In [ ]:
```
import gluonts
print(gluonts.__version__)
```

```
0.14.4
```

In [ ]:
```
%matplotlib inline
import matplotlib.pyplot as plt

import numpy as np
import pandas as pd

import torch
```

In [ ]:
```
from gluonts.dataset.multivariate_grouper import MultivariateGrouper
from gluonts.dataset.repository.datasets import dataset_recipes, get_dataset
from gluonts.evaluation.backtest import make_evaluation_predictions
from gluonts.evaluation import MultivariateEvaluator
```

```
/home/songzy/anaconda3/envs/py311/lib/python3.11/site-packages/gluonts/json.py:101: UserWarning: Using `json`-module for json-handling. Consider installing one of `orjson`, `ujson` to speed up serialization and deserialization.
  warnings.warn(
```

In [ ]:
```
# from pts.model.tempflow import TempFlowEstimator
from pts.model.time_grad import TimeGradEstimator
# from pts.model.transformer_tempflow import TransformerTempFlowEstimator
# from pts import Trainer
from pytorch_lightning import Trainer
```

In [ ]:
```
from diffusers import (
    PNDMScheduler,
    DDIMScheduler,
    DPMSolverMultistepScheduler,
    KDPM2DiscreteScheduler,
    DEISMultistepScheduler,
)
```

In [ ]:
```
device = torch.device("cuda" if torch.cuda.is_available() else "cpu")
```

In [ ]:
```
def plot(target, forecast, prediction_length, prediction_intervals=(50.0, 90.0),
    label_prefix = ""
    rows = 4
    cols = 4
    fig, axs = plt.subplots(rows, cols, figsize=(24, 24))
    axx = axs.ravel()
    seq_len, target_dim = target.shape

    ps = [50.0] + [
            50.0 + f * c / 2.0 for c in prediction_intervals for f in [-1.0, +1.
        ]

    percentiles_sorted = sorted(set(ps))

    def alpha_for_percentile(p):
        return (p / 100.0) ** 0.3

    for dim in range(0, min(rows * cols, target_dim)):
        ax = axx[dim]
```

```
        target[-2 * prediction_length :][dim].plot(ax=ax)

        ps_data = [forecast.quantile(p / 100.0)[:,dim] for p in percentiles_sort
        i_p50 = len(percentiles_sorted) // 2

        p50_data = ps_data[i_p50]
        p50_series = pd.Series(data=p50_data, index=forecast.index)
        p50_series.plot(color=color, ls="-", label=f"{label_prefix}median", ax=a

        for i in range(len(percentiles_sorted) // 2):
            ptile = percentiles_sorted[i]
            alpha = alpha_for_percentile(ptile)
            ax.fill_between(
                forecast.index,
                ps_data[i],
                ps_data[-i - 1],
                facecolor=color,
                alpha=alpha,
                interpolate=True,
            )
            # Hack to create labels for the error intervals.
            # Doesn't actually plot anything, because we only pass a single data
            pd.Series(data=p50_data[:1], index=forecast.index[:1]).plot(
                color=color,
                alpha=alpha,
                linewidth=10,
                label=f"{label_prefix}{100 - ptile * 2}%",
                ax=ax,
            )

    legend = ["observations", "median prediction"] + [f"{k}% prediction interval
    axx[0].legend(legend, loc="upper left")

    if fname is not None:
        plt.savefig(fname, bbox_inches='tight', pad_inches=0.05)
```

In [ ]:
```
print(f"Available datasets: {list(dataset_recipes.keys())}")
```

```
Available datasets: ['constant', 'exchange_rate', 'solar-energy', 'electricity',
'traffic', 'exchange_rate_nips', 'electricity_nips', 'traffic_nips', 'solar_nip
s', 'wiki2000_nips', 'wiki-rolling_nips', 'taxi_30min', 'kaggle_web_traffic_with_
missing', 'kaggle_web_traffic_without_missing', 'kaggle_web_traffic_weekly', 'm1_
yearly', 'm1_quarterly', 'm1_monthly', 'nn5_daily_with_missing', 'nn5_daily_witho
ut_missing', 'nn5_weekly', 'tourism_monthly', 'tourism_quarterly', 'tourism_yearl
y', 'cif_2016', 'london_smart_meters_without_missing', 'wind_farms_without_missin
g', 'car_parts_without_missing', 'dominick', 'fred_md', 'pedestrian_counts', 'hos
pital', 'covid_deaths', 'kdd_cup_2018_without_missing', 'weather', 'm3_monthly',
'm3_quarterly', 'm3_yearly', 'm3_other', 'm4_hourly', 'm4_daily', 'm4_weekly', 'm
4_monthly', 'm4_quarterly', 'm4_yearly', 'm5', 'uber_tlc_daily', 'uber_tlc_hourl
y', 'airpassengers', 'australian_electricity_demand', 'electricity_hourly', 'elec
tricity_weekly', 'rideshare_without_missing', 'saugeenday', 'solar_10_minutes',
'solar_weekly', 'sunspot_without_missing', 'temperature_rain_without_missing', 'v
ehicle_trips_without_missing']
```

In [ ]:
```
# exchange_rate_nips, electricity_nips, traffic_nips, solar_nips, wiki-rolling_n
dataset_electricity = get_dataset("electricity_nips", regenerate=False)
```

In [ ]:
```
dataset_electricity.metadata
```

Out[ ]:
```
MetaData(freq='H', target=None, feat_static_cat=[CategoricalFeatureInfo(name='f
eat_static_cat_0', cardinality='370')], feat_static_real=[], feat_dynamic_real=
[], feat_dynamic_cat=[], prediction_length=24)
```

In [ ]:
```
train_grouper_electricity = MultivariateGrouper(max_target_dim=min(2000, int(dat

test_grouper_electricity = MultivariateGrouper(num_test_dates=int(len(dataset_el
                                    max_target_dim=min(2000, int(dataset_electric
```

In [ ]:
```
dataset_train_electricity = train_grouper_electricity(dataset_electricity.train)
dataset_test_electricity = test_grouper_electricity(dataset_electricity.test)
```

In [ ]:
```
scheduler = DEISMultistepScheduler(
    num_train_timesteps=150,
    beta_end=0.1,
)
```

In [ ]:
```
estimator_electricity = TimeGradEstimator(
    input_size=int(dataset_electricity.metadata.feat_static_cat[0].cardinality),
    hidden_size=64,
    num_layers=2,
    dropout_rate=0.1,
    lags_seq=[1],
    scheduler=scheduler,
    num_inference_steps=149,
    prediction_length=dataset_electricity.metadata.prediction_length,
    context_length=dataset_electricity.metadata.prediction_length * 3,
    freq=dataset_electricity.metadata.freq,
    scaling="mean",
    trainer_kwargs=dict(max_epochs=2, accelerator="gpu", devices="1"),
)
```

In [ ]:
```
predictor_electricity = estimator_electricity.train(dataset_train_electricity, n
```

```
GPU available: True (cuda), used: True
TPU available: False, using: 0 TPU cores
HPU available: False, using: 0 HPUs
/home/songzy/anaconda3/envs/py311/lib/python3.11/site-packages/lightning/pytorch/
trainer/configuration_validator.py:70: You defined a `validation_step` but have n
o `val_dataloader`. Skipping val loop.
You are using a CUDA device ('NVIDIA RTX A6000') that has Tensor Cores. To proper
ly utilize them, you should set `torch.set_float32_matmul_precision('medium' | 'h
igh')` which will trade-off precision for performance. For more details, read htt
ps://pytorch.org/docs/stable/generated/torch.set_float32_matmul_precision.html#to
rch.set_float32_matmul_precision
Missing logger folder: /home/songzy/myDL/TimeGrad/timegrad-s4-main/lightning_logs
LOCAL_RANK: 0 - CUDA_VISIBLE_DEVICES: [0,1]

  | Name  | Type          | Params | Mode  | In sizes
| Out sizes
------------------------------------------------------------------------------
------------------------------------------------------------
0 | model | TimeGradModel | 432 K  | train | [[1, 1], [1, 1], [1, 72, 5], [1, 72,
370], [1, 72, 370], [1, 24, 5]] | [1, 100, 24, 370]
------------------------------------------------------------------------------
------------------------------------------------------------
432 K     Trainable params
0         Non-trainable params
432 K     Total params
1.729     Total estimated model params size (MB)
Training: |          | 0/? [00:00<?, ?it/s]
```

```
Epoch 0, global step 50: 'train_loss' reached 0.35117 (best 0.35117), saving mode
l to '/home/songzy/myDL/TimeGrad/timegrad-s4-main/lightning_logs/version_0/checkp
oints/epoch=0-step=50.ckpt' as top 1
Epoch 1, global step 100: 'train_loss' reached 0.10801 (best 0.10801), saving mod
el to '/home/songzy/myDL/TimeGrad/timegrad-s4-main/lightning_logs/version_0/check
points/epoch=1-step=100.ckpt' as top 1
`Trainer.fit` stopped: `max_epochs=2` reached.
```

In [ ]:
```
forecast_it_electricity, ts_it_electricity = make_evaluation_predictions(dataset
                                                 predictor=predictor_electricity
                                                 num_samples=10)
```

In [ ]:
```
forecasts_electricity = list(forecast_it_electricity)
targets_electricity = list(ts_it_electricity)
```

In [ ]:
```
forecasts_electricity
```

Out[ ]:
```
[gluonts.model.forecast.SampleForecast(info=None, item_id=None, samples=array
([[[   38.551365 ,   111.24629  ,    19.173153 , ...,
       177.69583  ,   123.104454 ,    87.3238   ],
    [   71.24024  ,    14.0557785,    42.238007 , ...,
       142.59763  ,   134.72757  ,    58.497005 ],
    [   27.689753 ,    80.02125  ,    47.750633 , ...,
       171.44206  ,   -94.17962  ,    64.9861   ],
    ...,
    [   82.71062  ,   146.94029  ,   122.88683  , ...,
       228.20012  ,   327.46008  ,   114.8938   ],
    [  105.948296 ,   145.93352  ,    88.913376 , ...,
       238.98572  ,   380.29108  ,   115.022385 ],
    [  113.70903  ,   109.75074  ,    62.250103 , ...,
       254.49559  ,   461.2211   ,    91.82055  ]],

   [[  -49.559277 ,   209.77446  ,    84.44827  , ...,
       140.6284   ,   -36.77492  ,    90.54461  ],
    [   88.89584  ,   102.349434 ,    53.88907  , ...,
       569.051    ,   218.94951  ,    47.815784 ],
    [   55.418137 ,    91.43444  ,    52.78603  , ...,
        15.013325 ,   134.08481  ,   -13.477302 ],
    ...,
    [   97.16258  ,   134.67876  ,    63.57168  , ...,
       199.54988  ,   281.73138  ,   126.7778   ],
    [  114.427055 ,   151.16203  ,    84.62577  , ...,
       221.45667  ,   336.2889   ,   117.98814  ],
    [   45.923    ,    75.83209  ,    59.89258  , ...,
      -979.57837  , -1866.586    ,  -216.94424  ]],

   [[   90.08046  ,  -443.05972  ,   257.47156  , ...,
        20.802433 ,  1291.9818   ,  1005.9517   ],
    [  133.53244  ,  1350.249    ,   259.00778  , ...,
       184.22823  ,   250.59413  ,   133.50597  ],
    [   35.35289  ,     8.760716 ,    56.398346 , ...,
     -1584.6827   ,  -715.1039   ,  -401.1591   ],
    ...,
    [   82.98967  ,   121.65596  ,    56.765137 , ...,
       110.19183  ,   191.3271   ,    73.69051  ],
    [  116.06335  ,   111.44777  ,   106.48282  , ...,
       569.56696  ,   791.66785  ,   159.86743  ],
    [  152.55977  ,    59.62127  ,    70.2315   , ...,
       230.2326   ,   411.07654  ,   127.186646 ]],

   ...,

   [[   49.90878  ,    84.478035 ,    39.548244 , ...,
        11.619471 ,   202.55377  ,    56.410408 ],
    [ -175.60532  ,  -221.31834  ,  1243.0088   , ...,
       117.20223  ,   287.39648  ,    62.317425 ],
    [  768.8351   ,  -682.68964  ,   111.63029  , ...,
        90.50825  ,  1679.7604   ,   327.8952   ],
    ...,
    [   77.14852  ,   192.98972  ,    56.1639   , ...,
       137.79916  ,   331.80832  ,    83.31949  ],
    [   82.169    ,   139.79787  ,    69.094574 , ...,
       178.20958  ,   231.45654  ,    85.23568  ],
    [   68.84375  ,   107.60866  ,    52.036354 , ...,
        87.54843  ,   142.23184  ,    75.89718  ]],

   [[  -65.29146  ,    95.15295  ,    21.608772 , ...,
```

```
                    -7.8241434,    92.29102  ,   105.23276  ],
                 [  128.41794  ,    13.350443 ,  -118.882065 , ...,
                   -139.8278   ,    16.810167 ,   151.09415  ],
                 [   61.67759  ,    59.33199  ,    49.86079  , ...,
                    141.92935  ,   143.5138   ,    85.21302  ],
                 ...,
                 [   81.445526 ,   118.094666 ,    63.71279  , ...,
                    102.61211  ,   261.80652  ,    41.596954 ],
                 [   74.71935  ,    80.77579  ,   -84.0094   , ...,
                    85.65069   ,   169.22879  ,    79.472435 ],
                 [  142.34091  , -1239.5497   ,    12.609534 , ...,
                    137.123    ,   330.45914  ,    93.53427  ]],

                [[ -110.62361  ,  -114.08667  ,    16.504593 , ...,
                    30.115425 ,  -306.34     ,  -228.24316  ],
                 [  579.6357   ,   199.86855  ,  -274.00546  , ...,
                    267.0339   ,  4348.246    ,   893.9363   ],
                 [   74.66559  ,   191.82277  ,    90.85225  , ...,
                    76.63056   ,   194.30879  ,    62.420807 ],
                 ...,
                 [  278.65683  ,     7.3973665,    70.01877  , ...,
                    235.3062   ,   363.92917  ,   107.89326  ],
                 [  123.061516 ,   889.4536   ,    39.611126 , ...,
                    318.71225  ,   326.414    ,   -17.951477 ],
                 [  256.91223  ,   637.3754   ,    92.34489  , ...,
                    317.74838  ,   574.08704  ,   196.2275   ]]], dtype=float32), start
_date=Period('2014-09-01 01:00', 'H')),
 gluonts.model.forecast.SampleForecast(info=None, item_id=None, samples=array
([[[ 8.60130463e+01,  8.52307587e+01,  9.25410385e+01, ...,
           4.13234924e+02,  5.83648071e+02,  2.67633209e+02],
         [-9.97829914e+00,  8.03547592e+01,  4.52250900e+01, ...,
           8.84938812e+01,  1.99056206e+01,  5.12989731e+01],
         [-3.23320892e+02, -1.35166443e+02, -2.37577915e+00, ...,
          -1.77043552e+01,  1.77224182e+02,  1.49805517e+01],
         ...,
         [ 2.96019697e+00,  9.89009476e+00, -1.04272490e+01, ...,
           1.58613815e+02,  4.39100403e+02, -3.79528275e+01],
         [ 9.67197647e+01,  1.06140327e+02,  1.04102745e+02, ...,
           2.54959488e+02,  2.66496613e+02,  1.05416534e+02],
         [ 9.68462067e+01,  1.30784454e+02,  7.18152466e+01, ...,
           2.22051056e+02,  2.72238525e+02,  1.07905136e+02]],

        [[ 5.14840775e+01,  1.27869507e+02,  2.09732227e+01, ...,
           1.81629959e+02,  2.43736389e+02,  7.87998352e+01],
         [ 2.04010797e+00,  7.25760803e+01,  1.82957935e+01, ...,
           1.02064575e+02,  1.46880096e+02,  7.91236496e+01],
         [-3.70093536e+02, -4.86760620e+02,  1.97602024e+01, ...,
           9.88839035e+01,  1.16470312e+03, -1.33760168e+03],
         ...,
         [ 6.83595657e+01,  1.31736267e+02,  1.19207611e+02, ...,
           1.78284042e+02,  2.18841339e+02,  9.37747879e+01],
         [ 8.03545303e+01,  4.27039032e+01,  4.33370323e+01, ...,
           1.72146408e+02,  2.51965439e+02,  7.41925735e+01],
         [ 7.86145325e+01,  1.39780167e+02,  7.44652786e+01, ...,
           3.29311829e+02,  7.25454529e+02,  5.75971680e+02]],

        [[ 7.68159637e+01,  6.03310242e+01,  5.95423241e+01, ...,
           4.64030762e+01,  2.59771332e+02,  6.71232529e+01],
         [-1.81888382e+02, -2.42213425e+02, -4.22453728e+01, ...,
          -4.80745239e+02, -8.50274841e+02, -1.40731308e+02],
```

```
          [-8.27778931e+01,  1.45140381e+03, -5.55284607e+02, ...,
            1.89601196e+02,  2.24606354e+02,  1.13908272e+02],
          ...,
          [ 4.97054749e+01,  1.02891731e+02,  8.17177505e+01, ...,
            2.00173981e+02,  2.69489471e+02,  9.35548935e+01],
          [ 4.40765038e+01,  1.11428802e+02,  2.45479851e+01, ...,
           -2.99402256e+01, -2.92785461e+02, -8.95188675e+01],
          [ 7.40529633e+01,  1.35665604e+02,  5.38529243e+01, ...,
            2.82986298e+02,  1.93389175e+02,  9.28958435e+01]],

         ...,

         [[ 4.11130371e+01,  9.33423080e+01,  3.75662384e+01, ...,
            1.11428978e+02, -2.89783051e+02,  4.18109560e+00],
          [ 6.57790146e+01,  1.19468033e+02, -5.65089111e+02, ...,
            1.58999344e+02,  1.50256683e+02,  6.89871902e+01],
          [ 6.66629639e+01,  6.31525879e+01,  3.66028862e+01, ...,
            1.34621689e+02,  2.55965591e+02,  6.68774109e+01],
          ...,
          [ 7.04908905e+01,  7.07947006e+01,  8.14952545e+01, ...,
            9.98973465e+01,  2.09647217e+02,  4.98073235e+01],
          [-6.18964050e+02, -4.47605835e+02,  4.79038095e+00, ...,
           -2.56654129e+01, -1.55597437e+03, -1.10913953e+03],
          [-3.41558075e+02,  5.53900818e+02, -1.63920898e+02, ...,
            1.23845772e+02,  1.49100357e+02,  3.20677368e+02]],

         [[ 8.60728912e+01,  1.58729568e+02,  1.56872818e+02, ...,
            1.56991684e+02,  2.11737228e+02,  5.87358589e+01],
          [ 1.06644119e+02,  9.26198425e+01,  1.02956909e+02, ...,
            1.05689178e+02,  1.75391922e+02,  1.01592400e+02],
          [-2.05730394e-01, -5.02225342e+01,  2.34832191e+01, ...,
            2.82322968e+02,  1.40161499e+02,  1.83088440e+02],
          ...,
          [ 1.12520836e+02, -4.54574203e+00,  1.29677368e+02, ...,
            9.77558365e+01,  6.44507446e+02, -5.03199158e+01],
          [ 1.17343054e+03, -1.52895593e+03,  6.26665466e+02, ...,
            4.54805115e+02,  7.14898254e+02,  2.33717432e+03],
          [ 5.49052238e+01,  1.18151604e+02,  5.18619232e+01, ...,
            1.52813675e+02,  2.23158615e+02,  8.58576050e+01]],

         [[ 5.58392715e+01,  2.91719452e+02, -2.78742645e+02, ...,
            1.43476059e+02,  3.02949463e+02,  8.56363525e+01],
          [ 9.06162109e+01,  1.63876770e+02,  3.92363091e+01, ...,
            1.26597443e+02, -1.35869080e+02, -1.25982162e+02],
          [-2.63166199e+02, -7.02765564e+02, -1.33219040e+02, ...,
            2.78610565e+02,  5.43437157e+01,  1.42689163e+02],
          ...,
          [ 8.17373596e+02,  8.97331543e+02,  6.72444031e+02, ...,
            3.45331360e+02,  5.59174988e+02,  2.20916733e+02],
          [-1.78978491e+00,  3.37064270e+02,  5.77814026e+01, ...,
            1.75980621e+02,  2.14418060e+02,  1.45272034e+02],
          [ 9.02078323e+01,  1.18185295e+02,  7.07394714e+01, ...,
            1.74991760e+02,  2.24432449e+02,  1.08168098e+02]]],
        dtype=float32), start_date=Period('2014-09-02 01:00', 'H')),
 gluonts.model.forecast.SampleForecast(info=None, item_id=None, samples=array
([[[-1.19637619e+02,  5.31033859e+01, -2.63013291e+00, ...,
            1.98963959e+02, -1.90562103e+02, -3.44593842e+02],
          [ 6.06352501e+01,  8.56594467e+01,  4.77128258e+01, ...,
            1.67906982e+02, -3.59909210e+02,  8.44184418e+01],
          [ 6.86017532e+01,  8.05380707e+01,  4.93472328e+01, ...,
```

```
   7.52250366e+01,  1.60431274e+02,  3.83123093e+01],
 ...,
 [ 6.04396629e+01,  5.47485542e+01,  5.15349197e+01, ...,
   1.56180603e+02,  1.85440414e+02,  8.41095200e+01],
 [ 5.56689186e+01,  1.28244843e+02,  6.48853531e+01, ...,
   1.98603821e+02,  3.32927155e+02,  9.20502472e+01],
 [ 9.74806442e+01,  1.50587601e+02,  7.45084381e+01, ...,
   2.43007431e+02,  1.95680817e+02,  1.08576187e+02]],

[[ 6.18475952e+01,  1.07183296e+02,  6.06938057e+01, ...,
   1.53018616e+02,  2.92010223e+02,  8.92503128e+01],
 [-3.76064545e+02, -2.99416046e+02, -4.75846672e+01, ...,
   4.41822461e+03,  1.08634155e+03, -2.38808151e+02],
 [ 6.42709274e+01, -1.87494850e+01,  3.69584045e+01, ...,
   1.32167786e+02,  1.98560608e+02,  8.48542252e+01],
 ...,
 [ 1.79125118e+01, -4.01042627e+03, -2.49685638e+02, ...,
   2.60665131e+02, -4.98132849e+00,  2.97236542e+02],
 [ 3.22064896e+01,  1.39057922e+02,  5.84977989e+01, ...,
   1.17954132e+02,  2.18419678e+02,  9.06516495e+01],
 [ 6.60930023e+01,  1.30620468e+02,  4.75562248e+01, ...,
   9.25393295e+01,  2.20726379e+02,  7.79615784e+01]],

[[-2.41766907e+02,  4.28680420e+01,  5.35578308e+01, ...,
   8.61593872e+02, -4.49315137e+03,  1.29324756e+03],
 [ 6.63197021e+01,  6.64800339e+01,  5.53933182e+01, ...,
  -8.36196289e+02, -3.08051807e+03,  4.37277107e+01],
 [ 4.23811760e+01,  1.15583168e+02,  6.81196823e+01, ...,
   9.22418518e+01,  1.92067139e+02,  1.04096649e+02],
 ...,
 [ 2.07319202e+01,  1.07923416e+02,  5.39245262e+01, ...,
  -9.43164124e+02,  2.96996606e+03,  2.52793961e+01],
 [ 1.39932671e+01,  5.07914257e+00,  4.51234016e+01, ...,
   1.31218628e+02,  2.12436646e+02,  9.04298401e+01],
 [ 8.99135132e+01,  1.18352257e+02,  6.27324829e+01, ...,
   1.93187729e+02,  2.53743500e+02,  1.04031967e+02]],

...,

[[ 7.28397980e+01,  9.39336014e+01,  7.33360214e+01, ...,
   1.79811462e+02,  2.90418030e+02,  1.07664627e+02],
 [ 6.62413177e+01,  1.28354996e+02,  6.06288414e+01, ...,
   1.87876480e+02,  2.77217102e+02,  6.74655685e+01],
 [ 5.38859100e+01,  1.05948814e+02,  3.79313431e+01, ...,
   9.04336166e+01,  1.57214005e+02,  3.83639984e+01],
 ...,
 [ 8.05389465e+02,  5.65527916e+01,  1.21660652e+02, ...,
  -5.71828430e+02, -5.87259155e+02, -6.11866516e+02],
 [ 5.34942398e+01,  4.28727493e+01, -4.37328529e+00, ...,
   1.23038733e+03,  3.42654938e+02, -3.09888947e+02],
 [ 6.71889496e+01,  1.05677223e+02,  5.53495941e+01, ...,
   1.23228920e+02,  1.04204742e+02,  6.64053116e+01]],

[[-1.03071350e+02,  2.95760231e+01,  5.41364670e+01, ...,
   1.53724838e+02,  6.79984924e+02, -3.74976959e+02],
 [ 4.50318832e+01,  5.33350677e+01,  4.56245270e+01, ...,
   9.47309113e+01,  1.71808075e+02,  3.47678909e+01],
 [ 7.44162292e+01,  9.72071457e+01,  6.26670303e+01, ...,
   2.10047474e+01,  1.34992081e+02,  9.32501678e+01],
 ...,
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                [ 4.68311348e+01,  8.69571609e+01,  3.18558826e+01, ...,
                  5.48825722e+01,  2.60901825e+02,  7.76512833e+01],
                [ 1.13849663e+02, -1.83009262e+02,  6.28094063e+01, ...,
                  5.39310913e+01,  3.52107849e+02,  1.06972023e+02],
                [ 7.76669312e+01,  1.00694733e+02,  6.73981094e+01, ...,
                  1.00547661e+02,  1.97394226e+02,  8.45118103e+01]],

               [[ 5.63296967e+01,  4.58520737e+01,  5.16066170e+01, ...,
                  1.03956619e+02,  1.93574829e+02,  7.36835938e+01],
                [ 7.26054764e+01,  1.41107101e+02,  6.59917450e+01, ...,
                  1.58335632e+02,  2.52893784e+02,  8.83612366e+01],
                [-3.36957306e+02,  8.43095932e+01,  4.70291758e+00, ...,
                  1.74181004e+01, -1.13745142e+03, -6.21080139e+02],
                ...,
                [ 1.46818329e+02, -1.03391321e+03, -1.27453552e+03, ...,
                  1.31696136e+02,  2.43566238e+02,  9.14415131e+01],
                [ 1.09772110e+02,  1.59846558e+02,  1.05803017e+02, ...,
                  1.47033783e+02,  2.21096390e+02,  9.60493393e+01],
                [ 5.87365303e+01,  1.43618317e+02,  3.23436089e+01, ...,
                  1.31750656e+02, -2.22945290e+01,  8.43796005e+01]]],
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       gluonts.model.forecast.SampleForecast(info=None, item_id=None, samples=array
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                [ 7.22448730e+01,  1.22544525e+02,  6.43328552e+01, ...,
                  1.01322998e+02,  1.90492889e+02,  1.11904488e+02],
                [-1.86970158e+01, -1.32588348e+02, -5.40019958e+02, ...,
                  1.16622406e+02,  4.60666580e+01, -4.67940674e+02],
                ...,
                [ 8.80477524e+01,  1.17579582e+02,  1.82460754e+02, ...,
                  2.05137787e+02,  3.40432739e+02,  1.28953491e+02],
                [ 9.46836166e+01,  1.34240891e+02,  7.96671524e+01, ...,
                  1.89945297e+02,  2.94276703e+02,  1.20668419e+02],
                [ 6.93696136e+01,  1.23856598e+02,  8.17917252e+01, ...,
                  4.03189111e+03,  1.72673615e+02, -3.84184532e+01]],

               [[-1.09571707e+00,  5.31485939e+01, -4.79226646e+01, ...,
                  8.42280731e+01,  1.69215668e+02,  6.17921944e+01],
                [ 2.21417255e+01,  9.72157516e+01,  5.98918343e+01, ...,
                  1.24860413e+02,  2.27241196e+02,  8.97158051e+01],
                [ 2.53087036e+03,  5.03378220e+01,  8.95748825e+01, ...,
                  7.54653076e+02, -8.31008179e+02,  1.34115271e+03],
                ...,
                [ 8.65990677e+01, -2.36228088e+02,  2.98148102e+02, ...,
                  1.87067795e+02,  2.52815277e+02,  1.07340401e+02],
                [ 1.24358711e+01, -6.90476532e+01,  2.02305984e+01, ...,
                  3.12782192e+01, -7.97002125e+00,  7.24350815e+01],
                [ 9.59304047e+01,  1.16407745e+02,  6.36826706e+01, ...,
                  1.44652237e+02,  1.05926262e+02,  9.01277771e+01]],

               [[ 8.99803352e+00,  6.77729874e+01,  4.28448982e+01, ...,
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                [ 1.98486115e+02,  1.38271347e+02,  5.33716011e+01, ...,
                  1.72591965e+02,  2.43019104e+02,  1.97082672e+02],
                [ 9.32918091e+01,  1.20276657e+02,  1.01736763e+02, ...,
                  1.24963081e+02, -8.89126587e+01,  1.66116543e+01],
                ...,
                [ 9.19677277e+01,  1.80170105e+02,  8.26169586e+01, ...,
                  2.32125793e+02,  2.81955750e+02,  1.22245613e+02],
                [ 7.07445068e+01,  1.27654884e+02,  6.03300018e+01, ...,
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         3.44231453e+01,  1.70314728e+02,  5.89927673e+01],
        [ 1.12123276e+02,  2.98123871e+02,  1.27426575e+02, ...,
         2.48435455e+02,  1.16615974e+02,  8.21492462e+01]],

       ...,

       [[-1.35311325e+02, -2.39300391e+03,  1.27991626e+03, ...,
         1.24944542e+02,  1.60307571e+02,  3.71619873e+01],
        [ 5.11507378e+01,  8.13564682e+01,  5.08550301e+01, ...,
         9.08909683e+01,  1.93353561e+02,  2.99275837e+01],
        [ 4.76754875e+01,  1.02970398e+02,  3.59400368e+01, ...,
         1.07455460e+02,  1.81595444e+02,  8.23902359e+01],
        ...,
        [ 6.57681961e+01,  1.67195786e+02,  1.00345055e+02, ...,
         2.31906372e+02,  4.43777496e+02,  1.27281700e+02],
        [-5.69372986e+02, -1.42132556e+03, -1.94603790e+02, ...,
         -3.72415588e+02, -1.06595691e+03, -8.50914841e+01],
        [ 7.58078156e+01,  1.16801338e+02,  5.88129425e+01, ...,
         1.98878479e+02,  3.02178497e+02,  8.54755402e+01]],

       [[-1.50540939e+02,  6.39556160e+01,  3.54279785e+01, ...,
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        [ 4.49818420e+01,  1.54530746e+02, -3.85186493e+02, ...,
         -1.54707654e+03,  7.60651733e+02,  1.17913048e+02],
        [ 3.13286705e+01,  3.79321327e+01,  1.04225159e+01, ...,
         1.32446716e+02,  1.88188751e+02,  6.79997025e+01],
        ...,
        [-1.48518417e+02,  2.21315659e+02,  5.52327919e+01, ...,
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        [ 4.30542633e+02,  9.01789570e+00,  7.01444778e+01, ...,
         1.63239807e+02,  9.71201019e+01,  8.78782471e+02],
        [-3.47455444e+01,  1.64854393e+01,  5.04546967e+01, ...,
         3.03693695e+01, -5.60543091e+02, -2.70609650e+02]],

       [[ 1.25293076e+02, -4.52550018e+02,  7.63605530e+02, ...,
         3.19654903e+01,  1.90206589e+02,  1.06948593e+02],
        [ 8.48515015e+01,  1.67192322e+02,  5.19626579e+01, ...,
         -3.72304962e+02, -4.65825310e+01, -4.32230415e+01],
        [ 1.25080849e+02,  1.47905685e+02,  1.12871475e+02, ...,
         1.21584724e+02,  3.07854248e+02,  5.23027573e+01],
        ...,
        [ 1.33957458e+02,  1.41380157e+02,  1.43071808e+02, ...,
         2.07424210e+02,  3.83438660e+02,  1.50634354e+02],
        [ 6.84636002e+01,  1.51216019e+02,  6.59160233e+01, ...,
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        [ 5.12419777e+01,  6.38315811e+01,  3.24460487e+01, ...,
         1.21941483e+02,  1.69435440e+02,  5.79534798e+01]]],
      dtype=float32), start_date=Period('2014-09-04 01:00', 'H')),
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        [ 5.32332420e+01,  1.09343681e+02,  3.04015083e+01, ...,
         1.52033142e+02,  1.63918228e+02,  7.98911133e+01],
        [ 1.93570084e+02,  2.17516525e+02,  5.67597275e+01, ...,
         3.37251015e+01, -2.96784393e+02, -4.94580170e+02],
        ...,
        [ 1.07383797e+02,  2.12959076e+02,  1.35675690e+02, ...,
         1.75353149e+02,  3.26020294e+02,  1.20313660e+02],
        [ 9.75362701e+01, -3.31068909e+02,  6.72797546e+01, ...,
         1.11491600e+02,  2.46788132e+02,  1.08428070e+02],
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 [ 2.11640739e+01, -1.64507584e+02,  1.92677855e+00, ...,
   1.26155823e+02,  9.26379852e+01,  7.57375183e+01]],

[[ 2.28016090e+01,  1.00334282e+02,  4.36055069e+01, ...,
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 [ 5.01622391e+01,  1.15581116e+02,  2.40064468e+01, ...,
   1.32781662e+02,  9.45662537e+01,  7.02245483e+01],
 [-1.37168640e+02,  3.98019012e+02,  4.85788803e+01, ...,
   3.15964325e+02, -2.40131812e+03, -2.34749609e+03],
 ...,
 [-1.96401005e+01,  6.72653198e+01,  3.46948318e+01, ...,
  -4.92001038e+02, -9.26141907e+02, -6.30363121e+01],
 [ 8.65601273e+01,  1.52511642e+02,  6.36746292e+01, ...,
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 [ 8.06215973e+01,  1.23894867e+02,  4.71606865e+01, ...,
   2.06035583e+02,  1.86336960e+02,  1.00744514e+02]],

[[ 8.02607422e+01,  9.03514862e+01, -3.99100037e+01, ...,
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 [ 5.21537857e+01,  8.83076553e+01,  4.69046822e+01, ...,
   5.43075104e+01, -5.05309814e+02,  1.06275070e+02],
 [ 7.83177490e+01,  1.46580322e+02, -2.86715832e+01, ...,
   2.80705811e+02,  7.23165588e+02, -4.28716087e+00],
 ...,
 [ 6.13493767e+01,  1.40509140e+02,  5.67123909e+01, ...,
   1.83075378e+02,  2.29898712e+02,  1.03562576e+02],
 [ 6.05173874e+01,  1.07510353e+02,  6.82090302e+01, ...,
   7.39982300e+01,  1.89395599e+02,  6.27780228e+01],
 [-1.89275345e+02,  4.47545074e+02,  1.51334213e+02, ...,
   1.38346071e+01,  1.25603284e+03, -9.78447571e+02]],

...,

[[-9.18494225e+00,  2.96684875e+01, -5.02618217e+01, ...,
  -1.04944305e+02, -3.65746362e+03, -2.46637695e+03],
 [ 9.83682861e+01,  1.13874146e+02, -1.70408295e+02, ...,
   1.36777679e+02,  1.47240021e+02,  7.27619324e+01],
 [ 6.59044418e+01,  1.43268280e+02,  4.80940399e+01, ...,
   6.55810928e+01,  1.74777344e+02,  3.58958511e+01],
 ...,
 [-2.06181625e+02, -1.77955719e+02, -3.10903137e+02, ...,
   2.66862888e+01,  3.24132767e+01, -9.21440201e+01],
 [-1.58827332e+02,  1.11321388e+02,  3.26586571e+01, ...,
   1.45032425e+02,  1.25105576e+02,  1.03445641e+02],
 [ 5.74621582e+01,  6.07206993e+01,  4.49774437e+01, ...,
   5.16834473e+02, -6.82398438e+02,  8.93407059e+01]],

[[ 7.25596848e+01,  8.63385849e+01,  5.89979973e+01, ...,
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 [-1.55198412e+01, -1.72085510e+02,  2.25908494e+00, ...,
   8.94018097e+01,  1.43531265e+02,  3.20110779e+01],
 [ 7.38552322e+01,  1.24885597e+02,  5.98837967e+01, ...,
   1.52348129e+02,  3.24946594e+02,  9.71594391e+01],
 ...,
 [ 1.17728706e+02,  1.67576828e+02,  1.14275024e+02, ...,
   6.50585571e+02,  1.15187964e+03,  1.52884003e+02],
 [ 8.34625397e+01,  1.82795517e+02,  8.44632721e+01, ...,
   2.08309555e+02,  3.35117828e+02,  1.16122597e+02],
 [ 8.83973541e+01,  1.09004402e+02,  8.06662979e+01, ...,
   2.09169052e+02,  3.09215515e+02,  1.26952400e+02]],
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          [[-2.88516750e+01,  1.42154093e+01,  5.20681190e+01, ...,
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           [-1.95906563e+01, -1.38667282e+02,  8.77657089e+01, ...,
             6.64415970e+01,  1.59903381e+02,  8.44077301e+00],
           [ 8.02729492e+01,  8.45813599e+01,  1.22239990e+01, ...,
             1.52409744e+02,  1.67478348e+02,  6.47064972e+01],
           ...,
           [ 4.77472496e+01,  1.16872673e+02,  4.90568581e+01, ...,
             7.78505173e+01,  1.53104218e+02, -6.65278625e+01],
           [ 2.38294392e+01,  1.23186119e+02,  6.39085388e+01, ...,
             1.72915512e+02,  2.33990143e+02,  1.27712105e+02],
           [-3.40986481e+01,  1.32188568e+02,  1.78704849e+02, ...,
             1.52152756e+02,  2.01864182e+02,  1.16834763e+02]]],
      dtype=float32), start_date=Period('2014-09-05 01:00', 'H')),
 gluonts.model.forecast.SampleForecast(info=None, item_id=None, samples=array
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           [ 8.30514603e+01,  1.33152832e+02,  3.46493111e+01, ...,
             2.46122055e+02,  2.87736908e+02,  8.61505203e+01],
           [ 5.78045998e+01,  1.28654678e+02,  5.39568176e+01, ...,
             1.58208450e+02,  1.94891327e+02,  1.06778603e+02],
           ...,
           [-6.66392136e+01,  4.19150574e+02,  3.24715996e+01, ...,
             4.97993050e+01, -4.03576874e+02, -2.56653442e+02],
           [ 8.46714172e+01, -2.54092499e+02, -6.97911743e+02, ...,
             2.67460596e+03,  7.50584290e+02,  1.43042892e+02],
           [ 6.14984741e+01,  7.46657562e+01,  6.24065018e+01, ...,
             1.39743805e+02,  2.00632385e+02,  7.71728821e+01]],

          [[ 8.26811295e+01,  2.40705994e+02,  9.31993179e+01, ...,
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           [-6.52774536e+02, -2.32350601e+02,  6.49644470e+01, ...,
             1.75945526e+02, -9.70730164e+02, -1.72358673e+02],
           [ 5.99704208e+01,  1.20355621e+02,  3.83029060e+01, ...,
             1.28912735e+02,  1.75272247e+02,  8.14037933e+01],
           ...,
           [ 9.43069992e+01,  1.59901520e+02,  8.17184448e+01, ...,
             2.46430420e+02,  6.61487793e+02,  2.08677750e+01],
           [ 7.43020020e+01,  1.46141708e+02,  5.76209755e+01, ...,
             2.15510056e+02,  2.53060806e+02,  8.59974136e+01],
           [ 2.37724341e+03,  2.24329980e+03,  1.27320679e+02, ...,
             4.45830719e+02, -1.22049599e+02,  9.98660278e+02]],

          [[ 5.71359673e+01,  1.28352402e+02,  4.85843430e+01, ...,
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           [-2.84882568e+02,  1.99306534e+02,  1.86928482e+01, ...,
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           [ 8.46408539e+01,  7.13463821e+01,  9.35499496e+01, ...,
             2.02203796e+02,  1.27484818e+02,  4.60090828e+01],
           ...,
           [ 2.46968517e+01,  6.34042358e+02,  2.86178864e+02, ...,
             1.17444238e+03,  1.64107239e+03,  1.26882172e+02],
           [ 8.48119278e+01,  1.18103859e+02,  5.36421280e+01, ...,
             2.03205032e+02,  2.94423309e+02,  1.05218857e+02],
           [ 3.77387909e+02,  5.12311646e+02,  7.84313782e+02, ...,
             2.72322296e+02,  4.35289093e+02,  2.46281540e+02]],

          ...,
```

```
        [[ 3.42990456e+01,  2.18382950e+02,  6.35999680e+01, ...,
           1.67726135e+02,  1.26824402e+02,  1.84806305e+02],
         [ 2.02573228e+00, -7.40213623e+01, -1.48113312e+02, ...,
           1.04968887e+02, -2.82492554e+02,  3.46765556e+01],
         [ 6.01110840e+01,  2.27703915e+01,  5.36697578e+01, ...,
           1.31793243e+02,  1.01490265e+02,  5.61360550e+01],
         ...,
         [ 6.97393799e+01,  1.46192627e+02,  5.23659401e+01, ...,
           5.06278076e+01,  2.41595367e+02,  1.13765671e+02],
         [ 8.82311153e+00,  1.13788612e+02,  5.23509293e+01, ...,
           2.03688873e+02,  8.77914276e+01, -1.84431973e+01],
         [ 6.59108200e+01,  1.42982986e+02,  7.32344818e+01, ...,
           1.78793915e+02,  2.39747299e+02,  9.89646912e+01]],

        [[ 9.11918182e+01,  1.19074532e+02,  7.10218353e+01, ...,
           6.63393497e+00,  2.07074661e+02,  7.05539932e+01],
         [ 8.09573059e+01,  1.26667534e+02,  8.06121292e+01, ...,
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         [ 5.68081245e+01,  5.58554382e+01,  6.19186249e+01, ...,
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         ...,
         [ 1.21809273e+02,  1.23152435e+02,  1.29529526e+02, ...,
           1.56156799e+02,  5.04075241e+01,  9.78366470e+01],
         [ 1.87633224e+02,  1.08454697e+02,  8.17778320e+01, ...,
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         [ 5.28853699e+02, -4.07195984e+02,  1.72815491e+02, ...,
           1.56665222e+02,  3.14960754e+02,  1.01275688e+02]],

        [[-4.97653351e+02,  9.62284851e+01, -1.15085732e+02, ...,
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         [ 8.62449188e+01,  1.53499207e+02,  3.16302853e+01, ...,
           1.33148331e+02,  2.36442871e+02,  7.62206268e+01],
         ...,
         [-7.06474854e+02, -2.12399483e+01,  3.03652134e+01, ...,
           1.27577751e+02, -8.89087708e+02, -3.02701172e+02],
         [ 6.68762436e+01,  1.02178909e+02,  8.74742813e+01, ...,
          -1.18081924e+02, -4.16255585e+02,  3.47756882e+01],
         [ 3.97565422e+01,  1.48813232e+02,  4.02800827e+01, ...,
           1.59650757e+02,  2.23697464e+02,  1.19903564e+02]]],
       dtype=float32), start_date=Period('2014-09-06 01:00', 'H')),
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     [   23.001877 ,   116.79183  ,    52.91531  , ...,
       113.753975 ,   210.79121  ,    87.73596  ],
     [  142.84993  ,   154.05518  ,  -579.41895  , ...,
       202.38391  ,   202.5709   ,   100.146706 ],
     ...,
     [  102.835266 ,   144.78186  ,    99.861305 , ...,
       273.0172   ,  -667.3671   ,   200.76366  ],
     [   25.442526 ,  -301.39243  ,    63.343372 , ...,
       187.99942  ,   227.3151   ,   112.10818  ],
     [   81.56659  ,   118.25224  ,    54.763184 , ...,
        76.22309  ,    54.13546  ,    42.00912  ]],

    [[  728.80725  ,   764.9208   ,   152.62483  , ...,
      2128.504    ,   896.7481   ,    77.43048  ],
     [   75.48465  ,  -580.0862   ,    35.54671  , ...,
```

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  ...,
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     155.07722  ,   307.53897  ,    88.16471  ],
  [   74.29072  ,   113.72577  ,    68.33266  , ...,
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  [   93.53656  ,   139.17668  ,    73.98341  , ...,
     65.88468   ,   150.24995  ,    49.659378 ]],

 [[   66.97131  ,   102.19946  ,    63.01602  , ...,
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  [  123.474205 ,   382.87027  ,   298.5664   , ...,
    177.49753  ,   237.17635  ,   102.804504 ],
  [   22.043045 ,    10.221168 ,    40.90042  , ...,
     -8.523148 ,    77.26122  ,    35.59547  ],
  ...,
  [  -16.315022 ,  -614.10974  ,   -28.03736  , ...,
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  [  123.282814 ,   176.01454  ,    87.46065  , ...,
    191.81175  ,   226.39238  ,   100.551155 ],
  [   96.20263  ,   240.01796  ,   103.34623  , ...,
    105.85942  ,   228.10483  ,    77.92109  ]],

 ...,

 [[   75.11091  ,    93.42408  ,    58.251156 , ...,
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  [   71.58671  ,   119.55731  ,    82.27895  , ...,
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  ...,
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 [[ -478.03854  ,  -439.29333  ,    18.702055 , ...,
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  [ -121.310844 ,    90.08152  ,    65.68001  , ...,
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  [ -142.07268  ,   479.03876  ,   202.8121   , ...,
    298.58862  ,   220.95982  ,    90.24168  ],
  ...,
  [  122.2451   ,   135.88306  ,    90.34967  , ...,
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  [  110.31354  ,   149.20355  ,    82.748436 , ...,
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  [  129.9907   ,   233.25752  ,   180.76344  , ...,
   -918.01666  ,   357.3216   ,   103.918884 ]],

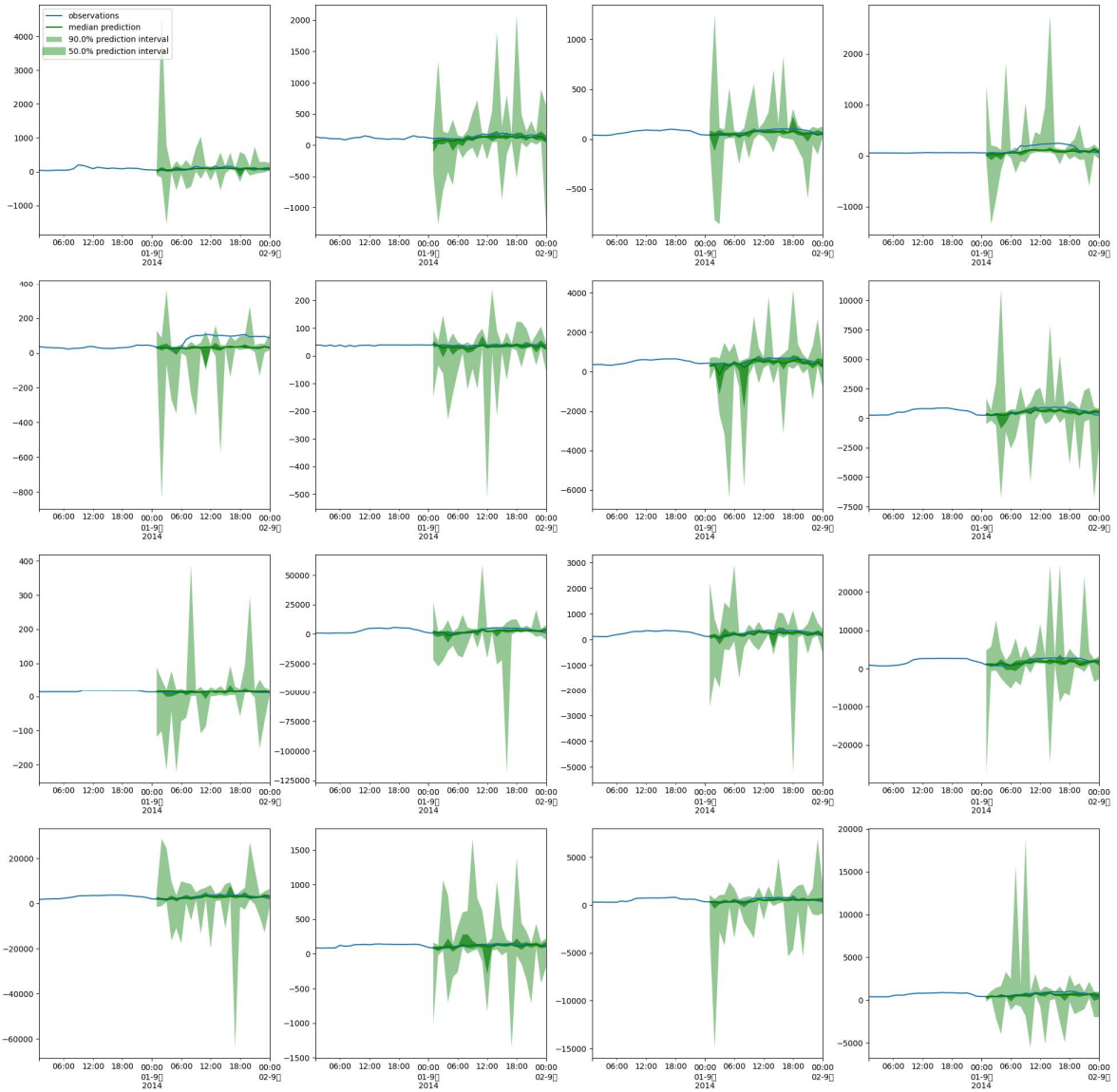
 [[   71.529625 ,   170.75381  ,    75.87255  , ...,
    110.03388  ,   226.25462  ,    71.60789  ],
  [  127.37774  ,   281.4887   ,  -395.12933  , ...,
    131.94681  ,   228.74574  ,    18.813631 ],
  [  -56.75653  ,    61.24371  ,    27.499247 , ...,
```

```
           -24.768785 ,  -767.61774  ,  -164.18236  ],
       ...,
       [   17.52874  ,   105.37601  ,    55.581535 , ...,
          135.11247  ,   218.73326  ,    81.759384 ],
       [   56.641933 ,   101.663536 ,    81.2428   , ...,
          156.59077  ,   161.18799  ,    87.88942  ],
       [-2191.6003   ,   579.89105  ,    49.780865 , ...,
          -75.56138  ,   546.36993  ,  -216.6977   ]]], dtype=float32), start
_date=Period('2014-09-07 01:00', 'H'))]
```

In [ ]:
```
print("Electricity")

plot(
    target=targets_electricity[0],
    forecast=forecasts_electricity[0],
    prediction_length=dataset_electricity.metadata.prediction_length,
)
plt.show()
```

```
Electricity
/home/songzy/anaconda3/envs/py311/lib/python3.11/site-packages/IPython/core/pylab
tools.py:170: UserWarning: Glyph 26376 (\N{CJK UNIFIED IDEOGRAPH-6708}) missing f
rom font(s) DejaVu Sans.
  fig.canvas.print_figure(bytes_io, **kw)
```



In [ ]:
```
evaluator = MultivariateEvaluator(quantiles=(np.arange(20)/20.0)[1:],
                                  target_agg_funcs={'sum': np.sum})
```

In [ ]:
```
agg_metric_electricity, item_metrics_electricity = evaluator(targets_electricity
```

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Running evaluation: 7it [00:00, 92.78it/s]
Running evaluation: 7it [00:00, 122.81it/s]
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Running evaluation: 7it [00:00, 130.85it/s]
Running evaluation: 7it [00:00, 132.59it/s]
Running evaluation: 7it [00:00, 131.28it/s]
Running evaluation: 7it [00:00, 131.35it/s]
Running evaluation: 7it [00:00, 132.70it/s]
Running evaluation: 7it [00:00, 132.02it/s]
Running evaluation: 7it [00:00, 132.98it/s]
Running evaluation: 7it [00:00, 132.82it/s]
Running evaluation: 7it [00:00, 133.83it/s]
Running evaluation: 7it [00:00, 131.60it/s]
Running evaluation: 7it [00:00, 132.66it/s]
Running evaluation: 7it [00:00, 133.61it/s]
```

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Running evaluation: 7it [00:00, 132.96it/s]
Running evaluation: 7it [00:00, 133.88it/s]
Running evaluation: 7it [00:00, 132.10it/s]
Running evaluation: 7it [00:00, 130.21it/s]
Running evaluation: 7it [00:00, 132.36it/s]
Running evaluation: 7it [00:00, 131.49it/s]
Running evaluation: 7it [00:00, 133.79it/s]
Running evaluation: 7it [00:00, 132.08it/s]
Running evaluation: 7it [00:00, 134.33it/s]
Running evaluation: 7it [00:00, 133.14it/s]
Running evaluation: 7it [00:00, 133.17it/s]
Running evaluation: 7it [00:00, 132.33it/s]
Running evaluation: 7it [00:00, 132.16it/s]
Running evaluation: 7it [00:00, 132.15it/s]
Running evaluation: 7it [00:00, 133.26it/s]
Running evaluation: 7it [00:00, 133.85it/s]
Running evaluation: 7it [00:00, 132.55it/s]
Running evaluation: 7it [00:00, 132.54it/s]
Running evaluation: 7it [00:00, 133.12it/s]
Running evaluation: 7it [00:00, 131.29it/s]
Running evaluation: 7it [00:00, 133.46it/s]
Running evaluation: 7it [00:00, 132.99it/s]
Running evaluation: 7it [00:00, 133.97it/s]
Running evaluation: 7it [00:00, 131.34it/s]
Running evaluation: 7it [00:00, 132.29it/s]
Running evaluation: 7it [00:00, 132.54it/s]
Running evaluation: 7it [00:00, 131.14it/s]
Running evaluation: 7it [00:00, 132.23it/s]
Running evaluation: 7it [00:00, 130.98it/s]
Running evaluation: 7it [00:00, 133.78it/s]
Running evaluation: 7it [00:00, 133.80it/s]
Running evaluation: 7it [00:00, 132.94it/s]
Running evaluation: 7it [00:00, 133.42it/s]
Running evaluation: 7it [00:00, 132.82it/s]
Running evaluation: 7it [00:00, 133.39it/s]
Running evaluation: 7it [00:00, 132.53it/s]
Running evaluation: 7it [00:00, 133.03it/s]
Running evaluation: 7it [00:00, 133.52it/s]
Running evaluation: 7it [00:00, 131.03it/s]
Running evaluation: 7it [00:00, 132.47it/s]
Running evaluation: 7it [00:00, 130.28it/s]
Running evaluation: 7it [00:00, 131.38it/s]
Running evaluation: 7it [00:00, 130.15it/s]
Running evaluation: 7it [00:00, 133.78it/s]
Running evaluation: 7it [00:00, 133.01it/s]
Running evaluation: 7it [00:00, 128.56it/s]
Running evaluation: 7it [00:00, 130.41it/s]
Running evaluation: 7it [00:00, 131.14it/s]
Running evaluation: 7it [00:00, 133.11it/s]
Running evaluation: 7it [00:00, 134.30it/s]
Running evaluation: 7it [00:00, 132.42it/s]
Running evaluation: 7it [00:00, 131.88it/s]
Running evaluation: 7it [00:00, 129.33it/s]
Running evaluation: 7it [00:00, 131.58it/s]
Running evaluation: 7it [00:00, 129.79it/s]
Running evaluation: 7it [00:00, 131.00it/s]
Running evaluation: 7it [00:00, 133.05it/s]
Running evaluation: 7it [00:00, 130.82it/s]
Running evaluation: 7it [00:00, 132.01it/s]
Running evaluation: 7it [00:00, 132.73it/s]
```

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Running evaluation: 7it [00:00, 132.87it/s]
Running evaluation: 7it [00:00, 132.12it/s]
Running evaluation: 7it [00:00, 133.73it/s]
Running evaluation: 7it [00:00, 130.76it/s]
Running evaluation: 7it [00:00, 132.30it/s]
Running evaluation: 7it [00:00, 19.56it/s]
Running evaluation: 7it [00:00, 132.82it/s]
Running evaluation: 7it [00:00, 133.24it/s]
Running evaluation: 7it [00:00, 133.84it/s]
Running evaluation: 7it [00:00, 131.64it/s]
Running evaluation: 7it [00:00, 133.39it/s]
Running evaluation: 7it [00:00, 133.26it/s]
Running evaluation: 7it [00:00, 132.41it/s]
Running evaluation: 7it [00:00, 131.56it/s]
Running evaluation: 7it [00:00, 133.54it/s]
Running evaluation: 7it [00:00, 132.48it/s]
Running evaluation: 7it [00:00, 133.13it/s]
Running evaluation: 7it [00:00, 132.39it/s]
Running evaluation: 7it [00:00, 132.44it/s]
Running evaluation: 7it [00:00, 134.18it/s]
Running evaluation: 7it [00:00, 134.79it/s]
Running evaluation: 7it [00:00, 134.79it/s]
Running evaluation: 7it [00:00, 134.56it/s]
/home/songzy/anaconda3/envs/py311/lib/python3.11/site-packages/pandas/core/dtype
s/astype.py:170: UserWarning: Warning: converting a masked element to nan.
  return arr.astype(dtype, copy=True)
/home/songzy/anaconda3/envs/py311/lib/python3.11/site-packages/gluonts/evaluatio
n/_base.py:531: RuntimeWarning: divide by zero encountered in scalar divide
  totals["NRMSE"] = totals["RMSE"] / totals["abs_target_mean"]
/home/songzy/anaconda3/envs/py311/lib/python3.11/site-packages/gluonts/evaluatio
n/_base.py:532: RuntimeWarning: divide by zero encountered in scalar divide
  totals["ND"] = totals["abs_error"] / totals["abs_target_sum"]
/home/songzy/anaconda3/envs/py311/lib/python3.11/site-packages/gluonts/evaluatio
n/_base.py:536: RuntimeWarning: divide by zero encountered in scalar divide
  totals[f"QuantileLoss[{quantile}]"] / totals["abs_target_sum"]
Running evaluation: 7it [00:00, 125.83it/s]
Running evaluation: 7it [00:00, 132.31it/s]
Running evaluation: 7it [00:00, 129.85it/s]
Running evaluation: 7it [00:00, 131.62it/s]
Running evaluation: 7it [00:00, 132.90it/s]
Running evaluation: 7it [00:00, 129.17it/s]
Running evaluation: 7it [00:00, 132.55it/s]
Running evaluation: 7it [00:00, 132.66it/s]
Running evaluation: 7it [00:00, 131.29it/s]
Running evaluation: 7it [00:00, 131.87it/s]
Running evaluation: 7it [00:00, 131.75it/s]
Running evaluation: 7it [00:00, 127.41it/s]
Running evaluation: 7it [00:00, 131.73it/s]
Running evaluation: 7it [00:00, 131.85it/s]
Running evaluation: 7it [00:00, 129.06it/s]
Running evaluation: 7it [00:00, 132.88it/s]
Running evaluation: 7it [00:00, 133.23it/s]
Running evaluation: 7it [00:00, 130.16it/s]
Running evaluation: 7it [00:00, 131.30it/s]
Running evaluation: 7it [00:00, 130.23it/s]
Running evaluation: 7it [00:00, 133.38it/s]
Running evaluation: 7it [00:00, 132.52it/s]
Running evaluation: 7it [00:00, 129.27it/s]
Running evaluation: 7it [00:00, 130.29it/s]
Running evaluation: 7it [00:00, 130.16it/s]
```

```
Running evaluation: 7it [00:00, 130.89it/s]
Running evaluation: 7it [00:00, 131.75it/s]
Running evaluation: 7it [00:00, 129.35it/s]
Running evaluation: 7it [00:00, 132.32it/s]
Running evaluation: 7it [00:00, 133.44it/s]
Running evaluation: 7it [00:00, 132.37it/s]
Running evaluation: 7it [00:00, 132.74it/s]
Running evaluation: 7it [00:00, 131.64it/s]
Running evaluation: 7it [00:00, 130.45it/s]
Running evaluation: 7it [00:00, 132.78it/s]
Running evaluation: 7it [00:00, 133.73it/s]
Running evaluation: 7it [00:00, 131.75it/s]
Running evaluation: 7it [00:00, 132.34it/s]
Running evaluation: 7it [00:00, 134.23it/s]
Running evaluation: 7it [00:00, 133.03it/s]
Running evaluation: 7it [00:00, 131.43it/s]
Running evaluation: 7it [00:00, 132.89it/s]
Running evaluation: 7it [00:00, 130.94it/s]
Running evaluation: 7it [00:00, 132.84it/s]
Running evaluation: 7it [00:00, 134.44it/s]
Running evaluation: 7it [00:00, 135.27it/s]
Running evaluation: 7it [00:00, 132.11it/s]
Running evaluation: 7it [00:00, 92.80it/s]
```

In [ ]:
```
print("Electricity Results")
print("CRPS:", agg_metric_electricity["mean_wQuantileLoss"])
print("ND:", agg_metric_electricity["ND"])
print("NRMSE:", agg_metric_electricity["NRMSE"])
print("")
print("CRPS-Sum:", agg_metric_electricity["m_sum_mean_wQuantileLoss"])
print("ND-Sum:", agg_metric_electricity["m_sum_ND"])
print("NRMSE-Sum:", agg_metric_electricity["m_sum_NRMSE"])
```

```
Electricity Results
CRPS: 0.2707872836998276
ND: 0.29387715641085094
NRMSE: 6.013588729659628

CRPS-Sum: 0.18479722185712283
ND-Sum: 0.2467999744659055
NRMSE-Sum: 0.38316235608597204
```

In [ ]: