Практическая работа №5

Выполнил студент группы БВТ2003 Глазков Даниил

Вариант 1

X ∈ N(3,10); e ∈ N(0,0.3); признак № 5

In [1]:
```
from typing import List, Callable

import numpy as np

np.random.seed(42)

fns = [
    lambda x: np.power(x, 2),
    lambda x: np.sin(x/2),
    lambda x: np.cos(2 * x),
    lambda x: x - 4,
    lambda x: -x,
    lambda x: np.abs(x),
    lambda x: (np.power(x, 3))/4,
]


def generate(
        functions: List[Callable], target_index: int = 0, n_samples: int = 1000,
        x_normal_loc: float = 0., x_normal_scale: float = 1.,
        e_normal_loc: float = 0., e_normal_scale: float = 0.1
) -> np.array:
    X = np.random.normal(loc=x_normal_loc, scale=x_normal_scale, size=n_samples)
    e = np.random.normal(loc=e_normal_loc, scale=e_normal_scale, size=n_samples)
    features = np.array(
        [np.array(function(X) + e) for index, function in enumerate(functions) i
    ).T
    target = np.array([functions[target_index](X) + e]).T
    return np.hstack((features, target))


target_index = 4  # fife function
generate_for_task = lambda num: generate(fns, target_index, num, 3., 10., 0., 0.
np.savetxt("C:\\Users\\Daniel\\Downloads\\pr\\train.csv", generate_for_task(1000
np.savetxt("C:\\Users\\Daniel\\Downloads\\pr\\test.csv", generate_for_task(200),
```

In [2]:
```
import pandas as pd
pd.read_csv("C:\\Users\\Daniel\\Downloads\\pr\\train.csv", delimiter=',')
```

Out[2]:

	63.895	-0.326	-0.555	4.387	8.387	126.849	-7.547
0	2.893	1.001	-0.718	-2.105	1.895	1.335	-1.340
1	89.829	-0.982	1.012	5.495	9.495	212.801	-9.459
2	332.150	0.111	0.132	14.036	18.036	1514.488	-18.424
3	0.643	0.533	0.461	-3.132	0.868	0.281	-0.449
4	0.552	0.441	0.369	-3.223	0.777	0.189	-0.541
...	...	...	...	...	...	...	...
994	0.357	0.415	1.250	-3.490	0.510	0.323	0.132
995	440.021	-0.882	-0.450	16.969	20.969	2307.599	-20.985
996	88.254	-1.265	0.735	5.144	9.144	207.941	-9.673
997	7.305	-1.026	0.604	-6.761	2.663	-5.034	2.663
998	75.917	-1.163	-0.051	4.502	8.502	165.873	-8.949

999 rows × 7 columns

In [3]:
```
import pandas as pd
pd.read_csv("C:\\Users\\Daniel\\Downloads\\pr\\test.csv", delimiter=',')
```

Out[3]:

	14.617	-0.413	0.885	-7.210	4.293	-12.661	4.293.1
0	2.360	0.644	-1.057	-2.502	1.498	0.882	-1.612
1	24.464	-0.412	-0.696	-8.708	5.140	-29.634	5.140
2	-0.382	-0.428	0.599	-4.468	-0.308	-0.388	-0.308
3	253.674	-1.280	0.611	-20.223	15.649	-1012.076	15.649
4	26.489	0.686	-0.525	1.275	5.275	33.951	-4.991
...	...	...	...	...	...	...	...
194	12.668	-1.406	0.142	-8.055	3.185	-12.293	3.185
195	52.415	-0.745	-0.648	2.982	6.982	95.343	-7.535
196	9.884	0.699	0.694	-1.110	2.890	7.826	-3.493
197	11.724	-0.928	0.917	-7.353	3.477	-9.893	3.477
198	62.095	-0.695	-0.978	3.900	7.900	122.287	-7.858

199 rows × 7 columns

In [4]:
```
import numpy as np
from keras.layers import Input, Dense
from keras.models import Model
from keras.layers import GaussianNoise
from keras.layers import BatchNormalization
from keras.optimizers import Adam

np.random.seed(42)

train_data = np.genfromtxt("C:\\Users\\Daniel\\Downloads\\pr\\train.csv", delimi
```

```
test_data = np.genfromtxt("C:\\Users\\Daniel\\Downloads\\pr\\test.csv", delimite

train_x, train_y = train_data[:, :6], train_data[:, 6]
test_x, test_y = test_data[:, :6], test_data[:, 6]

mean = train_x.mean(axis=0)
std = train_x.std(axis=0)
train_x = (train_x - mean) / std
test_x = (test_x - mean) / std

basic_input_layer = Input(shape=(6,))


def create_encoder() -> Dense:
    encoded = Dense(128, activation='relu')(basic_input_layer)
    encoded = Dense(128, activation='relu')(BatchNormalization()(encoded))
    encoded = Dense(64, activation='relu')(BatchNormalization()(encoded))
    encoded = Dense(32, activation='relu', name='encode')(BatchNormalization()(e
    return encoded


def create_decoder(input_layer: Dense) -> Dense:
    decoded = Dense(64, activation='relu')(BatchNormalization()(input_layer))
    decoded = Dense(128, activation='relu')(BatchNormalization()(decoded))
    decoded = Dense(6, name='decode')(decoded)
    return decoded


def create_regression(input_layer: Dense) -> Dense:
    predicted = Dense(128, activation='relu')(input_layer)
    predicted = Dense(64, activation='relu')(BatchNormalization()(predicted))
    predicted = Dense(32, activation='relu')(BatchNormalization()(predicted))
    predicted = Dense(16, activation='relu')(predicted)
    predicted = Dense(8, activation='relu')(predicted)
    predicted = Dense(1, name="predict")(predicted)
    return predicted


encoder_output = create_encoder()
decoder_output = create_decoder(encoder_output)
regression_output = create_regression(encoder_output)

encoder = Model(basic_input_layer, encoder_output, name='encoder')
decoder = Model(basic_input_layer, decoder_output, name='decoder')
regression = Model(basic_input_layer, regression_output, name='regression')

model = Model(inputs=[basic_input_layer], outputs=[
    decoder_output,
    regression_output
])

model.compile(optimizer=Adam(learning_rate=0.0005), loss='mse', metrics='mae')
history = model.fit(train_x, [train_x, train_y], epochs=200, batch_size=32,
                    verbose=1, validation_split=0.8)

encoded_test = encoder.predict(test_x)
decoded_test = decoder.predict(test_x)
regression_test = regression.predict(test_x)

decoded_test = decoded_test * std + mean
```

```
mae = model.evaluate(test_x, [test_x, test_y])
print("Общее MAE:", mae)

np.savetxt('C:\\Users\\Daniel\\Downloads\\pr\\encoded1.csv', encoded_test, delim
np.savetxt('C:\\Users\\Daniel\\Downloads\\pr\\decoded1.csv', decoded_test, delim
np.savetxt('C:\\Users\\Daniel\\Downloads\\pr\\regression1.csv', np.vstack((test_

encoder.save('C:\\Users\\Daniel\\Downloads\\pr\\encoder1.h5')
decoder.save('C:\\Users\\Daniel\\Downloads\\pr\\decoder1.h5')
regression.save('C:\\Users\\Daniel\\Downloads\\pr\\regression1.h5')
```

```
Epoch 1/200
7/7 [==============================] - 2s 45ms/step - loss: 94.1044 - decode_lo
ss: 1.1810 - predict_loss: 92.9235 - decode_mae: 0.8386 - predict_mae: 7.7002 -
val_loss: 110.2989 - val_decode_loss: 1.0316 - val_predict_loss: 109.2674 - val
_decode_mae: 0.7552 - val_predict_mae: 8.3243
Epoch 2/200
7/7 [==============================] - 0s 9ms/step - loss: 87.1319 - decode_los
s: 0.9290 - predict_loss: 86.2029 - decode_mae: 0.7292 - predict_mae: 7.4158 -
val_loss: 110.2296 - val_decode_loss: 1.0270 - val_predict_loss: 109.2025 - val
_decode_mae: 0.7521 - val_predict_mae: 8.3225
Epoch 3/200
7/7 [==============================] - 0s 9ms/step - loss: 82.4177 - decode_los
s: 0.6901 - predict_loss: 81.7276 - decode_mae: 0.6357 - predict_mae: 7.2311 -
val_loss: 110.1034 - val_decode_loss: 1.0184 - val_predict_loss: 109.0850 - val
_decode_mae: 0.7477 - val_predict_mae: 8.3191
Epoch 4/200
7/7 [==============================] - 0s 9ms/step - loss: 78.0887 - decode_los
s: 0.5653 - predict_loss: 77.5234 - decode_mae: 0.5653 - predict_mae: 7.0187 -
val_loss: 109.9181 - val_decode_loss: 1.0059 - val_predict_loss: 108.9122 - val
_decode_mae: 0.7426 - val_predict_mae: 8.3132
Epoch 5/200
7/7 [==============================] - 0s 8ms/step - loss: 72.2893 - decode_los
s: 0.4381 - predict_loss: 71.8512 - decode_mae: 0.5027 - predict_mae: 6.7721 -
val_loss: 109.7053 - val_decode_loss: 0.9938 - val_predict_loss: 108.7115 - val
_decode_mae: 0.7369 - val_predict_mae: 8.3060
Epoch 6/200
7/7 [==============================] - 0s 8ms/step - loss: 67.2561 - decode_los
s: 0.3936 - predict_loss: 66.8625 - decode_mae: 0.4604 - predict_mae: 6.5161 -
val_loss: 109.3678 - val_decode_loss: 0.9796 - val_predict_loss: 108.3882 - val
_decode_mae: 0.7304 - val_predict_mae: 8.2946
Epoch 7/200
7/7 [==============================] - 0s 8ms/step - loss: 60.8750 - decode_los
s: 0.3158 - predict_loss: 60.5593 - decode_mae: 0.4273 - predict_mae: 6.2495 -
val_loss: 108.7712 - val_decode_loss: 0.9595 - val_predict_loss: 107.8118 - val
_decode_mae: 0.7229 - val_predict_mae: 8.2761
Epoch 8/200
7/7 [==============================] - 0s 12ms/step - loss: 53.5938 - decode_lo
ss: 0.2881 - predict_loss: 53.3057 - decode_mae: 0.3884 - predict_mae: 5.8293 -
val_loss: 107.8405 - val_decode_loss: 0.9368 - val_predict_loss: 106.9037 - val
_decode_mae: 0.7142 - val_predict_mae: 8.2475
Epoch 9/200
7/7 [==============================] - 0s 14ms/step - loss: 47.1538 - decode_lo
ss: 0.2719 - predict_loss: 46.8819 - decode_mae: 0.3868 - predict_mae: 5.5219 -
val_loss: 106.4226 - val_decode_loss: 0.9109 - val_predict_loss: 105.5117 - val
_decode_mae: 0.7056 - val_predict_mae: 8.2034
Epoch 10/200
7/7 [==============================] - 0s 14ms/step - loss: 39.6350 - decode_lo
ss: 0.2405 - predict_loss: 39.3945 - decode_mae: 0.3592 - predict_mae: 5.0205 -
val_loss: 104.5111 - val_decode_loss: 0.8894 - val_predict_loss: 103.6216 - val
_decode_mae: 0.6974 - val_predict_mae: 8.1426
Epoch 11/200
7/7 [==============================] - 0s 12ms/step - loss: 33.7506 - decode_lo
ss: 0.2989 - predict_loss: 33.4517 - decode_mae: 0.3905 - predict_mae: 4.5473 -
val_loss: 102.0849 - val_decode_loss: 0.8807 - val_predict_loss: 101.2043 - val
_decode_mae: 0.6905 - val_predict_mae: 8.0599
Epoch 12/200
7/7 [==============================] - 0s 14ms/step - loss: 25.5064 - decode_lo
ss: 0.2252 - predict_loss: 25.2812 - decode_mae: 0.3544 - predict_mae: 4.0436 -
val_loss: 98.9199 - val_decode_loss: 0.8655 - val_predict_loss: 98.0544 - val_d
ecode_mae: 0.6835 - val_predict_mae: 7.9416
```

```
Epoch 13/200
7/7 [==============================] - 0s 13ms/step - loss: 21.8966 - decode_lo
ss: 0.2171 - predict_loss: 21.6795 - decode_mae: 0.3392 - predict_mae: 3.7032 -
val_loss: 94.9169 - val_decode_loss: 0.8514 - val_predict_loss: 94.0655 - val_d
ecode_mae: 0.6768 - val_predict_mae: 7.7867
Epoch 14/200
7/7 [==============================] - 0s 12ms/step - loss: 14.2564 - decode_lo
ss: 0.1848 - predict_loss: 14.0716 - decode_mae: 0.3167 - predict_mae: 3.0270 -
val_loss: 90.7805 - val_decode_loss: 0.8384 - val_predict_loss: 89.9421 - val_d
ecode_mae: 0.6691 - val_predict_mae: 7.6289
Epoch 15/200
7/7 [==============================] - 0s 14ms/step - loss: 11.1521 - decode_lo
ss: 0.1925 - predict_loss: 10.9596 - decode_mae: 0.3137 - predict_mae: 2.5602 -
val_loss: 87.3123 - val_decode_loss: 0.8301 - val_predict_loss: 86.4821 - val_d
ecode_mae: 0.6639 - val_predict_mae: 7.4812
Epoch 16/200
7/7 [==============================] - 0s 12ms/step - loss: 12.0659 - decode_lo
ss: 0.2188 - predict_loss: 11.8470 - decode_mae: 0.3383 - predict_mae: 2.6018 -
val_loss: 83.9767 - val_decode_loss: 0.8246 - val_predict_loss: 83.1522 - val_d
ecode_mae: 0.6606 - val_predict_mae: 7.3257
Epoch 17/200
7/7 [==============================] - 0s 15ms/step - loss: 6.4628 - decode_los
s: 0.1896 - predict_loss: 6.2731 - decode_mae: 0.3126 - predict_mae: 1.8938 - v
al_loss: 79.5734 - val_decode_loss: 0.7977 - val_predict_loss: 78.7757 - val_de
code_mae: 0.6515 - val_predict_mae: 7.1348
Epoch 18/200
7/7 [==============================] - 0s 13ms/step - loss: 7.2761 - decode_los
s: 0.1897 - predict_loss: 7.0863 - decode_mae: 0.3226 - predict_mae: 2.0495 - v
al_loss: 75.4826 - val_decode_loss: 0.7685 - val_predict_loss: 74.7140 - val_de
code_mae: 0.6410 - val_predict_mae: 6.9282
Epoch 19/200
7/7 [==============================] - 0s 14ms/step - loss: 5.8844 - decode_los
s: 0.1854 - predict_loss: 5.6989 - decode_mae: 0.3132 - predict_mae: 1.8695 - v
al_loss: 72.4685 - val_decode_loss: 0.7473 - val_predict_loss: 71.7213 - val_de
code_mae: 0.6310 - val_predict_mae: 6.7407
Epoch 20/200
7/7 [==============================] - 0s 13ms/step - loss: 3.9203 - decode_los
s: 0.1501 - predict_loss: 3.7701 - decode_mae: 0.2832 - predict_mae: 1.5292 - v
al_loss: 68.6325 - val_decode_loss: 0.7215 - val_predict_loss: 67.9110 - val_de
code_mae: 0.6181 - val_predict_mae: 6.5496
Epoch 21/200
7/7 [==============================] - 0s 13ms/step - loss: 5.3071 - decode_los
s: 0.1768 - predict_loss: 5.1302 - decode_mae: 0.3022 - predict_mae: 1.5844 - v
al_loss: 65.1424 - val_decode_loss: 0.7035 - val_predict_loss: 64.4388 - val_de
code_mae: 0.6080 - val_predict_mae: 6.4011
Epoch 22/200
7/7 [==============================] - 0s 16ms/step - loss: 4.4293 - decode_los
s: 0.1602 - predict_loss: 4.2691 - decode_mae: 0.2913 - predict_mae: 1.5504 - v
al_loss: 62.6581 - val_decode_loss: 0.6902 - val_predict_loss: 61.9679 - val_de
code_mae: 0.5983 - val_predict_mae: 6.2903
Epoch 23/200
7/7 [==============================] - 0s 11ms/step - loss: 5.9462 - decode_los
s: 0.1692 - predict_loss: 5.7770 - decode_mae: 0.2989 - predict_mae: 1.8191 - v
al_loss: 59.9830 - val_decode_loss: 0.6703 - val_predict_loss: 59.3127 - val_de
code_mae: 0.5871 - val_predict_mae: 6.1336
Epoch 24/200
7/7 [==============================] - 0s 14ms/step - loss: 5.3436 - decode_los
s: 0.1772 - predict_loss: 5.1665 - decode_mae: 0.2994 - predict_mae: 1.6715 - v
al_loss: 59.0975 - val_decode_loss: 0.6600 - val_predict_loss: 58.4374 - val_de
code_mae: 0.5800 - val_predict_mae: 6.0483
```

```
Epoch 25/200
7/7 [==============================] - 0s 11ms/step - loss: 4.0485 - decode_los
s: 0.1431 - predict_loss: 3.9054 - decode_mae: 0.2753 - predict_mae: 1.5881 - v
al_loss: 56.7452 - val_decode_loss: 0.6389 - val_predict_loss: 56.1064 - val_de
code_mae: 0.5696 - val_predict_mae: 5.8835
Epoch 26/200
7/7 [==============================] - 0s 14ms/step - loss: 4.5115 - decode_los
s: 0.1680 - predict_loss: 4.3435 - decode_mae: 0.2890 - predict_mae: 1.5959 - v
al_loss: 53.5641 - val_decode_loss: 0.6176 - val_predict_loss: 52.9465 - val_de
code_mae: 0.5608 - val_predict_mae: 5.7146
Epoch 27/200
7/7 [==============================] - 0s 14ms/step - loss: 5.1337 - decode_los
s: 0.1935 - predict_loss: 4.9402 - decode_mae: 0.3168 - predict_mae: 1.6247 - v
al_loss: 50.6932 - val_decode_loss: 0.5995 - val_predict_loss: 50.0937 - val_de
code_mae: 0.5531 - val_predict_mae: 5.5604
Epoch 28/200
7/7 [==============================] - 0s 14ms/step - loss: 5.0629 - decode_los
s: 0.1661 - predict_loss: 4.8969 - decode_mae: 0.2880 - predict_mae: 1.5464 - v
al_loss: 48.4482 - val_decode_loss: 0.5800 - val_predict_loss: 47.8682 - val_de
code_mae: 0.5447 - val_predict_mae: 5.4231
Epoch 29/200
7/7 [==============================] - 0s 14ms/step - loss: 4.1501 - decode_los
s: 0.1428 - predict_loss: 4.0073 - decode_mae: 0.2728 - predict_mae: 1.5357 - v
al_loss: 44.2654 - val_decode_loss: 0.5485 - val_predict_loss: 43.7169 - val_de
code_mae: 0.5280 - val_predict_mae: 5.1958
Epoch 30/200
7/7 [==============================] - 0s 13ms/step - loss: 3.7083 - decode_los
s: 0.1471 - predict_loss: 3.5612 - decode_mae: 0.2757 - predict_mae: 1.5333 - v
al_loss: 42.2774 - val_decode_loss: 0.5382 - val_predict_loss: 41.7392 - val_de
code_mae: 0.5188 - val_predict_mae: 5.0578
Epoch 31/200
7/7 [==============================] - 0s 14ms/step - loss: 4.3266 - decode_los
s: 0.1527 - predict_loss: 4.1739 - decode_mae: 0.2815 - predict_mae: 1.5674 - v
al_loss: 40.5675 - val_decode_loss: 0.5299 - val_predict_loss: 40.0376 - val_de
code_mae: 0.5150 - val_predict_mae: 4.9383
Epoch 32/200
7/7 [==============================] - 0s 14ms/step - loss: 4.8177 - decode_los
s: 0.1656 - predict_loss: 4.6521 - decode_mae: 0.2905 - predict_mae: 1.6285 - v
al_loss: 37.1884 - val_decode_loss: 0.5096 - val_predict_loss: 36.6788 - val_de
code_mae: 0.5052 - val_predict_mae: 4.7260
Epoch 33/200
7/7 [==============================] - 0s 12ms/step - loss: 2.5487 - decode_los
s: 0.1247 - predict_loss: 2.4240 - decode_mae: 0.2595 - predict_mae: 1.2150 - v
al_loss: 33.8587 - val_decode_loss: 0.4765 - val_predict_loss: 33.3822 - val_de
code_mae: 0.4863 - val_predict_mae: 4.4678
Epoch 34/200
7/7 [==============================] - 0s 14ms/step - loss: 3.5874 - decode_los
s: 0.1318 - predict_loss: 3.4556 - decode_mae: 0.2626 - predict_mae: 1.2005 - v
al_loss: 31.3697 - val_decode_loss: 0.4490 - val_predict_loss: 30.9207 - val_de
code_mae: 0.4716 - val_predict_mae: 4.2750
Epoch 35/200
7/7 [==============================] - 0s 14ms/step - loss: 2.5852 - decode_los
s: 0.1148 - predict_loss: 2.4704 - decode_mae: 0.2483 - predict_mae: 1.2381 - v
al_loss: 30.1961 - val_decode_loss: 0.4367 - val_predict_loss: 29.7594 - val_de
code_mae: 0.4693 - val_predict_mae: 4.2330
Epoch 36/200
7/7 [==============================] - 0s 15ms/step - loss: 4.1188 - decode_los
s: 0.1438 - predict_loss: 3.9750 - decode_mae: 0.2712 - predict_mae: 1.4716 - v
al_loss: 30.3578 - val_decode_loss: 0.4400 - val_predict_loss: 29.9178 - val_de
code_mae: 0.4686 - val_predict_mae: 4.2556
```

```
Epoch 37/200
7/7 [==============================] - 0s 13ms/step - loss: 3.0820 - decode_los
s: 0.1133 - predict_loss: 2.9686 - decode_mae: 0.2404 - predict_mae: 1.3580 - v
al_loss: 27.7766 - val_decode_loss: 0.4169 - val_predict_loss: 27.3597 - val_de
code_mae: 0.4529 - val_predict_mae: 4.0629
Epoch 38/200
7/7 [==============================] - 0s 14ms/step - loss: 2.5854 - decode_los
s: 0.1260 - predict_loss: 2.4595 - decode_mae: 0.2523 - predict_mae: 1.1333 - v
al_loss: 24.8603 - val_decode_loss: 0.4023 - val_predict_loss: 24.4580 - val_de
code_mae: 0.4417 - val_predict_mae: 3.8240
Epoch 39/200
7/7 [==============================] - 0s 11ms/step - loss: 4.7283 - decode_los
s: 0.1693 - predict_loss: 4.5590 - decode_mae: 0.2877 - predict_mae: 1.4906 - v
al_loss: 19.8170 - val_decode_loss: 0.3701 - val_predict_loss: 19.4469 - val_de
code_mae: 0.4235 - val_predict_mae: 3.4027
Epoch 40/200
7/7 [==============================] - 0s 13ms/step - loss: 6.2798 - decode_los
s: 0.1538 - predict_loss: 6.1260 - decode_mae: 0.2872 - predict_mae: 1.8028 - v
al_loss: 18.5914 - val_decode_loss: 0.3598 - val_predict_loss: 18.2316 - val_de
code_mae: 0.4162 - val_predict_mae: 3.2434
Epoch 41/200
7/7 [==============================] - 0s 13ms/step - loss: 2.5706 - decode_los
s: 0.1088 - predict_loss: 2.4619 - decode_mae: 0.2399 - predict_mae: 1.1847 - v
al_loss: 16.1825 - val_decode_loss: 0.3374 - val_predict_loss: 15.8452 - val_de
code_mae: 0.4072 - val_predict_mae: 3.1251
Epoch 42/200
7/7 [==============================] - 0s 13ms/step - loss: 2.0242 - decode_los
s: 0.1086 - predict_loss: 1.9156 - decode_mae: 0.2329 - predict_mae: 0.8955 - v
al_loss: 14.0636 - val_decode_loss: 0.3171 - val_predict_loss: 13.7465 - val_de
code_mae: 0.3994 - val_predict_mae: 2.9835
Epoch 43/200
7/7 [==============================] - 0s 13ms/step - loss: 4.1665 - decode_los
s: 0.1443 - predict_loss: 4.0222 - decode_mae: 0.2544 - predict_mae: 1.2908 - v
al_loss: 12.1804 - val_decode_loss: 0.2877 - val_predict_loss: 11.8926 - val_de
code_mae: 0.3791 - val_predict_mae: 2.8303
Epoch 44/200
7/7 [==============================] - 0s 13ms/step - loss: 3.0862 - decode_los
s: 0.1284 - predict_loss: 2.9577 - decode_mae: 0.2602 - predict_mae: 1.3086 - v
al_loss: 10.8304 - val_decode_loss: 0.2704 - val_predict_loss: 10.5600 - val_de
code_mae: 0.3626 - val_predict_mae: 2.6793
Epoch 45/200
7/7 [==============================] - 0s 14ms/step - loss: 2.5704 - decode_los
s: 0.1109 - predict_loss: 2.4595 - decode_mae: 0.2425 - predict_mae: 1.1771 - v
al_loss: 11.0587 - val_decode_loss: 0.2770 - val_predict_loss: 10.7817 - val_de
code_mae: 0.3595 - val_predict_mae: 2.6286
Epoch 46/200
7/7 [==============================] - 0s 13ms/step - loss: 2.3438 - decode_los
s: 0.1149 - predict_loss: 2.2290 - decode_mae: 0.2454 - predict_mae: 1.1369 - v
al_loss: 11.5836 - val_decode_loss: 0.2848 - val_predict_loss: 11.2987 - val_de
code_mae: 0.3593 - val_predict_mae: 2.6950
Epoch 47/200
7/7 [==============================] - 0s 12ms/step - loss: 3.1696 - decode_los
s: 0.1404 - predict_loss: 3.0292 - decode_mae: 0.2640 - predict_mae: 1.3227 - v
al_loss: 8.4477 - val_decode_loss: 0.2491 - val_predict_loss: 8.1986 - val_deco
de_mae: 0.3344 - val_predict_mae: 2.3804
Epoch 48/200
7/7 [==============================] - 0s 13ms/step - loss: 2.8322 - decode_los
s: 0.1424 - predict_loss: 2.6897 - decode_mae: 0.2583 - predict_mae: 1.2102 - v
al_loss: 7.5406 - val_decode_loss: 0.2361 - val_predict_loss: 7.3045 - val_deco
de_mae: 0.3227 - val_predict_mae: 2.2830
```

```
Epoch 49/200
7/7 [==============================] - 0s 13ms/step - loss: 1.7257 - decode_los
s: 0.0939 - predict_loss: 1.6318 - decode_mae: 0.2239 - predict_mae: 1.0152 - v
al_loss: 7.2577 - val_decode_loss: 0.2344 - val_predict_loss: 7.0232 - val_deco
de_mae: 0.3137 - val_predict_mae: 2.1829
Epoch 50/200
7/7 [==============================] - 0s 12ms/step - loss: 3.4058 - decode_los
s: 0.1309 - predict_loss: 3.2749 - decode_mae: 0.2493 - predict_mae: 1.2543 - v
al_loss: 6.8050 - val_decode_loss: 0.2231 - val_predict_loss: 6.5819 - val_deco
de_mae: 0.3023 - val_predict_mae: 2.0469
Epoch 51/200
7/7 [==============================] - 0s 13ms/step - loss: 3.6597 - decode_los
s: 0.1251 - predict_loss: 3.5346 - decode_mae: 0.2523 - predict_mae: 1.2032 - v
al_loss: 3.5895 - val_decode_loss: 0.1999 - val_predict_loss: 3.3895 - val_deco
de_mae: 0.2905 - val_predict_mae: 1.5141
Epoch 52/200
7/7 [==============================] - 0s 13ms/step - loss: 2.2637 - decode_los
s: 0.0983 - predict_loss: 2.1654 - decode_mae: 0.2289 - predict_mae: 1.0620 - v
al_loss: 4.3550 - val_decode_loss: 0.1950 - val_predict_loss: 4.1600 - val_deco
de_mae: 0.2923 - val_predict_mae: 1.6473
Epoch 53/200
7/7 [==============================] - 0s 13ms/step - loss: 2.9571 - decode_los
s: 0.1233 - predict_loss: 2.8338 - decode_mae: 0.2546 - predict_mae: 1.3371 - v
al_loss: 6.1501 - val_decode_loss: 0.1946 - val_predict_loss: 5.9555 - val_deco
de_mae: 0.2932 - val_predict_mae: 1.9270
Epoch 54/200
7/7 [==============================] - 0s 14ms/step - loss: 3.1733 - decode_los
s: 0.1503 - predict_loss: 3.0230 - decode_mae: 0.2620 - predict_mae: 1.2896 - v
al_loss: 5.5683 - val_decode_loss: 0.1811 - val_predict_loss: 5.3873 - val_deco
de_mae: 0.2806 - val_predict_mae: 1.7835
Epoch 55/200
7/7 [==============================] - 0s 13ms/step - loss: 1.4562 - decode_los
s: 0.0917 - predict_loss: 1.3645 - decode_mae: 0.2242 - predict_mae: 0.8618 - v
al_loss: 5.2332 - val_decode_loss: 0.1774 - val_predict_loss: 5.0558 - val_deco
de_mae: 0.2728 - val_predict_mae: 1.6868
Epoch 56/200
7/7 [==============================] - 0s 14ms/step - loss: 2.0918 - decode_los
s: 0.1070 - predict_loss: 1.9848 - decode_mae: 0.2430 - predict_mae: 1.0657 - v
al_loss: 3.8920 - val_decode_loss: 0.1632 - val_predict_loss: 3.7289 - val_deco
de_mae: 0.2603 - val_predict_mae: 1.4772
Epoch 57/200
7/7 [==============================] - 0s 14ms/step - loss: 1.5785 - decode_los
s: 0.0871 - predict_loss: 1.4914 - decode_mae: 0.2149 - predict_mae: 0.9183 - v
al_loss: 3.2935 - val_decode_loss: 0.1512 - val_predict_loss: 3.1423 - val_deco
de_mae: 0.2506 - val_predict_mae: 1.3650
Epoch 58/200
7/7 [==============================] - 0s 14ms/step - loss: 2.2733 - decode_los
s: 0.0962 - predict_loss: 2.1771 - decode_mae: 0.2247 - predict_mae: 1.1234 - v
al_loss: 2.6692 - val_decode_loss: 0.1487 - val_predict_loss: 2.5205 - val_deco
de_mae: 0.2454 - val_predict_mae: 1.1335
Epoch 59/200
7/7 [==============================] - 0s 14ms/step - loss: 2.9200 - decode_los
s: 0.1088 - predict_loss: 2.8112 - decode_mae: 0.2324 - predict_mae: 1.1012 - v
al_loss: 3.5707 - val_decode_loss: 0.1565 - val_predict_loss: 3.4142 - val_deco
de_mae: 0.2467 - val_predict_mae: 1.3256
Epoch 60/200
7/7 [==============================] - 0s 13ms/step - loss: 2.1247 - decode_los
s: 0.1060 - predict_loss: 2.0187 - decode_mae: 0.2403 - predict_mae: 1.0571 - v
al_loss: 2.6365 - val_decode_loss: 0.1536 - val_predict_loss: 2.4829 - val_deco
de_mae: 0.2405 - val_predict_mae: 1.1254
```

```
Epoch 61/200
7/7 [==============================] - 0s 14ms/step - loss: 2.3029 - decode_los
s: 0.1069 - predict_loss: 2.1960 - decode_mae: 0.2357 - predict_mae: 1.1071 - v
al_loss: 1.9820 - val_decode_loss: 0.1439 - val_predict_loss: 1.8381 - val_deco
de_mae: 0.2329 - val_predict_mae: 0.9249
Epoch 62/200
7/7 [==============================] - 0s 14ms/step - loss: 3.2403 - decode_los
s: 0.1019 - predict_loss: 3.1384 - decode_mae: 0.2331 - predict_mae: 1.3298 - v
al_loss: 2.4880 - val_decode_loss: 0.1397 - val_predict_loss: 2.3483 - val_deco
de_mae: 0.2243 - val_predict_mae: 1.0084
Epoch 63/200
7/7 [==============================] - 0s 14ms/step - loss: 6.1892 - decode_los
s: 0.1149 - predict_loss: 6.0743 - decode_mae: 0.2343 - predict_mae: 1.2825 - v
al_loss: 2.5083 - val_decode_loss: 0.1429 - val_predict_loss: 2.3655 - val_deco
de_mae: 0.2260 - val_predict_mae: 1.0729
Epoch 64/200
7/7 [==============================] - 0s 13ms/step - loss: 1.8182 - decode_los
s: 0.0896 - predict_loss: 1.7286 - decode_mae: 0.2181 - predict_mae: 0.9831 - v
al_loss: 4.7401 - val_decode_loss: 0.1817 - val_predict_loss: 4.5584 - val_deco
de_mae: 0.2591 - val_predict_mae: 1.5094
Epoch 65/200
7/7 [==============================] - 0s 13ms/step - loss: 1.9876 - decode_los
s: 0.1122 - predict_loss: 1.8753 - decode_mae: 0.2395 - predict_mae: 1.0412 - v
al_loss: 3.5563 - val_decode_loss: 0.1811 - val_predict_loss: 3.3752 - val_deco
de_mae: 0.2578 - val_predict_mae: 1.3402
Epoch 66/200
7/7 [==============================] - 0s 13ms/step - loss: 3.3285 - decode_los
s: 0.1307 - predict_loss: 3.1978 - decode_mae: 0.2579 - predict_mae: 1.3664 - v
al_loss: 2.0245 - val_decode_loss: 0.1645 - val_predict_loss: 1.8599 - val_deco
de_mae: 0.2349 - val_predict_mae: 0.9624
Epoch 67/200
7/7 [==============================] - 0s 14ms/step - loss: 1.9653 - decode_los
s: 0.1084 - predict_loss: 1.8569 - decode_mae: 0.2307 - predict_mae: 1.0765 - v
al_loss: 1.7051 - val_decode_loss: 0.1598 - val_predict_loss: 1.5452 - val_deco
de_mae: 0.2241 - val_predict_mae: 0.8152
Epoch 68/200
7/7 [==============================] - 0s 13ms/step - loss: 1.5515 - decode_los
s: 0.0845 - predict_loss: 1.4669 - decode_mae: 0.2099 - predict_mae: 0.9561 - v
al_loss: 1.2726 - val_decode_loss: 0.1463 - val_predict_loss: 1.1263 - val_deco
de_mae: 0.2123 - val_predict_mae: 0.7168
Epoch 69/200
7/7 [==============================] - 0s 14ms/step - loss: 3.5065 - decode_los
s: 0.1187 - predict_loss: 3.3878 - decode_mae: 0.2406 - predict_mae: 1.3796 - v
al_loss: 1.3926 - val_decode_loss: 0.1475 - val_predict_loss: 1.2451 - val_deco
de_mae: 0.2112 - val_predict_mae: 0.7312
Epoch 70/200
7/7 [==============================] - 0s 13ms/step - loss: 1.6815 - decode_los
s: 0.0833 - predict_loss: 1.5981 - decode_mae: 0.2088 - predict_mae: 0.9496 - v
al_loss: 1.3492 - val_decode_loss: 0.1421 - val_predict_loss: 1.2071 - val_deco
de_mae: 0.2122 - val_predict_mae: 0.7124
Epoch 71/200
7/7 [==============================] - 0s 15ms/step - loss: 4.8550 - decode_los
s: 0.1172 - predict_loss: 4.7378 - decode_mae: 0.2402 - predict_mae: 1.2455 - v
al_loss: 0.9827 - val_decode_loss: 0.1322 - val_predict_loss: 0.8505 - val_deco
de_mae: 0.2075 - val_predict_mae: 0.6584
Epoch 72/200
7/7 [==============================] - 0s 13ms/step - loss: 3.1200 - decode_los
s: 0.1146 - predict_loss: 3.0054 - decode_mae: 0.2473 - predict_mae: 1.3557 - v
al_loss: 1.0735 - val_decode_loss: 0.1356 - val_predict_loss: 0.9379 - val_deco
de_mae: 0.2155 - val_predict_mae: 0.7298
```

```
Epoch 73/200
7/7 [==============================] - 0s 14ms/step - loss: 1.4712 - decode_los
s: 0.0999 - predict_loss: 1.3713 - decode_mae: 0.2237 - predict_mae: 0.9232 - v
al_loss: 1.4778 - val_decode_loss: 0.1395 - val_predict_loss: 1.3383 - val_deco
de_mae: 0.2193 - val_predict_mae: 0.7821
Epoch 74/200
7/7 [==============================] - 0s 14ms/step - loss: 2.8818 - decode_los
s: 0.1135 - predict_loss: 2.7683 - decode_mae: 0.2435 - predict_mae: 1.2409 - v
al_loss: 1.4258 - val_decode_loss: 0.1357 - val_predict_loss: 1.2901 - val_deco
de_mae: 0.2136 - val_predict_mae: 0.7367
Epoch 75/200
7/7 [==============================] - 0s 13ms/step - loss: 2.4103 - decode_los
s: 0.1125 - predict_loss: 2.2978 - decode_mae: 0.2379 - predict_mae: 1.1338 - v
al_loss: 1.1874 - val_decode_loss: 0.1248 - val_predict_loss: 1.0627 - val_deco
de_mae: 0.2060 - val_predict_mae: 0.6692
Epoch 76/200
7/7 [==============================] - 0s 14ms/step - loss: 1.5699 - decode_los
s: 0.1089 - predict_loss: 1.4610 - decode_mae: 0.2368 - predict_mae: 0.9369 - v
al_loss: 1.3736 - val_decode_loss: 0.1163 - val_predict_loss: 1.2573 - val_deco
de_mae: 0.2033 - val_predict_mae: 0.7088
Epoch 77/200
7/7 [==============================] - 0s 14ms/step - loss: 1.3617 - decode_los
s: 0.0989 - predict_loss: 1.2629 - decode_mae: 0.2251 - predict_mae: 0.8768 - v
al_loss: 1.7239 - val_decode_loss: 0.1125 - val_predict_loss: 1.6114 - val_deco
de_mae: 0.2014 - val_predict_mae: 0.7332
Epoch 78/200
7/7 [==============================] - 0s 14ms/step - loss: 2.1175 - decode_los
s: 0.1152 - predict_loss: 2.0023 - decode_mae: 0.2402 - predict_mae: 1.0821 - v
al_loss: 1.6419 - val_decode_loss: 0.1096 - val_predict_loss: 1.5322 - val_deco
de_mae: 0.1974 - val_predict_mae: 0.6858
Epoch 79/200
7/7 [==============================] - 0s 11ms/step - loss: 3.7194 - decode_los
s: 0.1130 - predict_loss: 3.6064 - decode_mae: 0.2394 - predict_mae: 1.3446 - v
al_loss: 1.4282 - val_decode_loss: 0.1064 - val_predict_loss: 1.3218 - val_deco
de_mae: 0.1896 - val_predict_mae: 0.7130
Epoch 80/200
7/7 [==============================] - 0s 12ms/step - loss: 1.9449 - decode_los
s: 0.1012 - predict_loss: 1.8436 - decode_mae: 0.2351 - predict_mae: 1.0253 - v
al_loss: 1.9703 - val_decode_loss: 0.1104 - val_predict_loss: 1.8600 - val_deco
de_mae: 0.1913 - val_predict_mae: 0.9473
Epoch 81/200
7/7 [==============================] - 0s 12ms/step - loss: 2.4185 - decode_los
s: 0.1099 - predict_loss: 2.3086 - decode_mae: 0.2327 - predict_mae: 1.1978 - v
al_loss: 1.7219 - val_decode_loss: 0.1075 - val_predict_loss: 1.6143 - val_deco
de_mae: 0.1933 - val_predict_mae: 0.8391
Epoch 82/200
7/7 [==============================] - 0s 14ms/step - loss: 1.5594 - decode_los
s: 0.0865 - predict_loss: 1.4729 - decode_mae: 0.2124 - predict_mae: 0.9196 - v
al_loss: 1.9817 - val_decode_loss: 0.1170 - val_predict_loss: 1.8647 - val_deco
de_mae: 0.2050 - val_predict_mae: 0.8563
Epoch 83/200
7/7 [==============================] - 0s 13ms/step - loss: 1.8052 - decode_los
s: 0.0939 - predict_loss: 1.7113 - decode_mae: 0.2171 - predict_mae: 0.9737 - v
al_loss: 1.5547 - val_decode_loss: 0.1125 - val_predict_loss: 1.4422 - val_deco
de_mae: 0.1996 - val_predict_mae: 0.7708
Epoch 84/200
7/7 [==============================] - 0s 13ms/step - loss: 2.2284 - decode_los
s: 0.1095 - predict_loss: 2.1189 - decode_mae: 0.2232 - predict_mae: 1.0321 - v
al_loss: 1.6692 - val_decode_loss: 0.1040 - val_predict_loss: 1.5652 - val_deco
de_mae: 0.1840 - val_predict_mae: 0.8428
```

```
Epoch 85/200
7/7 [==============================] - 0s 12ms/step - loss: 1.8814 - decode_los
s: 0.0788 - predict_loss: 1.8026 - decode_mae: 0.1961 - predict_mae: 0.9178 - v
al_loss: 2.0230 - val_decode_loss: 0.1011 - val_predict_loss: 1.9219 - val_deco
de_mae: 0.1861 - val_predict_mae: 0.7823
Epoch 86/200
7/7 [==============================] - 0s 14ms/step - loss: 1.5664 - decode_los
s: 0.0827 - predict_loss: 1.4837 - decode_mae: 0.2160 - predict_mae: 0.9426 - v
al_loss: 1.8222 - val_decode_loss: 0.0992 - val_predict_loss: 1.7230 - val_deco
de_mae: 0.1821 - val_predict_mae: 0.7617
Epoch 87/200
7/7 [==============================] - 0s 14ms/step - loss: 1.1955 - decode_los
s: 0.0684 - predict_loss: 1.1271 - decode_mae: 0.1911 - predict_mae: 0.8023 - v
al_loss: 1.7314 - val_decode_loss: 0.1026 - val_predict_loss: 1.6288 - val_deco
de_mae: 0.1774 - val_predict_mae: 0.7608
Epoch 88/200
7/7 [==============================] - 0s 13ms/step - loss: 1.4382 - decode_los
s: 0.0754 - predict_loss: 1.3628 - decode_mae: 0.1969 - predict_mae: 0.9250 - v
al_loss: 1.8700 - val_decode_loss: 0.1030 - val_predict_loss: 1.7670 - val_deco
de_mae: 0.1768 - val_predict_mae: 0.7530
Epoch 89/200
7/7 [==============================] - 0s 13ms/step - loss: 1.2897 - decode_los
s: 0.0860 - predict_loss: 1.2037 - decode_mae: 0.2007 - predict_mae: 0.7818 - v
al_loss: 1.8345 - val_decode_loss: 0.1015 - val_predict_loss: 1.7329 - val_deco
de_mae: 0.1752 - val_predict_mae: 0.6946
Epoch 90/200
7/7 [==============================] - 0s 13ms/step - loss: 1.2849 - decode_los
s: 0.0879 - predict_loss: 1.1970 - decode_mae: 0.2127 - predict_mae: 0.8543 - v
al_loss: 2.0677 - val_decode_loss: 0.1079 - val_predict_loss: 1.9598 - val_deco
de_mae: 0.1812 - val_predict_mae: 0.7334
Epoch 91/200
7/7 [==============================] - 0s 13ms/step - loss: 1.6098 - decode_los
s: 0.0757 - predict_loss: 1.5342 - decode_mae: 0.2065 - predict_mae: 0.9194 - v
al_loss: 1.6545 - val_decode_loss: 0.1063 - val_predict_loss: 1.5481 - val_deco
de_mae: 0.1752 - val_predict_mae: 0.6549
Epoch 92/200
7/7 [==============================] - 0s 13ms/step - loss: 1.8089 - decode_los
s: 0.0790 - predict_loss: 1.7299 - decode_mae: 0.1950 - predict_mae: 0.9697 - v
al_loss: 1.5818 - val_decode_loss: 0.1049 - val_predict_loss: 1.4769 - val_deco
de_mae: 0.1729 - val_predict_mae: 0.6725
Epoch 93/200
7/7 [==============================] - 0s 13ms/step - loss: 3.9906 - decode_los
s: 0.1297 - predict_loss: 3.8609 - decode_mae: 0.2299 - predict_mae: 1.2170 - v
al_loss: 1.7799 - val_decode_loss: 0.1073 - val_predict_loss: 1.6725 - val_deco
de_mae: 0.1748 - val_predict_mae: 0.6870
Epoch 94/200
7/7 [==============================] - 0s 13ms/step - loss: 1.2308 - decode_los
s: 0.0637 - predict_loss: 1.1672 - decode_mae: 0.1869 - predict_mae: 0.7804 - v
al_loss: 2.2307 - val_decode_loss: 0.1126 - val_predict_loss: 2.1181 - val_deco
de_mae: 0.1841 - val_predict_mae: 0.7671
Epoch 95/200
7/7 [==============================] - 0s 12ms/step - loss: 1.9260 - decode_los
s: 0.0839 - predict_loss: 1.8421 - decode_mae: 0.2042 - predict_mae: 0.8517 - v
al_loss: 1.6065 - val_decode_loss: 0.1142 - val_predict_loss: 1.4923 - val_deco
de_mae: 0.1832 - val_predict_mae: 0.6687
Epoch 96/200
7/7 [==============================] - 0s 13ms/step - loss: 2.5557 - decode_los
s: 0.1031 - predict_loss: 2.4526 - decode_mae: 0.2195 - predict_mae: 0.9928 - v
al_loss: 1.7611 - val_decode_loss: 0.1181 - val_predict_loss: 1.6430 - val_deco
de_mae: 0.1855 - val_predict_mae: 0.7101
```

```
Epoch 97/200
7/7 [==============================] - 0s 12ms/step - loss: 1.4423 - decode_los
s: 0.0739 - predict_loss: 1.3684 - decode_mae: 0.1959 - predict_mae: 0.9008 - v
al_loss: 2.6129 - val_decode_loss: 0.1218 - val_predict_loss: 2.4911 - val_deco
de_mae: 0.2005 - val_predict_mae: 0.8522
Epoch 98/200
7/7 [==============================] - 0s 12ms/step - loss: 1.4181 - decode_los
s: 0.0775 - predict_loss: 1.3406 - decode_mae: 0.2106 - predict_mae: 0.8861 - v
al_loss: 2.1174 - val_decode_loss: 0.1210 - val_predict_loss: 1.9964 - val_deco
de_mae: 0.2035 - val_predict_mae: 0.7153
Epoch 99/200
7/7 [==============================] - 0s 15ms/step - loss: 1.7106 - decode_los
s: 0.0860 - predict_loss: 1.6246 - decode_mae: 0.2172 - predict_mae: 0.9714 - v
al_loss: 2.1494 - val_decode_loss: 0.1162 - val_predict_loss: 2.0332 - val_deco
de_mae: 0.2014 - val_predict_mae: 0.6535
Epoch 100/200
7/7 [==============================] - 0s 14ms/step - loss: 1.6232 - decode_los
s: 0.0888 - predict_loss: 1.5344 - decode_mae: 0.2132 - predict_mae: 0.9490 - v
al_loss: 2.8088 - val_decode_loss: 0.1120 - val_predict_loss: 2.6968 - val_deco
de_mae: 0.2008 - val_predict_mae: 0.7169
Epoch 101/200
7/7 [==============================] - 0s 13ms/step - loss: 1.8245 - decode_los
s: 0.0926 - predict_loss: 1.7320 - decode_mae: 0.2266 - predict_mae: 1.0495 - v
al_loss: 2.6150 - val_decode_loss: 0.1108 - val_predict_loss: 2.5042 - val_deco
de_mae: 0.1990 - val_predict_mae: 0.7162
Epoch 102/200
7/7 [==============================] - 0s 13ms/step - loss: 2.5565 - decode_los
s: 0.1032 - predict_loss: 2.4533 - decode_mae: 0.2207 - predict_mae: 1.1558 - v
al_loss: 2.1085 - val_decode_loss: 0.1060 - val_predict_loss: 2.0025 - val_deco
de_mae: 0.1859 - val_predict_mae: 0.7258
Epoch 103/200
7/7 [==============================] - 0s 18ms/step - loss: 1.4669 - decode_los
s: 0.0803 - predict_loss: 1.3866 - decode_mae: 0.2024 - predict_mae: 0.9237 - v
al_loss: 2.5237 - val_decode_loss: 0.1057 - val_predict_loss: 2.4181 - val_deco
de_mae: 0.1851 - val_predict_mae: 0.7621
Epoch 104/200
7/7 [==============================] - 0s 14ms/step - loss: 1.1747 - decode_los
s: 0.0754 - predict_loss: 1.0993 - decode_mae: 0.1975 - predict_mae: 0.8137 - v
al_loss: 2.0167 - val_decode_loss: 0.0978 - val_predict_loss: 1.9189 - val_deco
de_mae: 0.1771 - val_predict_mae: 0.7711
Epoch 105/200
7/7 [==============================] - 0s 12ms/step - loss: 3.3321 - decode_los
s: 0.0806 - predict_loss: 3.2515 - decode_mae: 0.1957 - predict_mae: 0.9737 - v
al_loss: 1.7813 - val_decode_loss: 0.0933 - val_predict_loss: 1.6880 - val_deco
de_mae: 0.1725 - val_predict_mae: 0.6699
Epoch 106/200
7/7 [==============================] - 0s 14ms/step - loss: 1.2861 - decode_los
s: 0.0643 - predict_loss: 1.2218 - decode_mae: 0.1777 - predict_mae: 0.8292 - v
al_loss: 2.1539 - val_decode_loss: 0.0934 - val_predict_loss: 2.0605 - val_deco
de_mae: 0.1791 - val_predict_mae: 0.6734
Epoch 107/200
7/7 [==============================] - 0s 12ms/step - loss: 2.5968 - decode_los
s: 0.0860 - predict_loss: 2.5108 - decode_mae: 0.2148 - predict_mae: 1.0654 - v
al_loss: 2.8080 - val_decode_loss: 0.0912 - val_predict_loss: 2.7168 - val_deco
de_mae: 0.1788 - val_predict_mae: 0.7727
Epoch 108/200
7/7 [==============================] - 0s 17ms/step - loss: 1.8534 - decode_los
s: 0.0946 - predict_loss: 1.7587 - decode_mae: 0.2100 - predict_mae: 0.9204 - v
al_loss: 4.6821 - val_decode_loss: 0.0903 - val_predict_loss: 4.5919 - val_deco
de_mae: 0.1769 - val_predict_mae: 1.0088
```

```
Epoch 109/200
7/7 [==============================] - 0s 14ms/step - loss: 2.9216 - decode_los
s: 0.0901 - predict_loss: 2.8315 - decode_mae: 0.2155 - predict_mae: 1.2293 - v
al_loss: 3.5274 - val_decode_loss: 0.0864 - val_predict_loss: 3.4410 - val_deco
de_mae: 0.1716 - val_predict_mae: 0.8968
Epoch 110/200
7/7 [==============================] - 0s 13ms/step - loss: 1.6453 - decode_los
s: 0.0863 - predict_loss: 1.5590 - decode_mae: 0.2041 - predict_mae: 0.9569 - v
al_loss: 2.3158 - val_decode_loss: 0.0844 - val_predict_loss: 2.2314 - val_deco
de_mae: 0.1691 - val_predict_mae: 0.7807
Epoch 111/200
7/7 [==============================] - 0s 13ms/step - loss: 1.5196 - decode_los
s: 0.0804 - predict_loss: 1.4392 - decode_mae: 0.2031 - predict_mae: 0.8451 - v
al_loss: 2.5651 - val_decode_loss: 0.0833 - val_predict_loss: 2.4818 - val_deco
de_mae: 0.1714 - val_predict_mae: 0.7368
Epoch 112/200
7/7 [==============================] - 0s 15ms/step - loss: 1.2025 - decode_los
s: 0.0719 - predict_loss: 1.1306 - decode_mae: 0.1864 - predict_mae: 0.7913 - v
al_loss: 3.7689 - val_decode_loss: 0.0917 - val_predict_loss: 3.6771 - val_deco
de_mae: 0.1812 - val_predict_mae: 0.8766
Epoch 113/200
7/7 [==============================] - 0s 14ms/step - loss: 1.4991 - decode_los
s: 0.0749 - predict_loss: 1.4242 - decode_mae: 0.1991 - predict_mae: 0.9148 - v
al_loss: 3.3068 - val_decode_loss: 0.0911 - val_predict_loss: 3.2157 - val_deco
de_mae: 0.1801 - val_predict_mae: 0.8396
Epoch 114/200
7/7 [==============================] - 0s 13ms/step - loss: 1.4358 - decode_los
s: 0.0710 - predict_loss: 1.3648 - decode_mae: 0.1901 - predict_mae: 0.8549 - v
al_loss: 2.7841 - val_decode_loss: 0.0920 - val_predict_loss: 2.6920 - val_deco
de_mae: 0.1761 - val_predict_mae: 0.7584
Epoch 115/200
7/7 [==============================] - 0s 13ms/step - loss: 1.0199 - decode_los
s: 0.0584 - predict_loss: 0.9615 - decode_mae: 0.1711 - predict_mae: 0.7495 - v
al_loss: 2.5842 - val_decode_loss: 0.0886 - val_predict_loss: 2.4956 - val_deco
de_mae: 0.1681 - val_predict_mae: 0.8128
Epoch 116/200
7/7 [==============================] - 0s 11ms/step - loss: 1.4010 - decode_los
s: 0.0830 - predict_loss: 1.3180 - decode_mae: 0.2043 - predict_mae: 0.8447 - v
al_loss: 2.7363 - val_decode_loss: 0.0867 - val_predict_loss: 2.6496 - val_deco
de_mae: 0.1655 - val_predict_mae: 0.8137
Epoch 117/200
7/7 [==============================] - 0s 13ms/step - loss: 2.2374 - decode_los
s: 0.0598 - predict_loss: 2.1776 - decode_mae: 0.1718 - predict_mae: 0.7047 - v
al_loss: 2.7420 - val_decode_loss: 0.0894 - val_predict_loss: 2.6526 - val_deco
de_mae: 0.1677 - val_predict_mae: 0.7580
Epoch 118/200
7/7 [==============================] - 0s 13ms/step - loss: 2.4585 - decode_los
s: 0.1043 - predict_loss: 2.3542 - decode_mae: 0.2143 - predict_mae: 1.0356 - v
al_loss: 3.0797 - val_decode_loss: 0.0911 - val_predict_loss: 2.9887 - val_deco
de_mae: 0.1692 - val_predict_mae: 0.9536
Epoch 119/200
7/7 [==============================] - 0s 13ms/step - loss: 0.8370 - decode_los
s: 0.0704 - predict_loss: 0.7666 - decode_mae: 0.1878 - predict_mae: 0.6773 - v
al_loss: 3.6642 - val_decode_loss: 0.0979 - val_predict_loss: 3.5663 - val_deco
de_mae: 0.1799 - val_predict_mae: 1.0485
Epoch 120/200
7/7 [==============================] - 0s 14ms/step - loss: 1.4286 - decode_los
s: 0.0756 - predict_loss: 1.3530 - decode_mae: 0.1937 - predict_mae: 0.8894 - v
al_loss: 3.3027 - val_decode_loss: 0.0954 - val_predict_loss: 3.2073 - val_deco
de_mae: 0.1771 - val_predict_mae: 0.9361
```

```
Epoch 121/200
7/7 [==============================] - 0s 14ms/step - loss: 1.8795 - decode_los
s: 0.0790 - predict_loss: 1.8005 - decode_mae: 0.1999 - predict_mae: 0.9453 - v
al_loss: 3.2333 - val_decode_loss: 0.0931 - val_predict_loss: 3.1402 - val_deco
de_mae: 0.1687 - val_predict_mae: 0.8997
Epoch 122/200
7/7 [==============================] - 0s 13ms/step - loss: 1.8599 - decode_los
s: 0.0954 - predict_loss: 1.7646 - decode_mae: 0.2159 - predict_mae: 1.0064 - v
al_loss: 3.5324 - val_decode_loss: 0.0906 - val_predict_loss: 3.4418 - val_deco
de_mae: 0.1650 - val_predict_mae: 0.9372
Epoch 123/200
7/7 [==============================] - 0s 13ms/step - loss: 1.4360 - decode_los
s: 0.0685 - predict_loss: 1.3675 - decode_mae: 0.1902 - predict_mae: 0.8864 - v
al_loss: 4.5911 - val_decode_loss: 0.0929 - val_predict_loss: 4.4982 - val_deco
de_mae: 0.1672 - val_predict_mae: 0.9624
Epoch 124/200
7/7 [==============================] - 0s 11ms/step - loss: 1.1601 - decode_los
s: 0.0717 - predict_loss: 1.0884 - decode_mae: 0.1952 - predict_mae: 0.8061 - v
al_loss: 2.8991 - val_decode_loss: 0.0846 - val_predict_loss: 2.8145 - val_deco
de_mae: 0.1581 - val_predict_mae: 0.8281
Epoch 125/200
7/7 [==============================] - 0s 12ms/step - loss: 1.4475 - decode_los
s: 0.0648 - predict_loss: 1.3828 - decode_mae: 0.1836 - predict_mae: 0.8566 - v
al_loss: 2.7001 - val_decode_loss: 0.0869 - val_predict_loss: 2.6133 - val_deco
de_mae: 0.1600 - val_predict_mae: 0.8267
Epoch 126/200
7/7 [==============================] - 0s 13ms/step - loss: 2.1803 - decode_los
s: 0.1078 - predict_loss: 2.0725 - decode_mae: 0.2227 - predict_mae: 0.9302 - v
al_loss: 3.8731 - val_decode_loss: 0.0901 - val_predict_loss: 3.7830 - val_deco
de_mae: 0.1666 - val_predict_mae: 1.0288
Epoch 127/200
7/7 [==============================] - 0s 14ms/step - loss: 1.8958 - decode_los
s: 0.0813 - predict_loss: 1.8145 - decode_mae: 0.2058 - predict_mae: 0.9708 - v
al_loss: 3.4174 - val_decode_loss: 0.0883 - val_predict_loss: 3.3291 - val_deco
de_mae: 0.1622 - val_predict_mae: 0.9683
Epoch 128/200
7/7 [==============================] - 0s 15ms/step - loss: 1.4790 - decode_los
s: 0.0694 - predict_loss: 1.4095 - decode_mae: 0.1909 - predict_mae: 0.8384 - v
al_loss: 2.4766 - val_decode_loss: 0.0901 - val_predict_loss: 2.3865 - val_deco
de_mae: 0.1572 - val_predict_mae: 0.8213
Epoch 129/200
7/7 [==============================] - 0s 13ms/step - loss: 1.6329 - decode_los
s: 0.0702 - predict_loss: 1.5627 - decode_mae: 0.1931 - predict_mae: 0.9541 - v
al_loss: 2.2452 - val_decode_loss: 0.0923 - val_predict_loss: 2.1528 - val_deco
de_mae: 0.1553 - val_predict_mae: 0.7202
Epoch 130/200
7/7 [==============================] - 0s 12ms/step - loss: 1.3593 - decode_los
s: 0.0656 - predict_loss: 1.2938 - decode_mae: 0.1871 - predict_mae: 0.8913 - v
al_loss: 2.3778 - val_decode_loss: 0.0901 - val_predict_loss: 2.2877 - val_deco
de_mae: 0.1530 - val_predict_mae: 0.7255
Epoch 131/200
7/7 [==============================] - 0s 12ms/step - loss: 0.9998 - decode_los
s: 0.0600 - predict_loss: 0.9397 - decode_mae: 0.1760 - predict_mae: 0.6879 - v
al_loss: 2.1163 - val_decode_loss: 0.0909 - val_predict_loss: 2.0255 - val_deco
de_mae: 0.1515 - val_predict_mae: 0.7165
Epoch 132/200
7/7 [==============================] - 0s 12ms/step - loss: 0.8916 - decode_los
s: 0.0584 - predict_loss: 0.8332 - decode_mae: 0.1699 - predict_mae: 0.6904 - v
al_loss: 2.1554 - val_decode_loss: 0.0937 - val_predict_loss: 2.0617 - val_deco
de_mae: 0.1542 - val_predict_mae: 0.7585
```

```
Epoch 133/200
7/7 [==============================] - 0s 13ms/step - loss: 1.3011 - decode_los
s: 0.0786 - predict_loss: 1.2225 - decode_mae: 0.1945 - predict_mae: 0.8095 - v
al_loss: 3.4636 - val_decode_loss: 0.0970 - val_predict_loss: 3.3667 - val_deco
de_mae: 0.1602 - val_predict_mae: 0.8048
Epoch 134/200
7/7 [==============================] - 0s 13ms/step - loss: 0.8174 - decode_los
s: 0.0621 - predict_loss: 0.7553 - decode_mae: 0.1749 - predict_mae: 0.6304 - v
al_loss: 2.7722 - val_decode_loss: 0.0966 - val_predict_loss: 2.6757 - val_deco
de_mae: 0.1598 - val_predict_mae: 0.7000
Epoch 135/200
7/7 [==============================] - 0s 13ms/step - loss: 1.4030 - decode_los
s: 0.0715 - predict_loss: 1.3316 - decode_mae: 0.1793 - predict_mae: 0.8169 - v
al_loss: 2.2324 - val_decode_loss: 0.0940 - val_predict_loss: 2.1385 - val_deco
de_mae: 0.1547 - val_predict_mae: 0.6936
Epoch 136/200
7/7 [==============================] - 0s 13ms/step - loss: 1.6185 - decode_los
s: 0.0766 - predict_loss: 1.5419 - decode_mae: 0.2005 - predict_mae: 0.9343 - v
al_loss: 2.5434 - val_decode_loss: 0.0878 - val_predict_loss: 2.4556 - val_deco
de_mae: 0.1516 - val_predict_mae: 0.5999
Epoch 137/200
7/7 [==============================] - 0s 13ms/step - loss: 0.8902 - decode_los
s: 0.0793 - predict_loss: 0.8109 - decode_mae: 0.1845 - predict_mae: 0.6567 - v
al_loss: 2.9446 - val_decode_loss: 0.0808 - val_predict_loss: 2.8638 - val_deco
de_mae: 0.1510 - val_predict_mae: 0.6857
Epoch 138/200
7/7 [==============================] - 0s 13ms/step - loss: 0.9332 - decode_los
s: 0.0603 - predict_loss: 0.8729 - decode_mae: 0.1774 - predict_mae: 0.7160 - v
al_loss: 2.9608 - val_decode_loss: 0.0846 - val_predict_loss: 2.8763 - val_deco
de_mae: 0.1577 - val_predict_mae: 0.6899
Epoch 139/200
7/7 [==============================] - 0s 13ms/step - loss: 1.2224 - decode_los
s: 0.0587 - predict_loss: 1.1637 - decode_mae: 0.1747 - predict_mae: 0.7861 - v
al_loss: 2.7329 - val_decode_loss: 0.0825 - val_predict_loss: 2.6504 - val_deco
de_mae: 0.1527 - val_predict_mae: 0.7458
Epoch 140/200
7/7 [==============================] - 0s 13ms/step - loss: 1.0199 - decode_los
s: 0.0611 - predict_loss: 0.9588 - decode_mae: 0.1795 - predict_mae: 0.6982 - v
al_loss: 2.9327 - val_decode_loss: 0.0810 - val_predict_loss: 2.8517 - val_deco
de_mae: 0.1497 - val_predict_mae: 0.7139
Epoch 141/200
7/7 [==============================] - 0s 13ms/step - loss: 0.7438 - decode_los
s: 0.0647 - predict_loss: 0.6792 - decode_mae: 0.1794 - predict_mae: 0.6357 - v
al_loss: 3.4082 - val_decode_loss: 0.0817 - val_predict_loss: 3.3266 - val_deco
de_mae: 0.1484 - val_predict_mae: 0.7220
Epoch 142/200
7/7 [==============================] - 0s 13ms/step - loss: 1.4832 - decode_los
s: 0.0609 - predict_loss: 1.4223 - decode_mae: 0.1754 - predict_mae: 0.7689 - v
al_loss: 2.7095 - val_decode_loss: 0.0842 - val_predict_loss: 2.6253 - val_deco
de_mae: 0.1482 - val_predict_mae: 0.5968
Epoch 143/200
7/7 [==============================] - 0s 12ms/step - loss: 1.0622 - decode_los
s: 0.0632 - predict_loss: 0.9991 - decode_mae: 0.1821 - predict_mae: 0.7445 - v
al_loss: 2.4238 - val_decode_loss: 0.0851 - val_predict_loss: 2.3387 - val_deco
de_mae: 0.1487 - val_predict_mae: 0.6731
Epoch 144/200
7/7 [==============================] - 0s 13ms/step - loss: 1.2800 - decode_los
s: 0.0740 - predict_loss: 1.2059 - decode_mae: 0.1891 - predict_mae: 0.7997 - v
al_loss: 2.9372 - val_decode_loss: 0.0794 - val_predict_loss: 2.8578 - val_deco
de_mae: 0.1488 - val_predict_mae: 0.6636
```

```
Epoch 145/200
7/7 [==============================] - 0s 14ms/step - loss: 1.6601 - decode_los
s: 0.0692 - predict_loss: 1.5909 - decode_mae: 0.1731 - predict_mae: 0.8263 - v
al_loss: 3.8994 - val_decode_loss: 0.0819 - val_predict_loss: 3.8175 - val_deco
de_mae: 0.1539 - val_predict_mae: 0.7466
Epoch 146/200
7/7 [==============================] - 0s 13ms/step - loss: 1.9800 - decode_los
s: 0.0676 - predict_loss: 1.9123 - decode_mae: 0.1834 - predict_mae: 0.9496 - v
al_loss: 2.5524 - val_decode_loss: 0.0808 - val_predict_loss: 2.4716 - val_deco
de_mae: 0.1501 - val_predict_mae: 0.6130
Epoch 147/200
7/7 [==============================] - 0s 13ms/step - loss: 1.4980 - decode_los
s: 0.0840 - predict_loss: 1.4140 - decode_mae: 0.1929 - predict_mae: 0.7546 - v
al_loss: 2.3622 - val_decode_loss: 0.0799 - val_predict_loss: 2.2823 - val_deco
de_mae: 0.1484 - val_predict_mae: 0.6785
Epoch 148/200
7/7 [==============================] - 0s 12ms/step - loss: 1.2485 - decode_los
s: 0.0628 - predict_loss: 1.1857 - decode_mae: 0.1794 - predict_mae: 0.8603 - v
al_loss: 2.9323 - val_decode_loss: 0.0847 - val_predict_loss: 2.8476 - val_deco
de_mae: 0.1539 - val_predict_mae: 0.7065
Epoch 149/200
7/7 [==============================] - 0s 12ms/step - loss: 1.4923 - decode_los
s: 0.0731 - predict_loss: 1.4192 - decode_mae: 0.1973 - predict_mae: 0.9169 - v
al_loss: 3.8032 - val_decode_loss: 0.0861 - val_predict_loss: 3.7172 - val_deco
de_mae: 0.1548 - val_predict_mae: 0.8314
Epoch 150/200
7/7 [==============================] - 0s 12ms/step - loss: 1.5553 - decode_los
s: 0.0734 - predict_loss: 1.4819 - decode_mae: 0.1868 - predict_mae: 0.8441 - v
al_loss: 3.0735 - val_decode_loss: 0.0883 - val_predict_loss: 2.9852 - val_deco
de_mae: 0.1506 - val_predict_mae: 0.7241
Epoch 151/200
7/7 [==============================] - 0s 12ms/step - loss: 1.2110 - decode_los
s: 0.0612 - predict_loss: 1.1498 - decode_mae: 0.1791 - predict_mae: 0.8207 - v
al_loss: 3.0227 - val_decode_loss: 0.0865 - val_predict_loss: 2.9361 - val_deco
de_mae: 0.1518 - val_predict_mae: 0.7158
Epoch 152/200
7/7 [==============================] - 0s 14ms/step - loss: 0.8935 - decode_los
s: 0.0677 - predict_loss: 0.8258 - decode_mae: 0.1818 - predict_mae: 0.6593 - v
al_loss: 2.9491 - val_decode_loss: 0.0874 - val_predict_loss: 2.8617 - val_deco
de_mae: 0.1519 - val_predict_mae: 0.6535
Epoch 153/200
7/7 [==============================] - 0s 13ms/step - loss: 0.7218 - decode_los
s: 0.0531 - predict_loss: 0.6688 - decode_mae: 0.1642 - predict_mae: 0.6304 - v
al_loss: 3.5330 - val_decode_loss: 0.0903 - val_predict_loss: 3.4426 - val_deco
de_mae: 0.1536 - val_predict_mae: 0.6951
Epoch 154/200
7/7 [==============================] - 0s 14ms/step - loss: 1.3210 - decode_los
s: 0.0605 - predict_loss: 1.2605 - decode_mae: 0.1780 - predict_mae: 0.8032 - v
al_loss: 3.6652 - val_decode_loss: 0.0933 - val_predict_loss: 3.5719 - val_deco
de_mae: 0.1537 - val_predict_mae: 0.6450
Epoch 155/200
7/7 [==============================] - 0s 12ms/step - loss: 0.7456 - decode_los
s: 0.0591 - predict_loss: 0.6865 - decode_mae: 0.1734 - predict_mae: 0.6332 - v
al_loss: 3.5144 - val_decode_loss: 0.0895 - val_predict_loss: 3.4249 - val_deco
de_mae: 0.1489 - val_predict_mae: 0.6398
Epoch 156/200
7/7 [==============================] - 0s 13ms/step - loss: 0.9679 - decode_los
s: 0.0530 - predict_loss: 0.9149 - decode_mae: 0.1625 - predict_mae: 0.7427 - v
al_loss: 3.5784 - val_decode_loss: 0.0858 - val_predict_loss: 3.4927 - val_deco
de_mae: 0.1457 - val_predict_mae: 0.6283
```

```
Epoch 157/200
7/7 [==============================] - 0s 14ms/step - loss: 0.7164 - decode_los
s: 0.0581 - predict_loss: 0.6584 - decode_mae: 0.1715 - predict_mae: 0.6307 - v
al_loss: 3.8619 - val_decode_loss: 0.0854 - val_predict_loss: 3.7765 - val_deco
de_mae: 0.1454 - val_predict_mae: 0.6451
Epoch 158/200
7/7 [==============================] - 0s 13ms/step - loss: 1.2667 - decode_los
s: 0.0618 - predict_loss: 1.2049 - decode_mae: 0.1705 - predict_mae: 0.6924 - v
al_loss: 3.4628 - val_decode_loss: 0.0851 - val_predict_loss: 3.3777 - val_deco
de_mae: 0.1478 - val_predict_mae: 0.6194
Epoch 159/200
7/7 [==============================] - 0s 14ms/step - loss: 0.6992 - decode_los
s: 0.0621 - predict_loss: 0.6370 - decode_mae: 0.1690 - predict_mae: 0.6148 - v
al_loss: 3.1137 - val_decode_loss: 0.0867 - val_predict_loss: 3.0271 - val_deco
de_mae: 0.1506 - val_predict_mae: 0.6910
Epoch 160/200
7/7 [==============================] - 0s 12ms/step - loss: 1.0533 - decode_los
s: 0.0745 - predict_loss: 0.9788 - decode_mae: 0.1906 - predict_mae: 0.7761 - v
al_loss: 2.9235 - val_decode_loss: 0.0847 - val_predict_loss: 2.8388 - val_deco
de_mae: 0.1494 - val_predict_mae: 0.6641
Epoch 161/200
7/7 [==============================] - 0s 12ms/step - loss: 0.6807 - decode_los
s: 0.0521 - predict_loss: 0.6286 - decode_mae: 0.1645 - predict_mae: 0.5790 - v
al_loss: 2.5022 - val_decode_loss: 0.0767 - val_predict_loss: 2.4255 - val_deco
de_mae: 0.1440 - val_predict_mae: 0.5900
Epoch 162/200
7/7 [==============================] - 0s 13ms/step - loss: 0.9097 - decode_los
s: 0.0724 - predict_loss: 0.8373 - decode_mae: 0.1763 - predict_mae: 0.6442 - v
al_loss: 2.1407 - val_decode_loss: 0.0741 - val_predict_loss: 2.0665 - val_deco
de_mae: 0.1431 - val_predict_mae: 0.5896
Epoch 163/200
7/7 [==============================] - 0s 14ms/step - loss: 1.0352 - decode_los
s: 0.0669 - predict_loss: 0.9683 - decode_mae: 0.1860 - predict_mae: 0.7053 - v
al_loss: 3.2132 - val_decode_loss: 0.0850 - val_predict_loss: 3.1282 - val_deco
de_mae: 0.1520 - val_predict_mae: 0.7321
Epoch 164/200
7/7 [==============================] - 0s 13ms/step - loss: 1.3397 - decode_los
s: 0.0662 - predict_loss: 1.2735 - decode_mae: 0.1776 - predict_mae: 0.7287 - v
al_loss: 2.7257 - val_decode_loss: 0.0836 - val_predict_loss: 2.6421 - val_deco
de_mae: 0.1476 - val_predict_mae: 0.6703
Epoch 165/200
7/7 [==============================] - 0s 15ms/step - loss: 0.6274 - decode_los
s: 0.0539 - predict_loss: 0.5735 - decode_mae: 0.1645 - predict_mae: 0.5784 - v
al_loss: 2.1440 - val_decode_loss: 0.0793 - val_predict_loss: 2.0647 - val_deco
de_mae: 0.1403 - val_predict_mae: 0.5400
Epoch 166/200
7/7 [==============================] - 0s 15ms/step - loss: 0.8073 - decode_los
s: 0.0552 - predict_loss: 0.7521 - decode_mae: 0.1662 - predict_mae: 0.6723 - v
al_loss: 2.5711 - val_decode_loss: 0.0808 - val_predict_loss: 2.4903 - val_deco
de_mae: 0.1397 - val_predict_mae: 0.5900
Epoch 167/200
7/7 [==============================] - 0s 14ms/step - loss: 0.9438 - decode_los
s: 0.0635 - predict_loss: 0.8803 - decode_mae: 0.1726 - predict_mae: 0.6785 - v
al_loss: 2.9565 - val_decode_loss: 0.0816 - val_predict_loss: 2.8749 - val_deco
de_mae: 0.1415 - val_predict_mae: 0.6637
Epoch 168/200
7/7 [==============================] - 0s 14ms/step - loss: 2.0706 - decode_los
s: 0.0721 - predict_loss: 1.9985 - decode_mae: 0.1916 - predict_mae: 1.0605 - v
al_loss: 2.1507 - val_decode_loss: 0.0823 - val_predict_loss: 2.0684 - val_deco
de_mae: 0.1411 - val_predict_mae: 0.6117
```

```
Epoch 169/200
7/7 [==============================] - 0s 14ms/step - loss: 1.0631 - decode_los
s: 0.0537 - predict_loss: 1.0094 - decode_mae: 0.1631 - predict_mae: 0.7732 - v
al_loss: 2.4072 - val_decode_loss: 0.0786 - val_predict_loss: 2.3286 - val_deco
de_mae: 0.1377 - val_predict_mae: 0.6967
Epoch 170/200
7/7 [==============================] - 0s 13ms/step - loss: 1.1580 - decode_los
s: 0.0621 - predict_loss: 1.0959 - decode_mae: 0.1779 - predict_mae: 0.7645 - v
al_loss: 3.6102 - val_decode_loss: 0.0769 - val_predict_loss: 3.5333 - val_deco
de_mae: 0.1424 - val_predict_mae: 0.7953
Epoch 171/200
7/7 [==============================] - 0s 13ms/step - loss: 1.0741 - decode_los
s: 0.0600 - predict_loss: 1.0141 - decode_mae: 0.1688 - predict_mae: 0.7282 - v
al_loss: 2.4205 - val_decode_loss: 0.0771 - val_predict_loss: 2.3434 - val_deco
de_mae: 0.1352 - val_predict_mae: 0.6542
Epoch 172/200
7/7 [==============================] - 0s 13ms/step - loss: 0.7947 - decode_los
s: 0.0567 - predict_loss: 0.7380 - decode_mae: 0.1674 - predict_mae: 0.6467 - v
al_loss: 2.3071 - val_decode_loss: 0.0790 - val_predict_loss: 2.2281 - val_deco
de_mae: 0.1359 - val_predict_mae: 0.7189
Epoch 173/200
7/7 [==============================] - 0s 14ms/step - loss: 0.8905 - decode_los
s: 0.0610 - predict_loss: 0.8296 - decode_mae: 0.1667 - predict_mae: 0.6850 - v
al_loss: 2.5883 - val_decode_loss: 0.0821 - val_predict_loss: 2.5062 - val_deco
de_mae: 0.1425 - val_predict_mae: 0.7018
Epoch 174/200
7/7 [==============================] - 0s 14ms/step - loss: 1.1130 - decode_los
s: 0.0711 - predict_loss: 1.0419 - decode_mae: 0.1895 - predict_mae: 0.7960 - v
al_loss: 3.1093 - val_decode_loss: 0.0834 - val_predict_loss: 3.0259 - val_deco
de_mae: 0.1491 - val_predict_mae: 0.7460
Epoch 175/200
7/7 [==============================] - 0s 13ms/step - loss: 2.4704 - decode_los
s: 0.0699 - predict_loss: 2.4005 - decode_mae: 0.1826 - predict_mae: 0.8658 - v
al_loss: 2.6355 - val_decode_loss: 0.0818 - val_predict_loss: 2.5537 - val_deco
de_mae: 0.1445 - val_predict_mae: 0.6501
Epoch 176/200
7/7 [==============================] - 0s 13ms/step - loss: 1.1771 - decode_los
s: 0.0703 - predict_loss: 1.1068 - decode_mae: 0.1813 - predict_mae: 0.7000 - v
al_loss: 2.3501 - val_decode_loss: 0.0892 - val_predict_loss: 2.2610 - val_deco
de_mae: 0.1538 - val_predict_mae: 0.7047
Epoch 177/200
7/7 [==============================] - 0s 13ms/step - loss: 1.3672 - decode_los
s: 0.0873 - predict_loss: 1.2799 - decode_mae: 0.1873 - predict_mae: 0.6825 - v
al_loss: 2.6224 - val_decode_loss: 0.0931 - val_predict_loss: 2.5293 - val_deco
de_mae: 0.1670 - val_predict_mae: 0.7116
Epoch 178/200
7/7 [==============================] - 0s 14ms/step - loss: 1.0566 - decode_los
s: 0.0667 - predict_loss: 0.9899 - decode_mae: 0.1876 - predict_mae: 0.7692 - v
al_loss: 3.6475 - val_decode_loss: 0.1052 - val_predict_loss: 3.5423 - val_deco
de_mae: 0.1799 - val_predict_mae: 0.8648
Epoch 179/200
7/7 [==============================] - 0s 13ms/step - loss: 1.1710 - decode_los
s: 0.0667 - predict_loss: 1.1044 - decode_mae: 0.1848 - predict_mae: 0.7820 - v
al_loss: 2.2905 - val_decode_loss: 0.1014 - val_predict_loss: 2.1891 - val_deco
de_mae: 0.1675 - val_predict_mae: 0.7264
Epoch 180/200
7/7 [==============================] - 0s 14ms/step - loss: 0.8865 - decode_los
s: 0.0547 - predict_loss: 0.8317 - decode_mae: 0.1680 - predict_mae: 0.7004 - v
al_loss: 2.3106 - val_decode_loss: 0.1001 - val_predict_loss: 2.2105 - val_deco
de_mae: 0.1647 - val_predict_mae: 0.7395
```

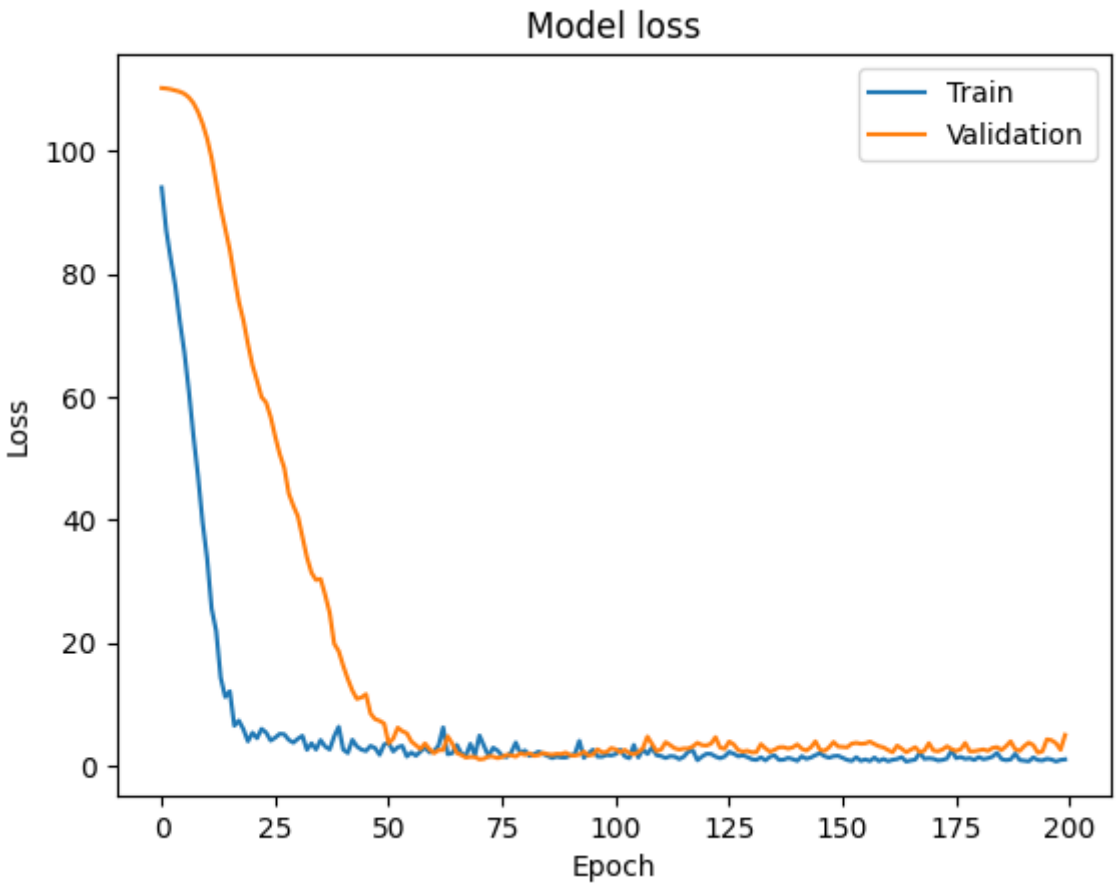
```
Epoch 181/200
7/7 [==============================] - 0s 13ms/step - loss: 1.3519 - decode_los
s: 0.0773 - predict_loss: 1.2746 - decode_mae: 0.2012 - predict_mae: 0.7871 - v
al_loss: 2.4449 - val_decode_loss: 0.0926 - val_predict_loss: 2.3523 - val_deco
de_mae: 0.1577 - val_predict_mae: 0.7491
Epoch 182/200
7/7 [==============================] - 0s 14ms/step - loss: 1.0048 - decode_los
s: 0.0573 - predict_loss: 0.9475 - decode_mae: 0.1750 - predict_mae: 0.7488 - v
al_loss: 2.5956 - val_decode_loss: 0.0898 - val_predict_loss: 2.5058 - val_deco
de_mae: 0.1632 - val_predict_mae: 0.7935
Epoch 183/200
7/7 [==============================] - 0s 13ms/step - loss: 1.1568 - decode_los
s: 0.0708 - predict_loss: 1.0860 - decode_mae: 0.1927 - predict_mae: 0.8063 - v
al_loss: 2.3627 - val_decode_loss: 0.0854 - val_predict_loss: 2.2773 - val_deco
de_mae: 0.1601 - val_predict_mae: 0.7500
Epoch 184/200
7/7 [==============================] - 0s 13ms/step - loss: 1.4116 - decode_los
s: 0.0738 - predict_loss: 1.3377 - decode_mae: 0.1976 - predict_mae: 0.8339 - v
al_loss: 2.8332 - val_decode_loss: 0.0763 - val_predict_loss: 2.7569 - val_deco
de_mae: 0.1536 - val_predict_mae: 0.7310
Epoch 185/200
7/7 [==============================] - 0s 14ms/step - loss: 2.0404 - decode_los
s: 0.0842 - predict_loss: 1.9562 - decode_mae: 0.1996 - predict_mae: 1.0350 - v
al_loss: 2.9696 - val_decode_loss: 0.0718 - val_predict_loss: 2.8978 - val_deco
de_mae: 0.1430 - val_predict_mae: 0.6974
Epoch 186/200
7/7 [==============================] - 0s 12ms/step - loss: 1.0254 - decode_los
s: 0.0597 - predict_loss: 0.9657 - decode_mae: 0.1693 - predict_mae: 0.7429 - v
al_loss: 2.5026 - val_decode_loss: 0.0715 - val_predict_loss: 2.4311 - val_deco
de_mae: 0.1395 - val_predict_mae: 0.6135
Epoch 187/200
7/7 [==============================] - 0s 13ms/step - loss: 0.8445 - decode_los
s: 0.0559 - predict_loss: 0.7887 - decode_mae: 0.1650 - predict_mae: 0.7072 - v
al_loss: 3.1267 - val_decode_loss: 0.0696 - val_predict_loss: 3.0571 - val_deco
de_mae: 0.1394 - val_predict_mae: 0.6627
Epoch 188/200
7/7 [==============================] - 0s 13ms/step - loss: 0.9586 - decode_los
s: 0.0578 - predict_loss: 0.9008 - decode_mae: 0.1706 - predict_mae: 0.7317 - v
al_loss: 3.9178 - val_decode_loss: 0.0679 - val_predict_loss: 3.8499 - val_deco
de_mae: 0.1408 - val_predict_mae: 0.6360
Epoch 189/200
7/7 [==============================] - 0s 14ms/step - loss: 1.8920 - decode_los
s: 0.0777 - predict_loss: 1.8144 - decode_mae: 0.1834 - predict_mae: 0.7771 - v
al_loss: 2.6316 - val_decode_loss: 0.0662 - val_predict_loss: 2.5653 - val_deco
de_mae: 0.1365 - val_predict_mae: 0.5599
Epoch 190/200
7/7 [==============================] - 0s 15ms/step - loss: 0.8695 - decode_los
s: 0.0635 - predict_loss: 0.8060 - decode_mae: 0.1667 - predict_mae: 0.6736 - v
al_loss: 2.3552 - val_decode_loss: 0.0699 - val_predict_loss: 2.2852 - val_deco
de_mae: 0.1389 - val_predict_mae: 0.6477
Epoch 191/200
7/7 [==============================] - 0s 14ms/step - loss: 0.7860 - decode_los
s: 0.0692 - predict_loss: 0.7168 - decode_mae: 0.1827 - predict_mae: 0.6517 - v
al_loss: 3.1361 - val_decode_loss: 0.0688 - val_predict_loss: 3.0673 - val_deco
de_mae: 0.1447 - val_predict_mae: 0.8121
Epoch 192/200
7/7 [==============================] - 0s 14ms/step - loss: 0.6663 - decode_los
s: 0.0536 - predict_loss: 0.6128 - decode_mae: 0.1618 - predict_mae: 0.6281 - v
al_loss: 3.6993 - val_decode_loss: 0.0726 - val_predict_loss: 3.6267 - val_deco
de_mae: 0.1492 - val_predict_mae: 0.8277
```

```
Epoch 193/200
7/7 [==============================] - 0s 14ms/step - loss: 1.2950 - decode_los
s: 0.0639 - predict_loss: 1.2311 - decode_mae: 0.1746 - predict_mae: 0.8353 - v
al_loss: 3.2942 - val_decode_loss: 0.0769 - val_predict_loss: 3.2173 - val_deco
de_mae: 0.1500 - val_predict_mae: 0.7245
Epoch 194/200
7/7 [==============================] - 0s 13ms/step - loss: 0.8682 - decode_los
s: 0.0613 - predict_loss: 0.8069 - decode_mae: 0.1719 - predict_mae: 0.6755 - v
al_loss: 2.0726 - val_decode_loss: 0.0863 - val_predict_loss: 1.9863 - val_deco
de_mae: 0.1528 - val_predict_mae: 0.6174
Epoch 195/200
7/7 [==============================] - 0s 14ms/step - loss: 0.7972 - decode_los
s: 0.0564 - predict_loss: 0.7408 - decode_mae: 0.1577 - predict_mae: 0.6120 - v
al_loss: 2.2826 - val_decode_loss: 0.0774 - val_predict_loss: 2.2051 - val_deco
de_mae: 0.1446 - val_predict_mae: 0.7074
Epoch 196/200
7/7 [==============================] - 0s 13ms/step - loss: 1.0822 - decode_los
s: 0.0568 - predict_loss: 1.0255 - decode_mae: 0.1667 - predict_mae: 0.7237 - v
al_loss: 4.2384 - val_decode_loss: 0.0705 - val_predict_loss: 4.1679 - val_deco
de_mae: 0.1421 - val_predict_mae: 0.8391
Epoch 197/200
7/7 [==============================] - 0s 13ms/step - loss: 0.9547 - decode_los
s: 0.0573 - predict_loss: 0.8974 - decode_mae: 0.1663 - predict_mae: 0.7016 - v
al_loss: 4.0926 - val_decode_loss: 0.0720 - val_predict_loss: 4.0206 - val_deco
de_mae: 0.1408 - val_predict_mae: 0.8108
Epoch 198/200
7/7 [==============================] - 0s 11ms/step - loss: 0.6409 - decode_los
s: 0.0552 - predict_loss: 0.5857 - decode_mae: 0.1586 - predict_mae: 0.5711 - v
al_loss: 3.6061 - val_decode_loss: 0.0728 - val_predict_loss: 3.5333 - val_deco
de_mae: 0.1409 - val_predict_mae: 0.6619
Epoch 199/200
7/7 [==============================] - 0s 12ms/step - loss: 0.8843 - decode_los
s: 0.0522 - predict_loss: 0.8321 - decode_mae: 0.1565 - predict_mae: 0.6284 - v
al_loss: 2.5384 - val_decode_loss: 0.0696 - val_predict_loss: 2.4688 - val_deco
de_mae: 0.1337 - val_predict_mae: 0.5932
Epoch 200/200
7/7 [==============================] - 0s 14ms/step - loss: 0.9802 - decode_los
s: 0.0661 - predict_loss: 0.9141 - decode_mae: 0.1828 - predict_mae: 0.7557 - v
al_loss: 4.9524 - val_decode_loss: 0.0711 - val_predict_loss: 4.8813 - val_deco
de_mae: 0.1400 - val_predict_mae: 0.7379
7/7 [==============================] - 0s 791us/step
7/7 [==============================] - 0s 2ms/step
7/7 [==============================] - 0s 1ms/step
7/7 [==============================] - 0s 2ms/step - loss: 2.6576 - decode_los
s: 0.0590 - predict_loss: 2.5986 - decode_mae: 0.1361 - predict_mae: 0.7163
Общее MAE: [2.657607078552246, 0.0589837022125721, 2.598623275756836, 0.1361242
6817417145, 0.7162818312644958]
WARNING:tensorflow:Compiled the loaded model, but the compiled metrics have yet
to be built. `model.compile_metrics` will be empty until you train or evaluate
the model.
WARNING:tensorflow:Compiled the loaded model, but the compiled metrics have yet
to be built. `model.compile_metrics` will be empty until you train or evaluate
the model.
WARNING:tensorflow:Compiled the loaded model, but the compiled metrics have yet
to be built. `model.compile_metrics` will be empty until you train or evaluate
the model.
```

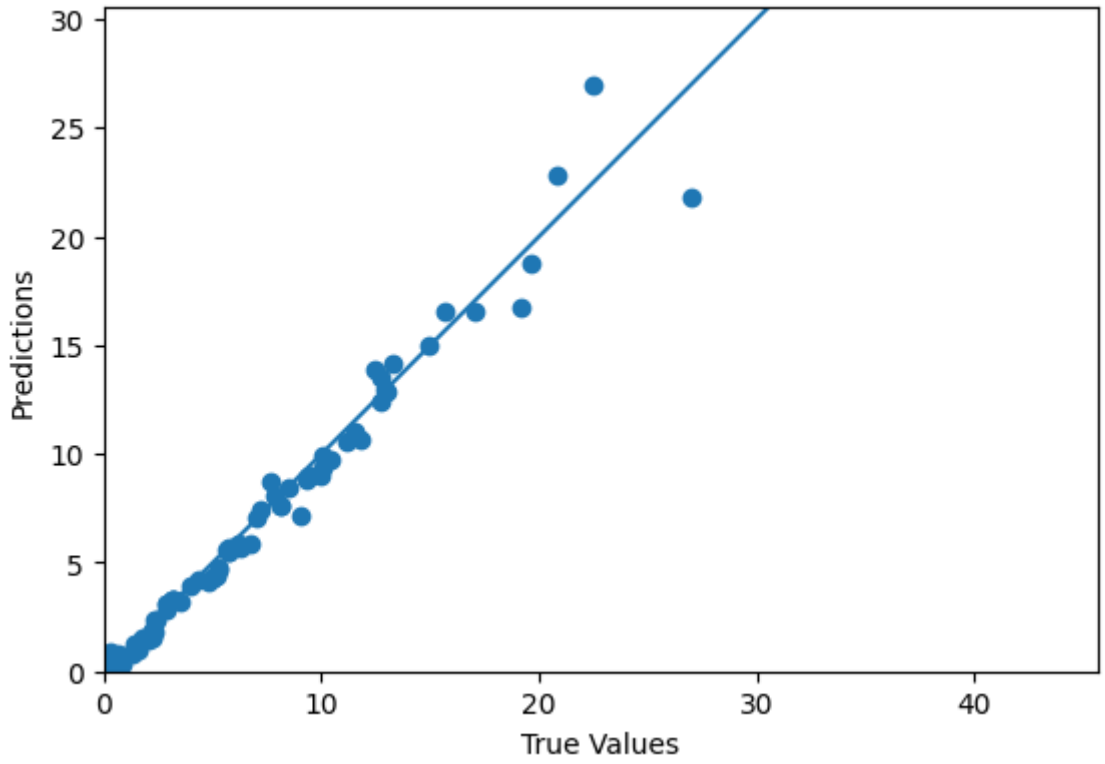
```
C:\Users\Daniel\AppData\Local\Programs\Python\Python311\Lib\site-packages\keras
\src\engine\training.py:3079: UserWarning: You are saving your model as an HDF5
file via `model.save()`. This file format is considered legacy. We recommend us
ing instead the native Keras format, e.g. `model.save('my_model.keras')`.
  saving_api.save_model(
```

In [5]:
```
import matplotlib.pyplot as plt

plt.plot(history.history['loss'])
plt.plot(history.history['val_loss'])
plt.title('Model loss')
plt.ylabel('Loss')
plt.xlabel('Epoch')
plt.legend(['Train', 'Validation'], loc='upper right')
plt.show()
```



In [6]:
```
plt.scatter(test_y, regression_test)
plt.xlabel("True Values")
plt.ylabel("Predictions")
plt.axis('equal')
plt.axis('square')
plt.xlim([0, plt.xlim()[1]])
plt.ylim([0, plt.ylim()[1]])
plt.plot([-100, 100], [-100, 100])
plt.show()
```



In [7]:
```
import pandas as pd
pd.read_csv("C:\\Users\\Daniel\\Downloads\\pr\\train.csv", delimiter=',')
```

Out[7]:

	63.895	-0.326	-0.555	4.387	8.387	126.849	-7.547
0	2.893	1.001	-0.718	-2.105	1.895	1.335	-1.340
1	89.829	-0.982	1.012	5.495	9.495	212.801	-9.459
2	332.150	0.111	0.132	14.036	18.036	1514.488	-18.424
3	0.643	0.533	0.461	-3.132	0.868	0.281	-0.449
4	0.552	0.441	0.369	-3.223	0.777	0.189	-0.541
...	...	...	...	...	...	...	...
994	0.357	0.415	1.250	-3.490	0.510	0.323	0.132
995	440.021	-0.882	-0.450	16.969	20.969	2307.599	-20.985
996	88.254	-1.265	0.735	5.144	9.144	207.941	-9.673
997	7.305	-1.026	0.604	-6.761	2.663	-5.034	2.663
998	75.917	-1.163	-0.051	4.502	8.502	165.873	-8.949

999 rows × 7 columns

In [8]:
```
import pandas as pd
pd.read_csv("C:\\Users\\Daniel\\Downloads\\pr\\test.csv", delimiter=',')
```

Out[8]:

	14.617	-0.413	0.885	-7.210	4.293	-12.661	4.293.1
0	2.360	0.644	-1.057	-2.502	1.498	0.882	-1.612
1	24.464	-0.412	-0.696	-8.708	5.140	-29.634	5.140
2	-0.382	-0.428	0.599	-4.468	-0.308	-0.388	-0.308
3	253.674	-1.280	0.611	-20.223	15.649	-1012.076	15.649
4	26.489	0.686	-0.525	1.275	5.275	33.951	-4.991
...	...	...	...	...	...	...	...
194	12.668	-1.406	0.142	-8.055	3.185	-12.293	3.185
195	52.415	-0.745	-0.648	2.982	6.982	95.343	-7.535
196	9.884	0.699	0.694	-1.110	2.890	7.826	-3.493
197	11.724	-0.928	0.917	-7.353	3.477	-9.893	3.477
198	62.095	-0.695	-0.978	3.900	7.900	122.287	-7.858

199 rows × 7 columns

In [9]:
```
import pandas as pd
pd.read_csv("C:\\Users\\Daniel\\Downloads\\pr\\encoded.csv", delimiter=',')
```

Out[9]:

	0.480	0.000	0.300	2.060	1.773	0.000.1	2.256	0.000.2
0	0.768	1.961	3.535	4.138	1.293	3.678	5.002	0.089
1	1.362	0.164	0.000	3.061	1.704	0.609	3.886	0.000
2	0.705	0.793	1.556	2.854	1.507	0.895	2.043	0.000
3	0.795	0.000	0.000	4.365	3.274	0.000	6.817	0.000
4	0.337	2.376	5.238	4.295	0.880	4.501	4.375	0.877
...	...	...	...	...	...	...	...	...
194	1.315	0.279	0.548	3.975	2.061	0.581	4.035	0.000
195	0.478	3.645	7.525	7.108	0.742	6.233	6.371	0.430
196	0.088	1.433	3.198	2.983	1.468	2.005	2.172	0.639
197	0.649	0.131	0.761	2.912	1.827	0.189	2.749	0.000
198	0.571	4.135	8.724	8.143	0.873	7.359	7.710	0.441

199 rows × 8 columns

In [10]:
```
import pandas as pd
pd.read_csv("C:\\Users\\Daniel\\Downloads\\pr\\decoded.csv", delimiter=',')
```

Out[10]:

	47.045	-0.454	0.948	-7.792	4.589	118.431
0	-0.994	0.301	-1.198	-1.825	3.478	85.415
1	51.664	-0.663	-0.690	-9.474	6.247	-212.922
2	-11.818	-0.222	0.571	-3.348	1.339	126.028
3	277.694	-0.855	0.611	-18.906	15.277	-1042.377
4	21.957	0.648	-0.723	1.275	4.785	15.694
...	...	...	...	...	...	...
194	48.917	-1.222	-0.016	-8.210	4.333	82.757
195	53.670	-0.641	-0.649	2.846	7.682	147.154
196	15.398	0.972	0.934	-0.912	2.909	-73.365
197	47.185	-0.804	0.979	-8.020	4.235	77.167
198	73.068	-0.638	-0.950	3.616	8.157	278.794

199 rows × 6 columns

In [11]:
```
import pandas as pd
pd.read_csv("C:\\Users\\Daniel\\Downloads\\pr\\regression.csv", delimiter=',')
```

Out[11]:

	4.293	0.175
0	-1.612	-2.330
1	5.140	0.175
2	-0.308	0.082
3	15.649	0.175
4	-4.991	-5.145
...	...	...
194	3.185	0.175
195	-7.535	-7.278
196	-3.493	-2.768
197	3.477	0.175
198	-7.858	-8.302

199 rows × 2 columns