=torch.float64)
Grad: %f tensor([1.7376, 1.7376, 1.0192, 1.7376, 1.7376, 1.0192],
dtype=torch.float64)
-----

Epoch 25, Loss 0.447931
Params: %f tensor([0.9956, 0.9956, 0.9974, 0.4956, 0.0956, 0.4974],
dtype=torch.float64)
Grad: %f tensor([1.7370, 1.7370, 1.0187, 1.7370, 1.7370, 1.0187],
dtype=torch.float64)
-----

Epoch 26, Loss 0.447643
Params: %f tensor([0.9955, 0.9955, 0.9973, 0.4955, 0.0955, 0.4973],
dtype=torch.float64)
Grad: %f tensor([1.7363, 1.7363, 1.0183, 1.7363, 1.7363, 1.0183],
dtype=torch.float64)
-----

Epoch 27, Loss 0.447355
Params: %f tensor([0.9953, 0.9953, 0.9972, 0.4953, 0.0953, 0.4972],
dtype=torch.float64)
Grad: %f tensor([1.7357, 1.7357, 1.0179, 1.7357, 1.7357, 1.0179],
dtype=torch.float64)
-----

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```
Epoch 28, Loss 0.447067
Params: %f tensor([0.9951, 0.9951, 0.9971, 0.4951, 0.0951, 0.4971],
dtype=torch.float64)
Grad: %f tensor([1.7351, 1.7351, 1.0175, 1.7351, 1.7351, 1.0175],
dtype=torch.float64)
-----

Epoch 29, Loss 0.446779
Params: %f tensor([0.9949, 0.9949, 0.9970, 0.4949, 0.0949, 0.4970],
dtype=torch.float64)
Grad: %f tensor([1.7345, 1.7345, 1.0171, 1.7345, 1.7345, 1.0171],
dtype=torch.float64)
-----

Epoch 30, Loss 0.446491
Params: %f tensor([0.9948, 0.9948, 0.9969, 0.4948, 0.0948, 0.4969],
dtype=torch.float64)
Grad: %f tensor([1.7338, 1.7338, 1.0167, 1.7338, 1.7338, 1.0167],
dtype=torch.float64)
-----

Epoch 31, Loss 0.446204
Params: %f tensor([0.9946, 0.9946, 0.9968, 0.4946, 0.0946, 0.4968],
dtype=torch.float64)
Grad: %f tensor([1.7332, 1.7332, 1.0163, 1.7332, 1.7332, 1.0163],
dtype=torch.float64)
-----

Epoch 32, Loss 0.445917
Params: %f tensor([0.9944, 0.9944, 0.9967, 0.4944, 0.0944, 0.4967],
dtype=torch.float64)
Grad: %f tensor([1.7326, 1.7326, 1.0159, 1.7326, 1.7326, 1.0159],
dtype=torch.float64)
-----

Epoch 33, Loss 0.445630
Params: %f tensor([0.9943, 0.9943, 0.9966, 0.4943, 0.0943, 0.4966],
dtype=torch.float64)
Grad: %f tensor([1.7319, 1.7319, 1.0155, 1.7319, 1.7319, 1.0155],
dtype=torch.float64)
-----

Epoch 34, Loss 0.445343
Params: %f tensor([0.9941, 0.9941, 0.9965, 0.4941, 0.0941, 0.4965],
dtype=torch.float64)
Grad: %f tensor([1.7313, 1.7313, 1.0151, 1.7313, 1.7313, 1.0151],
dtype=torch.float64)
-----

Epoch 35, Loss 0.445056
Params: %f tensor([0.9939, 0.9939, 0.9964, 0.4939, 0.0939, 0.4964],
dtype=torch.float64)
Grad: %f tensor([1.7307, 1.7307, 1.0147, 1.7307, 1.7307, 1.0147],
dtype=torch.float64)
-----
```

```

Epoch 36, Loss 0.444770
Params: %f tensor([0.9937, 0.9937, 0.9963, 0.4937, 0.0937, 0.4963],
dtype=torch.float64)
Grad: %f tensor([1.7301, 1.7301, 1.0143, 1.7301, 1.7301, 1.0143],
dtype=torch.float64)
-----

Epoch 37, Loss 0.444484
Params: %f tensor([0.9936, 0.9936, 0.9962, 0.4936, 0.0936, 0.4962],
dtype=torch.float64)
Grad: %f tensor([1.7294, 1.7294, 1.0139, 1.7294, 1.7294, 1.0139],
dtype=torch.float64)
-----

Epoch 38, Loss 0.444198
Params: %f tensor([0.9934, 0.9934, 0.9961, 0.4934, 0.0934, 0.4961],
dtype=torch.float64)
Grad: %f tensor([1.7288, 1.7288, 1.0134, 1.7288, 1.7288, 1.0134],
dtype=torch.float64)
-----

Epoch 39, Loss 0.443912
Params: %f tensor([0.9932, 0.9932, 0.9960, 0.4932, 0.0932, 0.4960],
dtype=torch.float64)
Grad: %f tensor([1.7282, 1.7282, 1.0130, 1.7282, 1.7282, 1.0130],
dtype=torch.float64)
-----

Epoch 40, Loss 0.443626
Params: %f tensor([0.9930, 0.9930, 0.9959, 0.4930, 0.0930, 0.4959],
dtype=torch.float64)
Grad: %f tensor([1.7276, 1.7276, 1.0126, 1.7276, 1.7276, 1.0126],
dtype=torch.float64)
-----

Epoch 41, Loss 0.443341
Params: %f tensor([0.9929, 0.9929, 0.9958, 0.4929, 0.0929, 0.4958],
dtype=torch.float64)
Grad: %f tensor([1.7269, 1.7269, 1.0122, 1.7269, 1.7269, 1.0122],
dtype=torch.float64)
-----

Epoch 42, Loss 0.443056
Params: %f tensor([0.9927, 0.9927, 0.9957, 0.4927, 0.0927, 0.4957],
dtype=torch.float64)
Grad: %f tensor([1.7263, 1.7263, 1.0118, 1.7263, 1.7263, 1.0118],
dtype=torch.float64)
-----

Epoch 43, Loss 0.442771
Params: %f tensor([0.9925, 0.9925, 0.9956, 0.4925, 0.0925, 0.4956],
dtype=torch.float64)
Grad: %f tensor([1.7257, 1.7257, 1.0114, 1.7257, 1.7257, 1.0114],
dtype=torch.float64)
-----

```

```

Epoch 44, Loss 0.442486
Params: %f tensor([0.9924, 0.9924, 0.9955, 0.4924, 0.0924, 0.4955],
dtype=torch.float64)
Grad: %f tensor([1.7251, 1.7251, 1.0110, 1.7251, 1.7251, 1.0110],
dtype=torch.float64)
-----

Epoch 45, Loss 0.442202
Params: %f tensor([0.9922, 0.9922, 0.9954, 0.4922, 0.0922, 0.4954],
dtype=torch.float64)
Grad: %f tensor([1.7244, 1.7244, 1.0106, 1.7244, 1.7244, 1.0106],
dtype=torch.float64)
-----

Epoch 46, Loss 0.441918
Params: %f tensor([0.9920, 0.9920, 0.9953, 0.4920, 0.0920, 0.4953],
dtype=torch.float64)
Grad: %f tensor([1.7238, 1.7238, 1.0102, 1.7238, 1.7238, 1.0102],
dtype=torch.float64)
-----

Epoch 47, Loss 0.441634
Params: %f tensor([0.9918, 0.9918, 0.9952, 0.4918, 0.0918, 0.4952],
dtype=torch.float64)
Grad: %f tensor([1.7232, 1.7232, 1.0098, 1.7232, 1.7232, 1.0098],
dtype=torch.float64)
-----

Epoch 48, Loss 0.441350
Params: %f tensor([0.9917, 0.9917, 0.9951, 0.4917, 0.0917, 0.4951],
dtype=torch.float64)
Grad: %f tensor([1.7226, 1.7226, 1.0094, 1.7226, 1.7226, 1.0094],
dtype=torch.float64)
-----

Epoch 49, Loss 0.441066
Params: %f tensor([0.9915, 0.9915, 0.9950, 0.4915, 0.0915, 0.4950],
dtype=torch.float64)
Grad: %f tensor([1.7219, 1.7219, 1.0090, 1.7219, 1.7219, 1.0090],
dtype=torch.float64)
-----

Epoch 50, Loss 0.440783
Params: %f tensor([0.9913, 0.9913, 0.9949, 0.4913, 0.0913, 0.4949],
dtype=torch.float64)
Grad: %f tensor([1.7213, 1.7213, 1.0086, 1.7213, 1.7213, 1.0086],
dtype=torch.float64)
-----

Epoch 51, Loss 0.440499
Params: %f tensor([0.9911, 0.9911, 0.9948, 0.4911, 0.0911, 0.4948],
dtype=torch.float64)
Grad: %f tensor([1.7207, 1.7207, 1.0082, 1.7207, 1.7207, 1.0082],
dtype=torch.float64)
-----

```

```

Epoch 52, Loss 0.440216
Params: %f tensor([0.9910, 0.9910, 0.9947, 0.4910, 0.0910, 0.4947],
dtype=torch.float64)
Grad: %f tensor([1.7201, 1.7201, 1.0078, 1.7201, 1.7201, 1.0078],
dtype=torch.float64)
-----

Epoch 53, Loss 0.439933
Params: %f tensor([0.9908, 0.9908, 0.9946, 0.4908, 0.0908, 0.4946],
dtype=torch.float64)
Grad: %f tensor([1.7194, 1.7194, 1.0074, 1.7194, 1.7194, 1.0074],
dtype=torch.float64)
-----

Epoch 54, Loss 0.439651
Params: %f tensor([0.9906, 0.9906, 0.9945, 0.4906, 0.0906, 0.4945],
dtype=torch.float64)
Grad: %f tensor([1.7188, 1.7188, 1.0070, 1.7188, 1.7188, 1.0070],
dtype=torch.float64)
-----

Epoch 55, Loss 0.439368
Params: %f tensor([0.9905, 0.9905, 0.9944, 0.4905, 0.0905, 0.4944],
dtype=torch.float64)
Grad: %f tensor([1.7182, 1.7182, 1.0065, 1.7182, 1.7182, 1.0065],
dtype=torch.float64)
-----

Epoch 56, Loss 0.439086
Params: %f tensor([0.9903, 0.9903, 0.9943, 0.4903, 0.0903, 0.4943],
dtype=torch.float64)
Grad: %f tensor([1.7176, 1.7176, 1.0061, 1.7176, 1.7176, 1.0061],
dtype=torch.float64)
-----

Epoch 57, Loss 0.438804
Params: %f tensor([0.9901, 0.9901, 0.9942, 0.4901, 0.0901, 0.4942],
dtype=torch.float64)
Grad: %f tensor([1.7170, 1.7170, 1.0057, 1.7170, 1.7170, 1.0057],
dtype=torch.float64)
-----

Epoch 58, Loss 0.438522
Params: %f tensor([0.9899, 0.9899, 0.9941, 0.4899, 0.0899, 0.4941],
dtype=torch.float64)
Grad: %f tensor([1.7163, 1.7163, 1.0053, 1.7163, 1.7163, 1.0053],
dtype=torch.float64)
-----

Epoch 59, Loss 0.438241
Params: %f tensor([0.9898, 0.9898, 0.9940, 0.4898, 0.0898, 0.4940],
dtype=torch.float64)
Grad: %f tensor([1.7157, 1.7157, 1.0049, 1.7157, 1.7157, 1.0049],
dtype=torch.float64)
-----

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```

Epoch 60, Loss 0.437959
Params: %f tensor([0.9896, 0.9896, 0.9939, 0.4896, 0.0896, 0.4939],
dtype=torch.float64)
Grad: %f tensor([1.7151, 1.7151, 1.0045, 1.7151, 1.7151, 1.0045],
dtype=torch.float64)
-----

Epoch 61, Loss 0.437678
Params: %f tensor([0.9894, 0.9894, 0.9938, 0.4894, 0.0894, 0.4938],
dtype=torch.float64)
Grad: %f tensor([1.7145, 1.7145, 1.0041, 1.7145, 1.7145, 1.0041],
dtype=torch.float64)
-----

Epoch 62, Loss 0.437397
Params: %f tensor([0.9893, 0.9893, 0.9937, 0.4893, 0.0893, 0.4937],
dtype=torch.float64)
Grad: %f tensor([1.7138, 1.7138, 1.0037, 1.7138, 1.7138, 1.0037],
dtype=torch.float64)
-----

Epoch 63, Loss 0.437116
Params: %f tensor([0.9891, 0.9891, 0.9936, 0.4891, 0.0891, 0.4936],
dtype=torch.float64)
Grad: %f tensor([1.7132, 1.7132, 1.0033, 1.7132, 1.7132, 1.0033],
dtype=torch.float64)
-----

Epoch 64, Loss 0.436836
Params: %f tensor([0.9889, 0.9889, 0.9935, 0.4889, 0.0889, 0.4935],
dtype=torch.float64)
Grad: %f tensor([1.7126, 1.7126, 1.0029, 1.7126, 1.7126, 1.0029],
dtype=torch.float64)
-----

Epoch 65, Loss 0.436555
Params: %f tensor([0.9887, 0.9887, 0.9934, 0.4887, 0.0887, 0.4934],
dtype=torch.float64)
Grad: %f tensor([1.7120, 1.7120, 1.0025, 1.7120, 1.7120, 1.0025],
dtype=torch.float64)
-----

Epoch 66, Loss 0.436275
Params: %f tensor([0.9886, 0.9886, 0.9933, 0.4886, 0.0886, 0.4933],
dtype=torch.float64)
Grad: %f tensor([1.7114, 1.7114, 1.0021, 1.7114, 1.7114, 1.0021],
dtype=torch.float64)
-----

Epoch 67, Loss 0.435995
Params: %f tensor([0.9884, 0.9884, 0.9932, 0.4884, 0.0884, 0.4932],
dtype=torch.float64)
Grad: %f tensor([1.7107, 1.7107, 1.0017, 1.7107, 1.7107, 1.0017],
dtype=torch.float64)
-----

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Epoch 68, Loss 0.435715
Params: %f tensor([0.9882, 0.9882, 0.9931, 0.4882, 0.0882, 0.4931],
dtype=torch.float64)
Grad: %f tensor([1.7101, 1.7101, 1.0013, 1.7101, 1.7101, 1.0013],
dtype=torch.float64)
-----

Epoch 69, Loss 0.435436
Params: %f tensor([0.9881, 0.9881, 0.9930, 0.4881, 0.0881, 0.4930],
dtype=torch.float64)
Grad: %f tensor([1.7095, 1.7095, 1.0009, 1.7095, 1.7095, 1.0009],
dtype=torch.float64)
-----

Epoch 70, Loss 0.435157
Params: %f tensor([0.9879, 0.9879, 0.9929, 0.4879, 0.0879, 0.4929],
dtype=torch.float64)
Grad: %f tensor([1.7089, 1.7089, 1.0005, 1.7089, 1.7089, 1.0005],
dtype=torch.float64)
-----

Epoch 71, Loss 0.434877
Params: %f tensor([0.9877, 0.9877, 0.9928, 0.4877, 0.0877, 0.4928],
dtype=torch.float64)
Grad: %f tensor([1.7083, 1.7083, 1.0001, 1.7083, 1.7083, 1.0001],
dtype=torch.float64)
-----

Epoch 72, Loss 0.434598
Params: %f tensor([0.9875, 0.9875, 0.9927, 0.4875, 0.0875, 0.4927],
dtype=torch.float64)
Grad: %f tensor([1.7077, 1.7077, 0.9997, 1.7077, 1.7077, 0.9997],
dtype=torch.float64)
-----

Epoch 73, Loss 0.434320
Params: %f tensor([0.9874, 0.9874, 0.9926, 0.4874, 0.0874, 0.4926],
dtype=torch.float64)
Grad: %f tensor([1.7070, 1.7070, 0.9993, 1.7070, 1.7070, 0.9993],
dtype=torch.float64)
-----

Epoch 74, Loss 0.434041
Params: %f tensor([0.9872, 0.9872, 0.9925, 0.4872, 0.0872, 0.4925],
dtype=torch.float64)
Grad: %f tensor([1.7064, 1.7064, 0.9989, 1.7064, 1.7064, 0.9989],
dtype=torch.float64)
-----

Epoch 75, Loss 0.433763
Params: %f tensor([0.9870, 0.9870, 0.9924, 0.4870, 0.0870, 0.4924],
dtype=torch.float64)
Grad: %f tensor([1.7058, 1.7058, 0.9985, 1.7058, 1.7058, 0.9985],
dtype=torch.float64)
-----

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Epoch 76, Loss 0.433485
Params: %f tensor([0.9869, 0.9869, 0.9923, 0.4869, 0.0869, 0.4923],
dtype=torch.float64)
Grad: %f tensor([1.7052, 1.7052, 0.9981, 1.7052, 1.7052, 0.9981],
dtype=torch.float64)
-----

Epoch 77, Loss 0.433207
Params: %f tensor([0.9867, 0.9867, 0.9922, 0.4867, 0.0867, 0.4922],
dtype=torch.float64)
Grad: %f tensor([1.7046, 1.7046, 0.9977, 1.7046, 1.7046, 0.9977],
dtype=torch.float64)
-----

Epoch 78, Loss 0.432929
Params: %f tensor([0.9865, 0.9865, 0.9921, 0.4865, 0.0865, 0.4921],
dtype=torch.float64)
Grad: %f tensor([1.7039, 1.7039, 0.9973, 1.7039, 1.7039, 0.9973],
dtype=torch.float64)
-----

Epoch 79, Loss 0.432651
Params: %f tensor([0.9864, 0.9864, 0.9920, 0.4864, 0.0864, 0.4920],
dtype=torch.float64)
Grad: %f tensor([1.7033, 1.7033, 0.9969, 1.7033, 1.7033, 0.9969],
dtype=torch.float64)
-----

Epoch 80, Loss 0.432374
Params: %f tensor([0.9862, 0.9862, 0.9919, 0.4862, 0.0862, 0.4919],
dtype=torch.float64)
Grad: %f tensor([1.7027, 1.7027, 0.9965, 1.7027, 1.7027, 0.9965],
dtype=torch.float64)
-----

Epoch 81, Loss 0.432097
Params: %f tensor([0.9860, 0.9860, 0.9918, 0.4860, 0.0860, 0.4918],
dtype=torch.float64)
Grad: %f tensor([1.7021, 1.7021, 0.9961, 1.7021, 1.7021, 0.9961],
dtype=torch.float64)
-----

Epoch 82, Loss 0.431820
Params: %f tensor([0.9858, 0.9858, 0.9917, 0.4858, 0.0858, 0.4917],
dtype=torch.float64)
Grad: %f tensor([1.7015, 1.7015, 0.9957, 1.7015, 1.7015, 0.9957],
dtype=torch.float64)
-----

Epoch 83, Loss 0.431543
Params: %f tensor([0.9857, 0.9857, 0.9916, 0.4857, 0.0857, 0.4916],
dtype=torch.float64)
Grad: %f tensor([1.7009, 1.7009, 0.9953, 1.7009, 1.7009, 0.9953],
dtype=torch.float64)
-----

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Epoch 84, Loss 0.431267
Params: %f tensor([0.9855, 0.9855, 0.9915, 0.4855, 0.0855, 0.4915],
dtype=torch.float64)
Grad: %f tensor([1.7002, 1.7002, 0.9949, 1.7002, 1.7002, 0.9949],
dtype=torch.float64)
-----

Epoch 85, Loss 0.430990
Params: %f tensor([0.9853, 0.9853, 0.9914, 0.4853, 0.0853, 0.4914],
dtype=torch.float64)
Grad: %f tensor([1.6996, 1.6996, 0.9945, 1.6996, 1.6996, 0.9945],
dtype=torch.float64)
-----

Epoch 86, Loss 0.430714
Params: %f tensor([0.9852, 0.9852, 0.9913, 0.4852, 0.0852, 0.4913],
dtype=torch.float64)
Grad: %f tensor([1.6990, 1.6990, 0.9941, 1.6990, 1.6990, 0.9941],
dtype=torch.float64)
-----

Epoch 87, Loss 0.430438
Params: %f tensor([0.9850, 0.9850, 0.9912, 0.4850, 0.0850, 0.4912],
dtype=torch.float64)
Grad: %f tensor([1.6984, 1.6984, 0.9937, 1.6984, 1.6984, 0.9937],
dtype=torch.float64)
-----

Epoch 88, Loss 0.430163
Params: %f tensor([0.9848, 0.9848, 0.9911, 0.4848, 0.0848, 0.4911],
dtype=torch.float64)
Grad: %f tensor([1.6978, 1.6978, 0.9933, 1.6978, 1.6978, 0.9933],
dtype=torch.float64)
-----

Epoch 89, Loss 0.429887
Params: %f tensor([0.9847, 0.9847, 0.9910, 0.4847, 0.0847, 0.4910],
dtype=torch.float64)
Grad: %f tensor([1.6972, 1.6972, 0.9929, 1.6972, 1.6972, 0.9929],
dtype=torch.float64)
-----

Epoch 90, Loss 0.429612
Params: %f tensor([0.9845, 0.9845, 0.9909, 0.4845, 0.0845, 0.4909],
dtype=torch.float64)
Grad: %f tensor([1.6966, 1.6966, 0.9925, 1.6966, 1.6966, 0.9925],
dtype=torch.float64)
-----

Epoch 91, Loss 0.429337
Params: %f tensor([0.9843, 0.9843, 0.9908, 0.4843, 0.0843, 0.4908],
dtype=torch.float64)
Grad: %f tensor([1.6959, 1.6959, 0.9921, 1.6959, 1.6959, 0.9921],
dtype=torch.float64)
-----

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Epoch 92, Loss 0.429062
Params: %f tensor([0.9841, 0.9841, 0.9907, 0.4841, 0.0841, 0.4907],
dtype=torch.float64)
Grad: %f tensor([1.6953, 1.6953, 0.9917, 1.6953, 1.6953, 0.9917],
dtype=torch.float64)
-----

Epoch 93, Loss 0.428787
Params: %f tensor([0.9840, 0.9840, 0.9906, 0.4840, 0.0840, 0.4906],
dtype=torch.float64)
Grad: %f tensor([1.6947, 1.6947, 0.9913, 1.6947, 1.6947, 0.9913],
dtype=torch.float64)
-----

Epoch 94, Loss 0.428513
Params: %f tensor([0.9838, 0.9838, 0.9905, 0.4838, 0.0838, 0.4905],
dtype=torch.float64)
Grad: %f tensor([1.6941, 1.6941, 0.9909, 1.6941, 1.6941, 0.9909],
dtype=torch.float64)
-----

Epoch 95, Loss 0.428238
Params: %f tensor([0.9836, 0.9836, 0.9904, 0.4836, 0.0836, 0.4904],
dtype=torch.float64)
Grad: %f tensor([1.6935, 1.6935, 0.9905, 1.6935, 1.6935, 0.9905],
dtype=torch.float64)
-----

Epoch 96, Loss 0.427964
Params: %f tensor([0.9835, 0.9835, 0.9903, 0.4835, 0.0835, 0.4903],
dtype=torch.float64)
Grad: %f tensor([1.6929, 1.6929, 0.9901, 1.6929, 1.6929, 0.9901],
dtype=torch.float64)
-----

Epoch 97, Loss 0.427690
Params: %f tensor([0.9833, 0.9833, 0.9902, 0.4833, 0.0833, 0.4902],
dtype=torch.float64)
Grad: %f tensor([1.6923, 1.6923, 0.9897, 1.6923, 1.6923, 0.9897],
dtype=torch.float64)
-----

Epoch 98, Loss 0.427417
Params: %f tensor([0.9831, 0.9831, 0.9901, 0.4831, 0.0831, 0.4901],
dtype=torch.float64)
Grad: %f tensor([1.6917, 1.6917, 0.9893, 1.6917, 1.6917, 0.9893],
dtype=torch.float64)
-----

Epoch 99, Loss 0.427143
Params: %f tensor([0.9830, 0.9830, 0.9900, 0.4830, 0.0830, 0.4900],
dtype=torch.float64)
Grad: %f tensor([1.6910, 1.6910, 0.9889, 1.6910, 1.6910, 0.9889],
dtype=torch.float64)
-----

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Epoch 100, Loss 0.426870
Params: %f tensor([0.9828, 0.9828, 0.9899, 0.4828, 0.0828, 0.4899],
dtype=torch.float64)
Grad: %f tensor([1.6904, 1.6904, 0.9885, 1.6904, 1.6904, 0.9885],
dtype=torch.float64)
-----

Epoch 101, Loss 0.426597
Params: %f tensor([0.9826, 0.9826, 0.9898, 0.4826, 0.0826, 0.4898],
dtype=torch.float64)
Grad: %f tensor([1.6898, 1.6898, 0.9881, 1.6898, 1.6898, 0.9881],
dtype=torch.float64)
-----

Epoch 102, Loss 0.426324
Params: %f tensor([0.9825, 0.9825, 0.9897, 0.4825, 0.0825, 0.4897],
dtype=torch.float64)
Grad: %f tensor([1.6892, 1.6892, 0.9877, 1.6892, 1.6892, 0.9877],
dtype=torch.float64)
-----

Epoch 103, Loss 0.426051
Params: %f tensor([0.9823, 0.9823, 0.9896, 0.4823, 0.0823, 0.4896],
dtype=torch.float64)
Grad: %f tensor([1.6886, 1.6886, 0.9873, 1.6886, 1.6886, 0.9873],
dtype=torch.float64)
-----

Epoch 104, Loss 0.425778
Params: %f tensor([0.9821, 0.9821, 0.9895, 0.4821, 0.0821, 0.4895],
dtype=torch.float64)
Grad: %f tensor([1.6880, 1.6880, 0.9869, 1.6880, 1.6880, 0.9869],
dtype=torch.float64)
-----

Epoch 105, Loss 0.425506
Params: %f tensor([0.9819, 0.9819, 0.9894, 0.4819, 0.0819, 0.4894],
dtype=torch.float64)
Grad: %f tensor([1.6874, 1.6874, 0.9865, 1.6874, 1.6874, 0.9865],
dtype=torch.float64)
-----

Epoch 106, Loss 0.425234
Params: %f tensor([0.9818, 0.9818, 0.9893, 0.4818, 0.0818, 0.4893],
dtype=torch.float64)
Grad: %f tensor([1.6868, 1.6868, 0.9861, 1.6868, 1.6868, 0.9861],
dtype=torch.float64)
-----

Epoch 107, Loss 0.424962
Params: %f tensor([0.9816, 0.9816, 0.9892, 0.4816, 0.0816, 0.4892],
dtype=torch.float64)
Grad: %f tensor([1.6861, 1.6861, 0.9857, 1.6861, 1.6861, 0.9857],
dtype=torch.float64)
-----

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Epoch 108, Loss 0.424690
Params: %f tensor([0.9814, 0.9814, 0.9891, 0.4814, 0.0814, 0.4891],
dtype=torch.float64)
Grad: %f tensor([1.6855, 1.6855, 0.9853, 1.6855, 1.6855, 0.9853],
dtype=torch.float64)
-----

Epoch 109, Loss 0.424419
Params: %f tensor([0.9813, 0.9813, 0.9890, 0.4813, 0.0813, 0.4890],
dtype=torch.float64)
Grad: %f tensor([1.6849, 1.6849, 0.9849, 1.6849, 1.6849, 0.9849],
dtype=torch.float64)
-----

Epoch 110, Loss 0.424147
Params: %f tensor([0.9811, 0.9811, 0.9889, 0.4811, 0.0811, 0.4889],
dtype=torch.float64)
Grad: %f tensor([1.6843, 1.6843, 0.9845, 1.6843, 1.6843, 0.9845],
dtype=torch.float64)
-----

Epoch 111, Loss 0.423876
Params: %f tensor([0.9809, 0.9809, 0.9888, 0.4809, 0.0809, 0.4888],
dtype=torch.float64)
Grad: %f tensor([1.6837, 1.6837, 0.9841, 1.6837, 1.6837, 0.9841],
dtype=torch.float64)
-----

Epoch 112, Loss 0.423605
Params: %f tensor([0.9808, 0.9808, 0.9887, 0.4808, 0.0808, 0.4887],
dtype=torch.float64)
Grad: %f tensor([1.6831, 1.6831, 0.9837, 1.6831, 1.6831, 0.9837],
dtype=torch.float64)
-----

Epoch 113, Loss 0.423335
Params: %f tensor([0.9806, 0.9806, 0.9886, 0.4806, 0.0806, 0.4886],
dtype=torch.float64)
Grad: %f tensor([1.6825, 1.6825, 0.9833, 1.6825, 1.6825, 0.9833],
dtype=torch.float64)
-----

Epoch 114, Loss 0.423064
Params: %f tensor([0.9804, 0.9804, 0.9885, 0.4804, 0.0804, 0.4885],
dtype=torch.float64)
Grad: %f tensor([1.6819, 1.6819, 0.9829, 1.6819, 1.6819, 0.9829],
dtype=torch.float64)
-----

Epoch 115, Loss 0.422794
Params: %f tensor([0.9803, 0.9803, 0.9884, 0.4803, 0.0803, 0.4884],
dtype=torch.float64)
Grad: %f tensor([1.6813, 1.6813, 0.9825, 1.6813, 1.6813, 0.9825],
dtype=torch.float64)
-----

```

```

Epoch 116, Loss 0.422524
Params: %f tensor([0.9801, 0.9801, 0.9883, 0.4801, 0.0801, 0.4883],
dtype=torch.float64)
Grad: %f tensor([1.6807, 1.6807, 0.9822, 1.6807, 1.6807, 0.9822],
dtype=torch.float64)
-----

Epoch 117, Loss 0.422254
Params: %f tensor([0.9799, 0.9799, 0.9882, 0.4799, 0.0799, 0.4882],
dtype=torch.float64)
Grad: %f tensor([1.6801, 1.6801, 0.9818, 1.6801, 1.6801, 0.9818],
dtype=torch.float64)
-----

Epoch 118, Loss 0.421984
Params: %f tensor([0.9798, 0.9798, 0.9881, 0.4798, 0.0798, 0.4881],
dtype=torch.float64)
Grad: %f tensor([1.6794, 1.6794, 0.9814, 1.6794, 1.6794, 0.9814],
dtype=torch.float64)
-----

Epoch 119, Loss 0.421714
Params: %f tensor([0.9796, 0.9796, 0.9880, 0.4796, 0.0796, 0.4880],
dtype=torch.float64)
Grad: %f tensor([1.6788, 1.6788, 0.9810, 1.6788, 1.6788, 0.9810],
dtype=torch.float64)
-----

Epoch 120, Loss 0.421445
Params: %f tensor([0.9794, 0.9794, 0.9879, 0.4794, 0.0794, 0.4879],
dtype=torch.float64)
Grad: %f tensor([1.6782, 1.6782, 0.9806, 1.6782, 1.6782, 0.9806],
dtype=torch.float64)
-----

Epoch 121, Loss 0.421176
Params: %f tensor([0.9793, 0.9793, 0.9878, 0.4793, 0.0793, 0.4878],
dtype=torch.float64)
Grad: %f tensor([1.6776, 1.6776, 0.9802, 1.6776, 1.6776, 0.9802],
dtype=torch.float64)
-----

Epoch 122, Loss 0.420907
Params: %f tensor([0.9791, 0.9791, 0.9878, 0.4791, 0.0791, 0.4878],
dtype=torch.float64)
Grad: %f tensor([1.6770, 1.6770, 0.9798, 1.6770, 1.6770, 0.9798],
dtype=torch.float64)
-----

Epoch 123, Loss 0.420638
Params: %f tensor([0.9789, 0.9789, 0.9877, 0.4789, 0.0789, 0.4877],
dtype=torch.float64)
Grad: %f tensor([1.6764, 1.6764, 0.9794, 1.6764, 1.6764, 0.9794],
dtype=torch.float64)
-----

```

```

Epoch 124, Loss 0.420369
Params: %f tensor([0.9788, 0.9788, 0.9876, 0.4788, 0.0788, 0.4876],
dtype=torch.float64)
Grad: %f tensor([1.6758, 1.6758, 0.9790, 1.6758, 1.6758, 0.9790],
dtype=torch.float64)
-----

Epoch 125, Loss 0.420101
Params: %f tensor([0.9786, 0.9786, 0.9875, 0.4786, 0.0786, 0.4875],
dtype=torch.float64)
Grad: %f tensor([1.6752, 1.6752, 0.9786, 1.6752, 1.6752, 0.9786],
dtype=torch.float64)
-----

Epoch 126, Loss 0.419833
Params: %f tensor([0.9784, 0.9784, 0.9874, 0.4784, 0.0784, 0.4874],
dtype=torch.float64)
Grad: %f tensor([1.6746, 1.6746, 0.9782, 1.6746, 1.6746, 0.9782],
dtype=torch.float64)
-----

Epoch 127, Loss 0.419565
Params: %f tensor([0.9782, 0.9782, 0.9873, 0.4782, 0.0782, 0.4873],
dtype=torch.float64)
Grad: %f tensor([1.6740, 1.6740, 0.9778, 1.6740, 1.6740, 0.9778],
dtype=torch.float64)
-----

Epoch 128, Loss 0.419297
Params: %f tensor([0.9781, 0.9781, 0.9872, 0.4781, 0.0781, 0.4872],
dtype=torch.float64)
Grad: %f tensor([1.6734, 1.6734, 0.9774, 1.6734, 1.6734, 0.9774],
dtype=torch.float64)
-----

Epoch 129, Loss 0.419029
Params: %f tensor([0.9779, 0.9779, 0.9871, 0.4779, 0.0779, 0.4871],
dtype=torch.float64)
Grad: %f tensor([1.6728, 1.6728, 0.9770, 1.6728, 1.6728, 0.9770],
dtype=torch.float64)
-----

Epoch 130, Loss 0.418762
Params: %f tensor([0.9777, 0.9777, 0.9870, 0.4777, 0.0777, 0.4870],
dtype=torch.float64)
Grad: %f tensor([1.6722, 1.6722, 0.9766, 1.6722, 1.6722, 0.9766],
dtype=torch.float64)
-----

Epoch 131, Loss 0.418495
Params: %f tensor([0.9776, 0.9776, 0.9869, 0.4776, 0.0776, 0.4869],
dtype=torch.float64)
Grad: %f tensor([1.6716, 1.6716, 0.9762, 1.6716, 1.6716, 0.9762],
dtype=torch.float64)
-----

```

```

Epoch 132, Loss 0.418228
Params: %f tensor([0.9774, 0.9774, 0.9868, 0.4774, 0.0774, 0.4868],
dtype=torch.float64)
Grad: %f tensor([1.6710, 1.6710, 0.9758, 1.6710, 1.6710, 0.9758],
dtype=torch.float64)
-----

Epoch 133, Loss 0.417961
Params: %f tensor([0.9772, 0.9772, 0.9867, 0.4772, 0.0772, 0.4867],
dtype=torch.float64)
Grad: %f tensor([1.6703, 1.6703, 0.9755, 1.6703, 1.6703, 0.9755],
dtype=torch.float64)
-----

Epoch 134, Loss 0.417694
Params: %f tensor([0.9771, 0.9771, 0.9866, 0.4771, 0.0771, 0.4866],
dtype=torch.float64)
Grad: %f tensor([1.6697, 1.6697, 0.9751, 1.6697, 1.6697, 0.9751],
dtype=torch.float64)
-----

Epoch 135, Loss 0.417428
Params: %f tensor([0.9769, 0.9769, 0.9865, 0.4769, 0.0769, 0.4865],
dtype=torch.float64)
Grad: %f tensor([1.6691, 1.6691, 0.9747, 1.6691, 1.6691, 0.9747],
dtype=torch.float64)
-----

Epoch 136, Loss 0.417162
Params: %f tensor([0.9767, 0.9767, 0.9864, 0.4767, 0.0767, 0.4864],
dtype=torch.float64)
Grad: %f tensor([1.6685, 1.6685, 0.9743, 1.6685, 1.6685, 0.9743],
dtype=torch.float64)
-----

Epoch 137, Loss 0.416896
Params: %f tensor([0.9766, 0.9766, 0.9863, 0.4766, 0.0766, 0.4863],
dtype=torch.float64)
Grad: %f tensor([1.6679, 1.6679, 0.9739, 1.6679, 1.6679, 0.9739],
dtype=torch.float64)
-----

Epoch 138, Loss 0.416630
Params: %f tensor([0.9764, 0.9764, 0.9862, 0.4764, 0.0764, 0.4862],
dtype=torch.float64)
Grad: %f tensor([1.6673, 1.6673, 0.9735, 1.6673, 1.6673, 0.9735],
dtype=torch.float64)
-----

Epoch 139, Loss 0.416364
Params: %f tensor([0.9762, 0.9762, 0.9861, 0.4762, 0.0762, 0.4861],
dtype=torch.float64)
Grad: %f tensor([1.6667, 1.6667, 0.9731, 1.6667, 1.6667, 0.9731],
dtype=torch.float64)
-----

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```

Epoch 140, Loss 0.416099
Params: %f tensor([0.9761, 0.9761, 0.9860, 0.4761, 0.0761, 0.4860],
dtype=torch.float64)
Grad: %f tensor([1.6661, 1.6661, 0.9727, 1.6661, 1.6661, 0.9727],
dtype=torch.float64)
-----

Epoch 141, Loss 0.415833
Params: %f tensor([0.9759, 0.9759, 0.9859, 0.4759, 0.0759, 0.4859],
dtype=torch.float64)
Grad: %f tensor([1.6655, 1.6655, 0.9723, 1.6655, 1.6655, 0.9723],
dtype=torch.float64)
-----

Epoch 142, Loss 0.415568
Params: %f tensor([0.9757, 0.9757, 0.9858, 0.4757, 0.0757, 0.4858],
dtype=torch.float64)
Grad: %f tensor([1.6649, 1.6649, 0.9719, 1.6649, 1.6649, 0.9719],
dtype=torch.float64)
-----

Epoch 143, Loss 0.415303
Params: %f tensor([0.9756, 0.9756, 0.9857, 0.4756, 0.0756, 0.4857],
dtype=torch.float64)
Grad: %f tensor([1.6643, 1.6643, 0.9715, 1.6643, 1.6643, 0.9715],
dtype=torch.float64)
-----

Epoch 144, Loss 0.415039
Params: %f tensor([0.9754, 0.9754, 0.9856, 0.4754, 0.0754, 0.4856],
dtype=torch.float64)
Grad: %f tensor([1.6637, 1.6637, 0.9711, 1.6637, 1.6637, 0.9711],
dtype=torch.float64)
-----

Epoch 145, Loss 0.414774
Params: %f tensor([0.9752, 0.9752, 0.9855, 0.4752, 0.0752, 0.4855],
dtype=torch.float64)
Grad: %f tensor([1.6631, 1.6631, 0.9707, 1.6631, 1.6631, 0.9707],
dtype=torch.float64)
-----

Epoch 146, Loss 0.414510
Params: %f tensor([0.9751, 0.9751, 0.9854, 0.4751, 0.0751, 0.4854],
dtype=torch.float64)
Grad: %f tensor([1.6625, 1.6625, 0.9704, 1.6625, 1.6625, 0.9704],
dtype=torch.float64)
-----

Epoch 147, Loss 0.414246
Params: %f tensor([0.9749, 0.9749, 0.9853, 0.4749, 0.0749, 0.4853],
dtype=torch.float64)
Grad: %f tensor([1.6619, 1.6619, 0.9700, 1.6619, 1.6619, 0.9700],
dtype=torch.float64)
-----

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Epoch 148, Loss 0.413982
Params: %f tensor([0.9747, 0.9747, 0.9852, 0.4747, 0.0747, 0.4852],
dtype=torch.float64)
Grad: %f tensor([1.6613, 1.6613, 0.9696, 1.6613, 1.6613, 0.9696],
dtype=torch.float64)
-----

Epoch 149, Loss 0.413718
Params: %f tensor([0.9746, 0.9746, 0.9851, 0.4746, 0.0746, 0.4851],
dtype=torch.float64)
Grad: %f tensor([1.6607, 1.6607, 0.9692, 1.6607, 1.6607, 0.9692],
dtype=torch.float64)
-----

Epoch 150, Loss 0.413455
Params: %f tensor([0.9744, 0.9744, 0.9850, 0.4744, 0.0744, 0.4850],
dtype=torch.float64)
Grad: %f tensor([1.6601, 1.6601, 0.9688, 1.6601, 1.6601, 0.9688],
dtype=torch.float64)
-----

Epoch 151, Loss 0.413191
Params: %f tensor([0.9742, 0.9742, 0.9849, 0.4742, 0.0742, 0.4849],
dtype=torch.float64)
Grad: %f tensor([1.6595, 1.6595, 0.9684, 1.6595, 1.6595, 0.9684],
dtype=torch.float64)
-----

Epoch 152, Loss 0.412928
Params: %f tensor([0.9741, 0.9741, 0.9848, 0.4741, 0.0741, 0.4848],
dtype=torch.float64)
Grad: %f tensor([1.6589, 1.6589, 0.9680, 1.6589, 1.6589, 0.9680],
dtype=torch.float64)
-----

Epoch 153, Loss 0.412665
Params: %f tensor([0.9739, 0.9739, 0.9847, 0.4739, 0.0739, 0.4847],
dtype=torch.float64)
Grad: %f tensor([1.6583, 1.6583, 0.9676, 1.6583, 1.6583, 0.9676],
dtype=torch.float64)
-----

Epoch 154, Loss 0.412402
Params: %f tensor([0.9738, 0.9738, 0.9846, 0.4738, 0.0738, 0.4846],
dtype=torch.float64)
Grad: %f tensor([1.6577, 1.6577, 0.9672, 1.6577, 1.6577, 0.9672],
dtype=torch.float64)
-----

Epoch 155, Loss 0.412140
Params: %f tensor([0.9736, 0.9736, 0.9845, 0.4736, 0.0736, 0.4845],
dtype=torch.float64)
Grad: %f tensor([1.6571, 1.6571, 0.9668, 1.6571, 1.6571, 0.9668],
dtype=torch.float64)
-----

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Epoch 156, Loss 0.411877
Params: %f tensor([0.9734, 0.9734, 0.9844, 0.4734, 0.0734, 0.4844],
dtype=torch.float64)
Grad: %f tensor([1.6565, 1.6565, 0.9664, 1.6565, 1.6565, 0.9664],
dtype=torch.float64)
-----

Epoch 157, Loss 0.411615
Params: %f tensor([0.9733, 0.9733, 0.9843, 0.4733, 0.0733, 0.4843],
dtype=torch.float64)
Grad: %f tensor([1.6559, 1.6559, 0.9661, 1.6559, 1.6559, 0.9661],
dtype=torch.float64)
-----

Epoch 158, Loss 0.411353
Params: %f tensor([0.9731, 0.9731, 0.9842, 0.4731, 0.0731, 0.4842],
dtype=torch.float64)
Grad: %f tensor([1.6553, 1.6553, 0.9657, 1.6553, 1.6553, 0.9657],
dtype=torch.float64)
-----

Epoch 159, Loss 0.411091
Params: %f tensor([0.9729, 0.9729, 0.9842, 0.4729, 0.0729, 0.4842],
dtype=torch.float64)
Grad: %f tensor([1.6547, 1.6547, 0.9653, 1.6547, 1.6547, 0.9653],
dtype=torch.float64)
-----

Epoch 160, Loss 0.410830
Params: %f tensor([0.9728, 0.9728, 0.9841, 0.4728, 0.0728, 0.4841],
dtype=torch.float64)
Grad: %f tensor([1.6541, 1.6541, 0.9649, 1.6541, 1.6541, 0.9649],
dtype=torch.float64)
-----

Epoch 161, Loss 0.410568
Params: %f tensor([0.9726, 0.9726, 0.9840, 0.4726, 0.0726, 0.4840],
dtype=torch.float64)
Grad: %f tensor([1.6535, 1.6535, 0.9645, 1.6535, 1.6535, 0.9645],
dtype=torch.float64)
-----

Epoch 162, Loss 0.410307
Params: %f tensor([0.9724, 0.9724, 0.9839, 0.4724, 0.0724, 0.4839],
dtype=torch.float64)
Grad: %f tensor([1.6529, 1.6529, 0.9641, 1.6529, 1.6529, 0.9641],
dtype=torch.float64)
-----

Epoch 163, Loss 0.410046
Params: %f tensor([0.9723, 0.9723, 0.9838, 0.4723, 0.0723, 0.4838],
dtype=torch.float64)
Grad: %f tensor([1.6523, 1.6523, 0.9637, 1.6523, 1.6523, 0.9637],
dtype=torch.float64)
-----

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```

Epoch 164, Loss 0.409785
Params: %f tensor([0.9721, 0.9721, 0.9837, 0.4721, 0.0721, 0.4837],
dtype=torch.float64)
Grad: %f tensor([1.6517, 1.6517, 0.9633, 1.6517, 1.6517, 0.9633],
dtype=torch.float64)
-----

Epoch 165, Loss 0.409524
Params: %f tensor([0.9719, 0.9719, 0.9836, 0.4719, 0.0719, 0.4836],
dtype=torch.float64)
Grad: %f tensor([1.6511, 1.6511, 0.9629, 1.6511, 1.6511, 0.9629],
dtype=torch.float64)
-----

Epoch 166, Loss 0.409264
Params: %f tensor([0.9718, 0.9718, 0.9835, 0.4718, 0.0718, 0.4835],
dtype=torch.float64)
Grad: %f tensor([1.6505, 1.6505, 0.9626, 1.6505, 1.6505, 0.9626],
dtype=torch.float64)
-----

Epoch 167, Loss 0.409004
Params: %f tensor([0.9716, 0.9716, 0.9834, 0.4716, 0.0716, 0.4834],
dtype=torch.float64)
Grad: %f tensor([1.6499, 1.6499, 0.9622, 1.6499, 1.6499, 0.9622],
dtype=torch.float64)
-----

Epoch 168, Loss 0.408744
Params: %f tensor([0.9714, 0.9714, 0.9833, 0.4714, 0.0714, 0.4833],
dtype=torch.float64)
Grad: %f tensor([1.6493, 1.6493, 0.9618, 1.6493, 1.6493, 0.9618],
dtype=torch.float64)
-----

Epoch 169, Loss 0.408484
Params: %f tensor([0.9713, 0.9713, 0.9832, 0.4713, 0.0713, 0.4832],
dtype=torch.float64)
Grad: %f tensor([1.6487, 1.6487, 0.9614, 1.6487, 1.6487, 0.9614],
dtype=torch.float64)
-----

Epoch 170, Loss 0.408224
Params: %f tensor([0.9711, 0.9711, 0.9831, 0.4711, 0.0711, 0.4831],
dtype=torch.float64)
Grad: %f tensor([1.6481, 1.6481, 0.9610, 1.6481, 1.6481, 0.9610],
dtype=torch.float64)
-----

Epoch 171, Loss 0.407964
Params: %f tensor([0.9709, 0.9709, 0.9830, 0.4709, 0.0709, 0.4830],
dtype=torch.float64)
Grad: %f tensor([1.6475, 1.6475, 0.9606, 1.6475, 1.6475, 0.9606],
dtype=torch.float64)
-----

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Epoch 172, Loss 0.407705
Params: %f tensor([0.9708, 0.9708, 0.9829, 0.4708, 0.0708, 0.4829],
dtype=torch.float64)
Grad: %f tensor([1.6469, 1.6469, 0.9602, 1.6469, 1.6469, 0.9602],
dtype=torch.float64)
-----

Epoch 173, Loss 0.407446
Params: %f tensor([0.9706, 0.9706, 0.9828, 0.4706, 0.0706, 0.4828],
dtype=torch.float64)
Grad: %f tensor([1.6463, 1.6463, 0.9598, 1.6463, 1.6463, 0.9598],
dtype=torch.float64)
-----

Epoch 174, Loss 0.407187
Params: %f tensor([0.9704, 0.9704, 0.9827, 0.4704, 0.0704, 0.4827],
dtype=torch.float64)
Grad: %f tensor([1.6457, 1.6457, 0.9595, 1.6457, 1.6457, 0.9595],
dtype=torch.float64)
-----

Epoch 175, Loss 0.406928
Params: %f tensor([0.9703, 0.9703, 0.9826, 0.4703, 0.0703, 0.4826],
dtype=torch.float64)
Grad: %f tensor([1.6451, 1.6451, 0.9591, 1.6451, 1.6451, 0.9591],
dtype=torch.float64)
-----

Epoch 176, Loss 0.406670
Params: %f tensor([0.9701, 0.9701, 0.9825, 0.4701, 0.0701, 0.4825],
dtype=torch.float64)
Grad: %f tensor([1.6445, 1.6445, 0.9587, 1.6445, 1.6445, 0.9587],
dtype=torch.float64)
-----

Epoch 177, Loss 0.406411
Params: %f tensor([0.9700, 0.9700, 0.9824, 0.4700, 0.0700, 0.4824],
dtype=torch.float64)
Grad: %f tensor([1.6439, 1.6439, 0.9583, 1.6439, 1.6439, 0.9583],
dtype=torch.float64)
-----

Epoch 178, Loss 0.406153
Params: %f tensor([0.9698, 0.9698, 0.9823, 0.4698, 0.0698, 0.4823],
dtype=torch.float64)
Grad: %f tensor([1.6434, 1.6434, 0.9579, 1.6434, 1.6434, 0.9579],
dtype=torch.float64)
-----

Epoch 179, Loss 0.405895
Params: %f tensor([0.9696, 0.9696, 0.9822, 0.4696, 0.0696, 0.4822],
dtype=torch.float64)
Grad: %f tensor([1.6428, 1.6428, 0.9575, 1.6428, 1.6428, 0.9575],
dtype=torch.float64)
-----

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Epoch 180, Loss 0.405637
Params: %f tensor([0.9695, 0.9695, 0.9821, 0.4695, 0.0695, 0.4821],
dtype=torch.float64)
Grad: %f tensor([1.6422, 1.6422, 0.9571, 1.6422, 1.6422, 0.9571],
dtype=torch.float64)
-----

Epoch 181, Loss 0.405379
Params: %f tensor([0.9693, 0.9693, 0.9820, 0.4693, 0.0693, 0.4820],
dtype=torch.float64)
Grad: %f tensor([1.6416, 1.6416, 0.9567, 1.6416, 1.6416, 0.9567],
dtype=torch.float64)
-----

Epoch 182, Loss 0.405122
Params: %f tensor([0.9691, 0.9691, 0.9819, 0.4691, 0.0691, 0.4819],
dtype=torch.float64)
Grad: %f tensor([1.6410, 1.6410, 0.9564, 1.6410, 1.6410, 0.9564],
dtype=torch.float64)
-----

Epoch 183, Loss 0.404865
Params: %f tensor([0.9690, 0.9690, 0.9818, 0.4690, 0.0690, 0.4818],
dtype=torch.float64)
Grad: %f tensor([1.6404, 1.6404, 0.9560, 1.6404, 1.6404, 0.9560],
dtype=torch.float64)
-----

Epoch 184, Loss 0.404608
Params: %f tensor([0.9688, 0.9688, 0.9818, 0.4688, 0.0688, 0.4818],
dtype=torch.float64)
Grad: %f tensor([1.6398, 1.6398, 0.9556, 1.6398, 1.6398, 0.9556],
dtype=torch.float64)
-----

Epoch 185, Loss 0.404351
Params: %f tensor([0.9686, 0.9686, 0.9817, 0.4686, 0.0686, 0.4817],
dtype=torch.float64)
Grad: %f tensor([1.6392, 1.6392, 0.9552, 1.6392, 1.6392, 0.9552],
dtype=torch.float64)
-----

Epoch 186, Loss 0.404094
Params: %f tensor([0.9685, 0.9685, 0.9816, 0.4685, 0.0685, 0.4816],
dtype=torch.float64)
Grad: %f tensor([1.6386, 1.6386, 0.9548, 1.6386, 1.6386, 0.9548],
dtype=torch.float64)
-----

Epoch 187, Loss 0.403837
Params: %f tensor([0.9683, 0.9683, 0.9815, 0.4683, 0.0683, 0.4815],
dtype=torch.float64)
Grad: %f tensor([1.6380, 1.6380, 0.9544, 1.6380, 1.6380, 0.9544],
dtype=torch.float64)
-----

```

```

Epoch 188, Loss 0.403581
Params: %f tensor([0.9682, 0.9682, 0.9814, 0.4682, 0.0682, 0.4814],
dtype=torch.float64)
Grad: %f tensor([1.6374, 1.6374, 0.9540, 1.6374, 1.6374, 0.9540],
dtype=torch.float64)
-----

Epoch 189, Loss 0.403325
Params: %f tensor([0.9680, 0.9680, 0.9813, 0.4680, 0.0680, 0.4813],
dtype=torch.float64)
Grad: %f tensor([1.6368, 1.6368, 0.9537, 1.6368, 1.6368, 0.9537],
dtype=torch.float64)
-----

Epoch 190, Loss 0.403069
Params: %f tensor([0.9678, 0.9678, 0.9812, 0.4678, 0.0678, 0.4812],
dtype=torch.float64)
Grad: %f tensor([1.6362, 1.6362, 0.9533, 1.6362, 1.6362, 0.9533],
dtype=torch.float64)
-----

Epoch 191, Loss 0.402813
Params: %f tensor([0.9677, 0.9677, 0.9811, 0.4677, 0.0677, 0.4811],
dtype=torch.float64)
Grad: %f tensor([1.6356, 1.6356, 0.9529, 1.6356, 1.6356, 0.9529],
dtype=torch.float64)
-----

Epoch 192, Loss 0.402558
Params: %f tensor([0.9675, 0.9675, 0.9810, 0.4675, 0.0675, 0.4810],
dtype=torch.float64)
Grad: %f tensor([1.6350, 1.6350, 0.9525, 1.6350, 1.6350, 0.9525],
dtype=torch.float64)
-----

Epoch 193, Loss 0.402302
Params: %f tensor([0.9673, 0.9673, 0.9809, 0.4673, 0.0673, 0.4809],
dtype=torch.float64)
Grad: %f tensor([1.6345, 1.6345, 0.9521, 1.6345, 1.6345, 0.9521],
dtype=torch.float64)
-----

Epoch 194, Loss 0.402047
Params: %f tensor([0.9672, 0.9672, 0.9808, 0.4672, 0.0672, 0.4808],
dtype=torch.float64)
Grad: %f tensor([1.6339, 1.6339, 0.9517, 1.6339, 1.6339, 0.9517],
dtype=torch.float64)
-----

Epoch 195, Loss 0.401792
Params: %f tensor([0.9670, 0.9670, 0.9807, 0.4670, 0.0670, 0.4807],
dtype=torch.float64)
Grad: %f tensor([1.6333, 1.6333, 0.9514, 1.6333, 1.6333, 0.9514],
dtype=torch.float64)
-----

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```

Epoch 196, Loss 0.401537
Params: %f tensor([0.9668, 0.9668, 0.9806, 0.4668, 0.0668, 0.4806],
dtype=torch.float64)
Grad: %f tensor([1.6327, 1.6327, 0.9510, 1.6327, 1.6327, 0.9510],
dtype=torch.float64)
-----

Epoch 197, Loss 0.401282
Params: %f tensor([0.9667, 0.9667, 0.9805, 0.4667, 0.0667, 0.4805],
dtype=torch.float64)
Grad: %f tensor([1.6321, 1.6321, 0.9506, 1.6321, 1.6321, 0.9506],
dtype=torch.float64)
-----

Epoch 198, Loss 0.401028
Params: %f tensor([0.9665, 0.9665, 0.9804, 0.4665, 0.0665, 0.4804],
dtype=torch.float64)
Grad: %f tensor([1.6315, 1.6315, 0.9502, 1.6315, 1.6315, 0.9502],
dtype=torch.float64)
-----

Epoch 199, Loss 0.400774
Params: %f tensor([0.9664, 0.9664, 0.9803, 0.4664, 0.0664, 0.4803],
dtype=torch.float64)
Grad: %f tensor([1.6309, 1.6309, 0.9498, 1.6309, 1.6309, 0.9498],
dtype=torch.float64)
-----

Epoch 200, Loss 0.400519
Params: %f tensor([0.9662, 0.9662, 0.9802, 0.4662, 0.0662, 0.4802],
dtype=torch.float64)
Grad: %f tensor([1.6303, 1.6303, 0.9494, 1.6303, 1.6303, 0.9494],
dtype=torch.float64)
-----

Epoch 201, Loss 0.400266
Params: %f tensor([0.9660, 0.9660, 0.9801, 0.4660, 0.0660, 0.4801],
dtype=torch.float64)
Grad: %f tensor([1.6297, 1.6297, 0.9491, 1.6297, 1.6297, 0.9491],
dtype=torch.float64)
-----

Epoch 202, Loss 0.400012
Params: %f tensor([0.9659, 0.9659, 0.9800, 0.4659, 0.0659, 0.4800],
dtype=torch.float64)
Grad: %f tensor([1.6291, 1.6291, 0.9487, 1.6291, 1.6291, 0.9487],
dtype=torch.float64)
-----

Epoch 203, Loss 0.399758
Params: %f tensor([0.9657, 0.9657, 0.9799, 0.4657, 0.0657, 0.4799],
dtype=torch.float64)
Grad: %f tensor([1.6285, 1.6285, 0.9483, 1.6285, 1.6285, 0.9483],
dtype=torch.float64)
-----

```

```

Epoch 204, Loss 0.399505
Params: %f tensor([0.9655, 0.9655, 0.9798, 0.4655, 0.0655, 0.4798],
dtype=torch.float64)
Grad: %f tensor([1.6280, 1.6280, 0.9479, 1.6280, 1.6280, 0.9479],
dtype=torch.float64)
-----

Epoch 205, Loss 0.399252
Params: %f tensor([0.9654, 0.9654, 0.9798, 0.4654, 0.0654, 0.4798],
dtype=torch.float64)
Grad: %f tensor([1.6274, 1.6274, 0.9475, 1.6274, 1.6274, 0.9475],
dtype=torch.float64)
-----

Epoch 206, Loss 0.398999
Params: %f tensor([0.9652, 0.9652, 0.9797, 0.4652, 0.0652, 0.4797],
dtype=torch.float64)
Grad: %f tensor([1.6268, 1.6268, 0.9471, 1.6268, 1.6268, 0.9471],
dtype=torch.float64)
-----

Epoch 207, Loss 0.398746
Params: %f tensor([0.9651, 0.9651, 0.9796, 0.4651, 0.0651, 0.4796],
dtype=torch.float64)
Grad: %f tensor([1.6262, 1.6262, 0.9468, 1.6262, 1.6262, 0.9468],
dtype=torch.float64)
-----

Epoch 208, Loss 0.398493
Params: %f tensor([0.9649, 0.9649, 0.9795, 0.4649, 0.0649, 0.4795],
dtype=torch.float64)
Grad: %f tensor([1.6256, 1.6256, 0.9464, 1.6256, 1.6256, 0.9464],
dtype=torch.float64)
-----

Epoch 209, Loss 0.398241
Params: %f tensor([0.9647, 0.9647, 0.9794, 0.4647, 0.0647, 0.4794],
dtype=torch.float64)
Grad: %f tensor([1.6250, 1.6250, 0.9460, 1.6250, 1.6250, 0.9460],
dtype=torch.float64)
-----

Epoch 210, Loss 0.397989
Params: %f tensor([0.9646, 0.9646, 0.9793, 0.4646, 0.0646, 0.4793],
dtype=torch.float64)
Grad: %f tensor([1.6244, 1.6244, 0.9456, 1.6244, 1.6244, 0.9456],
dtype=torch.float64)
-----

Epoch 211, Loss 0.397736
Params: %f tensor([0.9644, 0.9644, 0.9792, 0.4644, 0.0644, 0.4792],
dtype=torch.float64)
Grad: %f tensor([1.6238, 1.6238, 0.9452, 1.6238, 1.6238, 0.9452],
dtype=torch.float64)
-----

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Epoch 212, Loss 0.397485
Params: %f tensor([0.9642, 0.9642, 0.9791, 0.4642, 0.0642, 0.4791],
dtype=torch.float64)
Grad: %f tensor([1.6232, 1.6232, 0.9448, 1.6232, 1.6232, 0.9448],
dtype=torch.float64)
-----

Epoch 213, Loss 0.397233
Params: %f tensor([0.9641, 0.9641, 0.9790, 0.4641, 0.0641, 0.4790],
dtype=torch.float64)
Grad: %f tensor([1.6227, 1.6227, 0.9445, 1.6227, 1.6227, 0.9445],
dtype=torch.float64)
-----

Epoch 214, Loss 0.396981
Params: %f tensor([0.9639, 0.9639, 0.9789, 0.4639, 0.0639, 0.4789],
dtype=torch.float64)
Grad: %f tensor([1.6221, 1.6221, 0.9441, 1.6221, 1.6221, 0.9441],
dtype=torch.float64)
-----

Epoch 215, Loss 0.396730
Params: %f tensor([0.9638, 0.9638, 0.9788, 0.4638, 0.0638, 0.4788],
dtype=torch.float64)
Grad: %f tensor([1.6215, 1.6215, 0.9437, 1.6215, 1.6215, 0.9437],
dtype=torch.float64)
-----

Epoch 216, Loss 0.396479
Params: %f tensor([0.9636, 0.9636, 0.9787, 0.4636, 0.0636, 0.4787],
dtype=torch.float64)
Grad: %f tensor([1.6209, 1.6209, 0.9433, 1.6209, 1.6209, 0.9433],
dtype=torch.float64)
-----

Epoch 217, Loss 0.396228
Params: %f tensor([0.9634, 0.9634, 0.9786, 0.4634, 0.0634, 0.4786],
dtype=torch.float64)
Grad: %f tensor([1.6203, 1.6203, 0.9429, 1.6203, 1.6203, 0.9429],
dtype=torch.float64)
-----

Epoch 218, Loss 0.395977
Params: %f tensor([0.9633, 0.9633, 0.9785, 0.4633, 0.0633, 0.4785],
dtype=torch.float64)
Grad: %f tensor([1.6197, 1.6197, 0.9426, 1.6197, 1.6197, 0.9426],
dtype=torch.float64)
-----

Epoch 219, Loss 0.395726
Params: %f tensor([0.9631, 0.9631, 0.9784, 0.4631, 0.0631, 0.4784],
dtype=torch.float64)
Grad: %f tensor([1.6191, 1.6191, 0.9422, 1.6191, 1.6191, 0.9422],
dtype=torch.float64)
-----

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```

Epoch 220, Loss 0.395476
Params: %f tensor([0.9629, 0.9629, 0.9783, 0.4629, 0.0629, 0.4783],
dtype=torch.float64)
Grad: %f tensor([1.6186, 1.6186, 0.9418, 1.6186, 1.6186, 0.9418],
dtype=torch.float64)
-----

Epoch 221, Loss 0.395226
Params: %f tensor([0.9628, 0.9628, 0.9782, 0.4628, 0.0628, 0.4782],
dtype=torch.float64)
Grad: %f tensor([1.6180, 1.6180, 0.9414, 1.6180, 1.6180, 0.9414],
dtype=torch.float64)
-----

Epoch 222, Loss 0.394976
Params: %f tensor([0.9626, 0.9626, 0.9782, 0.4626, 0.0626, 0.4782],
dtype=torch.float64)
Grad: %f tensor([1.6174, 1.6174, 0.9410, 1.6174, 1.6174, 0.9410],
dtype=torch.float64)
-----

Epoch 223, Loss 0.394726
Params: %f tensor([0.9625, 0.9625, 0.9781, 0.4625, 0.0625, 0.4781],
dtype=torch.float64)
Grad: %f tensor([1.6168, 1.6168, 0.9407, 1.6168, 1.6168, 0.9407],
dtype=torch.float64)
-----

Epoch 224, Loss 0.394476
Params: %f tensor([0.9623, 0.9623, 0.9780, 0.4623, 0.0623, 0.4780],
dtype=torch.float64)
Grad: %f tensor([1.6162, 1.6162, 0.9403, 1.6162, 1.6162, 0.9403],
dtype=torch.float64)
-----

Epoch 225, Loss 0.394227
Params: %f tensor([0.9621, 0.9621, 0.9779, 0.4621, 0.0621, 0.4779],
dtype=torch.float64)
Grad: %f tensor([1.6156, 1.6156, 0.9399, 1.6156, 1.6156, 0.9399],
dtype=torch.float64)
-----

Epoch 226, Loss 0.393977
Params: %f tensor([0.9620, 0.9620, 0.9778, 0.4620, 0.0620, 0.4778],
dtype=torch.float64)
Grad: %f tensor([1.6150, 1.6150, 0.9395, 1.6150, 1.6150, 0.9395],
dtype=torch.float64)
-----

Epoch 227, Loss 0.393728
Params: %f tensor([0.9618, 0.9618, 0.9777, 0.4618, 0.0618, 0.4777],
dtype=torch.float64)
Grad: %f tensor([1.6145, 1.6145, 0.9391, 1.6145, 1.6145, 0.9391],
dtype=torch.float64)
-----

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Epoch 228, Loss 0.393479
Params: %f tensor([0.9616, 0.9616, 0.9776, 0.4616, 0.0616, 0.4776],
dtype=torch.float64)
Grad: %f tensor([1.6139, 1.6139, 0.9388, 1.6139, 1.6139, 0.9388],
dtype=torch.float64)
-----

Epoch 229, Loss 0.393230
Params: %f tensor([0.9615, 0.9615, 0.9775, 0.4615, 0.0615, 0.4775],
dtype=torch.float64)
Grad: %f tensor([1.6133, 1.6133, 0.9384, 1.6133, 1.6133, 0.9384],
dtype=torch.float64)
-----

Epoch 230, Loss 0.392982
Params: %f tensor([0.9613, 0.9613, 0.9774, 0.4613, 0.0613, 0.4774],
dtype=torch.float64)
Grad: %f tensor([1.6127, 1.6127, 0.9380, 1.6127, 1.6127, 0.9380],
dtype=torch.float64)
-----

Epoch 231, Loss 0.392733
Params: %f tensor([0.9612, 0.9612, 0.9773, 0.4612, 0.0612, 0.4773],
dtype=torch.float64)
Grad: %f tensor([1.6121, 1.6121, 0.9376, 1.6121, 1.6121, 0.9376],
dtype=torch.float64)
-----

Epoch 232, Loss 0.392485
Params: %f tensor([0.9610, 0.9610, 0.9772, 0.4610, 0.0610, 0.4772],
dtype=torch.float64)
Grad: %f tensor([1.6115, 1.6115, 0.9372, 1.6115, 1.6115, 0.9372],
dtype=torch.float64)
-----

Epoch 233, Loss 0.392237
Params: %f tensor([0.9608, 0.9608, 0.9771, 0.4608, 0.0608, 0.4771],
dtype=torch.float64)
Grad: %f tensor([1.6110, 1.6110, 0.9369, 1.6110, 1.6110, 0.9369],
dtype=torch.float64)
-----

Epoch 234, Loss 0.391989
Params: %f tensor([0.9607, 0.9607, 0.9770, 0.4607, 0.0607, 0.4770],
dtype=torch.float64)
Grad: %f tensor([1.6104, 1.6104, 0.9365, 1.6104, 1.6104, 0.9365],
dtype=torch.float64)
-----

Epoch 235, Loss 0.391741
Params: %f tensor([0.9605, 0.9605, 0.9769, 0.4605, 0.0605, 0.4769],
dtype=torch.float64)
Grad: %f tensor([1.6098, 1.6098, 0.9361, 1.6098, 1.6098, 0.9361],
dtype=torch.float64)
-----

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Epoch 236, Loss 0.391494
Params: %f tensor([0.9604, 0.9604, 0.9768, 0.4604, 0.0604, 0.4768],
dtype=torch.float64)
Grad: %f tensor([1.6092, 1.6092, 0.9357, 1.6092, 1.6092, 0.9357],
dtype=torch.float64)
-----

Epoch 237, Loss 0.391246
Params: %f tensor([0.9602, 0.9602, 0.9767, 0.4602, 0.0602, 0.4767],
dtype=torch.float64)
Grad: %f tensor([1.6086, 1.6086, 0.9353, 1.6086, 1.6086, 0.9353],
dtype=torch.float64)
-----

Epoch 238, Loss 0.390999
Params: %f tensor([0.9600, 0.9600, 0.9766, 0.4600, 0.0600, 0.4766],
dtype=torch.float64)
Grad: %f tensor([1.6080, 1.6080, 0.9350, 1.6080, 1.6080, 0.9350],
dtype=torch.float64)
-----

Epoch 239, Loss 0.390752
Params: %f tensor([0.9599, 0.9599, 0.9766, 0.4599, 0.0599, 0.4766],
dtype=torch.float64)
Grad: %f tensor([1.6075, 1.6075, 0.9346, 1.6075, 1.6075, 0.9346],
dtype=torch.float64)
-----

Epoch 240, Loss 0.390505
Params: %f tensor([0.9597, 0.9597, 0.9765, 0.4597, 0.0597, 0.4765],
dtype=torch.float64)
Grad: %f tensor([1.6069, 1.6069, 0.9342, 1.6069, 1.6069, 0.9342],
dtype=torch.float64)
-----

Epoch 241, Loss 0.390259
Params: %f tensor([0.9596, 0.9596, 0.9764, 0.4596, 0.0596, 0.4764],
dtype=torch.float64)
Grad: %f tensor([1.6063, 1.6063, 0.9338, 1.6063, 1.6063, 0.9338],
dtype=torch.float64)
-----

Epoch 242, Loss 0.390012
Params: %f tensor([0.9594, 0.9594, 0.9763, 0.4594, 0.0594, 0.4763],
dtype=torch.float64)
Grad: %f tensor([1.6057, 1.6057, 0.9334, 1.6057, 1.6057, 0.9334],
dtype=torch.float64)
-----

Epoch 243, Loss 0.389766
Params: %f tensor([0.9592, 0.9592, 0.9762, 0.4592, 0.0592, 0.4762],
dtype=torch.float64)
Grad: %f tensor([1.6051, 1.6051, 0.9331, 1.6051, 1.6051, 0.9331],
dtype=torch.float64)
-----

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Epoch 244, Loss 0.389520
Params: %f tensor([0.9591, 0.9591, 0.9761, 0.4591, 0.0591, 0.4761],
dtype=torch.float64)
Grad: %f tensor([1.6046, 1.6046, 0.9327, 1.6046, 1.6046, 0.9327],
dtype=torch.float64)
-----

Epoch 245, Loss 0.389274
Params: %f tensor([0.9589, 0.9589, 0.9760, 0.4589, 0.0589, 0.4760],
dtype=torch.float64)
Grad: %f tensor([1.6040, 1.6040, 0.9323, 1.6040, 1.6040, 0.9323],
dtype=torch.float64)
-----

Epoch 246, Loss 0.389028
Params: %f tensor([0.9588, 0.9588, 0.9759, 0.4588, 0.0588, 0.4759],
dtype=torch.float64)
Grad: %f tensor([1.6034, 1.6034, 0.9319, 1.6034, 1.6034, 0.9319],
dtype=torch.float64)
-----

Epoch 247, Loss 0.388783
Params: %f tensor([0.9586, 0.9586, 0.9758, 0.4586, 0.0586, 0.4758],
dtype=torch.float64)
Grad: %f tensor([1.6028, 1.6028, 0.9316, 1.6028, 1.6028, 0.9316],
dtype=torch.float64)
-----

Epoch 248, Loss 0.388537
Params: %f tensor([0.9584, 0.9584, 0.9757, 0.4584, 0.0584, 0.4757],
dtype=torch.float64)
Grad: %f tensor([1.6022, 1.6022, 0.9312, 1.6022, 1.6022, 0.9312],
dtype=torch.float64)
-----

Epoch 249, Loss 0.388292
Params: %f tensor([0.9583, 0.9583, 0.9756, 0.4583, 0.0583, 0.4756],
dtype=torch.float64)
Grad: %f tensor([1.6017, 1.6017, 0.9308, 1.6017, 1.6017, 0.9308],
dtype=torch.float64)
-----

Epoch 250, Loss 0.388047
Params: %f tensor([0.9581, 0.9581, 0.9755, 0.4581, 0.0581, 0.4755],
dtype=torch.float64)
Grad: %f tensor([1.6011, 1.6011, 0.9304, 1.6011, 1.6011, 0.9304],
dtype=torch.float64)
-----

Epoch 251, Loss 0.387802
Params: %f tensor([0.9580, 0.9580, 0.9754, 0.4580, 0.0580, 0.4754],
dtype=torch.float64)
Grad: %f tensor([1.6005, 1.6005, 0.9301, 1.6005, 1.6005, 0.9301],
dtype=torch.float64)
-----

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Epoch 252, Loss 0.387558
Params: %f tensor([0.9578, 0.9578, 0.9753, 0.4578, 0.0578, 0.4753],
dtype=torch.float64)
Grad: %f tensor([1.5999, 1.5999, 0.9297, 1.5999, 1.5999, 0.9297],
dtype=torch.float64)
-----

Epoch 253, Loss 0.387313
Params: %f tensor([0.9576, 0.9576, 0.9753, 0.4576, 0.0576, 0.4753],
dtype=torch.float64)
Grad: %f tensor([1.5993, 1.5993, 0.9293, 1.5993, 1.5993, 0.9293],
dtype=torch.float64)
-----

Epoch 254, Loss 0.387069
Params: %f tensor([0.9575, 0.9575, 0.9752, 0.4575, 0.0575, 0.4752],
dtype=torch.float64)
Grad: %f tensor([1.5988, 1.5988, 0.9289, 1.5988, 1.5988, 0.9289],
dtype=torch.float64)
-----

Epoch 255, Loss 0.386825
Params: %f tensor([0.9573, 0.9573, 0.9751, 0.4573, 0.0573, 0.4751],
dtype=torch.float64)
Grad: %f tensor([1.5982, 1.5982, 0.9286, 1.5982, 1.5982, 0.9286],
dtype=torch.float64)
-----

Epoch 256, Loss 0.386581
Params: %f tensor([0.9572, 0.9572, 0.9750, 0.4572, 0.0572, 0.4750],
dtype=torch.float64)
Grad: %f tensor([1.5976, 1.5976, 0.9282, 1.5976, 1.5976, 0.9282],
dtype=torch.float64)
-----

Epoch 257, Loss 0.386337
Params: %f tensor([0.9570, 0.9570, 0.9749, 0.4570, 0.0570, 0.4749],
dtype=torch.float64)
Grad: %f tensor([1.5970, 1.5970, 0.9278, 1.5970, 1.5970, 0.9278],
dtype=torch.float64)
-----

Epoch 258, Loss 0.386093
Params: %f tensor([0.9568, 0.9568, 0.9748, 0.4568, 0.0568, 0.4748],
dtype=torch.float64)
Grad: %f tensor([1.5964, 1.5964, 0.9274, 1.5964, 1.5964, 0.9274],
dtype=torch.float64)
-----

Epoch 259, Loss 0.385850
Params: %f tensor([0.9567, 0.9567, 0.9747, 0.4567, 0.0567, 0.4747],
dtype=torch.float64)
Grad: %f tensor([1.5959, 1.5959, 0.9270, 1.5959, 1.5959, 0.9270],
dtype=torch.float64)
-----

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```

Epoch 260, Loss 0.385607
Params: %f tensor([0.9565, 0.9565, 0.9746, 0.4565, 0.0565, 0.4746],
dtype=torch.float64)
Grad: %f tensor([1.5953, 1.5953, 0.9267, 1.5953, 1.5953, 0.9267],
dtype=torch.float64)
-----

Epoch 261, Loss 0.385364
Params: %f tensor([0.9564, 0.9564, 0.9745, 0.4564, 0.0564, 0.4745],
dtype=torch.float64)
Grad: %f tensor([1.5947, 1.5947, 0.9263, 1.5947, 1.5947, 0.9263],
dtype=torch.float64)
-----

Epoch 262, Loss 0.385121
Params: %f tensor([0.9562, 0.9562, 0.9744, 0.4562, 0.0562, 0.4744],
dtype=torch.float64)
Grad: %f tensor([1.5941, 1.5941, 0.9259, 1.5941, 1.5941, 0.9259],
dtype=torch.float64)
-----

Epoch 263, Loss 0.384878
Params: %f tensor([0.9560, 0.9560, 0.9743, 0.4560, 0.0560, 0.4743],
dtype=torch.float64)
Grad: %f tensor([1.5936, 1.5936, 0.9255, 1.5936, 1.5936, 0.9255],
dtype=torch.float64)
-----

Epoch 264, Loss 0.384636
Params: %f tensor([0.9559, 0.9559, 0.9742, 0.4559, 0.0559, 0.4742],
dtype=torch.float64)
Grad: %f tensor([1.5930, 1.5930, 0.9252, 1.5930, 1.5930, 0.9252],
dtype=torch.float64)
-----

Epoch 265, Loss 0.384393
Params: %f tensor([0.9557, 0.9557, 0.9741, 0.4557, 0.0557, 0.4741],
dtype=torch.float64)
Grad: %f tensor([1.5924, 1.5924, 0.9248, 1.5924, 1.5924, 0.9248],
dtype=torch.float64)
-----

Epoch 266, Loss 0.384151
Params: %f tensor([0.9556, 0.9556, 0.9740, 0.4556, 0.0556, 0.4740],
dtype=torch.float64)
Grad: %f tensor([1.5918, 1.5918, 0.9244, 1.5918, 1.5918, 0.9244],
dtype=torch.float64)
-----

Epoch 267, Loss 0.383909
Params: %f tensor([0.9554, 0.9554, 0.9740, 0.4554, 0.0554, 0.4740],
dtype=torch.float64)
Grad: %f tensor([1.5913, 1.5913, 0.9240, 1.5913, 1.5913, 0.9240],
dtype=torch.float64)
-----

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```

Epoch 268, Loss 0.383667
Params: %f tensor([0.9552, 0.9552, 0.9739, 0.4552, 0.0552, 0.4739],
dtype=torch.float64)
Grad: %f tensor([1.5907, 1.5907, 0.9237, 1.5907, 1.5907, 0.9237],
dtype=torch.float64)
-----

Epoch 269, Loss 0.383426
Params: %f tensor([0.9551, 0.9551, 0.9738, 0.4551, 0.0551, 0.4738],
dtype=torch.float64)
Grad: %f tensor([1.5901, 1.5901, 0.9233, 1.5901, 1.5901, 0.9233],
dtype=torch.float64)
-----

Epoch 270, Loss 0.383184
Params: %f tensor([0.9549, 0.9549, 0.9737, 0.4549, 0.0549, 0.4737],
dtype=torch.float64)
Grad: %f tensor([1.5895, 1.5895, 0.9229, 1.5895, 1.5895, 0.9229],
dtype=torch.float64)
-----

Epoch 271, Loss 0.382943
Params: %f tensor([0.9548, 0.9548, 0.9736, 0.4548, 0.0548, 0.4736],
dtype=torch.float64)
Grad: %f tensor([1.5889, 1.5889, 0.9226, 1.5889, 1.5889, 0.9226],
dtype=torch.float64)
-----

Epoch 272, Loss 0.382702
Params: %f tensor([0.9546, 0.9546, 0.9735, 0.4546, 0.0546, 0.4735],
dtype=torch.float64)
Grad: %f tensor([1.5884, 1.5884, 0.9222, 1.5884, 1.5884, 0.9222],
dtype=torch.float64)
-----

Epoch 273, Loss 0.382461
Params: %f tensor([0.9544, 0.9544, 0.9734, 0.4544, 0.0544, 0.4734],
dtype=torch.float64)
Grad: %f tensor([1.5878, 1.5878, 0.9218, 1.5878, 1.5878, 0.9218],
dtype=torch.float64)
-----

Epoch 274, Loss 0.382220
Params: %f tensor([0.9543, 0.9543, 0.9733, 0.4543, 0.0543, 0.4733],
dtype=torch.float64)
Grad: %f tensor([1.5872, 1.5872, 0.9214, 1.5872, 1.5872, 0.9214],
dtype=torch.float64)
-----

Epoch 275, Loss 0.381979
Params: %f tensor([0.9541, 0.9541, 0.9732, 0.4541, 0.0541, 0.4732],
dtype=torch.float64)
Grad: %f tensor([1.5867, 1.5867, 0.9211, 1.5867, 1.5867, 0.9211],
dtype=torch.float64)
-----

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Epoch 276, Loss 0.381739
Params: %f tensor([0.9540, 0.9540, 0.9731, 0.4540, 0.0540, 0.4731],
dtype=torch.float64)
Grad: %f tensor([1.5861, 1.5861, 0.9207, 1.5861, 1.5861, 0.9207],
dtype=torch.float64)
-----

Epoch 277, Loss 0.381499
Params: %f tensor([0.9538, 0.9538, 0.9730, 0.4538, 0.0538, 0.4730],
dtype=torch.float64)
Grad: %f tensor([1.5855, 1.5855, 0.9203, 1.5855, 1.5855, 0.9203],
dtype=torch.float64)
-----

Epoch 278, Loss 0.381259
Params: %f tensor([0.9537, 0.9537, 0.9729, 0.4537, 0.0537, 0.4729],
dtype=torch.float64)
Grad: %f tensor([1.5849, 1.5849, 0.9199, 1.5849, 1.5849, 0.9199],
dtype=torch.float64)
-----

Epoch 279, Loss 0.381019
Params: %f tensor([0.9535, 0.9535, 0.9728, 0.4535, 0.0535, 0.4728],
dtype=torch.float64)
Grad: %f tensor([1.5844, 1.5844, 0.9196, 1.5844, 1.5844, 0.9196],
dtype=torch.float64)
-----

Epoch 280, Loss 0.380779
Params: %f tensor([0.9533, 0.9533, 0.9728, 0.4533, 0.0533, 0.4728],
dtype=torch.float64)
Grad: %f tensor([1.5838, 1.5838, 0.9192, 1.5838, 1.5838, 0.9192],
dtype=torch.float64)
-----

Epoch 281, Loss 0.380539
Params: %f tensor([0.9532, 0.9532, 0.9727, 0.4532, 0.0532, 0.4727],
dtype=torch.float64)
Grad: %f tensor([1.5832, 1.5832, 0.9188, 1.5832, 1.5832, 0.9188],
dtype=torch.float64)
-----

Epoch 282, Loss 0.380300
Params: %f tensor([0.9530, 0.9530, 0.9726, 0.4530, 0.0530, 0.4726],
dtype=torch.float64)
Grad: %f tensor([1.5826, 1.5826, 0.9184, 1.5826, 1.5826, 0.9184],
dtype=torch.float64)
-----

Epoch 283, Loss 0.380061
Params: %f tensor([0.9529, 0.9529, 0.9725, 0.4529, 0.0529, 0.4725],
dtype=torch.float64)
Grad: %f tensor([1.5821, 1.5821, 0.9181, 1.5821, 1.5821, 0.9181],
dtype=torch.float64)
-----

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```

Epoch 284, Loss 0.379822
Params: %f tensor([0.9527, 0.9527, 0.9724, 0.4527, 0.0527, 0.4724],
dtype=torch.float64)
Grad: %f tensor([1.5815, 1.5815, 0.9177, 1.5815, 1.5815, 0.9177],
dtype=torch.float64)
-----

Epoch 285, Loss 0.379583
Params: %f tensor([0.9525, 0.9525, 0.9723, 0.4525, 0.0525, 0.4723],
dtype=torch.float64)
Grad: %f tensor([1.5809, 1.5809, 0.9173, 1.5809, 1.5809, 0.9173],
dtype=torch.float64)
-----

Epoch 286, Loss 0.379344
Params: %f tensor([0.9524, 0.9524, 0.9722, 0.4524, 0.0524, 0.4722],
dtype=torch.float64)
Grad: %f tensor([1.5803, 1.5803, 0.9170, 1.5803, 1.5803, 0.9170],
dtype=torch.float64)
-----

Epoch 287, Loss 0.379106
Params: %f tensor([0.9522, 0.9522, 0.9721, 0.4522, 0.0522, 0.4721],
dtype=torch.float64)
Grad: %f tensor([1.5798, 1.5798, 0.9166, 1.5798, 1.5798, 0.9166],
dtype=torch.float64)
-----

Epoch 288, Loss 0.378868
Params: %f tensor([0.9521, 0.9521, 0.9720, 0.4521, 0.0521, 0.4720],
dtype=torch.float64)
Grad: %f tensor([1.5792, 1.5792, 0.9162, 1.5792, 1.5792, 0.9162],
dtype=torch.float64)
-----

Epoch 289, Loss 0.378629
Params: %f tensor([0.9519, 0.9519, 0.9719, 0.4519, 0.0519, 0.4719],
dtype=torch.float64)
Grad: %f tensor([1.5786, 1.5786, 0.9158, 1.5786, 1.5786, 0.9158],
dtype=torch.float64)
-----

Epoch 290, Loss 0.378391
Params: %f tensor([0.9518, 0.9518, 0.9718, 0.4518, 0.0518, 0.4718],
dtype=torch.float64)
Grad: %f tensor([1.5781, 1.5781, 0.9155, 1.5781, 1.5781, 0.9155],
dtype=torch.float64)
-----

Epoch 291, Loss 0.378154
Params: %f tensor([0.9516, 0.9516, 0.9717, 0.4516, 0.0516, 0.4717],
dtype=torch.float64)
Grad: %f tensor([1.5775, 1.5775, 0.9151, 1.5775, 1.5775, 0.9151],
dtype=torch.float64)
-----

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```

Epoch 292, Loss 0.377916
Params: %f tensor([0.9514, 0.9514, 0.9717, 0.4514, 0.0514, 0.4717],
dtype=torch.float64)
Grad: %f tensor([1.5769, 1.5769, 0.9147, 1.5769, 1.5769, 0.9147],
dtype=torch.float64)
-----

Epoch 293, Loss 0.377678
Params: %f tensor([0.9513, 0.9513, 0.9716, 0.4513, 0.0513, 0.4716],
dtype=torch.float64)
Grad: %f tensor([1.5763, 1.5763, 0.9144, 1.5763, 1.5763, 0.9144],
dtype=torch.float64)
-----

Epoch 294, Loss 0.377441
Params: %f tensor([0.9511, 0.9511, 0.9715, 0.4511, 0.0511, 0.4715],
dtype=torch.float64)
Grad: %f tensor([1.5758, 1.5758, 0.9140, 1.5758, 1.5758, 0.9140],
dtype=torch.float64)
-----

Epoch 295, Loss 0.377204
Params: %f tensor([0.9510, 0.9510, 0.9714, 0.4510, 0.0510, 0.4714],
dtype=torch.float64)
Grad: %f tensor([1.5752, 1.5752, 0.9136, 1.5752, 1.5752, 0.9136],
dtype=torch.float64)
-----

Epoch 296, Loss 0.376967
Params: %f tensor([0.9508, 0.9508, 0.9713, 0.4508, 0.0508, 0.4713],
dtype=torch.float64)
Grad: %f tensor([1.5746, 1.5746, 0.9133, 1.5746, 1.5746, 0.9133],
dtype=torch.float64)
-----

Epoch 297, Loss 0.376730
Params: %f tensor([0.9507, 0.9507, 0.9712, 0.4507, 0.0507, 0.4712],
dtype=torch.float64)
Grad: %f tensor([1.5741, 1.5741, 0.9129, 1.5741, 1.5741, 0.9129],
dtype=torch.float64)
-----

Epoch 298, Loss 0.376494
Params: %f tensor([0.9505, 0.9505, 0.9711, 0.4505, 0.0505, 0.4711],
dtype=torch.float64)
Grad: %f tensor([1.5735, 1.5735, 0.9125, 1.5735, 1.5735, 0.9125],
dtype=torch.float64)
-----

Epoch 299, Loss 0.376257
Params: %f tensor([0.9503, 0.9503, 0.9710, 0.4503, 0.0503, 0.4710],
dtype=torch.float64)
Grad: %f tensor([1.5729, 1.5729, 0.9121, 1.5729, 1.5729, 0.9121],
dtype=torch.float64)
-----

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Epoch 300, Loss 0.376021
Params: %f tensor([0.9502, 0.9502, 0.9709, 0.4502, 0.0502, 0.4709],
dtype=torch.float64)
Grad: %f tensor([1.5724, 1.5724, 0.9118, 1.5724, 1.5724, 0.9118],
dtype=torch.float64)
-----

Epoch 301, Loss 0.375785
Params: %f tensor([0.9500, 0.9500, 0.9708, 0.4500, 0.0500, 0.4708],
dtype=torch.float64)
Grad: %f tensor([1.5718, 1.5718, 0.9114, 1.5718, 1.5718, 0.9114],
dtype=torch.float64)
-----

Epoch 302, Loss 0.375549
Params: %f tensor([0.9499, 0.9499, 0.9707, 0.4499, 0.0499, 0.4707],
dtype=torch.float64)
Grad: %f tensor([1.5712, 1.5712, 0.9110, 1.5712, 1.5712, 0.9110],
dtype=torch.float64)
-----

Epoch 303, Loss 0.375313
Params: %f tensor([0.9497, 0.9497, 0.9707, 0.4497, 0.0497, 0.4707],
dtype=torch.float64)
Grad: %f tensor([1.5707, 1.5707, 0.9107, 1.5707, 1.5707, 0.9107],
dtype=torch.float64)
-----

Epoch 304, Loss 0.375078
Params: %f tensor([0.9496, 0.9496, 0.9706, 0.4496, 0.0496, 0.4706],
dtype=torch.float64)
Grad: %f tensor([1.5701, 1.5701, 0.9103, 1.5701, 1.5701, 0.9103],
dtype=torch.float64)
-----

Epoch 305, Loss 0.374842
Params: %f tensor([0.9494, 0.9494, 0.9705, 0.4494, 0.0494, 0.4705],
dtype=torch.float64)
Grad: %f tensor([1.5695, 1.5695, 0.9099, 1.5695, 1.5695, 0.9099],
dtype=torch.float64)
-----

Epoch 306, Loss 0.374607
Params: %f tensor([0.9492, 0.9492, 0.9704, 0.4492, 0.0492, 0.4704],
dtype=torch.float64)
Grad: %f tensor([1.5689, 1.5689, 0.9096, 1.5689, 1.5689, 0.9096],
dtype=torch.float64)
-----

Epoch 307, Loss 0.374372
Params: %f tensor([0.9491, 0.9491, 0.9703, 0.4491, 0.0491, 0.4703],
dtype=torch.float64)
Grad: %f tensor([1.5684, 1.5684, 0.9092, 1.5684, 1.5684, 0.9092],
dtype=torch.float64)
-----

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Epoch 308, Loss 0.374137
Params: %f tensor([0.9489, 0.9489, 0.9702, 0.4489, 0.0489, 0.4702],
dtype=torch.float64)
Grad: %f tensor([1.5678, 1.5678, 0.9088, 1.5678, 1.5678, 0.9088],
dtype=torch.float64)
-----

Epoch 309, Loss 0.373903
Params: %f tensor([0.9488, 0.9488, 0.9701, 0.4488, 0.0488, 0.4701],
dtype=torch.float64)
Grad: %f tensor([1.5672, 1.5672, 0.9084, 1.5672, 1.5672, 0.9084],
dtype=torch.float64)
-----

Epoch 310, Loss 0.373668
Params: %f tensor([0.9486, 0.9486, 0.9700, 0.4486, 0.0486, 0.4700],
dtype=torch.float64)
Grad: %f tensor([1.5667, 1.5667, 0.9081, 1.5667, 1.5667, 0.9081],
dtype=torch.float64)
-----

Epoch 311, Loss 0.373434
Params: %f tensor([0.9485, 0.9485, 0.9699, 0.4485, 0.0485, 0.4699],
dtype=torch.float64)
Grad: %f tensor([1.5661, 1.5661, 0.9077, 1.5661, 1.5661, 0.9077],
dtype=torch.float64)
-----

Epoch 312, Loss 0.373199
Params: %f tensor([0.9483, 0.9483, 0.9698, 0.4483, 0.0483, 0.4698],
dtype=torch.float64)
Grad: %f tensor([1.5655, 1.5655, 0.9073, 1.5655, 1.5655, 0.9073],
dtype=torch.float64)
-----

Epoch 313, Loss 0.372965
Params: %f tensor([0.9481, 0.9481, 0.9697, 0.4481, 0.0481, 0.4697],
dtype=torch.float64)
Grad: %f tensor([1.5650, 1.5650, 0.9070, 1.5650, 1.5650, 0.9070],
dtype=torch.float64)
-----

Epoch 314, Loss 0.372732
Params: %f tensor([0.9480, 0.9480, 0.9697, 0.4480, 0.0480, 0.4697],
dtype=torch.float64)
Grad: %f tensor([1.5644, 1.5644, 0.9066, 1.5644, 1.5644, 0.9066],
dtype=torch.float64)
-----

Epoch 315, Loss 0.372498
Params: %f tensor([0.9478, 0.9478, 0.9696, 0.4478, 0.0478, 0.4696],
dtype=torch.float64)
Grad: %f tensor([1.5638, 1.5638, 0.9062, 1.5638, 1.5638, 0.9062],
dtype=torch.float64)
-----

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Epoch 316, Loss 0.372264
Params: %f tensor([0.9477, 0.9477, 0.9695, 0.4477, 0.0477, 0.4695],
dtype=torch.float64)
Grad: %f tensor([1.5633, 1.5633, 0.9059, 1.5633, 1.5633, 0.9059],
dtype=torch.float64)
-----

Epoch 317, Loss 0.372031
Params: %f tensor([0.9475, 0.9475, 0.9694, 0.4475, 0.0475, 0.4694],
dtype=torch.float64)
Grad: %f tensor([1.5627, 1.5627, 0.9055, 1.5627, 1.5627, 0.9055],
dtype=torch.float64)
-----

Epoch 318, Loss 0.371798
Params: %f tensor([0.9474, 0.9474, 0.9693, 0.4474, 0.0474, 0.4693],
dtype=torch.float64)
Grad: %f tensor([1.5621, 1.5621, 0.9051, 1.5621, 1.5621, 0.9051],
dtype=torch.float64)
-----

Epoch 319, Loss 0.371565
Params: %f tensor([0.9472, 0.9472, 0.9692, 0.4472, 0.0472, 0.4692],
dtype=torch.float64)
Grad: %f tensor([1.5616, 1.5616, 0.9048, 1.5616, 1.5616, 0.9048],
dtype=torch.float64)
-----

Epoch 320, Loss 0.371332
Params: %f tensor([0.9470, 0.9470, 0.9691, 0.4470, 0.0470, 0.4691],
dtype=torch.float64)
Grad: %f tensor([1.5610, 1.5610, 0.9044, 1.5610, 1.5610, 0.9044],
dtype=torch.float64)
-----

Epoch 321, Loss 0.371099
Params: %f tensor([0.9469, 0.9469, 0.9690, 0.4469, 0.0469, 0.4690],
dtype=torch.float64)
Grad: %f tensor([1.5605, 1.5605, 0.9040, 1.5605, 1.5605, 0.9040],
dtype=torch.float64)
-----

Epoch 322, Loss 0.370867
Params: %f tensor([0.9467, 0.9467, 0.9689, 0.4467, 0.0467, 0.4689],
dtype=torch.float64)
Grad: %f tensor([1.5599, 1.5599, 0.9037, 1.5599, 1.5599, 0.9037],
dtype=torch.float64)
-----

Epoch 323, Loss 0.370635
Params: %f tensor([0.9466, 0.9466, 0.9688, 0.4466, 0.0466, 0.4688],
dtype=torch.float64)
Grad: %f tensor([1.5593, 1.5593, 0.9033, 1.5593, 1.5593, 0.9033],
dtype=torch.float64)
-----

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Epoch 324, Loss 0.370402
Params: %f tensor([0.9464, 0.9464, 0.9687, 0.4464, 0.0464, 0.4687],
dtype=torch.float64)
Grad: %f tensor([1.5588, 1.5588, 0.9029, 1.5588, 1.5588, 0.9029],
dtype=torch.float64)
-----

Epoch 325, Loss 0.370170
Params: %f tensor([0.9463, 0.9463, 0.9687, 0.4463, 0.0463, 0.4687],
dtype=torch.float64)
Grad: %f tensor([1.5582, 1.5582, 0.9026, 1.5582, 1.5582, 0.9026],
dtype=torch.float64)
-----

Epoch 326, Loss 0.369939
Params: %f tensor([0.9461, 0.9461, 0.9686, 0.4461, 0.0461, 0.4686],
dtype=torch.float64)
Grad: %f tensor([1.5576, 1.5576, 0.9022, 1.5576, 1.5576, 0.9022],
dtype=torch.float64)
-----

Epoch 327, Loss 0.369707
Params: %f tensor([0.9460, 0.9460, 0.9685, 0.4460, 0.0460, 0.4685],
dtype=torch.float64)
Grad: %f tensor([1.5571, 1.5571, 0.9018, 1.5571, 1.5571, 0.9018],
dtype=torch.float64)
-----

Epoch 328, Loss 0.369475
Params: %f tensor([0.9458, 0.9458, 0.9684, 0.4458, 0.0458, 0.4684],
dtype=torch.float64)
Grad: %f tensor([1.5565, 1.5565, 0.9015, 1.5565, 1.5565, 0.9015],
dtype=torch.float64)
-----

Epoch 329, Loss 0.369244
Params: %f tensor([0.9456, 0.9456, 0.9683, 0.4456, 0.0456, 0.4683],
dtype=torch.float64)
Grad: %f tensor([1.5559, 1.5559, 0.9011, 1.5559, 1.5559, 0.9011],
dtype=torch.float64)
-----

Epoch 330, Loss 0.369013
Params: %f tensor([0.9455, 0.9455, 0.9682, 0.4455, 0.0455, 0.4682],
dtype=torch.float64)
Grad: %f tensor([1.5554, 1.5554, 0.9007, 1.5554, 1.5554, 0.9007],
dtype=torch.float64)
-----

Epoch 331, Loss 0.368782
Params: %f tensor([0.9453, 0.9453, 0.9681, 0.4453, 0.0453, 0.4681],
dtype=torch.float64)
Grad: %f tensor([1.5548, 1.5548, 0.9004, 1.5548, 1.5548, 0.9004],
dtype=torch.float64)
-----

```

```

Epoch 332, Loss 0.368551
Params: %f tensor([0.9452, 0.9452, 0.9680, 0.4452, 0.0452, 0.4680],
dtype=torch.float64)
Grad: %f tensor([1.5543, 1.5543, 0.9000, 1.5543, 1.5543, 0.9000],
dtype=torch.float64)
-----

Epoch 333, Loss 0.368321
Params: %f tensor([0.9450, 0.9450, 0.9679, 0.4450, 0.0450, 0.4679],
dtype=torch.float64)
Grad: %f tensor([1.5537, 1.5537, 0.8996, 1.5537, 1.5537, 0.8996],
dtype=torch.float64)
-----

Epoch 334, Loss 0.368090
Params: %f tensor([0.9449, 0.9449, 0.9678, 0.4449, 0.0449, 0.4678],
dtype=torch.float64)
Grad: %f tensor([1.5531, 1.5531, 0.8993, 1.5531, 1.5531, 0.8993],
dtype=torch.float64)
-----

Epoch 335, Loss 0.367860
Params: %f tensor([0.9447, 0.9447, 0.9678, 0.4447, 0.0447, 0.4678],
dtype=torch.float64)
Grad: %f tensor([1.5526, 1.5526, 0.8989, 1.5526, 1.5526, 0.8989],
dtype=torch.float64)
-----

Epoch 336, Loss 0.367630
Params: %f tensor([0.9446, 0.9446, 0.9677, 0.4446, 0.0446, 0.4677],
dtype=torch.float64)
Grad: %f tensor([1.5520, 1.5520, 0.8985, 1.5520, 1.5520, 0.8985],
dtype=torch.float64)
-----

Epoch 337, Loss 0.367400
Params: %f tensor([0.9444, 0.9444, 0.9676, 0.4444, 0.0444, 0.4676],
dtype=torch.float64)
Grad: %f tensor([1.5514, 1.5514, 0.8982, 1.5514, 1.5514, 0.8982],
dtype=torch.float64)
-----

Epoch 338, Loss 0.367170
Params: %f tensor([0.9442, 0.9442, 0.9675, 0.4442, 0.0442, 0.4675],
dtype=torch.float64)
Grad: %f tensor([1.5509, 1.5509, 0.8978, 1.5509, 1.5509, 0.8978],
dtype=torch.float64)
-----

Epoch 339, Loss 0.366940
Params: %f tensor([0.9441, 0.9441, 0.9674, 0.4441, 0.0441, 0.4674],
dtype=torch.float64)
Grad: %f tensor([1.5503, 1.5503, 0.8974, 1.5503, 1.5503, 0.8974],
dtype=torch.float64)
-----

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Epoch 340, Loss 0.366711
Params: %f tensor([0.9439, 0.9439, 0.9673, 0.4439, 0.0439, 0.4673],
dtype=torch.float64)
Grad: %f tensor([1.5498, 1.5498, 0.8971, 1.5498, 1.5498, 0.8971],
dtype=torch.float64)
-----

Epoch 341, Loss 0.366482
Params: %f tensor([0.9438, 0.9438, 0.9672, 0.4438, 0.0438, 0.4672],
dtype=torch.float64)
Grad: %f tensor([1.5492, 1.5492, 0.8967, 1.5492, 1.5492, 0.8967],
dtype=torch.float64)
-----

Epoch 342, Loss 0.366252
Params: %f tensor([0.9436, 0.9436, 0.9671, 0.4436, 0.0436, 0.4671],
dtype=torch.float64)
Grad: %f tensor([1.5486, 1.5486, 0.8964, 1.5486, 1.5486, 0.8964],
dtype=torch.float64)
-----

Epoch 343, Loss 0.366023
Params: %f tensor([0.9435, 0.9435, 0.9670, 0.4435, 0.0435, 0.4670],
dtype=torch.float64)
Grad: %f tensor([1.5481, 1.5481, 0.8960, 1.5481, 1.5481, 0.8960],
dtype=torch.float64)
-----

Epoch 344, Loss 0.365795
Params: %f tensor([0.9433, 0.9433, 0.9670, 0.4433, 0.0433, 0.4670],
dtype=torch.float64)
Grad: %f tensor([1.5475, 1.5475, 0.8956, 1.5475, 1.5475, 0.8956],
dtype=torch.float64)
-----

Epoch 345, Loss 0.365566
Params: %f tensor([0.9432, 0.9432, 0.9669, 0.4432, 0.0432, 0.4669],
dtype=torch.float64)
Grad: %f tensor([1.5470, 1.5470, 0.8953, 1.5470, 1.5470, 0.8953],
dtype=torch.float64)
-----

Epoch 346, Loss 0.365338
Params: %f tensor([0.9430, 0.9430, 0.9668, 0.4430, 0.0430, 0.4668],
dtype=torch.float64)
Grad: %f tensor([1.5464, 1.5464, 0.8949, 1.5464, 1.5464, 0.8949],
dtype=torch.float64)
-----

Epoch 347, Loss 0.365109
Params: %f tensor([0.9429, 0.9429, 0.9667, 0.4429, 0.0429, 0.4667],
dtype=torch.float64)
Grad: %f tensor([1.5458, 1.5458, 0.8945, 1.5458, 1.5458, 0.8945],
dtype=torch.float64)
-----

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Epoch 348, Loss 0.364881
Params: %f tensor([0.9427, 0.9427, 0.9666, 0.4427, 0.0427, 0.4666],
dtype=torch.float64)
Grad: %f tensor([1.5453, 1.5453, 0.8942, 1.5453, 1.5453, 0.8942],
dtype=torch.float64)
-----

Epoch 349, Loss 0.364653
Params: %f tensor([0.9425, 0.9425, 0.9665, 0.4425, 0.0425, 0.4665],
dtype=torch.float64)
Grad: %f tensor([1.5447, 1.5447, 0.8938, 1.5447, 1.5447, 0.8938],
dtype=torch.float64)
-----

Epoch 350, Loss 0.364425
Params: %f tensor([0.9424, 0.9424, 0.9664, 0.4424, 0.0424, 0.4664],
dtype=torch.float64)
Grad: %f tensor([1.5442, 1.5442, 0.8934, 1.5442, 1.5442, 0.8934],
dtype=torch.float64)
-----

Epoch 351, Loss 0.364198
Params: %f tensor([0.9422, 0.9422, 0.9663, 0.4422, 0.0422, 0.4663],
dtype=torch.float64)
Grad: %f tensor([1.5436, 1.5436, 0.8931, 1.5436, 1.5436, 0.8931],
dtype=torch.float64)
-----

Epoch 352, Loss 0.363970
Params: %f tensor([0.9421, 0.9421, 0.9662, 0.4421, 0.0421, 0.4662],
dtype=torch.float64)
Grad: %f tensor([1.5430, 1.5430, 0.8927, 1.5430, 1.5430, 0.8927],
dtype=torch.float64)
-----

Epoch 353, Loss 0.363743
Params: %f tensor([0.9419, 0.9419, 0.9661, 0.4419, 0.0419, 0.4661],
dtype=torch.float64)
Grad: %f tensor([1.5425, 1.5425, 0.8924, 1.5425, 1.5425, 0.8924],
dtype=torch.float64)
-----

Epoch 354, Loss 0.363516
Params: %f tensor([0.9418, 0.9418, 0.9661, 0.4418, 0.0418, 0.4661],
dtype=torch.float64)
Grad: %f tensor([1.5419, 1.5419, 0.8920, 1.5419, 1.5419, 0.8920],
dtype=torch.float64)
-----

Epoch 355, Loss 0.363289
Params: %f tensor([0.9416, 0.9416, 0.9660, 0.4416, 0.0416, 0.4660],
dtype=torch.float64)
Grad: %f tensor([1.5414, 1.5414, 0.8916, 1.5414, 1.5414, 0.8916],
dtype=torch.float64)
-----

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Epoch 356, Loss 0.363062
Params: %f tensor([0.9415, 0.9415, 0.9659, 0.4415, 0.0415, 0.4659],
dtype=torch.float64)
Grad: %f tensor([1.5408, 1.5408, 0.8913, 1.5408, 1.5408, 0.8913],
dtype=torch.float64)
-----

Epoch 357, Loss 0.362835
Params: %f tensor([0.9413, 0.9413, 0.9658, 0.4413, 0.0413, 0.4658],
dtype=torch.float64)
Grad: %f tensor([1.5403, 1.5403, 0.8909, 1.5403, 1.5403, 0.8909],
dtype=torch.float64)
-----

Epoch 358, Loss 0.362609
Params: %f tensor([0.9412, 0.9412, 0.9657, 0.4412, 0.0412, 0.4657],
dtype=torch.float64)
Grad: %f tensor([1.5397, 1.5397, 0.8905, 1.5397, 1.5397, 0.8905],
dtype=torch.float64)
-----

Epoch 359, Loss 0.362383
Params: %f tensor([0.9410, 0.9410, 0.9656, 0.4410, 0.0410, 0.4656],
dtype=torch.float64)
Grad: %f tensor([1.5391, 1.5391, 0.8902, 1.5391, 1.5391, 0.8902],
dtype=torch.float64)
-----

Epoch 360, Loss 0.362156
Params: %f tensor([0.9409, 0.9409, 0.9655, 0.4409, 0.0409, 0.4655],
dtype=torch.float64)
Grad: %f tensor([1.5386, 1.5386, 0.8898, 1.5386, 1.5386, 0.8898],
dtype=torch.float64)
-----

Epoch 361, Loss 0.361930
Params: %f tensor([0.9407, 0.9407, 0.9654, 0.4407, 0.0407, 0.4654],
dtype=torch.float64)
Grad: %f tensor([1.5380, 1.5380, 0.8895, 1.5380, 1.5380, 0.8895],
dtype=torch.float64)
-----

Epoch 362, Loss 0.361705
Params: %f tensor([0.9405, 0.9405, 0.9653, 0.4405, 0.0405, 0.4653],
dtype=torch.float64)
Grad: %f tensor([1.5375, 1.5375, 0.8891, 1.5375, 1.5375, 0.8891],
dtype=torch.float64)
-----

Epoch 363, Loss 0.361479
Params: %f tensor([0.9404, 0.9404, 0.9653, 0.4404, 0.0404, 0.4653],
dtype=torch.float64)
Grad: %f tensor([1.5369, 1.5369, 0.8887, 1.5369, 1.5369, 0.8887],
dtype=torch.float64)
-----

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Epoch 364, Loss 0.361254
Params: %f tensor([0.9402, 0.9402, 0.9652, 0.4402, 0.0402, 0.4652],
dtype=torch.float64)
Grad: %f tensor([1.5364, 1.5364, 0.8884, 1.5364, 1.5364, 0.8884],
dtype=torch.float64)
-----

Epoch 365, Loss 0.361028
Params: %f tensor([0.9401, 0.9401, 0.9651, 0.4401, 0.0401, 0.4651],
dtype=torch.float64)
Grad: %f tensor([1.5358, 1.5358, 0.8880, 1.5358, 1.5358, 0.8880],
dtype=torch.float64)
-----

Epoch 366, Loss 0.360803
Params: %f tensor([0.9399, 0.9399, 0.9650, 0.4399, 0.0399, 0.4650],
dtype=torch.float64)
Grad: %f tensor([1.5352, 1.5352, 0.8877, 1.5352, 1.5352, 0.8877],
dtype=torch.float64)
-----

Epoch 367, Loss 0.360578
Params: %f tensor([0.9398, 0.9398, 0.9649, 0.4398, 0.0398, 0.4649],
dtype=torch.float64)
Grad: %f tensor([1.5347, 1.5347, 0.8873, 1.5347, 1.5347, 0.8873],
dtype=torch.float64)
-----

Epoch 368, Loss 0.360353
Params: %f tensor([0.9396, 0.9396, 0.9648, 0.4396, 0.0396, 0.4648],
dtype=torch.float64)
Grad: %f tensor([1.5341, 1.5341, 0.8869, 1.5341, 1.5341, 0.8869],
dtype=torch.float64)
-----

Epoch 369, Loss 0.360129
Params: %f tensor([0.9395, 0.9395, 0.9647, 0.4395, 0.0395, 0.4647],
dtype=torch.float64)
Grad: %f tensor([1.5336, 1.5336, 0.8866, 1.5336, 1.5336, 0.8866],
dtype=torch.float64)
-----

Epoch 370, Loss 0.359904
Params: %f tensor([0.9393, 0.9393, 0.9646, 0.4393, 0.0393, 0.4646],
dtype=torch.float64)
Grad: %f tensor([1.5330, 1.5330, 0.8862, 1.5330, 1.5330, 0.8862],
dtype=torch.float64)
-----

Epoch 371, Loss 0.359680
Params: %f tensor([0.9392, 0.9392, 0.9645, 0.4392, 0.0392, 0.4645],
dtype=torch.float64)
Grad: %f tensor([1.5325, 1.5325, 0.8858, 1.5325, 1.5325, 0.8858],
dtype=torch.float64)
-----

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Epoch 372, Loss 0.359456
Params: %f tensor([0.9390, 0.9390, 0.9645, 0.4390, 0.0390, 0.4645],
dtype=torch.float64)
Grad: %f tensor([1.5319, 1.5319, 0.8855, 1.5319, 1.5319, 0.8855],
dtype=torch.float64)
-----

Epoch 373, Loss 0.359232
Params: %f tensor([0.9389, 0.9389, 0.9644, 0.4389, 0.0389, 0.4644],
dtype=torch.float64)
Grad: %f tensor([1.5314, 1.5314, 0.8851, 1.5314, 1.5314, 0.8851],
dtype=torch.float64)
-----

Epoch 374, Loss 0.359008
Params: %f tensor([0.9387, 0.9387, 0.9643, 0.4387, 0.0387, 0.4643],
dtype=torch.float64)
Grad: %f tensor([1.5308, 1.5308, 0.8848, 1.5308, 1.5308, 0.8848],
dtype=torch.float64)
-----

Epoch 375, Loss 0.358784
Params: %f tensor([0.9385, 0.9385, 0.9642, 0.4385, 0.0385, 0.4642],
dtype=torch.float64)
Grad: %f tensor([1.5303, 1.5303, 0.8844, 1.5303, 1.5303, 0.8844],
dtype=torch.float64)
-----

Epoch 376, Loss 0.358560
Params: %f tensor([0.9384, 0.9384, 0.9641, 0.4384, 0.0384, 0.4641],
dtype=torch.float64)
Grad: %f tensor([1.5297, 1.5297, 0.8840, 1.5297, 1.5297, 0.8840],
dtype=torch.float64)
-----

Epoch 377, Loss 0.358337
Params: %f tensor([0.9382, 0.9382, 0.9640, 0.4382, 0.0382, 0.4640],
dtype=torch.float64)
Grad: %f tensor([1.5291, 1.5291, 0.8837, 1.5291, 1.5291, 0.8837],
dtype=torch.float64)
-----

Epoch 378, Loss 0.358114
Params: %f tensor([0.9381, 0.9381, 0.9639, 0.4381, 0.0381, 0.4639],
dtype=torch.float64)
Grad: %f tensor([1.5286, 1.5286, 0.8833, 1.5286, 1.5286, 0.8833],
dtype=torch.float64)
-----

Epoch 379, Loss 0.357891
Params: %f tensor([0.9379, 0.9379, 0.9638, 0.4379, 0.0379, 0.4638],
dtype=torch.float64)
Grad: %f tensor([1.5280, 1.5280, 0.8830, 1.5280, 1.5280, 0.8830],
dtype=torch.float64)
-----

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Epoch 380, Loss 0.357668
Params: %f tensor([0.9378, 0.9378, 0.9638, 0.4378, 0.0378, 0.4638],
dtype=torch.float64)
Grad: %f tensor([1.5275, 1.5275, 0.8826, 1.5275, 1.5275, 0.8826],
dtype=torch.float64)
-----

Epoch 381, Loss 0.357445
Params: %f tensor([0.9376, 0.9376, 0.9637, 0.4376, 0.0376, 0.4637],
dtype=torch.float64)
Grad: %f tensor([1.5269, 1.5269, 0.8822, 1.5269, 1.5269, 0.8822],
dtype=torch.float64)
-----

Epoch 382, Loss 0.357223
Params: %f tensor([0.9375, 0.9375, 0.9636, 0.4375, 0.0375, 0.4636],
dtype=torch.float64)
Grad: %f tensor([1.5264, 1.5264, 0.8819, 1.5264, 1.5264, 0.8819],
dtype=torch.float64)
-----

Epoch 383, Loss 0.357000
Params: %f tensor([0.9373, 0.9373, 0.9635, 0.4373, 0.0373, 0.4635],
dtype=torch.float64)
Grad: %f tensor([1.5258, 1.5258, 0.8815, 1.5258, 1.5258, 0.8815],
dtype=torch.float64)
-----

Epoch 384, Loss 0.356778
Params: %f tensor([0.9372, 0.9372, 0.9634, 0.4372, 0.0372, 0.4634],
dtype=torch.float64)
Grad: %f tensor([1.5253, 1.5253, 0.8812, 1.5253, 1.5253, 0.8812],
dtype=torch.float64)
-----

Epoch 385, Loss 0.356556
Params: %f tensor([0.9370, 0.9370, 0.9633, 0.4370, 0.0370, 0.4633],
dtype=torch.float64)
Grad: %f tensor([1.5247, 1.5247, 0.8808, 1.5247, 1.5247, 0.8808],
dtype=torch.float64)
-----

Epoch 386, Loss 0.356334
Params: %f tensor([0.9369, 0.9369, 0.9632, 0.4369, 0.0369, 0.4632],
dtype=torch.float64)
Grad: %f tensor([1.5242, 1.5242, 0.8805, 1.5242, 1.5242, 0.8805],
dtype=torch.float64)
-----

Epoch 387, Loss 0.356112
Params: %f tensor([0.9367, 0.9367, 0.9631, 0.4367, 0.0367, 0.4631],
dtype=torch.float64)
Grad: %f tensor([1.5236, 1.5236, 0.8801, 1.5236, 1.5236, 0.8801],
dtype=torch.float64)
-----

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Epoch 388, Loss 0.355891
Params: %f tensor([0.9366, 0.9366, 0.9630, 0.4366, 0.0366, 0.4630],
dtype=torch.float64)
Grad: %f tensor([1.5231, 1.5231, 0.8797, 1.5231, 1.5231, 0.8797],
dtype=torch.float64)
-----

Epoch 389, Loss 0.355669
Params: %f tensor([0.9364, 0.9364, 0.9630, 0.4364, 0.0364, 0.4630],
dtype=torch.float64)
Grad: %f tensor([1.5225, 1.5225, 0.8794, 1.5225, 1.5225, 0.8794],
dtype=torch.float64)
-----

Epoch 390, Loss 0.355448
Params: %f tensor([0.9363, 0.9363, 0.9629, 0.4363, 0.0363, 0.4629],
dtype=torch.float64)
Grad: %f tensor([1.5220, 1.5220, 0.8790, 1.5220, 1.5220, 0.8790],
dtype=torch.float64)
-----

Epoch 391, Loss 0.355227
Params: %f tensor([0.9361, 0.9361, 0.9628, 0.4361, 0.0361, 0.4628],
dtype=torch.float64)
Grad: %f tensor([1.5214, 1.5214, 0.8787, 1.5214, 1.5214, 0.8787],
dtype=torch.float64)
-----

Epoch 392, Loss 0.355006
Params: %f tensor([0.9360, 0.9360, 0.9627, 0.4360, 0.0360, 0.4627],
dtype=torch.float64)
Grad: %f tensor([1.5209, 1.5209, 0.8783, 1.5209, 1.5209, 0.8783],
dtype=torch.float64)
-----

Epoch 393, Loss 0.354785
Params: %f tensor([0.9358, 0.9358, 0.9626, 0.4358, 0.0358, 0.4626],
dtype=torch.float64)
Grad: %f tensor([1.5203, 1.5203, 0.8780, 1.5203, 1.5203, 0.8780],
dtype=torch.float64)
-----

Epoch 394, Loss 0.354565
Params: %f tensor([0.9357, 0.9357, 0.9625, 0.4357, 0.0357, 0.4625],
dtype=torch.float64)
Grad: %f tensor([1.5198, 1.5198, 0.8776, 1.5198, 1.5198, 0.8776],
dtype=torch.float64)
-----

Epoch 395, Loss 0.354344
Params: %f tensor([0.9355, 0.9355, 0.9624, 0.4355, 0.0355, 0.4624],
dtype=torch.float64)
Grad: %f tensor([1.5192, 1.5192, 0.8772, 1.5192, 1.5192, 0.8772],
dtype=torch.float64)
-----

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Epoch 396, Loss 0.354124
Params: %f tensor([0.9353, 0.9353, 0.9623, 0.4353, 0.0353, 0.4623],
dtype=torch.float64)
Grad: %f tensor([1.5187, 1.5187, 0.8769, 1.5187, 1.5187, 0.8769],
dtype=torch.float64)
-----

Epoch 397, Loss 0.353904
Params: %f tensor([0.9352, 0.9352, 0.9623, 0.4352, 0.0352, 0.4623],
dtype=torch.float64)
Grad: %f tensor([1.5181, 1.5181, 0.8765, 1.5181, 1.5181, 0.8765],
dtype=torch.float64)
-----

Epoch 398, Loss 0.353684
Params: %f tensor([0.9350, 0.9350, 0.9622, 0.4350, 0.0350, 0.4622],
dtype=torch.float64)
Grad: %f tensor([1.5176, 1.5176, 0.8762, 1.5176, 1.5176, 0.8762],
dtype=torch.float64)
-----

Epoch 399, Loss 0.353464
Params: %f tensor([0.9349, 0.9349, 0.9621, 0.4349, 0.0349, 0.4621],
dtype=torch.float64)
Grad: %f tensor([1.5170, 1.5170, 0.8758, 1.5170, 1.5170, 0.8758],
dtype=torch.float64)
-----

Epoch 400, Loss 0.353244
Params: %f tensor([0.9347, 0.9347, 0.9620, 0.4347, 0.0347, 0.4620],
dtype=torch.float64)
Grad: %f tensor([1.5165, 1.5165, 0.8755, 1.5165, 1.5165, 0.8755],
dtype=torch.float64)
-----

Epoch 401, Loss 0.353025
Params: %f tensor([0.9346, 0.9346, 0.9619, 0.4346, 0.0346, 0.4619],
dtype=torch.float64)
Grad: %f tensor([1.5159, 1.5159, 0.8751, 1.5159, 1.5159, 0.8751],
dtype=torch.float64)
-----

Epoch 402, Loss 0.352806
Params: %f tensor([0.9344, 0.9344, 0.9618, 0.4344, 0.0344, 0.4618],
dtype=torch.float64)
Grad: %f tensor([1.5154, 1.5154, 0.8747, 1.5154, 1.5154, 0.8747],
dtype=torch.float64)
-----

Epoch 403, Loss 0.352586
Params: %f tensor([0.9343, 0.9343, 0.9617, 0.4343, 0.0343, 0.4617],
dtype=torch.float64)
Grad: %f tensor([1.5148, 1.5148, 0.8744, 1.5148, 1.5148, 0.8744],
dtype=torch.float64)
-----

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Epoch 404, Loss 0.352367
Params: %f tensor([0.9341, 0.9341, 0.9616, 0.4341, 0.0341, 0.4616],
dtype=torch.float64)
Grad: %f tensor([1.5143, 1.5143, 0.8740, 1.5143, 1.5143, 0.8740],
dtype=torch.float64)
-----

Epoch 405, Loss 0.352149
Params: %f tensor([0.9340, 0.9340, 0.9616, 0.4340, 0.0340, 0.4616],
dtype=torch.float64)
Grad: %f tensor([1.5137, 1.5137, 0.8737, 1.5137, 1.5137, 0.8737],
dtype=torch.float64)
-----

Epoch 406, Loss 0.351930
Params: %f tensor([0.9338, 0.9338, 0.9615, 0.4338, 0.0338, 0.4615],
dtype=torch.float64)
Grad: %f tensor([1.5132, 1.5132, 0.8733, 1.5132, 1.5132, 0.8733],
dtype=torch.float64)
-----

Epoch 407, Loss 0.351711
Params: %f tensor([0.9337, 0.9337, 0.9614, 0.4337, 0.0337, 0.4614],
dtype=torch.float64)
Grad: %f tensor([1.5126, 1.5126, 0.8730, 1.5126, 1.5126, 0.8730],
dtype=torch.float64)
-----

Epoch 408, Loss 0.351493
Params: %f tensor([0.9335, 0.9335, 0.9613, 0.4335, 0.0335, 0.4613],
dtype=torch.float64)
Grad: %f tensor([1.5121, 1.5121, 0.8726, 1.5121, 1.5121, 0.8726],
dtype=torch.float64)
-----

Epoch 409, Loss 0.351275
Params: %f tensor([0.9334, 0.9334, 0.9612, 0.4334, 0.0334, 0.4612],
dtype=torch.float64)
Grad: %f tensor([1.5115, 1.5115, 0.8722, 1.5115, 1.5115, 0.8722],
dtype=torch.float64)
-----

Epoch 410, Loss 0.351057
Params: %f tensor([0.9332, 0.9332, 0.9611, 0.4332, 0.0332, 0.4611],
dtype=torch.float64)
Grad: %f tensor([1.5110, 1.5110, 0.8719, 1.5110, 1.5110, 0.8719],
dtype=torch.float64)
-----

Epoch 411, Loss 0.350839
Params: %f tensor([0.9331, 0.9331, 0.9610, 0.4331, 0.0331, 0.4610],
dtype=torch.float64)
Grad: %f tensor([1.5105, 1.5105, 0.8715, 1.5105, 1.5105, 0.8715],
dtype=torch.float64)
-----

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```

Epoch 412, Loss 0.350621
Params: %f tensor([0.9329, 0.9329, 0.9609, 0.4329, 0.0329, 0.4609],
dtype=torch.float64)
Grad: %f tensor([1.5099, 1.5099, 0.8712, 1.5099, 1.5099, 0.8712],
dtype=torch.float64)
-----

Epoch 413, Loss 0.350404
Params: %f tensor([0.9328, 0.9328, 0.9609, 0.4328, 0.0328, 0.4609],
dtype=torch.float64)
Grad: %f tensor([1.5094, 1.5094, 0.8708, 1.5094, 1.5094, 0.8708],
dtype=torch.float64)
-----

Epoch 414, Loss 0.350186
Params: %f tensor([0.9326, 0.9326, 0.9608, 0.4326, 0.0326, 0.4608],
dtype=torch.float64)
Grad: %f tensor([1.5088, 1.5088, 0.8705, 1.5088, 1.5088, 0.8705],
dtype=torch.float64)
-----

Epoch 415, Loss 0.349969
Params: %f tensor([0.9325, 0.9325, 0.9607, 0.4325, 0.0325, 0.4607],
dtype=torch.float64)
Grad: %f tensor([1.5083, 1.5083, 0.8701, 1.5083, 1.5083, 0.8701],
dtype=torch.float64)
-----

Epoch 416, Loss 0.349752
Params: %f tensor([0.9323, 0.9323, 0.9606, 0.4323, 0.0323, 0.4606],
dtype=torch.float64)
Grad: %f tensor([1.5077, 1.5077, 0.8698, 1.5077, 1.5077, 0.8698],
dtype=torch.float64)
-----

Epoch 417, Loss 0.349535
Params: %f tensor([0.9322, 0.9322, 0.9605, 0.4322, 0.0322, 0.4605],
dtype=torch.float64)
Grad: %f tensor([1.5072, 1.5072, 0.8694, 1.5072, 1.5072, 0.8694],
dtype=torch.float64)
-----

Epoch 418, Loss 0.349318
Params: %f tensor([0.9320, 0.9320, 0.9604, 0.4320, 0.0320, 0.4604],
dtype=torch.float64)
Grad: %f tensor([1.5066, 1.5066, 0.8691, 1.5066, 1.5066, 0.8691],
dtype=torch.float64)
-----

Epoch 419, Loss 0.349101
Params: %f tensor([0.9319, 0.9319, 0.9603, 0.4319, 0.0319, 0.4603],
dtype=torch.float64)
Grad: %f tensor([1.5061, 1.5061, 0.8687, 1.5061, 1.5061, 0.8687],
dtype=torch.float64)
-----

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Epoch 420, Loss 0.348885
Params: %f tensor([0.9317, 0.9317, 0.9602, 0.4317, 0.0317, 0.4602],
dtype=torch.float64)
Grad: %f tensor([1.5055, 1.5055, 0.8683, 1.5055, 1.5055, 0.8683],
dtype=torch.float64)
-----

Epoch 421, Loss 0.348669
Params: %f tensor([0.9316, 0.9316, 0.9602, 0.4316, 0.0316, 0.4602],
dtype=torch.float64)
Grad: %f tensor([1.5050, 1.5050, 0.8680, 1.5050, 1.5050, 0.8680],
dtype=torch.float64)
-----

Epoch 422, Loss 0.348452
Params: %f tensor([0.9314, 0.9314, 0.9601, 0.4314, 0.0314, 0.4601],
dtype=torch.float64)
Grad: %f tensor([1.5045, 1.5045, 0.8676, 1.5045, 1.5045, 0.8676],
dtype=torch.float64)
-----

Epoch 423, Loss 0.348236
Params: %f tensor([0.9313, 0.9313, 0.9600, 0.4313, 0.0313, 0.4600],
dtype=torch.float64)
Grad: %f tensor([1.5039, 1.5039, 0.8673, 1.5039, 1.5039, 0.8673],
dtype=torch.float64)
-----

Epoch 424, Loss 0.348021
Params: %f tensor([0.9311, 0.9311, 0.9599, 0.4311, 0.0311, 0.4599],
dtype=torch.float64)
Grad: %f tensor([1.5034, 1.5034, 0.8669, 1.5034, 1.5034, 0.8669],
dtype=torch.float64)
-----

Epoch 425, Loss 0.347805
Params: %f tensor([0.9310, 0.9310, 0.9598, 0.4310, 0.0310, 0.4598],
dtype=torch.float64)
Grad: %f tensor([1.5028, 1.5028, 0.8666, 1.5028, 1.5028, 0.8666],
dtype=torch.float64)
-----

Epoch 426, Loss 0.347589
Params: %f tensor([0.9308, 0.9308, 0.9597, 0.4308, 0.0308, 0.4597],
dtype=torch.float64)
Grad: %f tensor([1.5023, 1.5023, 0.8662, 1.5023, 1.5023, 0.8662],
dtype=torch.float64)
-----

Epoch 427, Loss 0.347374
Params: %f tensor([0.9307, 0.9307, 0.9596, 0.4307, 0.0307, 0.4596],
dtype=torch.float64)
Grad: %f tensor([1.5017, 1.5017, 0.8659, 1.5017, 1.5017, 0.8659],
dtype=torch.float64)
-----

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Epoch 428, Loss 0.347159
Params: %f tensor([0.9305, 0.9305, 0.9596, 0.4305, 0.0305, 0.4596],
dtype=torch.float64)
Grad: %f tensor([1.5012, 1.5012, 0.8655, 1.5012, 1.5012, 0.8655],
dtype=torch.float64)
-----

Epoch 429, Loss 0.346944
Params: %f tensor([0.9304, 0.9304, 0.9595, 0.4304, 0.0304, 0.4595],
dtype=torch.float64)
Grad: %f tensor([1.5006, 1.5006, 0.8652, 1.5006, 1.5006, 0.8652],
dtype=torch.float64)
-----

Epoch 430, Loss 0.346729
Params: %f tensor([0.9302, 0.9302, 0.9594, 0.4302, 0.0302, 0.4594],
dtype=torch.float64)
Grad: %f tensor([1.5001, 1.5001, 0.8648, 1.5001, 1.5001, 0.8648],
dtype=torch.float64)
-----

Epoch 431, Loss 0.346514
Params: %f tensor([0.9301, 0.9301, 0.9593, 0.4301, 0.0301, 0.4593],
dtype=torch.float64)
Grad: %f tensor([1.4996, 1.4996, 0.8645, 1.4996, 1.4996, 0.8645],
dtype=torch.float64)
-----

Epoch 432, Loss 0.346300
Params: %f tensor([0.9299, 0.9299, 0.9592, 0.4299, 0.0299, 0.4592],
dtype=torch.float64)
Grad: %f tensor([1.4990, 1.4990, 0.8641, 1.4990, 1.4990, 0.8641],
dtype=torch.float64)
-----

Epoch 433, Loss 0.346085
Params: %f tensor([0.9298, 0.9298, 0.9591, 0.4298, 0.0298, 0.4591],
dtype=torch.float64)
Grad: %f tensor([1.4985, 1.4985, 0.8638, 1.4985, 1.4985, 0.8638],
dtype=torch.float64)
-----

Epoch 434, Loss 0.345871
Params: %f tensor([0.9296, 0.9296, 0.9590, 0.4296, 0.0296, 0.4590],
dtype=torch.float64)
Grad: %f tensor([1.4979, 1.4979, 0.8634, 1.4979, 1.4979, 0.8634],
dtype=torch.float64)
-----

Epoch 435, Loss 0.345657
Params: %f tensor([0.9295, 0.9295, 0.9590, 0.4295, 0.0295, 0.4590],
dtype=torch.float64)
Grad: %f tensor([1.4974, 1.4974, 0.8630, 1.4974, 1.4974, 0.8630],
dtype=torch.float64)
-----

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Epoch 436, Loss 0.345443
Params: %f tensor([0.9293, 0.9293, 0.9589, 0.4293, 0.0293, 0.4589],
dtype=torch.float64)
Grad: %f tensor([1.4969, 1.4969, 0.8627, 1.4969, 1.4969, 0.8627],
dtype=torch.float64)
-----

Epoch 437, Loss 0.345229
Params: %f tensor([0.9292, 0.9292, 0.9588, 0.4292, 0.0292, 0.4588],
dtype=torch.float64)
Grad: %f tensor([1.4963, 1.4963, 0.8623, 1.4963, 1.4963, 0.8623],
dtype=torch.float64)
-----

Epoch 438, Loss 0.345015
Params: %f tensor([0.9290, 0.9290, 0.9587, 0.4290, 0.0290, 0.4587],
dtype=torch.float64)
Grad: %f tensor([1.4958, 1.4958, 0.8620, 1.4958, 1.4958, 0.8620],
dtype=torch.float64)
-----

Epoch 439, Loss 0.344802
Params: %f tensor([0.9289, 0.9289, 0.9586, 0.4289, 0.0289, 0.4586],
dtype=torch.float64)
Grad: %f tensor([1.4952, 1.4952, 0.8616, 1.4952, 1.4952, 0.8616],
dtype=torch.float64)
-----

Epoch 440, Loss 0.344589
Params: %f tensor([0.9287, 0.9287, 0.9585, 0.4287, 0.0287, 0.4585],
dtype=torch.float64)
Grad: %f tensor([1.4947, 1.4947, 0.8613, 1.4947, 1.4947, 0.8613],
dtype=torch.float64)
-----

Epoch 441, Loss 0.344375
Params: %f tensor([0.9286, 0.9286, 0.9584, 0.4286, 0.0286, 0.4584],
dtype=torch.float64)
Grad: %f tensor([1.4941, 1.4941, 0.8609, 1.4941, 1.4941, 0.8609],
dtype=torch.float64)
-----

Epoch 442, Loss 0.344162
Params: %f tensor([0.9284, 0.9284, 0.9583, 0.4284, 0.0284, 0.4583],
dtype=torch.float64)
Grad: %f tensor([1.4936, 1.4936, 0.8606, 1.4936, 1.4936, 0.8606],
dtype=torch.float64)
-----

Epoch 443, Loss 0.343949
Params: %f tensor([0.9283, 0.9283, 0.9583, 0.4283, 0.0283, 0.4583],
dtype=torch.float64)
Grad: %f tensor([1.4931, 1.4931, 0.8602, 1.4931, 1.4931, 0.8602],
dtype=torch.float64)
-----

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Epoch 444, Loss 0.343737
Params: %f tensor([0.9281, 0.9281, 0.9582, 0.4281, 0.0281, 0.4582],
dtype=torch.float64)
Grad: %f tensor([1.4925, 1.4925, 0.8599, 1.4925, 1.4925, 0.8599],
dtype=torch.float64)
-----

Epoch 445, Loss 0.343524
Params: %f tensor([0.9280, 0.9280, 0.9581, 0.4280, 0.0280, 0.4581],
dtype=torch.float64)
Grad: %f tensor([1.4920, 1.4920, 0.8595, 1.4920, 1.4920, 0.8595],
dtype=torch.float64)
-----

Epoch 446, Loss 0.343312
Params: %f tensor([0.9278, 0.9278, 0.9580, 0.4278, 0.0278, 0.4580],
dtype=torch.float64)
Grad: %f tensor([1.4914, 1.4914, 0.8592, 1.4914, 1.4914, 0.8592],
dtype=torch.float64)
-----

Epoch 447, Loss 0.343099
Params: %f tensor([0.9277, 0.9277, 0.9579, 0.4277, 0.0277, 0.4579],
dtype=torch.float64)
Grad: %f tensor([1.4909, 1.4909, 0.8588, 1.4909, 1.4909, 0.8588],
dtype=torch.float64)
-----

Epoch 448, Loss 0.342887
Params: %f tensor([0.9275, 0.9275, 0.9578, 0.4275, 0.0275, 0.4578],
dtype=torch.float64)
Grad: %f tensor([1.4904, 1.4904, 0.8585, 1.4904, 1.4904, 0.8585],
dtype=torch.float64)
-----

Epoch 449, Loss 0.342675
Params: %f tensor([0.9274, 0.9274, 0.9577, 0.4274, 0.0274, 0.4577],
dtype=torch.float64)
Grad: %f tensor([1.4898, 1.4898, 0.8581, 1.4898, 1.4898, 0.8581],
dtype=torch.float64)
-----

Epoch 450, Loss 0.342464
Params: %f tensor([0.9272, 0.9272, 0.9577, 0.4272, 0.0272, 0.4577],
dtype=torch.float64)
Grad: %f tensor([1.4893, 1.4893, 0.8578, 1.4893, 1.4893, 0.8578],
dtype=torch.float64)
-----

Epoch 451, Loss 0.342252
Params: %f tensor([0.9271, 0.9271, 0.9576, 0.4271, 0.0271, 0.4576],
dtype=torch.float64)
Grad: %f tensor([1.4888, 1.4888, 0.8574, 1.4888, 1.4888, 0.8574],
dtype=torch.float64)
-----

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Epoch 452, Loss 0.342041
Params: %f tensor([0.9269, 0.9269, 0.9575, 0.4269, 0.0269, 0.4575],
dtype=torch.float64)
Grad: %f tensor([1.4882, 1.4882, 0.8571, 1.4882, 1.4882, 0.8571],
dtype=torch.float64)
-----

Epoch 453, Loss 0.341829
Params: %f tensor([0.9268, 0.9268, 0.9574, 0.4268, 0.0268, 0.4574],
dtype=torch.float64)
Grad: %f tensor([1.4877, 1.4877, 0.8567, 1.4877, 1.4877, 0.8567],
dtype=torch.float64)
-----

Epoch 454, Loss 0.341618
Params: %f tensor([0.9266, 0.9266, 0.9573, 0.4266, 0.0266, 0.4573],
dtype=torch.float64)
Grad: %f tensor([1.4871, 1.4871, 0.8564, 1.4871, 1.4871, 0.8564],
dtype=torch.float64)
-----

Epoch 455, Loss 0.341407
Params: %f tensor([0.9265, 0.9265, 0.9572, 0.4265, 0.0265, 0.4572],
dtype=torch.float64)
Grad: %f tensor([1.4866, 1.4866, 0.8560, 1.4866, 1.4866, 0.8560],
dtype=torch.float64)
-----

Epoch 456, Loss 0.341196
Params: %f tensor([0.9263, 0.9263, 0.9571, 0.4263, 0.0263, 0.4571],
dtype=torch.float64)
Grad: %f tensor([1.4861, 1.4861, 0.8557, 1.4861, 1.4861, 0.8557],
dtype=torch.float64)
-----

Epoch 457, Loss 0.340985
Params: %f tensor([0.9262, 0.9262, 0.9571, 0.4262, 0.0262, 0.4571],
dtype=torch.float64)
Grad: %f tensor([1.4855, 1.4855, 0.8553, 1.4855, 1.4855, 0.8553],
dtype=torch.float64)
-----

Epoch 458, Loss 0.340775
Params: %f tensor([0.9260, 0.9260, 0.9570, 0.4260, 0.0260, 0.4570],
dtype=torch.float64)
Grad: %f tensor([1.4850, 1.4850, 0.8550, 1.4850, 1.4850, 0.8550],
dtype=torch.float64)
-----

Epoch 459, Loss 0.340564
Params: %f tensor([0.9259, 0.9259, 0.9569, 0.4259, 0.0259, 0.4569],
dtype=torch.float64)
Grad: %f tensor([1.4844, 1.4844, 0.8546, 1.4844, 1.4844, 0.8546],
dtype=torch.float64)
-----

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Epoch 460, Loss 0.340354
Params: %f tensor([0.9257, 0.9257, 0.9568, 0.4257, 0.0257, 0.4568],
dtype=torch.float64)
Grad: %f tensor([1.4839, 1.4839, 0.8543, 1.4839, 1.4839, 0.8543],
dtype=torch.float64)
-----

Epoch 461, Loss 0.340144
Params: %f tensor([0.9256, 0.9256, 0.9567, 0.4256, 0.0256, 0.4567],
dtype=torch.float64)
Grad: %f tensor([1.4834, 1.4834, 0.8539, 1.4834, 1.4834, 0.8539],
dtype=torch.float64)
-----

Epoch 462, Loss 0.339934
Params: %f tensor([0.9254, 0.9254, 0.9566, 0.4254, 0.0254, 0.4566],
dtype=torch.float64)
Grad: %f tensor([1.4828, 1.4828, 0.8536, 1.4828, 1.4828, 0.8536],
dtype=torch.float64)
-----

Epoch 463, Loss 0.339724
Params: %f tensor([0.9253, 0.9253, 0.9565, 0.4253, 0.0253, 0.4565],
dtype=torch.float64)
Grad: %f tensor([1.4823, 1.4823, 0.8532, 1.4823, 1.4823, 0.8532],
dtype=torch.float64)
-----

Epoch 464, Loss 0.339515
Params: %f tensor([0.9251, 0.9251, 0.9565, 0.4251, 0.0251, 0.4565],
dtype=torch.float64)
Grad: %f tensor([1.4818, 1.4818, 0.8529, 1.4818, 1.4818, 0.8529],
dtype=torch.float64)
-----

Epoch 465, Loss 0.339305
Params: %f tensor([0.9250, 0.9250, 0.9564, 0.4250, 0.0250, 0.4564],
dtype=torch.float64)
Grad: %f tensor([1.4812, 1.4812, 0.8525, 1.4812, 1.4812, 0.8525],
dtype=torch.float64)
-----

Epoch 466, Loss 0.339096
Params: %f tensor([0.9249, 0.9249, 0.9563, 0.4249, 0.0249, 0.4563],
dtype=torch.float64)
Grad: %f tensor([1.4807, 1.4807, 0.8522, 1.4807, 1.4807, 0.8522],
dtype=torch.float64)
-----

Epoch 467, Loss 0.338887
Params: %f tensor([0.9247, 0.9247, 0.9562, 0.4247, 0.0247, 0.4562],
dtype=torch.float64)
Grad: %f tensor([1.4802, 1.4802, 0.8518, 1.4802, 1.4802, 0.8518],
dtype=torch.float64)
-----

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Epoch 468, Loss 0.338678
Params: %f tensor([0.9246, 0.9246, 0.9561, 0.4246, 0.0246, 0.4561],
dtype=torch.float64)
Grad: %f tensor([1.4796, 1.4796, 0.8515, 1.4796, 1.4796, 0.8515],
dtype=torch.float64)
-----

Epoch 469, Loss 0.338469
Params: %f tensor([0.9244, 0.9244, 0.9560, 0.4244, 0.0244, 0.4560],
dtype=torch.float64)
Grad: %f tensor([1.4791, 1.4791, 0.8511, 1.4791, 1.4791, 0.8511],
dtype=torch.float64)
-----

Epoch 470, Loss 0.338260
Params: %f tensor([0.9243, 0.9243, 0.9560, 0.4243, 0.0243, 0.4560],
dtype=torch.float64)
Grad: %f tensor([1.4786, 1.4786, 0.8508, 1.4786, 1.4786, 0.8508],
dtype=torch.float64)
-----

Epoch 471, Loss 0.338052
Params: %f tensor([0.9241, 0.9241, 0.9559, 0.4241, 0.0241, 0.4559],
dtype=torch.float64)
Grad: %f tensor([1.4780, 1.4780, 0.8505, 1.4780, 1.4780, 0.8505],
dtype=torch.float64)
-----

Epoch 472, Loss 0.337843
Params: %f tensor([0.9240, 0.9240, 0.9558, 0.4240, 0.0240, 0.4558],
dtype=torch.float64)
Grad: %f tensor([1.4775, 1.4775, 0.8501, 1.4775, 1.4775, 0.8501],
dtype=torch.float64)
-----

Epoch 473, Loss 0.337635
Params: %f tensor([0.9238, 0.9238, 0.9557, 0.4238, 0.0238, 0.4557],
dtype=torch.float64)
Grad: %f tensor([1.4769, 1.4769, 0.8498, 1.4769, 1.4769, 0.8498],
dtype=torch.float64)
-----

Epoch 474, Loss 0.337427
Params: %f tensor([0.9237, 0.9237, 0.9556, 0.4237, 0.0237, 0.4556],
dtype=torch.float64)
Grad: %f tensor([1.4764, 1.4764, 0.8494, 1.4764, 1.4764, 0.8494],
dtype=torch.float64)
-----

Epoch 475, Loss 0.337219
Params: %f tensor([0.9235, 0.9235, 0.9555, 0.4235, 0.0235, 0.4555],
dtype=torch.float64)
Grad: %f tensor([1.4759, 1.4759, 0.8491, 1.4759, 1.4759, 0.8491],
dtype=torch.float64)
-----

```

```

Epoch 476, Loss 0.337011
Params: %f tensor([0.9234, 0.9234, 0.9554, 0.4234, 0.0234, 0.4554],
dtype=torch.float64)
Grad: %f tensor([1.4753, 1.4753, 0.8487, 1.4753, 1.4753, 0.8487],
dtype=torch.float64)
-----
Epoch 477, Loss 0.336803
Params: %f tensor([0.9232, 0.9232, 0.9554, 0.4232, 0.0232, 0.4554],
dtype=torch.float64)
Grad: %f tensor([1.4748, 1.4748, 0.8484, 1.4748, 1.4748, 0.8484],
dtype=torch.float64)
-----
Epoch 478, Loss 0.336596
Params: %f tensor([0.9231, 0.9231, 0.9553, 0.4231, 0.0231, 0.4553],
dtype=torch.float64)
Grad: %f tensor([1.4743, 1.4743, 0.8480, 1.4743, 1.4743, 0.8480],
dtype=torch.float64)
-----
Epoch 479, Loss 0.336388
Params: %f tensor([0.9229, 0.9229, 0.9552, 0.4229, 0.0229, 0.4552],
dtype=torch.float64)
Grad: %f tensor([1.4737, 1.4737, 0.8477, 1.4737, 1.4737, 0.8477],
dtype=torch.float64)
-----
Epoch 480, Loss 0.336181
Params: %f tensor([0.9228, 0.9228, 0.9551, 0.4228, 0.0228, 0.4551],
dtype=torch.float64)
Grad: %f tensor([1.4732, 1.4732, 0.8473, 1.4732, 1.4732, 0.8473],
dtype=torch.float64)
-----
Epoch 481, Loss 0.335974
Params: %f tensor([0.9226, 0.9226, 0.9550, 0.4226, 0.0226, 0.4550],
dtype=torch.float64)
Grad: %f tensor([1.4727, 1.4727, 0.8470, 1.4727, 1.4727, 0.8470],
dtype=torch.float64)
-----
Epoch 482, Loss 0.335767
Params: %f tensor([0.9225, 0.9225, 0.9549, 0.4225, 0.0225, 0.4549],
dtype=torch.float64)
Grad: %f tensor([1.4721, 1.4721, 0.8466, 1.4721, 1.4721, 0.8466],
dtype=torch.float64)
-----
Epoch 483, Loss 0.335561
Params: %f tensor([0.9223, 0.9223, 0.9548, 0.4223, 0.0223, 0.4548],
dtype=torch.float64)
Grad: %f tensor([1.4716, 1.4716, 0.8463, 1.4716, 1.4716, 0.8463],
dtype=torch.float64)
-----

```

```

Epoch 484, Loss 0.335354
Params: %f tensor([0.9222, 0.9222, 0.9548, 0.4222, 0.0222, 0.4548],
dtype=torch.float64)
Grad: %f tensor([1.4711, 1.4711, 0.8459, 1.4711, 1.4711, 0.8459],
dtype=torch.float64)
-----

Epoch 485, Loss 0.335147
Params: %f tensor([0.9221, 0.9221, 0.9547, 0.4221, 0.0221, 0.4547],
dtype=torch.float64)
Grad: %f tensor([1.4706, 1.4706, 0.8456, 1.4706, 1.4706, 0.8456],
dtype=torch.float64)
-----

Epoch 486, Loss 0.334941
Params: %f tensor([0.9219, 0.9219, 0.9546, 0.4219, 0.0219, 0.4546],
dtype=torch.float64)
Grad: %f tensor([1.4700, 1.4700, 0.8453, 1.4700, 1.4700, 0.8453],
dtype=torch.float64)
-----

Epoch 487, Loss 0.334735
Params: %f tensor([0.9218, 0.9218, 0.9545, 0.4218, 0.0218, 0.4545],
dtype=torch.float64)
Grad: %f tensor([1.4695, 1.4695, 0.8449, 1.4695, 1.4695, 0.8449],
dtype=torch.float64)
-----

Epoch 488, Loss 0.334529
Params: %f tensor([0.9216, 0.9216, 0.9544, 0.4216, 0.0216, 0.4544],
dtype=torch.float64)
Grad: %f tensor([1.4690, 1.4690, 0.8446, 1.4690, 1.4690, 0.8446],
dtype=torch.float64)
-----

Epoch 489, Loss 0.334323
Params: %f tensor([0.9215, 0.9215, 0.9543, 0.4215, 0.0215, 0.4543],
dtype=torch.float64)
Grad: %f tensor([1.4684, 1.4684, 0.8442, 1.4684, 1.4684, 0.8442],
dtype=torch.float64)
-----

Epoch 490, Loss 0.334117
Params: %f tensor([0.9213, 0.9213, 0.9543, 0.4213, 0.0213, 0.4543],
dtype=torch.float64)
Grad: %f tensor([1.4679, 1.4679, 0.8439, 1.4679, 1.4679, 0.8439],
dtype=torch.float64)
-----

Epoch 491, Loss 0.333912
Params: %f tensor([0.9212, 0.9212, 0.9542, 0.4212, 0.0212, 0.4542],
dtype=torch.float64)
Grad: %f tensor([1.4674, 1.4674, 0.8435, 1.4674, 1.4674, 0.8435],
dtype=torch.float64)
-----

```

```
Epoch 492, Loss 0.333706
Params: %f tensor([0.9210, 0.9210, 0.9541, 0.4210, 0.0210, 0.4541],
dtype=torch.float64)
Grad: %f tensor([1.4668, 1.4668, 0.8432, 1.4668, 1.4668, 0.8432],
dtype=torch.float64)
-----
Epoch 493, Loss 0.333501
Params: %f tensor([0.9209, 0.9209, 0.9540, 0.4209, 0.0209, 0.4540],
dtype=torch.float64)
Grad: %f tensor([1.4663, 1.4663, 0.8428, 1.4663, 1.4663, 0.8428],
dtype=torch.float64)
-----
Epoch 494, Loss 0.333296
Params: %f tensor([0.9207, 0.9207, 0.9539, 0.4207, 0.0207, 0.4539],
dtype=torch.float64)
Grad: %f tensor([1.4658, 1.4658, 0.8425, 1.4658, 1.4658, 0.8425],
dtype=torch.float64)
-----
Epoch 495, Loss 0.333091
Params: %f tensor([0.9206, 0.9206, 0.9538, 0.4206, 0.0206, 0.4538],
dtype=torch.float64)
Grad: %f tensor([1.4652, 1.4652, 0.8421, 1.4652, 1.4652, 0.8421],
dtype=torch.float64)
-----
Epoch 496, Loss 0.332886
Params: %f tensor([0.9204, 0.9204, 0.9538, 0.4204, 0.0204, 0.4538],
dtype=torch.float64)
Grad: %f tensor([1.4647, 1.4647, 0.8418, 1.4647, 1.4647, 0.8418],
dtype=torch.float64)
-----
Epoch 497, Loss 0.332682
Params: %f tensor([0.9203, 0.9203, 0.9537, 0.4203, 0.0203, 0.4537],
dtype=torch.float64)
Grad: %f tensor([1.4642, 1.4642, 0.8415, 1.4642, 1.4642, 0.8415],
dtype=torch.float64)
-----
Epoch 498, Loss 0.332477
Params: %f tensor([0.9201, 0.9201, 0.9536, 0.4201, 0.0201, 0.4536],
dtype=torch.float64)
Grad: %f tensor([1.4637, 1.4637, 0.8411, 1.4637, 1.4637, 0.8411],
dtype=torch.float64)
-----
Epoch 499, Loss 0.332273
Params: %f tensor([0.9200, 0.9200, 0.9535, 0.4200, 0.0200, 0.4535],
dtype=torch.float64)
Grad: %f tensor([1.4631, 1.4631, 0.8408, 1.4631, 1.4631, 0.8408],
dtype=torch.float64)
-----
```

```
Epoch 500, Loss 0.332069
Params: %f tensor([0.9199, 0.9199, 0.9534, 0.4199, 0.0199, 0.4534],
dtype=torch.float64)
Grad: %f tensor([1.4626, 1.4626, 0.8404, 1.4626, 1.4626, 0.8404],
dtype=torch.float64)
-----
```

```
[1003]: tensor([0.9199, 0.9199, 0.9534, 0.4199, 0.0199, 0.4534], dtype=torch.float64)
```

```
[1004]: X1_t = np.array(test.area)
X2_t = np.array(test.bedrooms)
X3_t = np.array(test.bathrooms)
X4_t = np.array(test.stories)
X5_t = np.array(test.parking)
X0_t= np.ones(109)
X = np.vstack([X0_t,X1_t,X2_t,X3_t,X4_t,X5_t])
```

```
[1005]: Ex = [0.5937, 0.5937, 0.7912, 0.0937, -0.3063, 0.2912]
Ex = torch.tensor(Ex).reshape(6,1)

X = np.vstack([X0_t,X1_t,X2_t,X3_t,X4_t,X5_t])
X = X.T
X = np.array(X)
x = scaler.fit_transform(X)
X= x
```

```
[1006]: Y = np.array(test.price)
Y = Y.reshape(109,1)
y = scaler.fit_transform(Y)
Y = y
# Y.reshape(1,-1)
```

```
[1007]: p = 108
Wye = np.ones(109)
while(p>0):
    M = X[p,:] #13300000
    Wye[p] = np.matmul(M,Ex)
    print('Truth: %f'%Y[p])
    print('Pred: %f'%Wye[p])
    print('-----')
    p=p-1
```

```
Truth: 0.000000
Pred: 0.099477
-----
```

```
Truth: 0.030675
Pred: 0.263733
-----
```

Truth: 0.033742
Pred: 0.279905

Truth: 0.049080
Pred: 0.158544

Truth: 0.049080
Pred: 0.235407

Truth: 0.055215
Pred: 0.318185

Truth: 0.061350
Pred: 0.185275

Truth: 0.061350
Pred: 0.143448

Truth: 0.084356
Pred: 0.513555

Truth: 0.085890
Pred: 0.627365

Truth: 0.085890
Pred: 0.237129

Truth: 0.098160
Pred: 0.814931

Truth: 0.104908
Pred: 0.457151

Truth: 0.107362
Pred: 0.090753

Truth: 0.110429
Pred: 0.768546

Truth: 0.110429
Pred: 0.319724

Truth: 0.116564
Pred: 0.499564

Truth: 0.116564
Pred: 0.140043

Truth: 0.122699
Pred: 0.497384

Truth: 0.122699
Pred: 0.032203

Truth: 0.128221
Pred: 0.307646

Truth: 0.128834
Pred: 0.266443

Truth: 0.128834
Pred: 0.369124

Truth: 0.128834
Pred: 0.710253

Truth: 0.138037
Pred: 0.328724

Truth: 0.141104
Pred: 0.327204

Truth: 0.141104
Pred: 0.328340

Truth: 0.141104
Pred: 0.196017

Truth: 0.141104
Pred: 0.353315

Truth: 0.141104
Pred: 0.261169

Truth: 0.141104
Pred: 0.295713

Truth: 0.147239
Pred: 0.149303

Truth: 0.147239
Pred: 0.862503

Truth: 0.153374
Pred: 0.577106

Truth: 0.153374
Pred: -0.040622

Truth: 0.153374
Pred: 0.330556

Truth: 0.156442
Pred: 0.096608

Truth: 0.156442
Pred: 0.216051

Truth: 0.159509
Pred: 0.457408

Truth: 0.162577
Pred: 0.089582

Truth: 0.165031
Pred: 1.015340

Truth: 0.165644
Pred: 0.329673

Truth: 0.171779
Pred: 0.359850

Truth: 0.177914
Pred: 0.303388

Truth: 0.177914
Pred: 0.175524

Truth: 0.185583
Pred: 0.310937

Truth: 0.187117
Pred: 0.547831

Truth: 0.193252
Pred: 0.117337

Truth: 0.201840
Pred: 0.346525

Truth: 0.201840
Pred: 0.923800

Truth: 0.202454
Pred: 0.565731

Truth: 0.202454
Pred: 0.220359

Truth: 0.202454
Pred: 0.342554

Truth: 0.208589
Pred: 0.258207

Truth: 0.211656
Pred: 0.589475

Truth: 0.214724
Pred: 0.710253

Truth: 0.220245
Pred: 0.432594

Truth: 0.220245
Pred: 0.216085

Truth: 0.223926
Pred: 0.105391

Truth: 0.226994
Pred: 0.632600

Truth: 0.226994
Pred: 0.475795

Truth: 0.233129
Pred: 0.358948

Truth: 0.245399
Pred: 0.334195

Truth: 0.263804
Pred: 0.223111

Truth: 0.263804
Pred: 0.627365

Truth: 0.263804
Pred: 0.287224

Truth: 0.268712
Pred: 0.402168

Truth: 0.276074
Pred: 0.535992

Truth: 0.282209
Pred: 0.506717

Truth: 0.285276
Pred: 0.713858

Truth: 0.291411
Pred: 0.964603

Truth: 0.292638
Pred: 0.758522

Truth: 0.293865
Pred: 0.503790

Truth: 0.294479
Pred: 0.367018

Truth: 0.294479
Pred: 0.787813

Truth: 0.309816
Pred: 0.549166

Truth: 0.322086
Pred: 0.762948

Truth: 0.325153
Pred: 0.317740

Truth: 0.325153
Pred: 0.560254

Truth: 0.325153
Pred: 0.847568

Truth: 0.343558
Pred: 0.448225

Truth: 0.349080
Pred: 0.364454

Truth: 0.349693
Pred: 0.419637

Truth: 0.355828
Pred: 0.470837

Truth: 0.355828
Pred: 0.754717

Truth: 0.361963
Pred: 0.812096

Truth: 0.374233
Pred: 0.106737

Truth: 0.383436
Pred: 0.560395

Truth: 0.385890
Pred: 0.425492

Truth: 0.386503
Pred: 0.473250

Truth: 0.386503
Pred: 0.649062

Truth: 0.396933
Pred: 0.475175

Truth: 0.401840
Pred: 0.575553

Truth: 0.404908
Pred: 0.461743

Truth: 0.414110
Pred: 0.955105

Truth: 0.423313
Pred: 0.137183

Truth: 0.429448
Pred: 0.375361

Truth: 0.429448
Pred: 1.306900

Truth: 0.469325
Pred: 0.824713

Truth: 0.478528
Pred: 0.432628

Truth: 0.487730
Pred: 0.489993

Truth: 0.490798
Pred: 0.520892

Truth: 0.509202
Pred: 0.746129

Truth: 0.509202
Pred: 0.510499

Truth: 0.570552
Pred: 0.447246

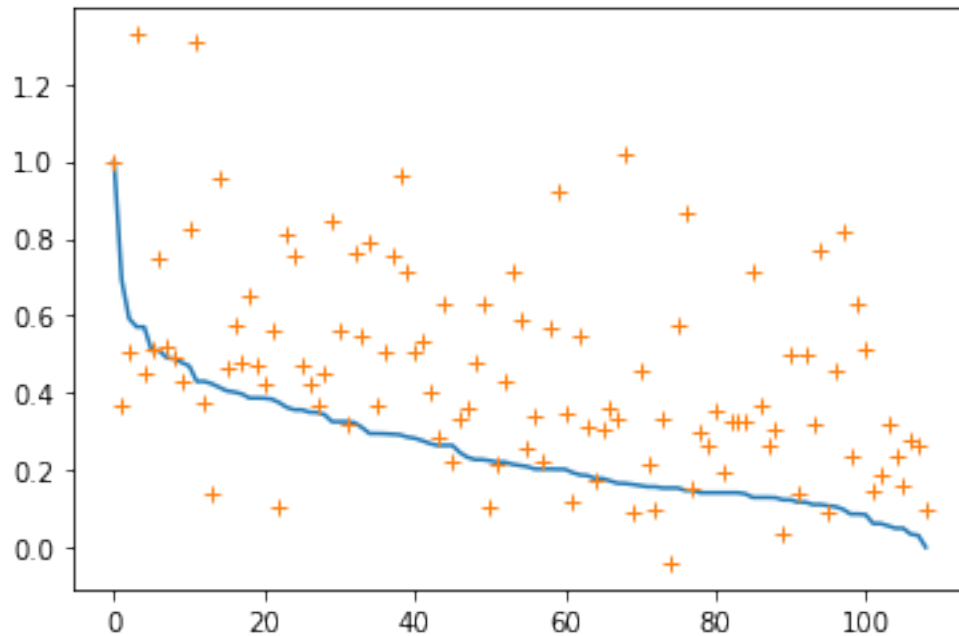
Truth: 0.570552
Pred: 1.328235

Truth: 0.592025
Pred: 0.505216

Truth: 0.693252
Pred: 0.370691

```
[1008]: pyplot.plot(Y)  
        pyplot.plot(Wye, '+')
```

```
[1008]: [<matplotlib.lines.Line2D at 0x1dc47d6e3d0>]
```



```
[1009]: #Traning set
X1_t = np.array(train.area)
X2_t = np.array(train.bedrooms)
X3_t = np.array(train.bathrooms)
X4_t = np.array(train.stories)
X5_t = np.array(train.parking)
X0_t= np.ones(436)
X = np.vstack([X0_t,X1_t,X2_t,X3_t,X4_t,X5_t])
X = X.T
X = np.array(X)
x = scaler.fit_transform(X)
X_train= x
X_train= torch.tensor(X_train).float()

Y = np.array(train.price)
Y = Y.reshape(436,1)
y = scaler.fit_transform(Y)
Y_train = y
Y_train = torch.tensor(Y_train).float().unsqueeze(1)
```

```
[1010]: #-----#

#Test Set
X1_t = np.array(test.area)
X2_t = np.array(test.bedrooms)
```

```

X3_t = np.array(test.bathrooms)
X4_t = np.array(test.stories)
X5_t = np.array(test.parking)
X0_t= np.ones(109)
X = np.vstack([X0_t,X1_t,X2_t,X3_t,X4_t,X5_t])
X = X.T
X = np.array(X)
x = scaler.fit_transform(X)
X_test= x
X_test= torch.tensor(X_test).float()

Y = np.array(test.price)
Y = Y.reshape(109,1)
y = scaler.fit_transform(Y)
Y_test = y
Y_test = torch.tensor(Y_test).float().unsqueeze(1)

```

```
[1011]: X_train.shape
```

```
[1011]: torch.Size([436, 6])
```

```

[1014]: def training_loop(n_epochs, optimizer, model, loss_fn, x_train, x_val, y_train,
    ↪y_val):
    for epoch in range(1, n_epochs + 1):
        p_train = model(x_train)
        loss_train = loss_fn(p_train, y_train)

        p_val = model(x_val)
        loss_val = loss_fn(p_val, y_val)

        optimizer.zero_grad()
        loss_train.backward()
        optimizer.step()

        if epoch == 1 or epoch % 10 == 0:
            print(f"Epoch {epoch}, Training loss {loss_train.item():.4f},"
                  f" Validation loss {loss_val.item():.4f}")
seq_model = neu.Sequential(
    neu.Linear(6, 8),
    neu.Tanh(),
    neu.Linear(8, 1))

optimizer = optim.SGD(seq_model.parameters(), lr=1e-3)

```

```

[1016]: training_loop(n_epochs = 200, optimizer = optimizer, model = seq_model, loss_fn=
    ↪ neu.MSELoss()),

```

```
x_train = X_train, x_val = X_test, y_train = Y_train, y_val = ␣
↪Y_test)
```

```
Epoch 1, Training loss 0.0796, Validation loss 0.0571
Epoch 10, Training loss 0.0768, Validation loss 0.0552
Epoch 20, Training loss 0.0739, Validation loss 0.0534
Epoch 30, Training loss 0.0712, Validation loss 0.0517
Epoch 40, Training loss 0.0687, Validation loss 0.0501
Epoch 50, Training loss 0.0663, Validation loss 0.0487
Epoch 60, Training loss 0.0642, Validation loss 0.0474
Epoch 70, Training loss 0.0621, Validation loss 0.0463
Epoch 80, Training loss 0.0603, Validation loss 0.0452
Epoch 90, Training loss 0.0585, Validation loss 0.0443
Epoch 100, Training loss 0.0569, Validation loss 0.0434
Epoch 110, Training loss 0.0554, Validation loss 0.0426
Epoch 120, Training loss 0.0540, Validation loss 0.0419
Epoch 130, Training loss 0.0526, Validation loss 0.0413
Epoch 140, Training loss 0.0514, Validation loss 0.0408
Epoch 150, Training loss 0.0503, Validation loss 0.0403
Epoch 160, Training loss 0.0492, Validation loss 0.0398
Epoch 170, Training loss 0.0483, Validation loss 0.0394
Epoch 180, Training loss 0.0473, Validation loss 0.0391
Epoch 190, Training loss 0.0465, Validation loss 0.0388
Epoch 200, Training loss 0.0457, Validation loss 0.0385
```

```
[1021]: seq_model_2 = neu.Sequential(neu.Linear(6, 8), neu.Tanh(),
                                     neu.Linear(8, 6), neu.Tanh(),
                                     neu.Linear(6, 4), neu.Tanh(), neu.Linear(4, 1))

optimizer = optim.SGD(seq_model_2.parameters(), lr=1e-3)

training_loop(n_epochs = 200, optimizer = optimizer, model = seq_model_2, ␣
↪loss_fn = neu.MSELoss(),
              x_train = X_train, x_val = X_test, y_train = Y_train, y_val = ␣
↪Y_test)
```

```
Epoch 1, Training loss 0.0416, Validation loss 0.0286
Epoch 10, Training loss 0.0409, Validation loss 0.0283
Epoch 20, Training loss 0.0402, Validation loss 0.0279
Epoch 30, Training loss 0.0396, Validation loss 0.0276
Epoch 40, Training loss 0.0391, Validation loss 0.0274
Epoch 50, Training loss 0.0386, Validation loss 0.0272
Epoch 60, Training loss 0.0381, Validation loss 0.0270
Epoch 70, Training loss 0.0377, Validation loss 0.0268
Epoch 80, Training loss 0.0373, Validation loss 0.0267
Epoch 90, Training loss 0.0369, Validation loss 0.0265
Epoch 100, Training loss 0.0366, Validation loss 0.0264
Epoch 110, Training loss 0.0363, Validation loss 0.0264
```

Epoch 120, Training loss 0.0360, Validation loss 0.0263
Epoch 130, Training loss 0.0358, Validation loss 0.0262
Epoch 140, Training loss 0.0356, Validation loss 0.0262
Epoch 150, Training loss 0.0354, Validation loss 0.0262
Epoch 160, Training loss 0.0352, Validation loss 0.0262
Epoch 170, Training loss 0.0350, Validation loss 0.0262
Epoch 180, Training loss 0.0348, Validation loss 0.0262
Epoch 190, Training loss 0.0347, Validation loss 0.0262
Epoch 200, Training loss 0.0346, Validation loss 0.0262