W12_NeuralNetwork-1uur

January 12, 2021

1 Een simpel Neuraal Netwerk in PyTorch

Dit is gemaakt door: - Levy Duivenvoorden (18005152) - Jefry el Bhwash (16095065) - Amin Mansouri - Niels van Drunen - Niels van Schaik

aangemaakt: 25/11/2020

1.1 importeer alle modules:

[1]:
```
import random
import time
import torch
import torchvision
import torchvision.transforms as transforms
import numpy as np
import pandas as pd
import math
import random

import torch.nn as nn
import torch.nn.functional as F
import torch.optim as optim

import seaborn as sns
import matplotlib.pyplot as plt

from tqdm import tqdm
from IPython.display import clear_output
from sklearn.metrics import r2_score
from sklearn.metrics import mean_squared_error
from sklearn.preprocessing import StandardScaler
from sklearn.feature_selection import SelectKBest, mutual_info_classif
from sklearn.metrics import mean_absolute_error
import wandb

# hier random seeds mee geven
random.seed(1337)
```

```
torch.manual_seed(1337)

%matplotlib inline
%config InlineBackend.print_figure_kwargs={'facecolor' : "w"}
```

[2]:
```
# CUDA initialisation
ngpu = torch.cuda.device_count() # number of available gpus
device = torch.device("cuda:4") if (torch.cuda.is_available() and ngpu > 0)␣
↪else "cpu" #cuda:0 for gpu 0, cuda:4 for gpu 5
torch.backends.cudnn.benchmark=True # Uses cudnn auto-tuner to find the best␣
↪algorithm to use for your hardware
```

1.2 Laad de dataframe in:

[3]:
```
df = pd.read_pickle('/home/18005152/notebooks/zero/Data:/modelData/_v01_1')
df = df['2019-09-02':'2019-11-29']
```

[4]:
```
df.std()
```

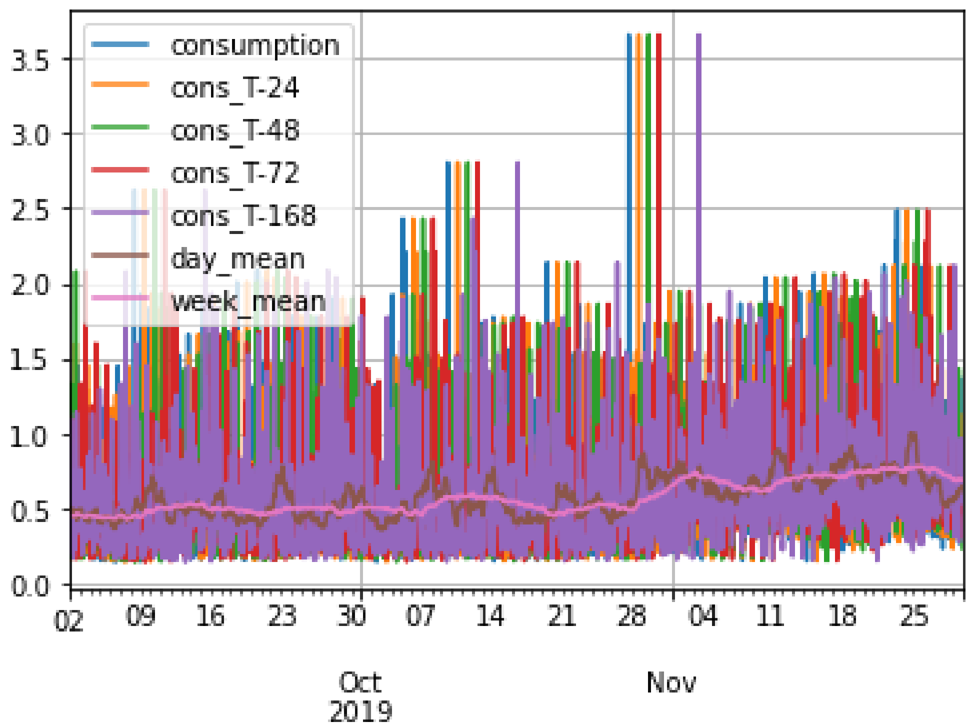
[4]:
```
consumption    0.370114
cons_T-24      0.370994
cons_T-48      0.372632
cons_T-72      0.372919
cons_T-168     0.364826
day_mean       0.130623
week_mean      0.104796
dtype: float64
```

1.3 Laat de data zien:

[5]:
```
%matplotlib inline
df.plot()
plt.grid()
df.head()
```

[5]:
```
                     consumption  cons_T-24  cons_T-48  cons_T-72  cons_T-168  \
2019-09-02 00:00:00        0.183      0.170     0.1790      0.604       0.227
2019-09-02 01:00:00        0.239      0.171     0.2090      0.563       0.214
2019-09-02 02:00:00        0.290      0.246     1.3335      0.780       1.099
2019-09-02 03:00:00        0.302      0.422     0.5510      1.101       0.768
2019-09-02 04:00:00        0.234      1.188     0.7450      0.485       0.744

                     day_mean  week_mean
2019-09-02 00:00:00   0.51006   0.460259
```

```
2019-09-02 01:00:00   0.50974   0.459872
2019-09-02 02:00:00   0.51122   0.460093
2019-09-02 03:00:00   0.47476   0.455424
2019-09-02 04:00:00   0.50024   0.458321
```



1.4 Train Validate Test split (ok)

[6]:
```
# lijst = ["consumption"]
# for i in range(0,24):
#     lijst.append("hour_"+str(i))
# print(lijst)
```

[7]:
```
#scale the data
#X:
scalerx = StandardScaler()
lijst = ["consumption"]
# for i in range(0,24):
#     lijst.append("hour_"+str(i))
scalerx.fit(df.loc[:,~df.columns.isin(lijst)])
scaled_dataX = scalerx.transform(df.loc[:,~df.columns.isin(lijst)]).tolist()
# for j in range(0,24):
#     for i in range(0,len(df["hour_"+str(j)].tolist())):
```

```
#         scaled_dataX[i][j] = df["hour_"+str(j)].tolist()[i]

#Y:
scalery = StandardScaler()
scalery.fit(df.loc[:,df.columns.isin(["consumption"])])
datay = scalery.transform(df.loc[:,df.columns.isin(["consumption"])])

start = 0
week = 7*1*24
end_train = 7*4*24
end_valid = 7*5*24
end_test = 7*6*24
#split the data
train_X = scaled_dataX[start:end_train]
train_y = datay[start:end_train].reshape(-1,1)

valid_X = scaled_dataX[end_train+week:end_valid+week]
valid_y = datay[end_train+week:end_valid+week].reshape(-1,1)

test_X = scaled_dataX[end_valid+week:end_test+week]
test_y = datay[end_valid+week:end_test+week].reshape(-1,1)

#Make tensors from the numpy arrays.
train_X_t = torch.from_numpy(np.array(train_X)).to(device).float()
train_y_t = torch.from_numpy(np.array(train_y)).to(device).float()

valid_X_t = torch.from_numpy(np.array(valid_X)).to(device).float()
valid_y_t = torch.from_numpy(np.array(valid_y)).to(device).float()

test_X_t = torch.from_numpy(np.array(test_X)).to(device).float()
test_y_t = torch.from_numpy(np.array(test_y)).to(device).float()

#Tensor Datasets
train_set = torch.utils.data.TensorDataset(train_X_t, train_y_t)
test_set = torch.utils.data.TensorDataset(valid_y_t, valid_X_t)

#Tensor DataLoaders
train_loader = torch.utils.data.DataLoader(train_set, batch_size=64,␣
 ↪shuffle=False, num_workers = 0)#, pin_memory=True)
test_loader = torch.utils.data.DataLoader(test_set, batch_size=64,␣
 ↪shuffle=False, num_workers = 0)#, pin_memory=True)
```

1.5 Neuraal Netwerk:

[8]:
```
#Parameters:
layerSize = 128
outputSize = 1
featureSize = train_X_t.shape[1]
relu = nn.ReLU()

#class maken voor NN
class Net(nn.Module):
    def __init__(self):
        super(Net, self).__init__()
        self.fc1 = nn.Linear(featureSize, layerSize)
        self.fc2 = nn.Linear(layerSize, outputSize)

    def forward(self, x):
        x = relu(self.fc1(x))
        x = self.fc2(x)
        return x
```

[9]:
```
#make model:
model = Net().to(device)
model.float()
```

[9]:
```
Net(
  (fc1): Linear(in_features=6, out_features=128, bias=True)
  (fc2): Linear(in_features=128, out_features=1, bias=True)
)
```

1.6 Train het Neuraal Netwerk:

[13]:
```
#Training parameters:
train_for = 100
show_every = 2
optimizer = optim.Adam(model.parameters(),lr=3e-4)
criterion = nn.SmoothL1Loss()
criterion0 = nn.MSELoss()

#initialize:
ite = 0
epochs = range(1,train_for)
alijst = []; blijst = []

#Learning loop:
for i in (epochs):
    btime = time.time()
```

```
    model.train()
    for batch_idx, data_target in enumerate(train_loader):
        data = data_target[0]
        target = data_target[1]
        data = data.view(-1, data.shape[1])
        optimizer.zero_grad()

        output = model(data)
        loss = 5*criterion(output, target)# + 3*criterion0(output, target)
        print(input)
        loss.backward()
        optimizer.step()
    etime = time.time()

    model.eval()
    if (ite%show_every) == 0:
        y = valid_y_t.cpu().detach().numpy()
        yhat = model(valid_X_t.float()).cpu().detach().numpy()
        # hier loss appenden ipv nog een losse berekening
        alijst.append(mean_absolute_error(train_y_t.cpu().detach().
↪numpy(),model(train_X_t.float()).cpu().detach().numpy()))
        blijst.append(mean_absolute_error(y,yhat))

        y = train_y_t.cpu().detach().numpy()
        yhat = model(train_X_t.float()).cpu().detach().numpy()
        # R^2-score:
        r2 = r2_score(yhat, y)
        # RMSE:
        rmse = np.sqrt(mean_squared_error(yhat, y))
        # MAPE:
        actual, pred = np.array(y), np.array(yhat)
        mape = np.mean(np.abs((actual - pred) / actual)) * 100
        # MAE:
        mae = mean_absolute_error(yhat, y)
        #print:
        print('Epoch: %d\t R\u00b2: %.2f\t RMSE: %.2f\t MAPE: %.2f\t MAE: %.
↪2f\t Looptime: %.3f s' % (ite,r2,rmse,mape,mae,etime-btime))
    ite+=1
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 0         R²: -2.82       RMSE: 0.81      MAPE: 107.92    MAE: 0.47
Looptime: 0.035 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 2        R^2: -2.82       RMSE: 0.81      MAPE: 108.38    MAE: 0.48
Looptime: 0.030 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 4         R²: -2.80       RMSE: 0.81      MAPE: 108.35    MAE: 0.48
Looptime: 0.030 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 6         R²: -2.80       RMSE: 0.81      MAPE: 108.37    MAE: 0.48
Looptime: 0.035 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 8         R²: -2.79       RMSE: 0.81      MAPE: 108.38    MAE: 0.48
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 10       R²: -2.79       RMSE: 0.81      MAPE: 108.40    MAE: 0.48
Looptime: 0.029 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 12       R²: -2.78       RMSE: 0.81      MAPE: 108.38    MAE: 0.48
Looptime: 0.029 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
Epoch: 14       R^2: -2.78      RMSE: 0.81      MAPE: 108.37    MAE: 0.48
Looptime: 0.029 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 16       R^2: -2.77      RMSE: 0.81      MAPE: 108.35    MAE: 0.48
Looptime: 0.028 s
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 18       R²: -2.77       RMSE: 0.81      MAPE: 108.33    MAE: 0.48
Looptime: 0.029 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 20       R²: -2.77       RMSE: 0.81      MAPE: 108.33    MAE: 0.48
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 22       R²: -2.76       RMSE: 0.81      MAPE: 108.32    MAE: 0.47
Looptime: 0.029 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 24        R²: -2.76       RMSE: 0.81      MAPE: 108.31    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 26        R²: -2.75       RMSE: 0.81      MAPE: 108.31    MAE: 0.47
Looptime: 0.029 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 28       R²: -2.75       RMSE: 0.81      MAPE: 108.30    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 30        R²: -2.74       RMSE: 0.81      MAPE: 108.29    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 32       R²: -2.74       RMSE: 0.81      MAPE: 108.26    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 34        R²: -2.73       RMSE: 0.81      MAPE: 108.26    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 36        R²: -2.73       RMSE: 0.81      MAPE: 108.26    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 38       R²: -2.72       RMSE: 0.81      MAPE: 108.24    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 40       R²: -2.72       RMSE: 0.81      MAPE: 108.23    MAE: 0.47
Looptime: 0.031 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 42        R²: -2.72       RMSE: 0.81      MAPE: 108.22    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 44       R²: -2.71       RMSE: 0.81      MAPE: 108.22    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 46        R²: -2.71       RMSE: 0.81      MAPE: 108.20    MAE: 0.47
Looptime: 0.030 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 48        R²: -2.70       RMSE: 0.81      MAPE: 108.19    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 50       R²: -2.70       RMSE: 0.80      MAPE: 108.17    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 52        R²: -2.70       RMSE: 0.80      MAPE: 108.14    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 54        R²: -2.69       RMSE: 0.80      MAPE: 108.13    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 56       R²: -2.69       RMSE: 0.80      MAPE: 108.11    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 58        R²: -2.68       RMSE: 0.80      MAPE: 108.10    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 60       R²: -2.68       RMSE: 0.80      MAPE: 108.10    MAE: 0.47
Looptime: 0.029 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
Epoch: 62        R²: -2.67       RMSE: 0.80      MAPE: 108.08    MAE: 0.47
Looptime: 0.027 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 64        R²: -2.67       RMSE: 0.80      MAPE: 108.06    MAE: 0.47
Looptime: 0.028 s
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 66        R²: -2.66       RMSE: 0.80      MAPE: 108.03    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 68       R²: -2.66       RMSE: 0.80      MAPE: 108.01    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 70       R²: -2.66       RMSE: 0.80      MAPE: 108.00    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 72        R²: -2.65       RMSE: 0.80      MAPE: 107.95    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 74        R²: -2.65       RMSE: 0.80      MAPE: 107.94    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 76        R²: -2.64       RMSE: 0.80      MAPE: 107.90    MAE: 0.47
Looptime: 0.029 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 78        R²: -2.64       RMSE: 0.80      MAPE: 107.86    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 80       R²: -2.63       RMSE: 0.80      MAPE: 107.86    MAE: 0.47
Looptime: 0.029 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 82       R²: -2.63       RMSE: 0.80      MAPE: 107.83    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 84        R^2: -2.62       RMSE: 0.80      MAPE: 107.81    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 86       R²: -2.62       RMSE: 0.80      MAPE: 107.80    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 88       R²: -2.61       RMSE: 0.80      MAPE: 107.79    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 90       R²: -2.61       RMSE: 0.80      MAPE: 107.74    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

Epoch: 92 R^2: -2.61 RMSE: 0.80 MAPE: 107.71 MAE: 0.47
Looptime: 0.028 s

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

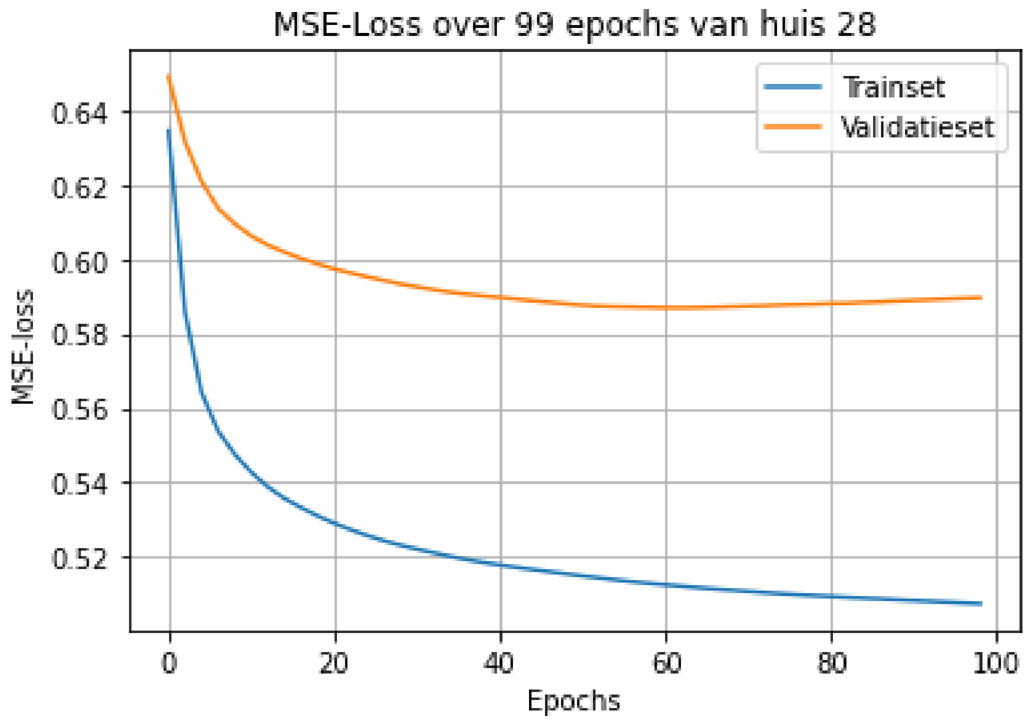
```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 94        R²: -2.60       RMSE: 0.80      MAPE: 107.67    MAE: 0.47
Looptime: 0.029 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 96        R²: -2.60       RMSE: 0.80      MAPE: 107.64    MAE: 0.47
Looptime: 0.028 s
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
```

```
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
<bound method Kernel.raw_input of <ipykernel.ipkernel.IPythonKernel object at
0x7fb3b5b73ac8>>
Epoch: 98       R²: -2.60       RMSE: 0.80      MAPE: 107.59    MAE: 0.47
Looptime: 0.028 s
```

[28]:

```
%matplotlib inline
plt.plot([i*show_every for i in range(0,len(alijst))],alijst,label="Trainset")
plt.plot([i*show_every for i in range(0,len(blijst))],blijst,␣
 ↪label="Validatieset")

plt.title('MSE-Loss over ' +str(list(epochs)[-1])+ ' epochs van huis 28' )
plt.xlabel("Epochs")
plt.ylabel("MSE-loss") # MSELoss
plt.legend()
#plt.xlim([150,250])
#plt.ylim([0.5,0.8])
plt.grid()
plt.savefig("im1.png")
plt.show()
```



1.7 Test het Neuraal Netwerk:

Geïmplementeerde validatie methoden: - R^2 - RMSE - MAPE - MAE (L1-Loss)

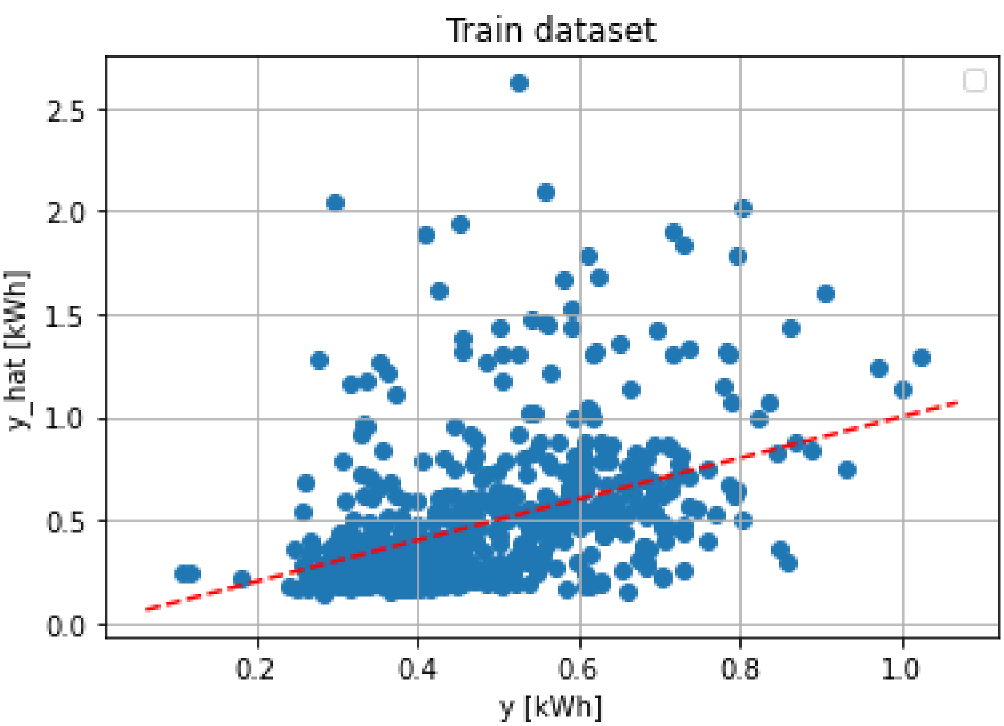
Train evaluation

[29]:
```
model.eval()

y = scalery.inverse_transform(train_y_t.cpu().detach().numpy())
yhat = scalery.inverse_transform(model(train_X_t.float()).cpu().detach().
 ↪numpy())

# R^2-score:
r2 = r2_score(yhat, y)
# RMSE:
rmse = np.sqrt(mean_squared_error(yhat, y))
# MAPE:
actual, pred = np.array(y), np.array(yhat)
mape = np.mean(np.abs((actual - pred) / actual)) * 100
# MAE:
mae = mean_absolute_error(yhat, y)
```

```
#zet de voorspelde tegen de werkelijke waarde uit.
%matplotlib inline
plt.scatter(yhat,y)
plt.xlabel("y [kWh]")
plt.ylabel("y_hat [kWh]")
plt.legend(loc="upper right")
plt.title('Train dataset')
plt.plot(plt.xlim(), plt.xlim(), ls="--", c='r', label="$y$=$\hat{y}$")
# plt.xlim([0.1,1])
# plt.ylim([0.1,1])
print('R\u00b2: \t%.2f \nRMSE: \t%.2f \nMAPE: \t%.2f \nMAE: \t%.2f' %␣
 ↪(r2,rmse,mape,mae))
plt.grid()
plt.savefig("im2.png")
plt.show()
```

```
No handles with labels found to put in legend.
```

```
R²:     -3.19
RMSE:   0.30
MAPE:   42.48
MAE:    0.19
```

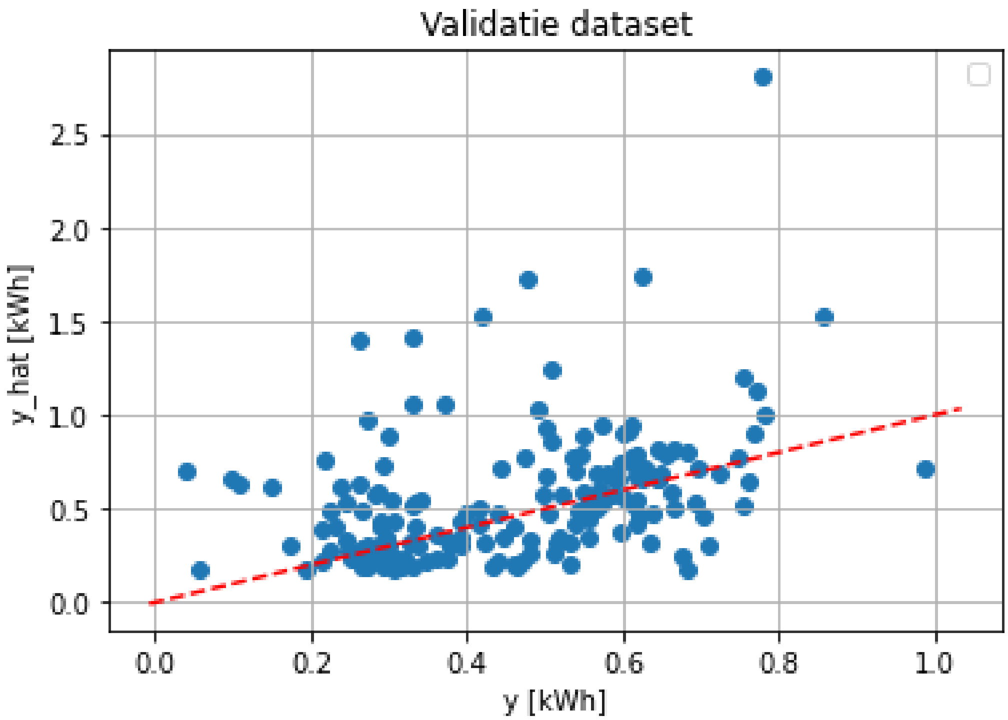


Validation evaluation

[30]:
```
model.eval()

y = scalery.inverse_transform(valid_y_t.cpu().detach().numpy())
yhat = scalery.inverse_transform(model(valid_X_t.float()).cpu().detach().
 ↪numpy())

# R^2-score:
r2 = r2_score(yhat, y)
# RMSE:
rmse = np.sqrt(mean_squared_error(yhat, y))
# MAPE:
actual, pred = np.array(y), np.array(yhat)
mape = np.mean(np.abs((actual - pred) / actual)) * 100
# MAE:
mae = mean_absolute_error(yhat, y)

#zet de voorspelde tegen de werkelijke waarde uit.
%matplotlib inline
plt.scatter(yhat,y)
plt.xlabel("y [kWh]")
plt.ylabel("y_hat [kWh]")
plt.legend(loc="upper right")
plt.title("Validatie dataset")
plt.plot(plt.xlim(), plt.xlim(), ls="--", c='r', label="$y$=$\hat{y}$")
# plt.xlim([0.1,1])
# plt.ylim([0.1,1])
print('R\u00b2: \t%.2f \nRMSE: \t%.2f \nMAPE: \t%.2f \nMAE: \t%.2f' %␣
 ↪(r2,rmse,mape,mae))
plt.grid()
plt.savefig("im3.png")
plt.show()
```

```
No handles with labels found to put in legend.
```

```
R²:     -2.84
RMSE:   0.35
MAPE:   38.99
MAE:    0.22
```



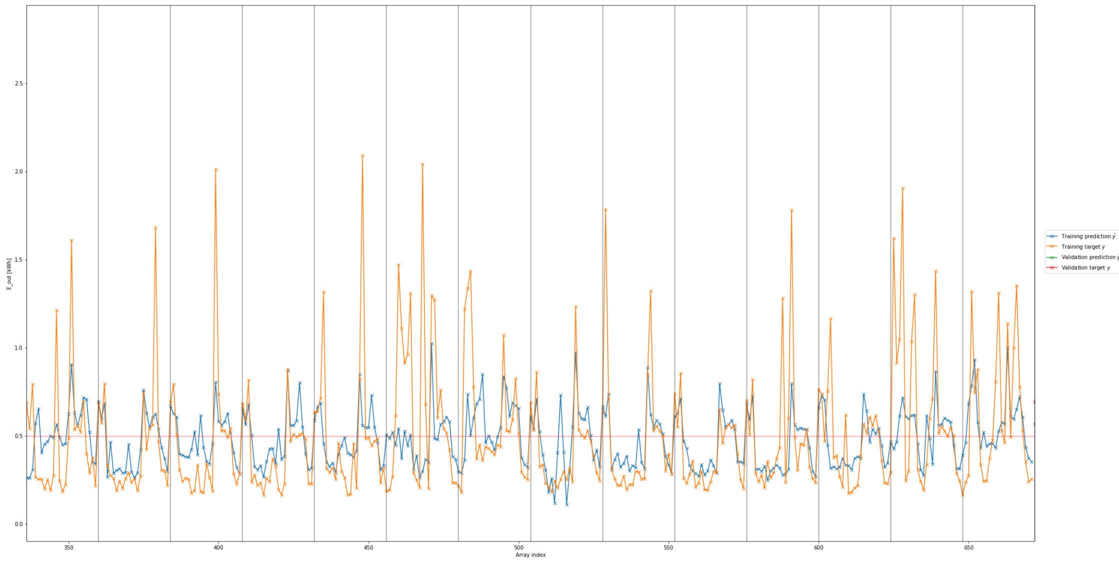
[31]:
```
A = np.sum(scalery.inverse_transform(model(train_X_t.float()).cpu().detach().
↪numpy()))
B = np.sum(scalery.inverse_transform(train_y_t.cpu().detach().numpy()))
C = (A-B)/B*100

D = np.sum(scalery.inverse_transform(model(valid_X_t.float()).cpu().detach().
↪numpy()))
E = np.sum(scalery.inverse_transform(valid_y_t.cpu().detach().numpy()))
F = (D-E)/E*100

print("Train:\t\t Model = %.2f kWh \t Actual = %.2f kWh \t percentage = %.2f" ␣
↪% (A,B,C) +"%")
print("Validation:\t Model = %.2f kWh \t Actual = %.2f kWh \t percentage = %.
↪2f" % (D,E,F) +"%")
```

```
Train:           Model = 321.65 kWh      Actual = 333.30 kWh      percentage =
-3.50%
Validation:      Model = 77.69 kWh       Actual = 95.46 kWh       percentage =
-18.62%
```

[32]:
```
kaas = []
#kaas.append(([i[0] for i in train_y_t.detach().cpu().numpy().tolist()])[-1:
↪][0])
```

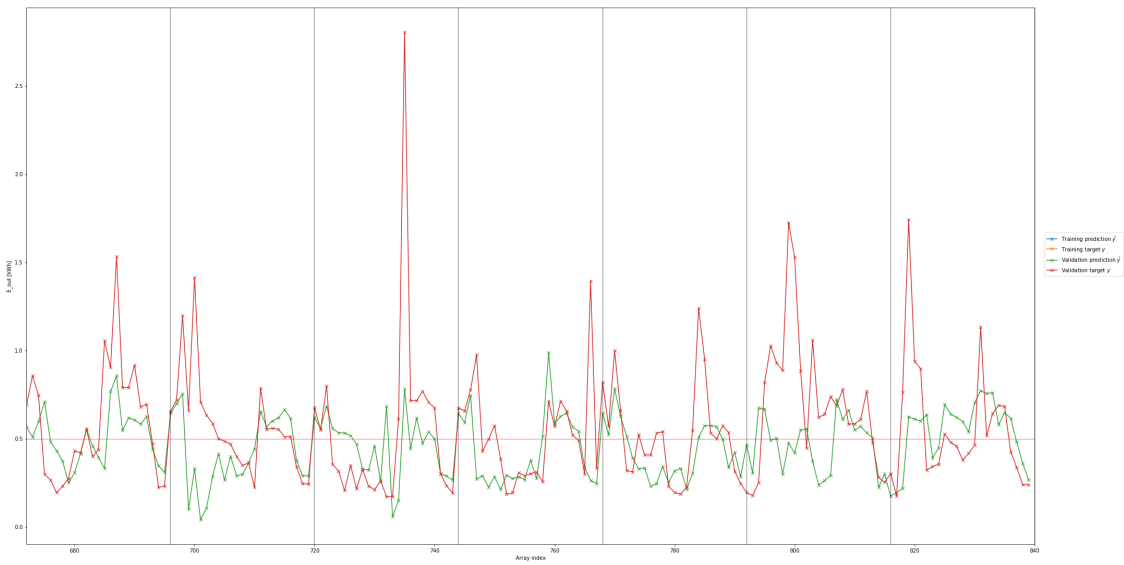
```
for i in [i[0] for i in scalery.inverse_transform((model(valid_X_t.float()).
↪detach().cpu().numpy()).tolist())]:
    kaas.append(i)

kaas1 = []
#kaas1.append(((train_y_t.detach().cpu().numpy().tolist())[-1:][0][0]))
for i in [i[0] for i in scalery.inverse_transform((valid_y_t.detach().cpu().
↪numpy()).tolist())]:
    kaas1.append(i)
```

[33]:
```
# Training
%matplotlib inline
plt.subplots(figsize=(30,15))
plt.plot(np.arange(0,len(train_y_t.detach().cpu().numpy())), scalery.
↪inverse_transform(model(train_X_t.float()).detach().cpu().numpy()),
         "x-", label="Training prediction $\hat{y}$")
plt.plot(np.arange(0,len(train_y_t.detach().cpu().numpy())), scalery.
↪inverse_transform(train_y_t.detach().cpu().numpy()),
         "x-", label="Training target $y$")
plt.grid()
plt.ylabel("E_out [kWh]")
plt.legend(loc=(1.01, 0.5))
plt.plot((np.arange(len(train_y_t.detach().cpu().numpy()),len(train_y_t.
↪detach().cpu().numpy())+len(valid_y_t.detach().cpu().numpy()))).tolist(),␣
↪kaas,
         "x-", label="Validation prediction $\hat{y}$")
plt.plot((np.arange(len(train_y_t.detach().cpu().numpy()),len(train_y_t.
↪detach().cpu().numpy())+len(valid_y_t.detach().cpu().numpy()))).tolist(),␣
↪kaas1,
         "x-", label="Validation target $y$")
[plt.axvline(i,color="black", alpha=0.4) for i in list(range(0,len(valid_y_t.
↪detach().cpu().numpy())+len(train_y_t.detach().cpu().numpy())+24,24))]
plt.axhline(np.mean(scalery.inverse_transform(train_y_t.detach().cpu().numpy().
↪tolist())),color='red', alpha=0.4)
# layout
# plt.ylim([-1,1.5])
#plt.xlim([672,840])
plt.xlim([336,672])
plt.xlabel("Array index")
plt.ylabel("E_out [kWh]")
plt.legend(loc=(1.01, 0.5))
plt.grid()
plt.tight_layout()
plt.savefig("im4.png")
plt.show()
```



[34]:
```
# Training
%matplotlib inline
plt.subplots(figsize=(30,15))
plt.plot(np.arange(0,len(train_y_t.detach().cpu().numpy())), scalery.
↪inverse_transform(model(train_X_t.float()).detach().cpu().numpy()),
         "x-", label="Training prediction $\hat{y}$")
plt.plot(np.arange(0,len(train_y_t.detach().cpu().numpy())), scalery.
↪inverse_transform(train_y_t.detach().cpu().numpy()),
         "x-", label="Training target $y$")
plt.grid()
plt.ylabel("E_out [kWh]")
plt.legend(loc=(1.01, 0.5))
plt.plot((np.arange(len(train_y_t.detach().cpu().numpy()),len(train_y_t.
↪detach().cpu().numpy())+len(valid_y_t.detach().cpu().numpy()))).tolist(),␣
↪kaas,
         "x-", label="Validation prediction $\hat{y}$")
plt.plot((np.arange(len(train_y_t.detach().cpu().numpy()),len(train_y_t.
↪detach().cpu().numpy())+len(valid_y_t.detach().cpu().numpy()))).tolist(),␣
↪kaas1,
         "x-", label="Validation target $y$")
[plt.axvline(i,color="black", alpha=0.4) for i in list(range(0,len(valid_y_t.
↪detach().cpu().numpy())+len(train_y_t.detach().cpu().numpy())+24,24))]
plt.axhline(np.mean(scalery.inverse_transform(train_y_t.detach().cpu().numpy().
↪tolist())),color='red', alpha=0.4)
# layout
# plt.ylim([-1,1.5])
plt.xlim([672,840])
# plt.xlim([336,672])
```

```python
plt.xlabel("Array index")
plt.ylabel("E_out [kWh]")
plt.legend(loc=(1.01, 0.5))
plt.grid()
plt.tight_layout()
plt.savefig("im5.png")
plt.show()
```



[75]:
```python
#Save the figs:



#export to pdf:
from fpdf import FPDF
pdf = FPDF()
pdf.add_page()

#write the doc:
info = ["Dataset 1 is hierbij gebruikt, met een batchsize van 64.",
        "8 Layers in network, tussen iedere layer zit een dropout van 0.16.",
        "Iedere Layersize is 256 nodes diep. Er is een LeakyReLU als␣
 ↪activatiefunctie gebruikt."]
pdf.set_font("Arial","B",size=15)
pdf.cell(200, 10, txt = "Model 1: Simple Neural Network",
         ln = 1, align = 'L')
pdf.set_font("Arial",size=9)
[pdf.cell(200, 5, txt = i, ln = 2, align = 'L')  for i in info]
pdf.image("im"+str(1)+".png",x=125,y=15, w=700/5*0.5, h=450/5*0.5)
```

```
#Training plot:
pdf.set_font("Arial","B",size=15)
pdf.text(10, 70, txt = "Training:")
pdf.set_font("Arial",size=9)
pdf.image("im"+str(2)+".png",x=10,y=75, w=700/5*0.5, h=450/5*0.5)
pdf.image("im"+str(4)+".png",x=80,y=75, w=700/5*0.9, h=450/5*0.5)

#Validation plot:
pdf.set_font("Arial","B",size=15)
pdf.text(10, 145, txt = "Validation:")
pdf.set_font("Arial",size=9)
pdf.image("im"+str(3)+".png",x=10,y=150, w=700/5*0.5, h=450/5*0.5)
pdf.image("im"+str(5)+".png",x=80,y=150, w=700/5*0.9, h=450/5*0.5)

#output the file:
pdf.output("Evaluation.pdf")
```

[75]: ''

[22]:

```
import plotly.express as px
import plotly
import os

df = px.data.iris()
pltx = px.scatter(y)
plotly.io.write_image(pltx,file='pltx.png',format='png',width=700, height=450)
pltx=(os.getcwd()+'/'+"pltx.png")
### define a method
def charts(self):
        self.set_xy(40.0,25.0)
        self.image(plt,  link='', type='', w=700/5, h=450/5)
```

```
---------------------------------------------------------------------------
ValueError                                Traceback (most recent call last)
<ipython-input-22-c5af4bb3c82b> in <module>()
      5 df = px.data.iris()
      6 pltx = px.scatter(y)
----> 7 plotly.io.write_image(pltx,file='pltx.png',format='png',width=700,␣
 ↪height=450)
      8 pltx=(os.getcwd()+'/'+"pltx.png")
      9 ### define a method

/home/18005152/.local/lib/python3.7/site-packages/plotly/io/_kaleido.py in␣
 ↪write_image(fig, file, format, scale, width, height, validate, engine)
    250         height=height,
    251         validate=validate,
--> 252         engine=engine,
```

```
    253     )
    254 

/home/18005152/.local/lib/python3.7/site-packages/plotly/io/_kaleido.py in to_image(fig, format, width, height, scale, validate, engine)
    107             height=height,
    108             scale=scale,
--> 109             validate=validate,
    110         )
    111     elif engine != "kaleido":

/home/18005152/.local/lib/python3.7/site-packages/plotly/io/_orca.py in to_image(fig, format, width, height, scale, validate)
   1533     # Make sure orca sever is running
   1534     # -------------------------------
-> 1535     ensure_server()
   1536 
   1537     # Handle defaults

/home/18005152/.local/lib/python3.7/site-packages/plotly/io/_orca.py in ensure_server()
   1388         # Validate orca executable only if server_url is not provided
   1389         if status.state == "unvalidated":
-> 1390             validate_executable()
   1391         # Acquire lock to make sure that we keep the properties of orca_state
   1392         # consistent across threads

/home/18005152/.local/lib/python3.7/site-packages/plotly/io/_orca.py in validate_executable()
   1085                 executable=config.executable,
   1086                 formatted_path=formatted_path,
-> 1087                 instructions=install_location_instructions,
   1088             )
   1089         )

ValueError:
The orca executable is required to export figures as static images,
but it could not be found on the system path.

Searched for executable 'orca' on the following path:
    /home/hub/bin
    /usr/local/cuda/bin
    /home/hub/bin
    /opt/jupyterhub/anaconda/bin
    /opt/jupyterhub/spark-2.2.0/bin
    /usr/local/sbin
    /usr/local/bin
```

```
    /usr/sbin
    /usr/bin
    /sbin
    /bin
    /usr/games
    /usr/local/games
    /snap/bin
    /usr/lib/jvm/java-8-oracle/bin
    /usr/lib/jvm/java-8-oracle/db/bin
    /usr/lib/jvm/java-8-oracle/jre/bin

If you haven't installed orca yet, you can do so using conda as follows:

    $ conda install -c plotly plotly-orca

Alternatively, see other installation methods in the orca project README at
https://github.com/plotly/orca

After installation is complete, no further configuration should be needed.

If you have installed orca, then for some reason plotly.py was unable to
locate it. In this case, set the `plotly.io.orca.config.executable`
property to the full path of your orca executable. For example:

    >>> plotly.io.orca.config.executable = '/path/to/orca'

After updating this executable property, try the export operation again.
If it is successful then you may want to save this configuration so that it
will be applied automatically in future sessions. You can do this as follows:

    >>> plotly.io.orca.config.save()

If you're still having trouble, feel free to ask for help on the forums at
https://community.plot.ly/c/api/python
```

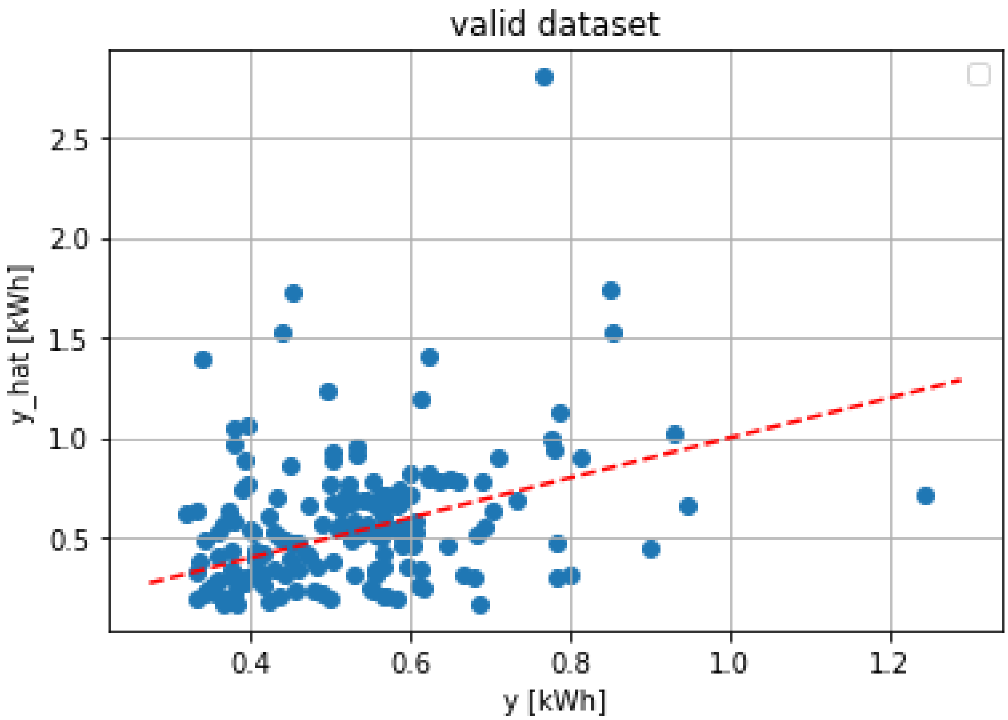
2 MVLR

[17]:
```python
from sklearn import linear_model
regr = linear_model.LinearRegression()
regr.fit(train_X,train_y)
yhat =  scalery.inverse_transform(regr.predict(valid_X))
y = scalery.inverse_transform(valid_y)
```

[18]:
```
r2 = r2_score(yhat, y)
rmse = np.sqrt(mean_squared_error(yhat, y))
actual, pred = np.array(y), np.array(yhat)
mape = np.mean(np.abs((actual - pred) / actual)) * 100
mae = mean_absolute_error(yhat, y)

#zet de voorspelde tegen de werkelijke waarde uit.
%matplotlib inline
plt.scatter(yhat,y)
plt.xlabel("y [kWh]")
plt.ylabel("y_hat [kWh]")
plt.legend(loc="upper right")
plt.title('valid dataset')
plt.plot(plt.xlim(), plt.xlim(), ls="--", c='r', label="$y$=$\hat{y}$")
# plt.xlim([0.1,1])
# plt.ylim([0.1,1])
print('R\u00b2: \t%.2f \nRMSE: \t%.2f \nMAPE: \t%.2f \nMAE: \t%.2f' %␣
↪(r2,rmse,mape,mae))
plt.grid()
plt.show()
```

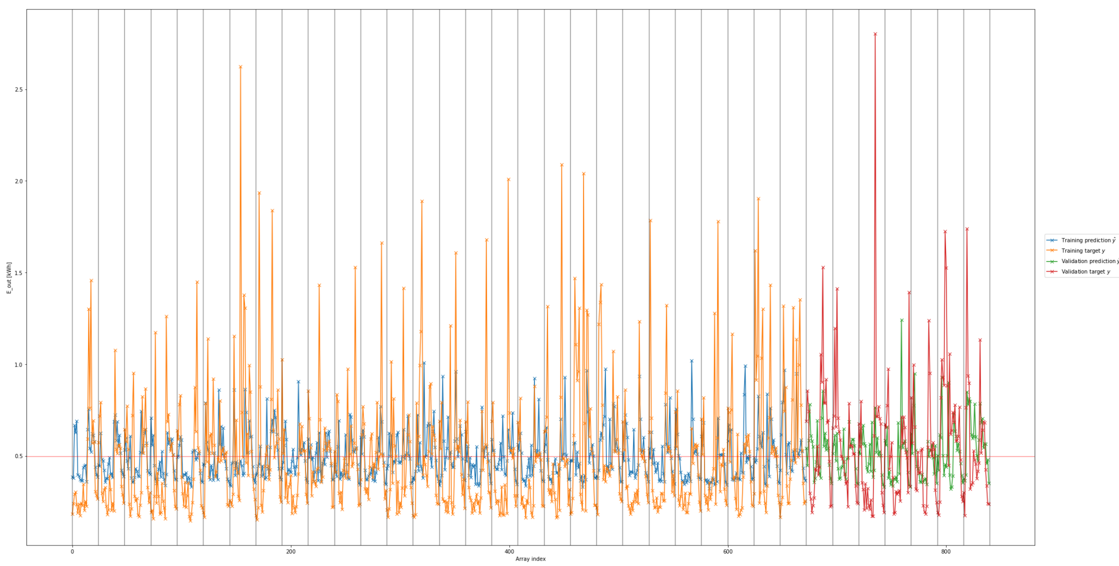
```
No handles with labels found to put in legend.
```

```
R²:     -4.25
RMSE:   0.34
MAPE:   46.04
MAE:    0.22
```



[19]:
```
# Training
%matplotlib inline
plt.subplots(figsize=(30,15))
plt.plot(np.arange(0,len(train_y_t.detach().cpu().numpy())), scalery.
 ↪inverse_transform(regr.predict(train_X)),
         "x-", label="Training prediction $\hat{y}$")
plt.plot(np.arange(0,len(train_y_t.detach().cpu().numpy())), scalery.
 ↪inverse_transform(train_y_t.detach().cpu().numpy()),
         "x-", label="Training target $y$")
plt.grid()
plt.ylabel("E_out [kWh]")
plt.legend(loc=(1.01, 0.5))
plt.plot((np.arange(len(train_y_t.detach().cpu().numpy()),len(train_y_t.
 ↪detach().cpu().numpy())+len(valid_y_t.detach().cpu().numpy()))).tolist(),␣
 ↪scalery.inverse_transform(regr.predict(valid_X)),
         "x-", label="Validation prediction $\hat{y}$")
plt.plot((np.arange(len(train_y_t.detach().cpu().numpy()),len(train_y_t.
 ↪detach().cpu().numpy())+len(valid_y_t.detach().cpu().numpy()))).tolist(),␣
 ↪scalery.inverse_transform(valid_y),
         "x-", label="Validation target $y$")
[plt.axvline(i,color="black", alpha=0.4) for i in list(range(0,len(valid_y_t.
 ↪detach().cpu().numpy())+len(train_y_t.detach().cpu().numpy())+24,24))]
```

```
plt.axhline(np.mean(scalery.inverse_transform(train_y_t.detach().cpu().numpy().
↪tolist())),color='red', alpha=0.4)
# layout
# plt.ylim([-1,1.5])
#plt.xlim([672,840])
# plt.xlim([336,672])
plt.xlabel("Array index")
plt.ylabel("E_out [kWh]")
plt.legend(loc=(1.01, 0.5))
plt.grid()
plt.tight_layout()
plt.show()
```



3 SVR

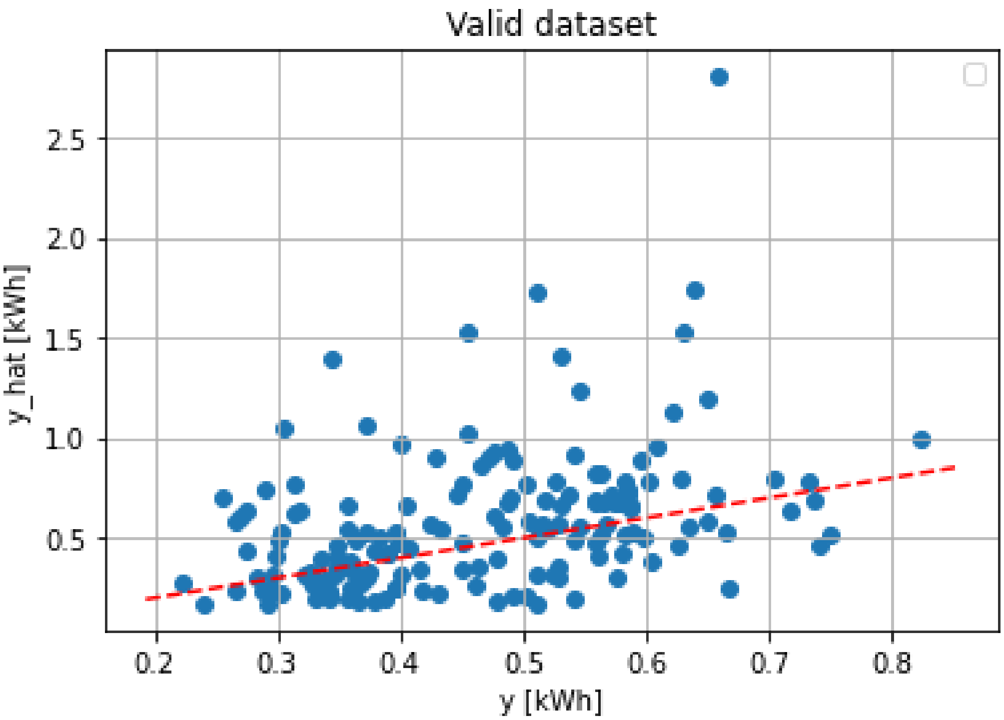
[20]:
```
from sklearn.svm import SVR
regr = SVR()
regr.fit(train_X,train_y)
yhat =  scalery.inverse_transform(regr.predict(valid_X))
y = scalery.inverse_transform(valid_y)
```

```
/opt/jupyterhub/anaconda/lib/python3.7/site-
packages/sklearn/utils/validation.py:72: DataConversionWarning: A column-vector
y was passed when a 1d array was expected. Please change the shape of y to
(n_samples, ), for example using ravel().
  return f(**kwargs)
```

[21]:
```python
r2 = r2_score(yhat, y)
rmse = np.sqrt(mean_squared_error(yhat, y))
actual, pred = np.array(y), np.array(yhat)
mape = np.mean(np.abs((actual - pred) / actual)) * 100
mae = mean_absolute_error(yhat, y)

#zet de voorspelde tegen de werkelijke waarde uit.
%matplotlib inline
plt.scatter(yhat,y)
plt.xlabel("y [kWh]")
plt.ylabel("y_hat [kWh]")
plt.legend(loc="upper right")
plt.title('Valid dataset')
plt.plot(plt.xlim(), plt.xlim(), ls="--", c='r', label="$y$=$\hat{y}$")
# plt.xlim([0.1,1])
# plt.ylim([0.1,1])
print('R\u00b2: \t%.2f \nRMSE: \t%.2f \nMAPE: \t%.2f \nMAE: \t%.2f' %␣
 ↪(r2,rmse,mape,mae))
plt.grid()
plt.show()
```

```
No handles with labels found to put in legend.
```

```
R²:     -6.30
RMSE:   0.34
MAPE:   52.64
MAE:    0.22
```

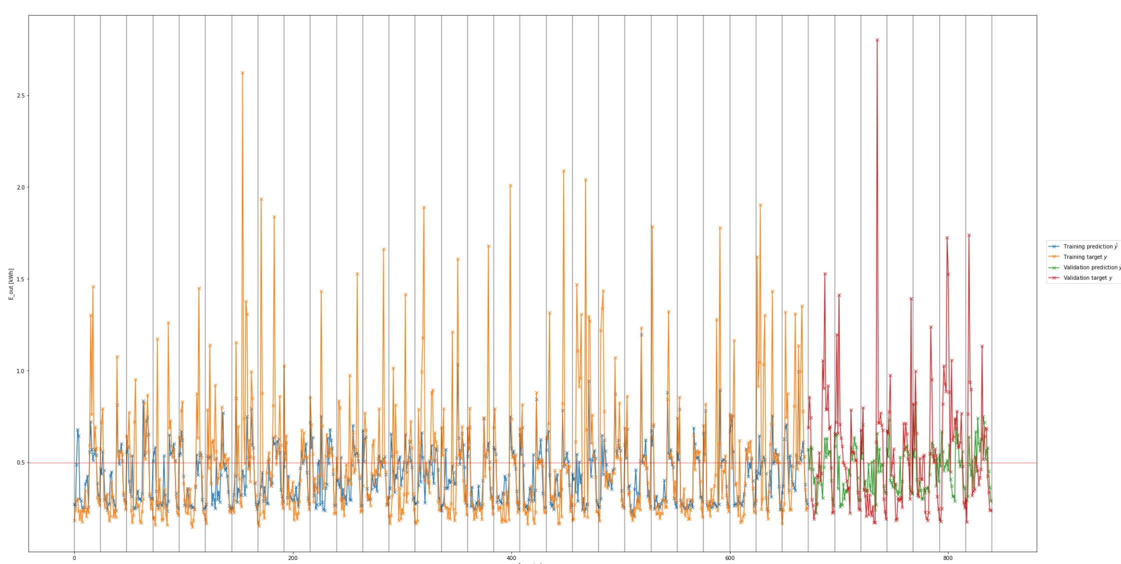


[22]:
```
A = np.sum(scalery.inverse_transform(regr.predict(train_X)))
B = np.sum(scalery.inverse_transform(train_y))
C = (A-B)/B*100

D = np.sum(scalery.inverse_transform(regr.predict(valid_X)))
E = np.sum(scalery.inverse_transform(valid_y))
F = (D-E)/E*100

print("Train:\t\t Model = %.2f kWh \t Actual = %.2f kWh \t percentage = %.2f" ␣
↪% (A,B,C) +"%")
print("Validation:\t Model = %.2f kWh \t Actual = %.2f kWh \t percentage = %.
↪2f" % (D,E,F) +"%")
```

```
Train:           Model = 284.43 kWh      Actual = 333.30 kWh     percentage =
-14.66%
Validation:      Model = 77.38 kWh       Actual = 95.46 kWh      percentage =
-18.94%
```

[23]:
```
# Training
%matplotlib inline
plt.subplots(figsize=(30,15))
plt.plot(np.arange(0,len(train_y_t.detach().cpu().numpy())), scalery.
↪inverse_transform(regr.predict(train_X)),
```

```
        "x-", label="Training prediction $\hat{y}$")
plt.plot(np.arange(0,len(train_y_t.detach().cpu().numpy())), scalery.
 ↪inverse_transform(train_y_t.detach().cpu().numpy()),
        "x-", label="Training target $y$")
plt.grid()
plt.ylabel("E_out [kWh]")
plt.legend(loc=(1.01, 0.5))
plt.plot((np.arange(len(train_y_t.detach().cpu().numpy()),len(train_y_t.
 ↪detach().cpu().numpy())+len(valid_y_t.detach().cpu().numpy()))).tolist(),␣
 ↪scalery.inverse_transform(regr.predict(valid_X)),
        "x-", label="Validation prediction $\hat{y}$")
plt.plot((np.arange(len(train_y_t.detach().cpu().numpy()),len(train_y_t.
 ↪detach().cpu().numpy())+len(valid_y_t.detach().cpu().numpy()))).tolist(),␣
 ↪scalery.inverse_transform(valid_y),
        "x-", label="Validation target $y$")
[plt.axvline(i,color="black", alpha=0.4) for i in list(range(0,len(valid_y_t.
 ↪detach().cpu().numpy())+len(train_y_t.detach().cpu().numpy())+24,24))]
plt.axhline(np.mean(scalery.inverse_transform(train_y_t.detach().cpu().numpy().
 ↪tolist())),color='red', alpha=0.4)
# layout
#plt.ylim([-1,1.5])
#plt.xlim([672,840])
#plt.xlim([336,672])
plt.xlabel("Array index")
plt.ylabel("E_out [kWh]")
plt.legend(loc=(1.01, 0.5))
plt.grid()
plt.tight_layout()
plt.show()
```



3.1 Stop de notebook:

//%%javascript //Jupyter.notebook.session.delete()