17.8.24

DECONET(synthetic our data)-10L-4000-red4000-lr0.0001-mu100-initkaiming-datasets\_Z\_400x10\_ksparse=5%\_sig1vt\_supp=10

הרצה ראשונה על Z:

לא השתנה כלום כבר מהאפוק הראשון. אולי מספרים קטנים מידי?

mse: tensor(7.2667e-26, device='cuda:0')

normalize mse: tensor(9.6699e-15, device='cuda:0')

הרצה על X:

הוא כבר צריך אפוקים...

לומר לאיתי: כשאני משתמשת בדאטא (לדוג', התמונות של MNIST, ויקי הופכת אותן לוקטור – אבל שורה לוקטורעמודה , ואז השורה הבאה לקטור עמודה משורשר, וכך הלאה..  
בפונקציה  def measure\_x(self, x):

זה סבבה נכון? כי תאכלס בסוף הכל נכנס בתוך הכפל מטריצות לא משנה הסדר...

בנוסף: ה-Z\_HAT שיוצא בהרצה הוא בעל 2 ערכים בודדים ☹ אולי צריך להגידל את K\_SPPARSE כדי שלא יהיו ערכים כאלה קטנים ואז זה יעזור?

**להמשך**: את המדידת שגיאה: לא לשקול להוסיף את C, ולנרמל באנרגיה של X.. לא בZ כפי שעשיתי כעת

19.8.24

שגיאת שחזור Z, לאחר נרמול לפי X:

normalize mse: tensor(5.6551e-30, device='cuda:0', dtype=torch.float64)

mse: tensor(7.3068e-26, device='cuda:0')

שגיאת שחזור X:

mse: tensor(28.8954, device='cuda:0')

normalize mse: tensor(0.0023, device='cuda:0', dtype=torch.float64)

25.8.24

נריץ מחדש עם תיקון הדאטא לסיגמא הנכון ב-ZT+ תיקון ZT לk\_sparse אחדים + רעש עם הסיגמא של 0.01.

רוצה להריץ: Z,X,X\_AVG

מחדש: דאטא!

בדאטא החדש Z קטן בסדר גודל \ שניים מ-X.

שגיאות:

**Checking Z:**

tensor([[-0.0099, -0.1162, 0.0692, ..., -0.1227, -0.1122, 0.3836],

[ 0.1244, 0.1452, -0.0073, ..., 0.2773, 0.0756, -0.0105],

[-0.1327, -0.2261, 0.0739, ..., 0.0583, 0.0437, -0.2212],

...,

[-0.0667, -0.0775, -0.0890, ..., -0.0381, 0.2176, -0.0499],

[ 0.0756, 0.3291, 0.0733, ..., 0.0586, 0.0307, 0.0926],

[-0.1813, 0.1261, 0.0593, ..., 0.0277, -0.1773, 0.2438]],

device='cuda:0')

mse: tensor(0.0371, device='cuda:0')

normalize mse: tensor(**2.8649e-06**, device='cuda:0', dtype=torch.float64)

**Checking X:**

tensor([[ -5.5878, 20.8464, 19.7134, ..., 7.3324, 12.7848, 7.6807],

[ 6.7207, 7.7367, 9.9122, ..., -7.7346, 9.2630, -1.9940],

[ -5.5843, -18.9540, -6.7065, ..., -1.9787, -12.6090, 4.1030],

...,

[ -3.8949, -6.0755, -10.3604, ..., 13.6436, 6.9196, -6.8632],

[ 3.3614, 3.6713, 5.8867, ..., 5.1898, 8.5010, -0.5223],

[ 7.2559, 8.7075, -7.2732, ..., 4.5774, -4.1879, -0.8253]],

device='cuda:0')

mse: tensor(30.3121, device='cuda:0')

normalize mse: tensor(**0.0023**, device='cuda:0', dtype=torch.float64)

**Checking X-AVG:**

tensor([[ 1.0651, 6.8963, -11.2528, ..., 8.1992, -6.8748, 6.4329],

[-15.0040, 4.1642, -8.5207, ..., 6.8768, 3.8848, 0.7513],

[ 1.6362, 5.1501, -4.4835, ..., 3.5742, -5.9461, -8.3168],

...,

[-11.7274, -11.4207, -5.9959, ..., -0.1476, -3.3525, 0.8470],

[ -6.7985, 5.5769, 8.7663, ..., -16.4095, 12.9164, -4.4192],

[ -3.9339, 9.9201, 15.9312, ..., 4.1610, -3.0986, -0.3062]],

device='cuda:0')

mse: tensor(25.6252, device='cuda:0')

normalize mse: tensor(**0.0020**, device='cuda:0', dtype=torch.float64)

Run of Z:

Model Hyperparameters:

ambient\_dim=4000

measurements=1000

redundancy=40000

DECONET\_iterations=10

Step size 1 parameter=0.5

Step size 2 parameter=0.3

Type of initialization=kaiming

Beta parameter a=0.5

Beta parameter b=0.7

DECONET(

(phi): Parameter(40000, 4000)

(first\_activation): TruncationActivation()

(second\_activation): ShrinkageActivation()

)

training: 100%|█████████████████████████████████████| 55/55 [00:10<00:00, 5.06it/s, loss=0.0873]

validation: 100%|██████████████████████████████████████| 8/8 [00:03<00:00, 2.47it/s, mse=0.0821]

--------------------------------------

Average Train MSE = 0.087320

--------------------------------------

Average Test MSE = 0.082129

--------------------------------------

Epoch no. = 0

--------------------------------------

Generalization error = 0.005191

--------------------------------------

A= tensor([[-0.0077, 0.0322, -0.0068, ..., -0.0258, 0.0526, 0.0277],

[ 0.0040, -0.0067, -0.0335, ..., -0.0297, -0.0123, 0.0205],

[-0.0288, -0.0368, -0.0361, ..., 0.0320, -0.0113, 0.0255],

...,

[-0.0040, -0.0794, 0.0318, ..., 0.0178, 0.0638, -0.0073],

[-0.0208, 0.0356, 0.0116, ..., 0.0013, 0.0446, 0.0110],

[ 0.0054, -0.0430, 0.0200, ..., 0.0449, -0.0203, -0.0074]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[ 0.0151, 0.0287, 0.0024, ..., 0.0270, -0.0105, -0.0105],

[-0.0028, 0.0142, -0.0211, ..., -0.0310, 0.0132, -0.0237],

[ 0.0341, -0.0593, 0.0037, ..., 0.0053, 0.0428, -0.0076],

...,

[-0.0083, -0.0061, 0.0216, ..., -0.0002, 0.0162, 0.0023],

[-0.0107, -0.0184, 0.0086, ..., -0.0079, 0.0033, -0.0020],

[-0.0158, 0.0026, -0.0398, ..., 0.0024, -0.0079, -0.0097]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Validation loss decreased (inf --> 0.005191). Saving model ...

training: 100%|█████████████████████████████████████| 55/55 [00:11<00:00, 4.96it/s, loss=0.0773]

validation: 100%|██████████████████████████████████████| 8/8 [00:03<00:00, 2.36it/s, mse=0.0745]

--------------------------------------

Average Train MSE = 0.077269

--------------------------------------

Average Test MSE = 0.074516

--------------------------------------

Epoch no. = 1

--------------------------------------

Generalization error = 0.002754

--------------------------------------

A= tensor([[-0.0077, 0.0322, -0.0068, ..., -0.0258, 0.0526, 0.0277],

[ 0.0040, -0.0067, -0.0335, ..., -0.0297, -0.0123, 0.0205],

[-0.0288, -0.0368, -0.0361, ..., 0.0320, -0.0113, 0.0255],

...,

[-0.0040, -0.0794, 0.0318, ..., 0.0178, 0.0638, -0.0073],

[-0.0208, 0.0356, 0.0116, ..., 0.0013, 0.0446, 0.0110],

[ 0.0054, -0.0430, 0.0200, ..., 0.0449, -0.0203, -0.0074]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[ 0.0156, 0.0312, 0.0011, ..., 0.0269, -0.0126, -0.0124],

[-0.0043, 0.0148, -0.0219, ..., -0.0296, 0.0154, -0.0256],

[ 0.0363, -0.0612, 0.0043, ..., 0.0045, 0.0436, -0.0058],

...,

[-0.0102, -0.0075, 0.0225, ..., -0.0002, 0.0159, 0.0052],

[-0.0125, -0.0217, 0.0104, ..., -0.0086, 0.0050, -0.0021],

[-0.0172, 0.0020, -0.0390, ..., 0.0036, -0.0052, -0.0071]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Validation loss decreased (0.005191 --> 0.002754). Saving model ...

training: 100%|█████████████████████████████████████| 55/55 [00:10<00:00, 5.03it/s, loss=0.0694]

validation: 100%|██████████████████████████████████████| 8/8 [00:03<00:00, 2.54it/s, mse=0.0682]

--------------------------------------

Average Train MSE = 0.069355

--------------------------------------

Average Test MSE = 0.068150

--------------------------------------

Epoch no. = 2

--------------------------------------

Generalization error = 0.001205

--------------------------------------

A= tensor([[-0.0077, 0.0322, -0.0068, ..., -0.0258, 0.0526, 0.0277],

[ 0.0040, -0.0067, -0.0335, ..., -0.0297, -0.0123, 0.0205],

[-0.0288, -0.0368, -0.0361, ..., 0.0320, -0.0113, 0.0255],

...,

[-0.0040, -0.0794, 0.0318, ..., 0.0178, 0.0638, -0.0073],

[-0.0208, 0.0356, 0.0116, ..., 0.0013, 0.0446, 0.0110],

[ 0.0054, -0.0430, 0.0200, ..., 0.0449, -0.0203, -0.0074]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[ 1.6712e-02, 3.3738e-02, -3.6030e-04, ..., 2.6733e-02,

-1.4249e-02, -1.4062e-02],

[-5.0793e-03, 1.5522e-02, -2.2401e-02, ..., -2.8534e-02,

1.7384e-02, -2.7072e-02],

[ 3.8077e-02, -6.3184e-02, 4.0795e-03, ..., 3.4381e-03,

4.4577e-02, -4.7803e-03],

...,

[-1.2021e-02, -9.1479e-03, 2.3566e-02, ..., -4.7081e-05,

1.6106e-02, 7.0225e-03],

[-1.4715e-02, -2.4652e-02, 1.2678e-02, ..., -8.6622e-03,

6.4571e-03, -2.9257e-03],

[-1.8716e-02, 1.6015e-03, -3.8162e-02, ..., 4.4434e-03,

-2.5888e-03, -4.9127e-03]], device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Validation loss decreased (0.002754 --> 0.001205). Saving model ...

training: 100%|█████████████████████████████████████| 55/55 [00:10<00:00, 5.03it/s, loss=0.0628]

validation: 100%|██████████████████████████████████████| 8/8 [00:03<00:00, 2.50it/s, mse=0.0631]

--------------------------------------

Average Train MSE = 0.062784

--------------------------------------

Average Test MSE = 0.063093

--------------------------------------

Epoch no. = 3

--------------------------------------

Generalization error = 0.000310

--------------------------------------

A= tensor([[-0.0077, 0.0322, -0.0068, ..., -0.0258, 0.0526, 0.0277],

[ 0.0040, -0.0067, -0.0335, ..., -0.0297, -0.0123, 0.0205],

[-0.0288, -0.0368, -0.0361, ..., 0.0320, -0.0113, 0.0255],

...,

[-0.0040, -0.0794, 0.0318, ..., 0.0178, 0.0638, -0.0073],

[-0.0208, 0.0356, 0.0116, ..., 0.0013, 0.0446, 0.0110],

[ 0.0054, -0.0430, 0.0200, ..., 0.0449, -0.0203, -0.0074]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[ 0.0174, 0.0356, -0.0017, ..., 0.0263, -0.0162, -0.0158],

[-0.0056, 0.0162, -0.0229, ..., -0.0279, 0.0193, -0.0284],

[ 0.0396, -0.0643, 0.0044, ..., 0.0024, 0.0452, -0.0037],

...,

[-0.0141, -0.0110, 0.0241, ..., -0.0001, 0.0165, 0.0088],

[-0.0169, -0.0276, 0.0142, ..., -0.0086, 0.0079, -0.0030],

[-0.0200, 0.0011, -0.0375, ..., 0.0052, -0.0005, -0.0029]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Validation loss decreased (0.001205 --> 0.000310). Saving model ...

training: 100%|█████████████████████████████████████| 55/55 [00:10<00:00, 5.01it/s, loss=0.0575]

validation: 100%|███████████████████████████████████████| 8/8 [00:03<00:00, 2.43it/s, mse=0.059]

--------------------------------------

Average Train MSE = 0.057544

--------------------------------------

Average Test MSE = 0.059039

--------------------------------------

Epoch no. = 4

--------------------------------------

Generalization error = 0.001495

--------------------------------------

A= tensor([[-0.0077, 0.0322, -0.0068, ..., -0.0258, 0.0526, 0.0277],

[ 0.0040, -0.0067, -0.0335, ..., -0.0297, -0.0123, 0.0205],

[-0.0288, -0.0368, -0.0361, ..., 0.0320, -0.0113, 0.0255],

...,

[-0.0040, -0.0794, 0.0318, ..., 0.0178, 0.0638, -0.0073],

[-0.0208, 0.0356, 0.0116, ..., 0.0013, 0.0446, 0.0110],

[ 0.0054, -0.0430, 0.0200, ..., 0.0449, -0.0203, -0.0074]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[ 0.0181, 0.0374, -0.0028, ..., 0.0257, -0.0180, -0.0172],

[-0.0064, 0.0166, -0.0233, ..., -0.0270, 0.0211, -0.0293],

[ 0.0415, -0.0657, 0.0045, ..., 0.0010, 0.0461, -0.0030],

...,

[-0.0159, -0.0129, 0.0244, ..., 0.0002, 0.0164, 0.0100],

[-0.0190, -0.0302, 0.0160, ..., -0.0086, 0.0093, -0.0036],

[-0.0208, 0.0011, -0.0367, ..., 0.0059, 0.0019, -0.0011]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Patience used: 1 out of 5

training: 100%|█████████████████████████████████████| 55/55 [00:10<00:00, 5.01it/s, loss=0.0532]

validation: 100%|██████████████████████████████████████| 8/8 [00:03<00:00, 2.37it/s, mse=0.0557]

--------------------------------------

Average Train MSE = 0.053227

--------------------------------------

Average Test MSE = 0.055675

--------------------------------------

Epoch no. = 5

--------------------------------------

Generalization error = 0.002448

--------------------------------------

A= tensor([[-0.0077, 0.0322, -0.0068, ..., -0.0258, 0.0526, 0.0277],

[ 0.0040, -0.0067, -0.0335, ..., -0.0297, -0.0123, 0.0205],

[-0.0288, -0.0368, -0.0361, ..., 0.0320, -0.0113, 0.0255],

...,

[-0.0040, -0.0794, 0.0318, ..., 0.0178, 0.0638, -0.0073],

[-0.0208, 0.0356, 0.0116, ..., 0.0013, 0.0446, 0.0110],

[ 0.0054, -0.0430, 0.0200, ..., 0.0449, -0.0203, -0.0074]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[ 1.8789e-02, 3.9408e-02, -3.6698e-03, ..., 2.5016e-02,

-1.9661e-02, -1.8441e-02],

[-7.0835e-03, 1.7077e-02, -2.3445e-02, ..., -2.6318e-02,

2.2636e-02, -3.0268e-02],

[ 4.2756e-02, -6.6637e-02, 4.1180e-03, ..., -4.1408e-04,

4.7122e-02, -2.3310e-03],

...,

[-1.7695e-02, -1.4402e-02, 2.5017e-02, ..., 2.2158e-04,

1.6767e-02, 1.1362e-02],

[-2.0960e-02, -3.3004e-02, 1.7712e-02, ..., -9.1316e-03,

1.0209e-02, -4.0096e-03],

[-2.1743e-02, 9.4004e-04, -3.5740e-02, ..., 6.5762e-03,

3.9024e-03, 8.7454e-05]], device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Patience used: 2 out of 5

training: 100%|█████████████████████████████████████| 55/55 [00:10<00:00, 5.02it/s, loss=0.0497]

validation: 100%|██████████████████████████████████████| 8/8 [00:03<00:00, 2.56it/s, mse=0.0529]

--------------------------------------

Average Train MSE = 0.049700

--------------------------------------

Average Test MSE = 0.052892

--------------------------------------

Epoch no. = 6

--------------------------------------

Generalization error = 0.003192

--------------------------------------

A= tensor([[-0.0077, 0.0322, -0.0068, ..., -0.0258, 0.0526, 0.0277],

[ 0.0040, -0.0067, -0.0335, ..., -0.0297, -0.0123, 0.0205],

[-0.0288, -0.0368, -0.0361, ..., 0.0320, -0.0113, 0.0255],

...,

[-0.0040, -0.0794, 0.0318, ..., 0.0178, 0.0638, -0.0073],

[-0.0208, 0.0356, 0.0116, ..., 0.0013, 0.0446, 0.0110],

[ 0.0054, -0.0430, 0.0200, ..., 0.0449, -0.0203, -0.0074]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[ 0.0192, 0.0409, -0.0046, ..., 0.0244, -0.0212, -0.0195],

[-0.0071, 0.0174, -0.0237, ..., -0.0263, 0.0241, -0.0312],

[ 0.0444, -0.0676, 0.0035, ..., -0.0014, 0.0481, -0.0014],

...,

[-0.0195, -0.0157, 0.0251, ..., 0.0003, 0.0173, 0.0126],

[-0.0229, -0.0350, 0.0193, ..., -0.0095, 0.0114, -0.0042],

[-0.0230, 0.0007, -0.0348, ..., 0.0073, 0.0055, 0.0014]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Patience used: 3 out of 5

training: 100%|█████████████████████████████████████| 55/55 [00:11<00:00, 4.91it/s, loss=0.0467]

validation: 100%|██████████████████████████████████████| 8/8 [00:03<00:00, 2.32it/s, mse=0.0506]

--------------------------------------

Average Train MSE = 0.046734

--------------------------------------

Average Test MSE = 0.050594

--------------------------------------

Epoch no. = 7

--------------------------------------

Generalization error = 0.003860

--------------------------------------

A= tensor([[-0.0077, 0.0322, -0.0068, ..., -0.0258, 0.0526, 0.0277],

[ 0.0040, -0.0067, -0.0335, ..., -0.0297, -0.0123, 0.0205],

[-0.0288, -0.0368, -0.0361, ..., 0.0320, -0.0113, 0.0255],

...,

[-0.0040, -0.0794, 0.0318, ..., 0.0178, 0.0638, -0.0073],

[-0.0208, 0.0356, 0.0116, ..., 0.0013, 0.0446, 0.0110],

[ 0.0054, -0.0430, 0.0200, ..., 0.0449, -0.0203, -0.0074]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[ 0.0196, 0.0422, -0.0050, ..., 0.0233, -0.0228, -0.0205],

[-0.0074, 0.0177, -0.0235, ..., -0.0260, 0.0255, -0.0317],

[ 0.0458, -0.0680, 0.0033, ..., -0.0028, 0.0488, -0.0005],

...,

[-0.0213, -0.0172, 0.0251, ..., 0.0002, 0.0174, 0.0137],

[-0.0243, -0.0372, 0.0206, ..., -0.0099, 0.0121, -0.0041],

[-0.0238, 0.0007, -0.0339, ..., 0.0075, 0.0071, 0.0022]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Patience used: 4 out of 5

training: 100%|█████████████████████████████████████| 55/55 [00:10<00:00, 5.00it/s, loss=0.0443]

validation: 100%|██████████████████████████████████████| 8/8 [00:03<00:00, 2.46it/s, mse=0.0486]

--------------------------------------

Average Train MSE = 0.044250

--------------------------------------

Average Test MSE = 0.048636

--------------------------------------

Epoch no. = 8

--------------------------------------

Generalization error = 0.004386

--------------------------------------

A= tensor([[-0.0077, 0.0322, -0.0068, ..., -0.0258, 0.0526, 0.0277],

[ 0.0040, -0.0067, -0.0335, ..., -0.0297, -0.0123, 0.0205],

[-0.0288, -0.0368, -0.0361, ..., 0.0320, -0.0113, 0.0255],

...,

[-0.0040, -0.0794, 0.0318, ..., 0.0178, 0.0638, -0.0073],

[-0.0208, 0.0356, 0.0116, ..., 0.0013, 0.0446, 0.0110],

[ 0.0054, -0.0430, 0.0200, ..., 0.0449, -0.0203, -0.0074]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[ 1.9758e-02, 4.3778e-02, -5.5456e-03, ..., 2.2485e-02,

-2.4151e-02, -2.1695e-02],

[-7.7758e-03, 1.8015e-02, -2.3554e-02, ..., -2.5710e-02,

2.6305e-02, -3.2083e-02],

[ 4.6814e-02, -6.8846e-02, 2.8851e-03, ..., -3.8078e-03,

4.9971e-02, -7.7873e-05],

...,

[-2.3109e-02, -1.8136e-02, 2.5409e-02, ..., 5.3936e-04,

1.7779e-02, 1.4774e-02],

[-2.6130e-02, -3.9139e-02, 2.1677e-02, ..., -1.0589e-02,

1.3224e-02, -4.0544e-03],

[-2.4624e-02, 6.3152e-04, -3.2842e-02, ..., 7.7898e-03,

8.5285e-03, 3.2797e-03]], device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Patience used: 5 out of 5

Part of X:

--------------------------------------

A= tensor([[-0.0337, -0.0565, -0.0594, ..., 0.0128, 0.0096, -0.0342],

[ 0.0192, 0.0262, -0.0068, ..., -0.0084, -0.0703, -0.0247],

[ 0.0076, 0.0126, 0.0174, ..., -0.0166, -0.0177, -0.0823],

...,

[-0.0470, 0.0542, 0.0055, ..., 0.0460, -0.0113, -0.0051],

[ 0.0052, 0.0569, -0.0114, ..., 0.0470, 0.0398, 0.0392],

[-0.0278, 0.0094, 0.0081, ..., -0.0008, 0.0239, -0.0150]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[ 0.0153, -0.0535, -0.0493, ..., 0.0936, -0.0481, 0.0529],

[ 0.0262, -0.1161, -0.0397, ..., -0.0075, 0.0614, 0.0244],

[ 0.0636, -0.0673, 0.0246, ..., 0.0113, 0.0804, 0.0405],

...,

[-0.0626, -0.0950, 0.0299, ..., 0.0591, -0.0820, -0.0044],

[ 0.0753, -0.0803, -0.0718, ..., 0.0788, -0.0708, 0.0839],

[-0.0758, -0.0939, 0.0883, ..., -0.0634, -0.0076, -0.0843]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Patience used: 2 out of 5

training: 100%|██████████████████████████████████████████████| 55/55 [00:10<00:00, 5.01it/s, loss=50.4]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.57it/s, mse=50.7]

--------------------------------------

Average Train MSE = 50.445726

--------------------------------------

Average Test MSE = 50.701930

--------------------------------------

Epoch no. = 17

--------------------------------------

Generalization error = 0.256204

--------------------------------------

A= tensor([[-0.0337, -0.0565, -0.0594, ..., 0.0128, 0.0096, -0.0342],

[ 0.0192, 0.0262, -0.0068, ..., -0.0084, -0.0703, -0.0247],

[ 0.0076, 0.0126, 0.0174, ..., -0.0166, -0.0177, -0.0823],

...,

[-0.0470, 0.0542, 0.0055, ..., 0.0460, -0.0113, -0.0051],

[ 0.0052, 0.0569, -0.0114, ..., 0.0470, 0.0398, 0.0392],

[-0.0278, 0.0094, 0.0081, ..., -0.0008, 0.0239, -0.0150]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[ 0.0155, -0.0552, -0.0527, ..., 0.0975, -0.0510, 0.0566],

[ 0.0288, -0.1204, -0.0443, ..., -0.0067, 0.0633, 0.0248],

[ 0.0676, -0.0715, 0.0249, ..., 0.0131, 0.0832, 0.0402],

...,

[-0.0661, -0.0996, 0.0337, ..., 0.0622, -0.0848, -0.0059],

[ 0.0786, -0.0829, -0.0758, ..., 0.0831, -0.0740, 0.0882],

[-0.0800, -0.0989, 0.0923, ..., -0.0657, -0.0073, -0.0882]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Patience used: 3 out of 5

training: 100%|██████████████████████████████████████████████| 55/55 [00:11<00:00, 4.97it/s, loss=48.8]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.47it/s, mse=49.1]

--------------------------------------

Average Train MSE = 48.802912

--------------------------------------

Average Test MSE = 49.075002

--------------------------------------

Epoch no. = 18

--------------------------------------

Generalization error = 0.272090

--------------------------------------

A= tensor([[-0.0337, -0.0565, -0.0594, ..., 0.0128, 0.0096, -0.0342],

[ 0.0192, 0.0262, -0.0068, ..., -0.0084, -0.0703, -0.0247],

[ 0.0076, 0.0126, 0.0174, ..., -0.0166, -0.0177, -0.0823],

...,

[-0.0470, 0.0542, 0.0055, ..., 0.0460, -0.0113, -0.0051],

[ 0.0052, 0.0569, -0.0114, ..., 0.0470, 0.0398, 0.0392],

[-0.0278, 0.0094, 0.0081, ..., -0.0008, 0.0239, -0.0150]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[ 0.0157, -0.0571, -0.0562, ..., 0.1011, -0.0539, 0.0601],

[ 0.0311, -0.1245, -0.0489, ..., -0.0057, 0.0651, 0.0252],

[ 0.0715, -0.0755, 0.0250, ..., 0.0146, 0.0857, 0.0401],

...,

[-0.0693, -0.1041, 0.0373, ..., 0.0649, -0.0879, -0.0076],

[ 0.0816, -0.0851, -0.0796, ..., 0.0870, -0.0771, 0.0922],

[-0.0839, -0.1037, 0.0963, ..., -0.0679, -0.0072, -0.0920]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Patience used: 4 out of 5

training: 100%|██████████████████████████████████████████████| 55/55 [00:10<00:00, 5.03it/s, loss=47.4]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.43it/s, mse=47.7]

--------------------------------------

Average Train MSE = 47.375564

--------------------------------------

Average Test MSE = 47.749811

--------------------------------------

Epoch no. = 19

--------------------------------------

Generalization error = 0.374247

--------------------------------------

A= tensor([[-0.0337, -0.0565, -0.0594, ..., 0.0128, 0.0096, -0.0342],

[ 0.0192, 0.0262, -0.0068, ..., -0.0084, -0.0703, -0.0247],

[ 0.0076, 0.0126, 0.0174, ..., -0.0166, -0.0177, -0.0823],

...,

[-0.0470, 0.0542, 0.0055, ..., 0.0460, -0.0113, -0.0051],

[ 0.0052, 0.0569, -0.0114, ..., 0.0470, 0.0398, 0.0392],

[-0.0278, 0.0094, 0.0081, ..., -0.0008, 0.0239, -0.0150]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[ 0.0160, -0.0584, -0.0595, ..., 0.1048, -0.0567, 0.0638],

[ 0.0341, -0.1284, -0.0535, ..., -0.0055, 0.0671, 0.0252],

[ 0.0756, -0.0794, 0.0248, ..., 0.0157, 0.0882, 0.0399],

...,

[-0.0723, -0.1083, 0.0408, ..., 0.0678, -0.0905, -0.0087],

[ 0.0848, -0.0873, -0.0833, ..., 0.0910, -0.0800, 0.0963],

[-0.0879, -0.1084, 0.1001, ..., -0.0700, -0.0071, -0.0957]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Patience used: 5 out of 5

X-AVG

Model Hyperparameters:

ambient\_dim=4000

measurements=1000

redundancy=40000

DECONET\_iterations=10

Step size 1 parameter=0.5

Step size 2 parameter=0.3

Type of initialization=kaiming

Beta parameter a=0.5

Beta parameter b=0.7

DECONET(

(phi): Parameter(40000, 4000)

(first\_activation): TruncationActivation()

(second\_activation): ShrinkageActivation()

)

training: 100%|██████████████████████████████████████████| 55/55 [00:11<00:00, 4.92it/s, loss=1.12e+02]

validation: 100%|████████████████████████████████████████████| 8/8 [00:03<00:00, 2.55it/s, mse=1.1e+02]

--------------------------------------

Average Train MSE = 111.520253

--------------------------------------

Average Test MSE = 110.121840

--------------------------------------

Epoch no. = 0

--------------------------------------

Generalization error = 1.398414

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-6.2711e-03, 4.1424e-05, 1.7847e-02, ..., 1.9021e-02,

2.3262e-02, -8.2587e-03],

[ 1.1852e-02, 2.0183e-02, -1.4214e-03, ..., 6.1916e-04,

-1.0655e-02, -1.5962e-02],

[-1.4662e-02, 1.1036e-02, -1.2097e-02, ..., 3.5196e-02,

-9.5416e-03, 1.9230e-02],

...,

[ 2.5427e-02, 5.6405e-03, -1.9126e-02, ..., -2.7957e-02,

2.7399e-02, -6.7156e-03],

[ 7.9355e-03, -7.3354e-03, 3.9946e-02, ..., -2.5965e-02,

-1.3333e-02, 9.3739e-03],

[-1.7102e-02, -8.0857e-04, -1.4781e-02, ..., 3.7215e-03,

-1.5844e-02, -3.9169e-02]], device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Validation loss decreased (inf --> 1.398414). Saving model ...

training: 100%|██████████████████████████████████████████| 55/55 [00:10<00:00, 5.01it/s, loss=1.05e+02]

validation: 100%|███████████████████████████████████████████| 8/8 [00:03<00:00, 2.39it/s, mse=1.04e+02]

--------------------------------------

Average Train MSE = 105.338776

--------------------------------------

Average Test MSE = 103.971646

--------------------------------------

Epoch no. = 1

--------------------------------------

Generalization error = 1.367130

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0119, 0.0053, 0.0231, ..., 0.0197, 0.0286, -0.0030],

[ 0.0161, 0.0199, -0.0068, ..., 0.0030, -0.0160, -0.0211],

[-0.0094, 0.0060, -0.0096, ..., 0.0299, -0.0149, 0.0183],

...,

[ 0.0272, 0.0063, -0.0145, ..., -0.0330, 0.0329, -0.0012],

[ 0.0134, -0.0117, 0.0451, ..., -0.0304, -0.0169, 0.0041],

[-0.0225, 0.0046, -0.0105, ..., -0.0003, -0.0112, -0.0403]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Validation loss decreased (1.398414 --> 1.367130). Saving model ...

training: 100%|██████████████████████████████████████████████| 55/55 [00:11<00:00, 4.98it/s, loss=99.5]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.54it/s, mse=97.9]

--------------------------------------

Average Train MSE = 99.546641

--------------------------------------

Average Test MSE = 97.913426

--------------------------------------

Epoch no. = 2

--------------------------------------

Generalization error = 1.633215

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0172, 0.0102, 0.0283, ..., 0.0216, 0.0339, 0.0019],

[ 0.0194, 0.0206, -0.0121, ..., 0.0065, -0.0211, -0.0259],

[-0.0044, 0.0013, -0.0074, ..., 0.0247, -0.0205, 0.0185],

...,

[ 0.0299, 0.0062, -0.0101, ..., -0.0381, 0.0384, 0.0041],

[ 0.0187, -0.0157, 0.0500, ..., -0.0348, -0.0208, -0.0011],

[-0.0277, 0.0098, -0.0063, ..., -0.0043, -0.0068, -0.0432]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Patience used: 1 out of 5

training: 100%|██████████████████████████████████████████████| 55/55 [00:11<00:00, 4.99it/s, loss=94.1]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.47it/s, mse=92.5]

--------------------------------------

Average Train MSE = 94.112628

--------------------------------------

Average Test MSE = 92.478744

--------------------------------------

Epoch no. = 3

--------------------------------------

Generalization error = 1.633884

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0223, 0.0149, 0.0335, ..., 0.0224, 0.0392, 0.0066],

[ 0.0223, 0.0206, -0.0170, ..., 0.0096, -0.0262, -0.0307],

[ 0.0003, -0.0030, -0.0041, ..., 0.0195, -0.0257, 0.0189],

...,

[ 0.0327, 0.0064, -0.0060, ..., -0.0430, 0.0439, 0.0091],

[ 0.0239, -0.0191, 0.0548, ..., -0.0390, -0.0253, -0.0060],

[-0.0325, 0.0147, -0.0022, ..., -0.0083, -0.0025, -0.0459]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Patience used: 2 out of 5

training: 100%|██████████████████████████████████████████████| 55/55 [00:11<00:00, 4.93it/s, loss=88.9]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.42it/s, mse=87.7]

--------------------------------------

Average Train MSE = 88.923827

--------------------------------------

Average Test MSE = 87.668812

--------------------------------------

Epoch no. = 4

--------------------------------------

Generalization error = 1.255015

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0272, 0.0191, 0.0384, ..., 0.0228, 0.0442, 0.0111],

[ 0.0243, 0.0213, -0.0217, ..., 0.0134, -0.0312, -0.0351],

[ 0.0046, -0.0069, -0.0006, ..., 0.0143, -0.0308, 0.0210],

...,

[ 0.0362, 0.0065, -0.0021, ..., -0.0480, 0.0492, 0.0140],

[ 0.0290, -0.0217, 0.0595, ..., -0.0432, -0.0298, -0.0110],

[-0.0367, 0.0195, 0.0020, ..., -0.0123, 0.0020, -0.0487]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Validation loss decreased (1.367130 --> 1.255015). Saving model ...

training: 100%|██████████████████████████████████████████████| 55/55 [00:10<00:00, 5.05it/s, loss=84.1]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.52it/s, mse=83.1]

--------------------------------------

Average Train MSE = 84.104343

--------------------------------------

Average Test MSE = 83.085803

--------------------------------------

Epoch no. = 5

--------------------------------------

Generalization error = 1.018540

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0319, 0.0231, 0.0436, ..., 0.0223, 0.0491, 0.0152],

[ 0.0261, 0.0216, -0.0264, ..., 0.0176, -0.0362, -0.0393],

[ 0.0087, -0.0107, 0.0029, ..., 0.0094, -0.0356, 0.0238],

...,

[ 0.0399, 0.0065, 0.0021, ..., -0.0531, 0.0544, 0.0185],

[ 0.0338, -0.0235, 0.0644, ..., -0.0474, -0.0337, -0.0158],

[-0.0407, 0.0241, 0.0061, ..., -0.0164, 0.0061, -0.0518]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Validation loss decreased (1.255015 --> 1.018540). Saving model ...

training: 100%|██████████████████████████████████████████████| 55/55 [00:11<00:00, 4.91it/s, loss=79.6]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.51it/s, mse=78.4]

--------------------------------------

Average Train MSE = 79.557189

--------------------------------------

Average Test MSE = 78.437745

--------------------------------------

Epoch no. = 6

--------------------------------------

Generalization error = 1.119444

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0364, 0.0268, 0.0486, ..., 0.0220, 0.0540, 0.0193],

[ 0.0277, 0.0218, -0.0307, ..., 0.0220, -0.0410, -0.0435],

[ 0.0127, -0.0142, 0.0067, ..., 0.0044, -0.0405, 0.0267],

...,

[ 0.0438, 0.0068, 0.0061, ..., -0.0581, 0.0595, 0.0230],

[ 0.0386, -0.0248, 0.0693, ..., -0.0519, -0.0378, -0.0204],

[-0.0444, 0.0284, 0.0102, ..., -0.0205, 0.0100, -0.0545]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Patience used: 1 out of 5

training: 100%|██████████████████████████████████████████████| 55/55 [00:11<00:00, 4.99it/s, loss=75.1]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.44it/s, mse=74.2]

--------------------------------------

Average Train MSE = 75.078695

--------------------------------------

Average Test MSE = 74.182698

--------------------------------------

Epoch no. = 7

--------------------------------------

Generalization error = 0.895997

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0407, 0.0301, 0.0538, ..., 0.0208, 0.0587, 0.0233],

[ 0.0292, 0.0218, -0.0349, ..., 0.0258, -0.0458, -0.0475],

[ 0.0164, -0.0174, 0.0108, ..., -0.0005, -0.0451, 0.0293],

...,

[ 0.0475, 0.0072, 0.0103, ..., -0.0630, 0.0645, 0.0274],

[ 0.0432, -0.0256, 0.0739, ..., -0.0560, -0.0423, -0.0248],

[-0.0479, 0.0324, 0.0139, ..., -0.0244, 0.0138, -0.0572]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Validation loss decreased (1.018540 --> 0.895997). Saving model ...

training: 100%|██████████████████████████████████████████████| 55/55 [00:10<00:00, 5.02it/s, loss=71.1]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.47it/s, mse=70.2]

--------------------------------------

Average Train MSE = 71.078581

--------------------------------------

Average Test MSE = 70.249172

--------------------------------------

Epoch no. = 8

--------------------------------------

Generalization error = 0.829409

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0448, 0.0334, 0.0588, ..., 0.0193, 0.0634, 0.0270],

[ 0.0300, 0.0216, -0.0391, ..., 0.0302, -0.0505, -0.0515],

[ 0.0200, -0.0207, 0.0145, ..., -0.0051, -0.0497, 0.0325],

...,

[ 0.0515, 0.0075, 0.0146, ..., -0.0678, 0.0695, 0.0315],

[ 0.0477, -0.0262, 0.0788, ..., -0.0604, -0.0463, -0.0290],

[-0.0513, 0.0364, 0.0174, ..., -0.0284, 0.0176, -0.0596]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Validation loss decreased (0.895997 --> 0.829409). Saving model ...

training: 100%|██████████████████████████████████████████████| 55/55 [00:11<00:00, 4.97it/s, loss=67.3]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.24it/s, mse=66.7]

--------------------------------------

Average Train MSE = 67.275154

--------------------------------------

Average Test MSE = 66.710107

--------------------------------------

Epoch no. = 9

--------------------------------------

Generalization error = 0.565047

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0489, 0.0365, 0.0639, ..., 0.0176, 0.0679, 0.0306],

[ 0.0312, 0.0209, -0.0430, ..., 0.0340, -0.0552, -0.0553],

[ 0.0235, -0.0237, 0.0188, ..., -0.0097, -0.0542, 0.0352],

...,

[ 0.0554, 0.0080, 0.0188, ..., -0.0725, 0.0743, 0.0355],

[ 0.0521, -0.0263, 0.0836, ..., -0.0646, -0.0505, -0.0330],

[-0.0544, 0.0403, 0.0212, ..., -0.0323, 0.0212, -0.0618]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Validation loss decreased (0.829409 --> 0.565047). Saving model ...

training: 100%|██████████████████████████████████████████████| 55/55 [00:10<00:00, 5.01it/s, loss=63.9]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.45it/s, mse=63.1]

--------------------------------------

Average Train MSE = 63.939225

--------------------------------------

Average Test MSE = 63.131251

--------------------------------------

Epoch no. = 10

--------------------------------------

Generalization error = 0.807974

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0527, 0.0394, 0.0688, ..., 0.0155, 0.0724, 0.0341],

[ 0.0319, 0.0203, -0.0469, ..., 0.0377, -0.0596, -0.0590],

[ 0.0267, -0.0264, 0.0225, ..., -0.0141, -0.0586, 0.0381],

...,

[ 0.0594, 0.0086, 0.0228, ..., -0.0771, 0.0789, 0.0391],

[ 0.0563, -0.0262, 0.0882, ..., -0.0685, -0.0544, -0.0369],

[-0.0575, 0.0438, 0.0246, ..., -0.0359, 0.0251, -0.0635]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Patience used: 1 out of 5

training: 100%|██████████████████████████████████████████████| 55/55 [00:10<00:00, 5.01it/s, loss=60.6]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.48it/s, mse=60.1]

--------------------------------------

Average Train MSE = 60.621345

--------------------------------------

Average Test MSE = 60.082717

--------------------------------------

Epoch no. = 11

--------------------------------------

Generalization error = 0.538628

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0565, 0.0421, 0.0737, ..., 0.0134, 0.0768, 0.0374],

[ 0.0324, 0.0196, -0.0506, ..., 0.0416, -0.0641, -0.0627],

[ 0.0299, -0.0290, 0.0265, ..., -0.0184, -0.0628, 0.0403],

...,

[ 0.0634, 0.0090, 0.0268, ..., -0.0815, 0.0835, 0.0429],

[ 0.0605, -0.0257, 0.0928, ..., -0.0724, -0.0585, -0.0406],

[-0.0605, 0.0472, 0.0276, ..., -0.0391, 0.0287, -0.0657]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Validation loss decreased (0.565047 --> 0.538628). Saving model ...

training: 100%|██████████████████████████████████████████████| 55/55 [00:11<00:00, 4.86it/s, loss=57.6]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.28it/s, mse=57.1]

--------------------------------------

Average Train MSE = 57.610692

--------------------------------------

Average Test MSE = 57.093945

--------------------------------------

Epoch no. = 12

--------------------------------------

Generalization error = 0.516747

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0601, 0.0448, 0.0784, ..., 0.0114, 0.0812, 0.0406],

[ 0.0331, 0.0183, -0.0542, ..., 0.0449, -0.0685, -0.0662],

[ 0.0330, -0.0316, 0.0300, ..., -0.0225, -0.0672, 0.0424],

...,

[ 0.0669, 0.0101, 0.0308, ..., -0.0856, 0.0881, 0.0464],

[ 0.0644, -0.0255, 0.0974, ..., -0.0761, -0.0623, -0.0442],

[-0.0633, 0.0504, 0.0309, ..., -0.0425, 0.0322, -0.0669]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Validation loss decreased (0.538628 --> 0.516747). Saving model ...

training: 100%|██████████████████████████████████████████████| 55/55 [00:11<00:00, 4.92it/s, loss=54.9]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.45it/s, mse=54.6]

--------------------------------------

Average Train MSE = 54.933750

--------------------------------------

Average Test MSE = 54.551890

--------------------------------------

Epoch no. = 13

--------------------------------------

Generalization error = 0.381860

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0636, 0.0472, 0.0831, ..., 0.0095, 0.0854, 0.0436],

[ 0.0337, 0.0173, -0.0578, ..., 0.0484, -0.0728, -0.0697],

[ 0.0360, -0.0339, 0.0332, ..., -0.0264, -0.0713, 0.0440],

...,

[ 0.0704, 0.0108, 0.0347, ..., -0.0897, 0.0926, 0.0498],

[ 0.0684, -0.0251, 0.1018, ..., -0.0797, -0.0665, -0.0476],

[-0.0661, 0.0535, 0.0340, ..., -0.0456, 0.0356, -0.0685]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Validation loss decreased (0.516747 --> 0.381860). Saving model ...

training: 100%|██████████████████████████████████████████████| 55/55 [00:11<00:00, 4.91it/s, loss=52.4]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.46it/s, mse=52.2]

--------------------------------------

Average Train MSE = 52.420650

--------------------------------------

Average Test MSE = 52.200255

--------------------------------------

Epoch no. = 14

--------------------------------------

Generalization error = 0.220395

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0670, 0.0496, 0.0875, ..., 0.0070, 0.0895, 0.0465],

[ 0.0341, 0.0161, -0.0612, ..., 0.0518, -0.0770, -0.0730],

[ 0.0387, -0.0361, 0.0367, ..., -0.0303, -0.0751, 0.0460],

...,

[ 0.0739, 0.0115, 0.0384, ..., -0.0937, 0.0969, 0.0531],

[ 0.0721, -0.0249, 0.1059, ..., -0.0829, -0.0705, -0.0508],

[-0.0688, 0.0564, 0.0370, ..., -0.0487, 0.0390, -0.0699]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Validation loss decreased (0.381860 --> 0.220395). Saving model ...

training: 100%|██████████████████████████████████████████████| 55/55 [00:11<00:00, 4.94it/s, loss=50.2]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.51it/s, mse=49.9]

--------------------------------------

Average Train MSE = 50.232568

--------------------------------------

Average Test MSE = 49.937409

--------------------------------------

Epoch no. = 15

--------------------------------------

Generalization error = 0.295159

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0703, 0.0518, 0.0919, ..., 0.0048, 0.0936, 0.0493],

[ 0.0344, 0.0151, -0.0646, ..., 0.0551, -0.0811, -0.0762],

[ 0.0415, -0.0381, 0.0399, ..., -0.0341, -0.0790, 0.0475],

...,

[ 0.0772, 0.0124, 0.0421, ..., -0.0975, 0.1012, 0.0562],

[ 0.0758, -0.0243, 0.1100, ..., -0.0863, -0.0744, -0.0538],

[-0.0714, 0.0592, 0.0399, ..., -0.0516, 0.0422, -0.0712]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Patience used: 1 out of 5

training: 100%|██████████████████████████████████████████████| 55/55 [00:11<00:00, 5.00it/s, loss=48.3]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.50it/s, mse=48.2]

--------------------------------------

Average Train MSE = 48.253328

--------------------------------------

Average Test MSE = 48.194637

--------------------------------------

Epoch no. = 16

--------------------------------------

Generalization error = 0.058690

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0735, 0.0539, 0.0963, ..., 0.0027, 0.0975, 0.0520],

[ 0.0349, 0.0140, -0.0679, ..., 0.0580, -0.0852, -0.0793],

[ 0.0442, -0.0402, 0.0428, ..., -0.0378, -0.0830, 0.0491],

...,

[ 0.0804, 0.0134, 0.0457, ..., -0.1012, 0.1054, 0.0593],

[ 0.0794, -0.0238, 0.1140, ..., -0.0894, -0.0783, -0.0569],

[-0.0741, 0.0619, 0.0427, ..., -0.0545, 0.0452, -0.0729]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Validation loss decreased (0.220395 --> 0.058690). Saving model ...

training: 100%|██████████████████████████████████████████████| 55/55 [00:11<00:00, 4.99it/s, loss=46.5]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.49it/s, mse=46.5]

--------------------------------------

Average Train MSE = 46.531295

--------------------------------------

Average Test MSE = 46.490480

--------------------------------------

Epoch no. = 17

--------------------------------------

Generalization error = 0.040814

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0766, 0.0558, 0.1004, ..., 0.0005, 0.1015, 0.0547],

[ 0.0352, 0.0129, -0.0711, ..., 0.0610, -0.0892, -0.0821],

[ 0.0468, -0.0421, 0.0456, ..., -0.0414, -0.0868, 0.0503],

...,

[ 0.0835, 0.0140, 0.0491, ..., -0.1048, 0.1096, 0.0622],

[ 0.0830, -0.0232, 0.1179, ..., -0.0924, -0.0821, -0.0597],

[-0.0766, 0.0645, 0.0456, ..., -0.0574, 0.0484, -0.0742]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Validation loss decreased (0.058690 --> 0.040814). Saving model ...

training: 100%|██████████████████████████████████████████████| 55/55 [00:10<00:00, 5.02it/s, loss=45.0]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.45it/s, mse=45.1]

--------------------------------------

Average Train MSE = 45.001912

--------------------------------------

Average Test MSE = 45.119596

--------------------------------------

Epoch no. = 18

--------------------------------------

Generalization error = 0.117685

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0796, 0.0578, 0.1044, ..., -0.0013, 0.1052, 0.0572],

[ 0.0357, 0.0119, -0.0742, ..., 0.0638, -0.0930, -0.0849],

[ 0.0493, -0.0438, 0.0485, ..., -0.0447, -0.0904, 0.0521],

...,

[ 0.0866, 0.0151, 0.0524, ..., -0.1083, 0.1136, 0.0651],

[ 0.0864, -0.0232, 0.1216, ..., -0.0952, -0.0863, -0.0625],

[-0.0790, 0.0670, 0.0482, ..., -0.0600, 0.0514, -0.0758]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Patience used: 1 out of 5

training: 100%|██████████████████████████████████████████████| 55/55 [00:11<00:00, 4.98it/s, loss=43.7]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.46it/s, mse=43.7]

--------------------------------------

Average Train MSE = 43.692904

--------------------------------------

Average Test MSE = 43.732006

--------------------------------------

Epoch no. = 19

--------------------------------------

Generalization error = 0.039102

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0826, 0.0599, 0.1083, ..., -0.0028, 0.1089, 0.0598],

[ 0.0360, 0.0108, -0.0772, ..., 0.0667, -0.0967, -0.0877],

[ 0.0518, -0.0458, 0.0508, ..., -0.0481, -0.0940, 0.0530],

...,

[ 0.0898, 0.0158, 0.0557, ..., -0.1117, 0.1175, 0.0679],

[ 0.0898, -0.0224, 0.1253, ..., -0.0982, -0.0900, -0.0653],

[-0.0814, 0.0693, 0.0507, ..., -0.0624, 0.0542, -0.0772]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Validation loss decreased (0.040814 --> 0.039102). Saving model ...

training: 100%|██████████████████████████████████████████████| 55/55 [00:11<00:00, 4.94it/s, loss=42.6]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.49it/s, mse=42.9]

--------------------------------------

Average Train MSE = 42.613549

--------------------------------------

Average Test MSE = 42.893098

--------------------------------------

Epoch no. = 20

--------------------------------------

Generalization error = 0.279549

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0857, 0.0618, 0.1122, ..., -0.0042, 0.1126, 0.0623],

[ 0.0365, 0.0096, -0.0802, ..., 0.0693, -0.1004, -0.0903],

[ 0.0542, -0.0476, 0.0532, ..., -0.0514, -0.0975, 0.0544],

...,

[ 0.0926, 0.0167, 0.0592, ..., -0.1149, 0.1215, 0.0708],

[ 0.0931, -0.0220, 0.1289, ..., -0.1008, -0.0938, -0.0679],

[-0.0840, 0.0716, 0.0534, ..., -0.0649, 0.0573, -0.0786]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Patience used: 1 out of 5

training: 100%|██████████████████████████████████████████████| 55/55 [00:11<00:00, 4.98it/s, loss=41.8]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.48it/s, mse=42.0]

--------------------------------------

Average Train MSE = 41.764696

--------------------------------------

Average Test MSE = 42.026185

--------------------------------------

Epoch no. = 21

--------------------------------------

Generalization error = 0.261489

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0885, 0.0637, 0.1159, ..., -0.0058, 0.1161, 0.0647],

[ 0.0367, 0.0085, -0.0832, ..., 0.0721, -0.1040, -0.0931],

[ 0.0567, -0.0493, 0.0554, ..., -0.0546, -0.1011, 0.0555],

...,

[ 0.0958, 0.0177, 0.0624, ..., -0.1183, 0.1252, 0.0736],

[ 0.0963, -0.0214, 0.1326, ..., -0.1035, -0.0975, -0.0704],

[-0.0865, 0.0739, 0.0559, ..., -0.0672, 0.0598, -0.0803]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Patience used: 2 out of 5

training: 100%|██████████████████████████████████████████████| 55/55 [00:11<00:00, 4.98it/s, loss=41.1]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.49it/s, mse=41.5]

--------------------------------------

Average Train MSE = 41.123116

--------------------------------------

Average Test MSE = 41.484670

--------------------------------------

Epoch no. = 22

--------------------------------------

Generalization error = 0.361554

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0914, 0.0656, 0.1196, ..., -0.0069, 0.1196, 0.0671],

[ 0.0369, 0.0074, -0.0861, ..., 0.0746, -0.1075, -0.0957],

[ 0.0590, -0.0511, 0.0577, ..., -0.0578, -0.1045, 0.0567],

...,

[ 0.0986, 0.0182, 0.0655, ..., -0.1214, 0.1289, 0.0763],

[ 0.0996, -0.0209, 0.1360, ..., -0.1060, -0.1014, -0.0729],

[-0.0889, 0.0760, 0.0586, ..., -0.0696, 0.0625, -0.0816]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Patience used: 3 out of 5

training: 100%|██████████████████████████████████████████████| 55/55 [00:11<00:00, 4.98it/s, loss=40.6]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.49it/s, mse=40.9]

--------------------------------------

Average Train MSE = 40.570908

--------------------------------------

Average Test MSE = 40.922961

--------------------------------------

Epoch no. = 23

--------------------------------------

Generalization error = 0.352052

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0943, 0.0675, 0.1231, ..., -0.0080, 0.1230, 0.0695],

[ 0.0371, 0.0061, -0.0889, ..., 0.0772, -0.1109, -0.0983],

[ 0.0613, -0.0528, 0.0595, ..., -0.0609, -0.1080, 0.0576],

...,

[ 0.1016, 0.0191, 0.0686, ..., -0.1247, 0.1325, 0.0788],

[ 0.1028, -0.0202, 0.1396, ..., -0.1086, -0.1051, -0.0753],

[-0.0915, 0.0784, 0.0613, ..., -0.0721, 0.0653, -0.0836]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Patience used: 4 out of 5

training: 100%|██████████████████████████████████████████████| 55/55 [00:11<00:00, 4.98it/s, loss=40.2]

validation: 100%|███████████████████████████████████████████████| 8/8 [00:03<00:00, 2.54it/s, mse=40.5]

--------------------------------------

Average Train MSE = 40.238386

--------------------------------------

Average Test MSE = 40.548130

--------------------------------------

Epoch no. = 24

--------------------------------------

Generalization error = 0.309744

--------------------------------------

A= tensor([[-0.0245, -0.0132, 0.0184, ..., 0.0080, -0.0241, 0.0338],

[ 0.0341, -0.0482, -0.0084, ..., 0.0069, 0.0040, 0.0609],

[-0.0245, 0.0399, 0.0705, ..., 0.0024, 0.0134, -0.0222],

...,

[-0.0047, 0.0285, -0.0451, ..., 0.0493, 0.0584, -0.0404],

[ 0.0256, -0.0036, 0.0230, ..., 0.0007, -0.0268, -0.0407],

[-0.0181, -0.0022, -0.0705, ..., 0.0588, -0.0144, 0.0185]],

device='cuda:0')

--------------------------------------

PHI= Parameter containing:

tensor([[-0.0972, 0.0695, 0.1266, ..., -0.0094, 0.1265, 0.0720],

[ 0.0373, 0.0047, -0.0918, ..., 0.0797, -0.1144, -0.1007],

[ 0.0638, -0.0543, 0.0613, ..., -0.0640, -0.1115, 0.0589],

...,

[ 0.1044, 0.0197, 0.0717, ..., -0.1279, 0.1361, 0.0813],

[ 0.1060, -0.0201, 0.1429, ..., -0.1110, -0.1089, -0.0776],

[-0.0939, 0.0807, 0.0637, ..., -0.0744, 0.0678, -0.0854]],

device='cuda:0', requires\_grad=True)

--------------------------------------

alpha= 0.5

--------------------------------------

beta= 0.3

Patience used: 5 out of 5

4.10

ההרצות עד כה היו עם סיגמא=0.01 ב-Zt, ולא הכפלנו את Ct באף מספר.

כעת:

נרצה בהרצות הבאות **לשנות את סיגמא**: להכפיל ב-2, 10, וכך גם לחלק.

**+** אותו דבר עבור המטריצה Ct. – **זה שקול ללשנות את הsupport של v' מ-10 למספרים שלהלן. נעשה זאת!**

כך, להריץ מחדש על Z שיוצא.

לתעד:

MSE, normalized MSE

לשמור את המטריצות הנלמדות (כמובן) ולבחון בטסט את התפלגות הערכים אחרי ולפני האימון, בכל אחד מהסניורים. (להשלים בקובץ 'לאיתי').

יצרתי היום את הnotebook show\_results.ipynb והשתמשתי בטנסורים השמורים של **estimated\_Z\_test\_sig001\_vt\_supp=10.pt**, estimated\_X\_test\_sig001\_vt\_supp=10, estimated\_X-X\_Avg\_test\_sig001\_vt\_supp=10