In [ ]:
```python
import os
import math
import time

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.preprocessing import MinMaxScaler

from TSB_UAD.models.distance import Fourier
from TSB_UAD.models.feature import Window
from TSB_UAD.utils.slidingWindows import find_length,plotFig
from TSB_UAD.models.poly import POLY
from TSB_UAD.models.hbos import HBOS
from TSB_UAD.models.cnn import cnn

from TSB_UAD.models.sand import SAND

from TSB_UAD.vus.metrics import get_metrics

from TSB_UAD.models.hbos_variant import HBOSVariant
from TSB_UAD.models.poly_variant import POLYVariant
from TSB_UAD.models.cnn_variant import  CnnVariant
```

```
2024-06-21 21:13:02.487298: I tensorflow/core/util/port.cc:111] oneDNN custom operations are on. You may see slightly different numerical results due to floating-point round-off errors fr
om different computation orders. To turn them off, set the environment variable `TF_ENABLE_ONEDNN_OPTS=0`.
2024-06-21 21:13:02.515343: E tensorflow/compiler/xla/stream_executor/cuda/cuda_dnn.cc:9342] Unable to register cuDNN factory: Attempting to register factory for plugin cuDNN when one has
already been registered
2024-06-21 21:13:02.515372: E tensorflow/compiler/xla/stream_executor/cuda/cuda_fft.cc:609] Unable to register cuFFT factory: Attempting to register factory for plugin cuFFT when one has
already been registered
2024-06-21 21:13:02.515393: E tensorflow/compiler/xla/stream_executor/cuda/cuda_blas.cc:1518] Unable to register cuBLAS factory: Attempting to register factory for plugin cuBLAS when one
has already been registered
2024-06-21 21:13:02.521208: I tensorflow/core/platform/cpu_feature_guard.cc:182] This TensorFlow binary is optimized to use available CPU instructions in performance-critical operations.
To enable the following instructions: AVX2 AVX_VNNI FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.
2024-06-21 21:13:03.142159: W tensorflow/compiler/tf2tensorrt/utils/py_utils.cc:38] TF-TRT Warning: Could not find TensorRT
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/tqdm/auto.py:21: TqdmWarning: IProgress not found. Please update jupyter and ipywidgets. See https://ipywidgets.readthedocs.i
o/en/stable/user_install.html
  from .autonotebook import tqdm as notebook_tqdm
```

In [ ]:
```python
INPUT_FOLDER_PATH = "generated_data"
VUS_METRIC = "all"
BATCH_SIZE = 2000
```

In [ ]:
```python
input_files = os.listdir(INPUT_FOLDER_PATH)
```

Sand (streaming baseline)

In [ ]:
```python
for current_file_name in sorted(input_files, key=lambda filename: int(filename.split('_')[0][-1])):
    start_time = time.time()
    current_file_path = os.path.join(INPUT_FOLDER_PATH, current_file_name)

    df = pd.read_csv(current_file_path, header=None).dropna().to_numpy()
    print(current_file_path)
    print(df.shape)

    data = df[:,0].astype(float)
    label = df[:,1].astype(int)

    slidingWindow = find_length(data)
    data_windowed = Window(window = slidingWindow).convert(data).to_numpy()

    modelName='SAND (online)'
    clf = SAND(pattern_length=slidingWindow,subsequence_length=4*(slidingWindow))
    x = data
    clf.fit(x,online=True,alpha=0.5,init_length=5000,batch_size=BATCH_SIZE,verbose=True,overlaping_rate=int(4*slidingWindow))
    score = clf.decision_scores_
    score = MinMaxScaler(feature_range=(0,1)).fit_transform(score.reshape(-1,1)).ravel()

    print(f"Elapsed time: {time.time() - start_time} seconds")

    plotFig(data, label, score, slidingWindow, fileName=current_file_name, modelName=modelName)
```

```
generated_data/normality1_NAB.out
(4031, 2)
0-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/numba/np/ufunc/parallel.py:371: NumbaWarning: The TBB threading layer requires TBB version 2021 update 6 or later i.e., TBB_I
NTERFACE_VERSION >= 12060. Found TBB_INTERFACE_VERSION = 12050. The TBB threading layer is disabled.
  warnings.warn(problem)
[STOP]: score length 4031
Elapsed time: 20.895854711532593 seconds
generated_data/normality1_Dodgers.out
(50400, 2)
0-->5000-->7000-->9000-->11000-->13000-->15000-->17000-->19000-->21000-->23000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
25000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
27000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
29000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
31000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
33000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
35000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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37000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
39000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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41000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
43000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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45000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
47000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
49000-->
```

```
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
[STOP]: score length 50400
Elapsed time: 284.96584367752075 seconds
generated_data/normality1_MGAB.out
(100000, 2)
0-->5000-->7000-->9000-->11000-->13000-->15000-->17000-->19000-->21000-->23000-->25000-->27000-->29000-->31000-->33000-->35000-->37000-->39000-->41000-->43000-->45000-->47000-->49000-->51
000-->53000-->55000-->57000-->59000-->61000-->63000-->65000-->67000-->69000-->71000-->73000-->75000-->77000-->79000-->81000-->83000-->85000-->87000-->89000-->91000-->93000-->95000-->97000
-->99000-->[STOP]: score length 100000
Elapsed time: 1809.7631921768188 seconds
generated_data/normality2_NAB_MGAB.out
(104031, 2)
0-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
5000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
7000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
9000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
11000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
13000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
15000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
17000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
19000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
21000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
23000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
25000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
27000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
29000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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31000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
33000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
35000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
37000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
39000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
41000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
43000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
45000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
47000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
49000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
51000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
53000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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55000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
57000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
59000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
61000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
63000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
65000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
67000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
69000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
71000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
73000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
75000-->
```

```
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
77000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
79000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
81000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
83000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
85000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
87000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
89000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
91000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
93000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
95000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
97000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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99000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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101000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
103000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
[STOP]: score length 104031
Elapsed time: 1850.9535970687866 seconds
generated_data/normality2_MGAB_NAB.out
(104031, 2)
0-->5000-->7000-->9000-->11000-->13000-->15000-->17000-->19000-->21000-->23000-->25000-->27000-->29000-->31000-->33000-->35000-->37000-->39000-->41000-->43000-->45000-->47000-->49000-->51
000-->53000-->55000-->57000-->59000-->61000-->63000-->65000-->67000-->69000-->71000-->73000-->75000-->77000-->79000-->81000-->83000-->85000-->87000-->89000-->91000-->93000-->95000-->97000
-->99000-->101000-->103000-->[STOP]: score length 104031
Elapsed time: 1788.052217721939 seconds
generated_data/normality2_NAB_Dodgers.out
(54431, 2)
0-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
5000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
7000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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9000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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11000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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13000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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15000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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17000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
19000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
21000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
23000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
25000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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27000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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31000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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33000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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35000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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37000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
39000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
41000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
43000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
45000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
47000-->
```

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/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
49000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
51000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
53000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
[STOP]: score length 54431
Elapsed time: 339.9815311431885 seconds
generated_data/normality2_Dodgers_MGAB.out
(150400, 2)
0-->5000-->7000-->9000-->11000-->13000-->15000-->17000-->19000-->21000-->23000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
25000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
27000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
29000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
31000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
33000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
35000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
37000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
39000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
41000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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43000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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45000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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47000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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49000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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51000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
53000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
55000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
57000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
59000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
61000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
63000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
65000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
67000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
69000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
71000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
73000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
75000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
77000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
79000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
81000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
83000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
85000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
87000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
89000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
91000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
```

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93000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
95000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
97000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
99000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
101000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
103000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
105000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
107000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
109000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
111000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
113000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
115000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
117000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
119000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
121000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
123000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
125000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
127000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
129000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
131000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
133000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
135000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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137000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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139000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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141000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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143000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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145000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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147000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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149000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
[STOP]: score length 150400
Elapsed time: 2485.6848526000977 seconds
generated_data/normality2_Dodgers_NAB.out
(54431, 2)
0-->5000-->7000-->9000-->11000-->13000-->15000-->17000-->19000-->21000-->23000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
25000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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27000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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29000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
31000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
33000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
35000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
37000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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39000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
41000-->
```

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/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
43000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
45000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
47000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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49000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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51000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
53000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
[STOP]: score length 54431
Elapsed time: 315.8099422454834 seconds
generated_data/normality2_MGAB_Dodgers.out
(150400, 2)
0-->5000-->7000-->9000-->11000-->13000-->15000-->17000-->19000-->21000-->23000-->25000-->27000-->29000-->31000-->33000-->35000-->37000-->39000-->41000-->43000-->45000-->47000-->49000-->51
000-->53000-->55000-->57000-->59000-->61000-->63000-->65000-->67000-->69000-->71000-->73000-->75000-->77000-->79000-->81000-->83000-->85000-->87000-->89000-->91000-->93000-->95000-->97000
-->99000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
101000-->103000-->105000-->107000-->109000-->111000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
113000-->115000-->117000-->119000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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121000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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123000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
125000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
127000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
129000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
131000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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133000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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135000-->
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137000-->
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139000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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141000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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143000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
145000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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147000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
149000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
[STOP]: score length 150400
Elapsed time: 3417.5396177768707 seconds
generated_data/normality3_NAB_Dodgers_MGAB.out
(154431, 2)
0-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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5000-->
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9000-->
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11000-->
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13000-->
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15000-->
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17000-->
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27000-->
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103000-->
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105000-->
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107000-->
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113000-->
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115000-->
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123000-->
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127000-->
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  return np.sqrt(welford_nanvar(a, w))
[STOP]: score length 154431
Elapsed time: 2533.616137266159 seconds
generated_data/normality3_Dodgers_MGAB_NAB.out
(154431, 2)
0-->5000-->7000-->9000-->11000-->13000-->15000-->17000-->19000-->21000-->23000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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91000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
93000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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95000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
97000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
99000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
101000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
103000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
105000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
107000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
109000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
111000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
113000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
115000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
117000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
119000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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121000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
123000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
125000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
127000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
129000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
131000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
```

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133000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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135000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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137000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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139000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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141000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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143000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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145000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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147000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
149000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
151000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
153000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
[STOP]: score length 154431
Elapsed time: 2534.3562552928925 seconds
generated_data/normality3_Dodgers_NAB_MGAB.out
(154431, 2)
0-->5000-->7000-->9000-->11000-->13000-->15000-->17000-->19000-->21000-->23000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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25000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
27000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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29000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
31000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
33000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
35000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
37000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
39000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
41000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
43000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
45000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
47000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
49000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
51000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
53000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
55000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
57000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
59000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
61000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
63000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
65000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
67000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
69000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
71000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
73000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
75000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
77000-->
```

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/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
79000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
81000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
83000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
85000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
87000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
89000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
91000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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93000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
95000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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97000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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101000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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103000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
105000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
107000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
109000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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111000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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113000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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115000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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117000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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119000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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121000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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123000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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125000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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127000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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129000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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131000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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133000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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135000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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139000-->
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145000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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147000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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149000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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151000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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153000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
```

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[STOP]: score length 154431
Elapsed time: 2456.876099586487 seconds
generated_data/normality3_MGAB_NAB_Dodgers.out
(154431, 2)
0-->5000-->7000-->9000-->11000-->13000-->15000-->17000-->19000-->21000-->23000-->25000-->27000-->29000-->31000-->33000-->35000-->37000-->39000-->41000-->43000-->45000-->47000-->49000-->51
000-->53000-->55000-->57000-->59000-->61000-->63000-->65000-->67000-->69000-->71000-->73000-->75000-->77000-->79000-->81000-->83000-->85000-->87000-->89000-->91000-->93000-->95000-->97000
-->99000-->101000-->103000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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105000-->107000-->109000-->111000-->113000-->115000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
117000-->119000-->121000-->123000-->125000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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127000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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129000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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137000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
139000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
141000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
143000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
145000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
147000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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149000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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151000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
153000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
[STOP]: score length 154431
Elapsed time: 3527.6694955825806 seconds
generated_data/normality3_MGAB_Dodgers_NAB.out
(154431, 2)
0-->5000-->7000-->9000-->11000-->13000-->15000-->17000-->19000-->21000-->23000-->25000-->27000-->29000-->31000-->33000-->35000-->37000-->39000-->41000-->43000-->45000-->47000-->49000-->51
000-->53000-->55000-->57000-->59000-->61000-->63000-->65000-->67000-->69000-->71000-->73000-->75000-->77000-->79000-->81000-->83000-->85000-->87000-->89000-->91000-->93000-->95000-->97000
-->99000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
101000-->103000-->105000-->107000-->109000-->111000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
113000-->115000-->117000-->119000-->121000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
123000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
125000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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127000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
129000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
131000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
133000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
135000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
137000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
139000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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141000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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143000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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145000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
147000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
149000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
151000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
153000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
```

```
[STOP]: score length 154431
Elapsed time: 3244.7621438503265 seconds
generated_data/normality3_NAB_MGAB_Dodgers.out
(154431, 2)
0-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
5000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
7000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
9000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
11000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
13000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
15000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
17000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
19000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
21000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
23000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
25000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
27000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
29000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
31000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
33000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
35000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
37000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
39000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
41000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
43000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
45000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
47000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
49000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
51000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
53000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
55000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
57000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
59000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
61000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
63000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
65000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
67000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
69000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
71000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
73000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
75000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
77000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
79000-->
```

```
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
81000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
83000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
85000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
87000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
89000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
91000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
93000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
95000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
97000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
99000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
101000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
103000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
105000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
107000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
109000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
111000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
113000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
115000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
117000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
119000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
121000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
123000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
125000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
127000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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129000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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131000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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133000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
135000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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137000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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139000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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141000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
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143000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
145000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
147000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
149000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
151000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
153000-->
/home/apapadoi/anaconda3/envs/TSB/lib/python3.9/site-packages/stumpy/core.py:443: RuntimeWarning: invalid value encountered in sqrt
  return np.sqrt(welford_nanvar(a, w))
[STOP]: score length 154431
Elapsed time: 2893.23961019516 seconds
```

normality1_NAB.out window=289 SAND (online)
AUC=0.99 R_AUC=1.0 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.93 R_AP=1.0 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality1_Dodgers.out window=288 SAND (online)
AUC=0.73 R_AUC=0.84 Precision=0.98 Recall=0.05 F=0.10 ExistenceReward=0.02 OverlapReward=0.01
AP=0.33 R_AP=0.71 Precision@k=0.05 Rprecision=0.74 Rrecall=0.01 Rf=0.02

normality1_MGAB.out window=49 SAND (online)
AUC=0.72 R_AUC=0.78 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_NAB_MGAB.out window=49 SAND (online)
AUC=0.54 R_AUC=0.69 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.01 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_NAB.out window=49 SAND (online)
AUC=0.67 R_AUC=0.69 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.01 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_NAB_Dodgers.out window=288 SAND (online)
AUC=0.71 R_AUC=0.8 Precision=0.98 Recall=0.04 F=0.08 ExistenceReward=0.02 OverlapReward=0.01
AP=0.29 R_AP=0.67 Precision@k=0.04 Rprecision=0.74 Rrecall=0.01 Rf=0.02

normality2_Dodgers_MGAB.out window=288 SAND (online)

AUC=0.74 R_AUC=0.8 Precision=0.38 Recall=0.03 F=0.06 ExistenceReward=0.03 OverlapReward=0.01

AP=0.11 R_AP=0.34 Precision@k=0.03 Rprecision=0.33 Rrecall=0.01 Rf=0.03

normality2_Dodgers_NAB.out window=288 SAND (online)

AUC=0.71 R_AUC=0.81 Precision=0.97 Recall=0.03 F=0.06 ExistenceReward=0.01 OverlapReward=0.00

AP=0.27 R_AP=0.64 Precision@k=0.03 Rprecision=0.49 Rrecall=0.01 Rf=0.01

normality2_MGAB_Dodgers.out window=49 SAND (online)
AUC=0.64 R_AUC=0.68 Precision=0.68 Recall=0.07 F=0.12 ExistenceReward=0.01 OverlapReward=0.01
AP=0.14 R_AP=0.1 Precision@k=0.07 Rprecision=0.11 Rrecall=0.01 Rf=0.02

normality3_NAB_Dodgers_MGAB.out window=288 SAND (online)
AUC=0.71 R_AUC=0.75 Precision=0.30 Recall=0.02 F=0.04 ExistenceReward=0.01 OverlapReward=0.00
AP=0.1 R_AP=0.31 Precision@k=0.02 Rprecision=0.16 Rrecall=0.01 Rf=0.01

normality3_Dodgers_MGAB_NAB.out window=288 SAND (online)
AUC=0.73 R_AUC=0.76 Precision=0.17 Recall=0.02 F=0.04 ExistenceReward=0.01 OverlapReward=0.01
AP=0.1 R_AP=0.3 Precision@k=0.02 Rprecision=0.27 Rrecall=0.01 Rf=0.02

normality3_Dodgers_NAB_MGAB.out window=288 SAND (online)
AUC=0.75 R_AUC=0.78 Precision=0.10 Recall=0.00 F=0.01 ExistenceReward=0.01 OverlapReward=0.01
AP=0.1 R_AP=0.31 Precision@k=0.00 Rprecision=0.13 Rrecall=0.01 Rf=0.01

normality3_MGAB_NAB_Dodgers.out window=49 SAND (online)
AUC=0.57 R_AUC=0.63 Precision=0.23 Recall=0.03 F=0.05 ExistenceReward=0.01 OverlapReward=0.01
AP=0.08 R_AP=0.08 Precision@k=0.03 Rprecision=0.13 Rrecall=0.01 Rf=0.02

normality3_MGAB_Dodgers_NAB.out window=49 SAND (online)
AUC=0.61 R_AUC=0.65 Precision=0.80 Recall=0.08 F=0.15 ExistenceReward=0.01 OverlapReward=0.01
AP=0.16 R_AP=0.1 Precision@k=0.08 Rprecision=0.18 Rrecall=0.01 Rf=0.02

POLY, HBOS, CNN (Offline baselines)

POLY

In [ ]:
```
for current_file_name in sorted(input_files, key=lambda filename: int(filename.split('_')[0][-1])):
    start_time = time.time()
    current_file_path = os.path.join(INPUT_FOLDER_PATH, current_file_name)

    df = pd.read_csv(current_file_path, header=None).dropna().to_numpy()
    print(current_file_path)
    print(df.shape)

    data = df[:,0].astype(float)
    label = df[:,1].astype(int)

    slidingWindow = find_length(data)
    data_windowed = Window(window = slidingWindow).convert(data).to_numpy()

    modelName='POLY'
    clf = POLY(power=3, window = slidingWindow)
    x = data
    clf.fit(x)
    measure = Fourier()
    measure.detector = clf
    measure.set_param()
    clf.decision_function(measure=measure)
    score = clf.decision_scores_
    score = MinMaxScaler(feature_range=(0,1)).fit_transform(score.reshape(-1,1)).ravel()

    print(f"Elapsed time: {time.time() - start_time} seconds")

    plotFig(data, label, score, slidingWindow, fileName=current_file_name, modelName=modelName)
```

```
generated_data/normality1_NAB.out
(4031, 2)
Elapsed time: 0.03132891654968262 seconds
generated_data/normality1_Dodgers.out
(50400, 2)
Elapsed time: 0.1057431697845459 seconds
generated_data/normality1_MGAB.out
(100000, 2)
Elapsed time: 0.14905714988708496 seconds
generated_data/normality2_NAB_MGAB.out
(104031, 2)
Elapsed time: 0.15231537818908691 seconds
generated_data/normality2_MGAB_NAB.out
(104031, 2)
Elapsed time: 0.1628410816192627 seconds
generated_data/normality2_NAB_Dodgers.out
(54431, 2)
Elapsed time: 0.10911750793457031 seconds
generated_data/normality2_Dodgers_MGAB.out
(150400, 2)
Elapsed time: 0.28421616554260254 seconds
generated_data/normality2_Dodgers_NAB.out
(54431, 2)
Elapsed time: 0.10577130317687988 seconds
generated_data/normality2_MGAB_Dodgers.out
(150400, 2)
Elapsed time: 0.345095157623291 seconds
generated_data/normality3_NAB_Dodgers_MGAB.out
(154431, 2)
Elapsed time: 0.2890501022338867 seconds
generated_data/normality3_Dodgers_MGAB_NAB.out
(154431, 2)
Elapsed time: 0.2832143306732178 seconds
generated_data/normality3_Dodgers_NAB_MGAB.out
(154431, 2)
Elapsed time: 0.28753662109375 seconds
generated_data/normality3_MGAB_NAB_Dodgers.out
(154431, 2)
Elapsed time: 0.23030734062194824 seconds
generated_data/normality3_MGAB_Dodgers_NAB.out
(154431, 2)
Elapsed time: 0.23097443580627441 seconds
generated_data/normality3_NAB_MGAB_Dodgers.out
(154431, 2)
Elapsed time: 0.22786760330200195 seconds
```

normality1_Dodgers.out window=288 POLY

AUC=0.69 R_AUC=0.85 Precision=0.99 Recall=0.05 F=0.10 ExistenceReward=0.01 OverlapReward=0.01

AP=0.33 R_AP=0.73 Precision@k=0.05 Rprecision=0.99 Rrecall=0.01 Rf=0.01

normality1_MGAB.out window=49 POLY

AUC=0.49 R_AUC=0.62 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00

AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_NAB_MGAB.out window=49 POLY
AUC=0.24 R_AUC=0.38 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_NAB.out window=49 POLY
AUC=0.24 R_AUC=0.38 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_NAB_Dodgers.out window=288 POLY

AUC=0.68 R_AUC=0.88 Precision=1.00 Recall=0.05 F=0.09 ExistenceReward=0.01 OverlapReward=0.01

AP=0.31 R_AP=0.74 Precision@k=0.05 Rprecision=1.00 Rrecall=0.01 Rf=0.01

normality2_Dodgers_MGAB.out window=288 POLY

AUC=0.83 R_AUC=0.86 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00

AP=0.24 R_AP=0.63 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_NAB.out window=288 POLY

AUC=0.64 R_AUC=0.84 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00

AP=0.24 R_AP=0.71 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_Dodgers.out window=49 POLY

AUC=0.79 R_AUC=0.83 Precision=0.18 Recall=0.03 F=0.05 ExistenceReward=0.06 OverlapReward=0.03

AP=0.09 R_AP=0.18 Precision@k=0.03 Rprecision=0.18 Rrecall=0.04 Rf=0.07

normality3_NAB_Dodgers_MGAB.out window=288 POLY

AUC=0.87 R_AUC=0.88 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00

AP=0.23 R_AP=0.64 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_MGAB_NAB.out window=288 POLY

AUC=0.78 R_AUC=0.84 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00

AP=0.23 R_AP=0.61 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_NAB_MGAB.out window=288 POLY

AUC=0.79 R_AUC=0.86 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00

AP=0.23 R_AP=0.62 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_MGAB_NAB_Dodgers.out window=49 POLY

AUC=0.75 R_AUC=0.83 Precision=0.16 Recall=0.02 F=0.03 ExistenceReward=0.13 OverlapReward=0.10

AP=0.1 R_AP=0.18 Precision@k=0.02 Rprecision=0.11 Rrecall=0.11 Rf=0.11

normality3_MGAB_Dodgers_NAB.out window=49 POLY
AUC=0.75 R_AUC=0.83 Precision=0.18 Recall=0.03 F=0.05 ExistenceReward=0.07 OverlapReward=0.03
AP=0.09 R_AP=0.18 Precision@k=0.03 Rprecision=0.18 Rrecall=0.04 Rf=0.07

normality3_NAB_MGAB_Dodgers.out window=49 POLY
AUC=0.75 R_AUC=0.82 Precision=0.16 Recall=0.02 F=0.03 ExistenceReward=0.13 OverlapReward=0.10
AP=0.1 R_AP=0.18 Precision@k=0.02 Rprecision=0.11 Rrecall=0.11 Rf=0.11

HBOS

In [ ]:
```
for current_file_name in sorted(input_files, key=lambda filename: int(filename.split('_')[0][-1])):
    start_time = time.time()
    current_file_path = os.path.join(INPUT_FOLDER_PATH, current_file_name)

    df = pd.read_csv(current_file_path, header=None).dropna().to_numpy()
    print(current_file_path)
    print(df.shape)
```

```
    data = df[:,0].astype(float)
    label = df[:,1].astype(int)

    slidingWindow = find_length(data)
    data_windowed = Window(window = slidingWindow).convert(data).to_numpy()

    modelName='HBOS'
    clf = HBOS()
    x = data_windowed
    clf.fit(x)

    score = clf.decision_scores_
    score = MinMaxScaler(feature_range=(0,1)).fit_transform(score.reshape(-1,1)).ravel()
    score = np.array([score[0]]*math.ceil((slidingWindow-1)/2) + list(score) + [score[-1]]*((slidingWindow-1)//2))

    print(f"Elapsed time: {time.time() - start_time} seconds")

    plotFig(data, label, score, slidingWindow, fileName=current_file_name, modelName=modelName)
```

```
generated_data/normality1_NAB.out
(4031, 2)
Elapsed time: 0.34332728385925293 seconds
generated_data/normality1_Dodgers.out
(50400, 2)
Elapsed time: 3.907789945602417 seconds
generated_data/normality1_MGAB.out
(100000, 2)
Elapsed time: 1.2901077270507812 seconds
generated_data/normality2_NAB_MGAB.out
(104031, 2)
Elapsed time: 1.3385822772979736 seconds
generated_data/normality2_MGAB_NAB.out
(104031, 2)
Elapsed time: 1.3520069122314453 seconds
generated_data/normality2_NAB_Dodgers.out
(54431, 2)
Elapsed time: 4.231564044952393 seconds
generated_data/normality2_Dodgers_MGAB.out
(150400, 2)
Elapsed time: 11.163569688796997 seconds
generated_data/normality2_Dodgers_NAB.out
(54431, 2)
Elapsed time: 4.372772932052612 seconds
generated_data/normality2_MGAB_Dodgers.out
(150400, 2)
Elapsed time: 1.9749886989593506 seconds
generated_data/normality3_NAB_Dodgers_MGAB.out
(154431, 2)
Elapsed time: 11.692062139511108 seconds
generated_data/normality3_Dodgers_MGAB_NAB.out
(154431, 2)
Elapsed time: 11.943434000015259 seconds
generated_data/normality3_Dodgers_NAB_MGAB.out
(154431, 2)
Elapsed time: 12.044646263122559 seconds
generated_data/normality3_MGAB_NAB_Dodgers.out
(154431, 2)
Elapsed time: 2.0454697608947754 seconds
generated_data/normality3_MGAB_Dodgers_NAB.out
(154431, 2)
Elapsed time: 2.042668581008911 seconds
generated_data/normality3_NAB_MGAB_Dodgers.out
(154431, 2)
Elapsed time: 2.0505099296569824 seconds
```

normality1_Dodgers.out window=288 HBOS

AUC=0.30 R_AUC=0.84 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00

AP=0.08 R_AP=0.64 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality1_MGAB.out window=49 HBOS

AUC=0.50 R_AUC=0.62 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00

AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_NAB_MGAB.out window=49 HBOS

AUC=0.80 R_AUC=0.67 Precision=0.10 Recall=0.67 F=0.17 ExistenceReward=0.17 OverlapReward=0.17

AP=0.15 R_AP=0.03 Precision@k=0.67 Rprecision=0.02 Rrecall=0.17 Rf=0.04

normality2_MGAB_NAB.out window=49 HBOS

AUC=0.80 R_AUC=0.67 Precision=0.10 Recall=0.67 F=0.17 ExistenceReward=0.17 OverlapReward=0.17

AP=0.16 R_AP=0.04 Precision@k=0.67 Rprecision=0.05 Rrecall=0.17 Rf=0.08

normality2_NAB_Dodgers.out window=288 HBOS

AUC=0.32 R_AUC=0.84 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00

AP=0.08 R_AP=0.64 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_MGAB.out window=288 HBOS

AUC=0.74 R_AUC=0.82 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00

AP=0.07 R_AP=0.53 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_NAB.out window=288 HBOS

AUC=0.32 R_AUC=0.83 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00

AP=0.08 R_AP=0.63 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_Dodgers.out window=49 HBOS

AUC=0.67 R_AUC=0.8 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00

AP=0.08 R_AP=0.19 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_NAB_Dodgers_MGAB.out window=288 HBOS

AUC=0.72 R_AUC=0.82 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00

AP=0.07 R_AP=0.53 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_MGAB_NAB.out window=288 HBOS

AUC=0.72 R_AUC=0.81 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00

AP=0.07 R_AP=0.52 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_NAB_MGAB.out window=288 HBOS

AUC=0.72 R_AUC=0.81 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00

AP=0.07 R_AP=0.52 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_MGAB_NAB_Dodgers.out window=49 HBOS

AUC=0.65 R_AUC=0.78 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00

AP=0.08 R_AP=0.18 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

CNN

In [ ]:
```
for current_file_name in sorted(input_files, key=lambda filename: int(filename.split('_')[0][-1])):
    start_time = time.time()
    current_file_path = os.path.join(INPUT_FOLDER_PATH, current_file_name)

    df = pd.read_csv(current_file_path, header=None).dropna().to_numpy()
    print(current_file_path)
    print(df.shape)
```

```python
    data = df[:,0].astype(float)
    label = df[:,1].astype(int)

    slidingWindow = find_length(data)
    data_windowed = Window(window = slidingWindow).convert(data).to_numpy()

    data_train = data[:int(0.1*len(data))]
    data_test = data

    modelName='CNN'
    clf = cnn(slidingwindow = slidingWindow, predict_time_steps=1, epochs = 100, patience = 5, verbose=0)
    print(data_train.shape)
    print(data_test.shape)
    clf.fit(data_train, data_test)
    measure = Fourier()
    measure.detector = clf
    measure.set_param()
    clf.decision_function(measure=measure)
    score = clf.decision_scores_
    score = MinMaxScaler(feature_range=(0,1)).fit_transform(score.reshape(-1,1)).ravel()

    print(f"Elapsed time: {time.time() - start_time} seconds")

    plotFig(data, label, score, slidingWindow, fileName=current_file_name, modelName=modelName)
```

```
generated_data/normality1_NAB.out
(4031, 2)
(403,)
(4031,)
```

```
2024-06-21 16:25:32.325254: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 16:25:32.330710: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 16:25:32.425624: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 16:25:32.425770: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 16:25:32.425854: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 16:25:32.425923: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 16:25:32.508319: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 16:25:32.508474: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 16:25:32.508547: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 16:25:32.508610: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 16:25:32.508671: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 16:25:32.508733: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 16:25:33.229120: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 16:25:33.229278: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 16:25:33.229371: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 16:25:33.229439: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 16:25:33.229511: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 16:25:33.229576: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1886] Created device /job:localhost/replica:0/task:0/device:GPU:0 with 21836 MB memory:  -> device: 0, name:
NVIDIA GeForce RTX 3090, pci bus id: 0000:01:00.0, compute capability: 8.6
2024-06-21 16:25:33.229845: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 16:25:33.229912: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1886] Created device /job:localhost/replica:0/task:0/device:GPU:1 with 22275 MB memory:  -> device: 1, name:
NVIDIA GeForce RTX 3090, pci bus id: 0000:05:00.0, compute capability: 8.6
2024-06-21 16:25:35.899349: I tensorflow/compiler/xla/stream_executor/cuda/cuda_dnn.cc:442] Loaded cuDNN version 8902
2024-06-21 16:25:38.359904: I tensorflow/compiler/xla/service/service.cc:168] XLA service 0x7b695d1e9bc0 initialized for platform CUDA (this does not guarantee that XLA will be used). Dev
ices:
2024-06-21 16:25:38.359918: I tensorflow/compiler/xla/service/service.cc:176]   StreamExecutor device (0): NVIDIA GeForce RTX 3090, Compute Capability 8.6
2024-06-21 16:25:38.359920: I tensorflow/compiler/xla/service/service.cc:176]   StreamExecutor device (1): NVIDIA GeForce RTX 3090, Compute Capability 8.6
2024-06-21 16:25:38.363997: I tensorflow/compiler/mlir/tensorflow/utils/dump_mlir_util.cc:269] disabling MLIR crash reproducer, set env var `MLIR_CRASH_REPRODUCER_DIRECTORY` to enable.
2024-06-21 16:25:38.419689: I ./tensorflow/compiler/jit/device_compiler.h:186] Compiled cluster using XLA!  This line is logged at most once for the lifetime of the process.
```

```
117/117 [==============================] - 0s 925us/step
Elapsed time: 8.476779460906982 seconds
generated_data/normality1_Dodgers.out
(50400, 2)
(5040,)
(50400,)
1566/1566 [==============================] - 1s 637us/step
Elapsed time: 10.329784631729126 seconds
generated_data/normality1_MGAB.out
(100000, 2)
(10000,)
(100000,)
3124/3124 [==============================] - 2s 632us/step
Elapsed time: 22.702486753463745 seconds
generated_data/normality2_NAB_MGAB.out
(104031, 2)
(10403,)
(104031,)
3250/3250 [==============================] - 2s 666us/step
Elapsed time: 25.652194499969482 seconds
generated_data/normality2_MGAB_NAB.out
(104031, 2)
(10403,)
(104031,)
3250/3250 [==============================] - 2s 639us/step
Elapsed time: 21.29753565788269 seconds
generated_data/normality2_NAB_Dodgers.out
(54431, 2)
(5443,)
(54431,)
1692/1692 [==============================] - 1s 705us/step
Elapsed time: 10.266452074050903 seconds
generated_data/normality2_Dodgers_MGAB.out
(150400, 2)
(15040,)
(150400,)
4691/4691 [==============================] - 3s 716us/step
Elapsed time: 34.484108448028564 seconds
generated_data/normality2_Dodgers_NAB.out
(54431, 2)
(5443,)
(54431,)
1692/1692 [==============================] - 1s 657us/step
Elapsed time: 10.629608631134033 seconds
generated_data/normality2_MGAB_Dodgers.out
(150400, 2)
(15040,)
(150400,)
4699/4699 [==============================] - 3s 693us/step
Elapsed time: 31.68571448326111 seconds
generated_data/normality3_NAB_Dodgers_MGAB.out
(154431, 2)
(15443,)
(154431,)
4817/4817 [==============================] - 8s 2ms/step
Elapsed time: 49.867316484451294 seconds
generated_data/normality3_Dodgers_MGAB_NAB.out
(154431, 2)
(15443,)
(154431,)
4817/4817 [==============================] - 8s 2ms/step
Elapsed time: 47.69216799736023 seconds
generated_data/normality3_Dodgers_NAB_MGAB.out
(154431, 2)
(15443,)
(154431,)
4817/4817 [==============================] - 6s 1ms/step
Elapsed time: 43.283355951309204 seconds
generated_data/normality3_MGAB_NAB_Dodgers.out
(154431, 2)
(15443,)
(154431,)
4825/4825 [==============================] - 5s 967us/step
Elapsed time: 44.317716121673584 seconds
generated_data/normality3_MGAB_Dodgers_NAB.out
(154431, 2)
(15443,)
(154431,)
4825/4825 [==============================] - 4s 885us/step
Elapsed time: 40.81185603141785 seconds
generated_data/normality3_NAB_MGAB_Dodgers.out
(154431, 2)
(15443,)
(154431,)
4825/4825 [==============================] - 4s 750us/step
Elapsed time: 43.12898015975952 seconds
```

normality1_NAB.out window=289 CNN

AUC=0.52 R_AUC=0.64 Precision=0.13 Recall=0.01 F=0.01 ExistenceReward=0.50 OverlapReward=0.00

AP=0.11 R_AP=0.18 Precision@k=0.01 Rprecision=0.14 Rrecall=0.10 Rf=0.12

normality1_Dodgers.out window=288 CNN

AUC=0.62 R_AUC=0.81 Precision=0.26 Recall=0.03 F=0.06 ExistenceReward=0.53 OverlapReward=0.11

AP=0.16 R_AP=0.58 Precision@k=0.03 Rprecision=0.17 Rrecall=0.19 Rf=0.18

normality1_MGAB.out window=49 CNN

AUC=0.57 R_AUC=0.79 Precision=0.03 Recall=0.11 F=0.05 ExistenceReward=0.60 OverlapReward=0.11

AP=0.04 R_AP=0.12 Precision@k=0.11 Rprecision=0.01 Rrecall=0.21 Rf=0.02

normality2_NAB_MGAB.out window=49 CNN

AUC=0.64 R_AUC=0.78 Precision=0.09 Recall=0.21 F=0.13 ExistenceReward=0.50 OverlapReward=0.05

AP=0.04 R_AP=0.05 Precision@k=0.21 Rprecision=0.08 Rrecall=0.14 Rf=0.10

normality2_MGAB_NAB.out window=49 CNN

AUC=0.80 R_AUC=0.87 Precision=0.11 Recall=0.33 F=0.17 ExistenceReward=0.25 OverlapReward=0.01

AP=0.07 R_AP=0.08 Precision@k=0.33 Rprecision=0.09 Rrecall=0.05 Rf=0.07

normality2_NAB_Dodgers.out window=288 CNN

AUC=0.33 R_AUC=0.78 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00

AP=0.08 R_AP=0.51 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_MGAB.out window=288 CNN

AUC=0.34 R_AUC=0.49 Precision=0.33 Recall=0.01 F=0.02 ExistenceReward=0.20 OverlapReward=0.07

AP=0.03 R_AP=0.11 Precision@k=0.01 Rprecision=0.27 Rrecall=0.09 Rf=0.14

normality2_Dodgers_NAB.out window=288 CNN

AUC=0.64 R_AUC=0.83 Precision=0.27 Recall=0.04 F=0.06 ExistenceReward=0.56 OverlapReward=0.18

AP=0.17 R_AP=0.58 Precision@k=0.04 Rprecision=0.16 Rrecall=0.25 Rf=0.20

normality2_MGAB_Dodgers.out window=49 CNN

AUC=0.79 R_AUC=0.85 Precision=0.11 Recall=0.06 F=0.08 ExistenceReward=0.69 OverlapReward=0.09

AP=0.1 R_AP=0.17 Precision@k=0.06 Rprecision=0.09 Rrecall=0.21 Rf=0.12

normality3_NAB_Dodgers_MGAB.out window=288 CNN

AUC=0.29 R_AUC=0.48 Precision=0.20 Recall=0.01 F=0.01 ExistenceReward=0.14 OverlapReward=0.03

AP=0.03 R_AP=0.11 Precision@k=0.01 Rprecision=0.22 Rrecall=0.05 Rf=0.08

normality3_Dodgers_MGAB_NAB.out window=288 CNN

AUC=0.30 R_AUC=0.49 Precision=0.26 Recall=0.01 F=0.03 ExistenceReward=0.26 OverlapReward=0.09

AP=0.03 R_AP=0.11 Precision@k=0.01 Rprecision=0.21 Rrecall=0.12 Rf=0.15

normality3_Dodgers_NAB_MGAB.out window=288 CNN

AUC=0.33 R_AUC=0.49 Precision=0.19 Recall=0.01 F=0.02 ExistenceReward=0.18 OverlapReward=0.05

AP=0.03 R_AP=0.11 Precision@k=0.01 Rprecision=0.18 Rrecall=0.07 Rf=0.10

normality3_MGAB_NAB_Dodgers.out window=49 CNN

AUC=0.62 R_AUC=0.83 Precision=0.09 Recall=0.05 F=0.06 ExistenceReward=0.61 OverlapReward=0.08

AP=0.07 R_AP=0.16 Precision@k=0.05 Rprecision=0.09 Rrecall=0.19 Rf=0.12

normality3_MGAB_Dodgers_NAB.out window=49 CNN

AUC=0.79 R_AUC=0.85 Precision=0.09 Recall=0.05 F=0.07 ExistenceReward=0.67 OverlapReward=0.08

AP=0.1 R_AP=0.18 Precision@k=0.05 Rprecision=0.09 Rrecall=0.20 Rf=0.12

Variant 1 (Naïve streaming variant)

POLY

In [ ]:
```
def run_poly_naive_streaming(per_batch_normalization):
    def _internal_run_poly(batch, slidingWindow):
        clf = POLY(power=3, window = slidingWindow)
        x = batch

        clf.fit(x)
        measure = Fourier()
        measure.detector = clf
        measure.set_param()
        clf.decision_function(measure=measure)
        score = clf.decision_scores_
        score = score.reshape(-1, 1)

        if per_batch_normalization:
            score = MinMaxScaler(feature_range=(0,1)).fit_transform(score)

        return score.ravel().tolist()


    for current_file_name in sorted(input_files, key=lambda filename: int(filename.split('_')[0][-1])):
        start_time = time.time()
        current_file_path = os.path.join(INPUT_FOLDER_PATH, current_file_name)
        final_scores = []

        df = pd.read_csv(current_file_path, header=None).dropna().to_numpy()
        print(current_file_path)
        print(df.shape)

        data = df[:,0].astype(float)
        label = df[:,1].astype(int)

        slidingWindow = find_length(data)

        total_batches = len(data) // BATCH_SIZE

        for i in range(total_batches):
            batch = data[i * BATCH_SIZE: (i + 1) * BATCH_SIZE]
            final_scores.extend(_internal_run_poly(batch, slidingWindow=slidingWindow))

        remaining_elements = len(data) % BATCH_SIZE
        if remaining_elements > 0:
            last_batch = data[total_batches * BATCH_SIZE:]

            if len(last_batch) < slidingWindow:
                final_scores.extend([final_scores[-1] for i in range(len(last_batch))])
            else:
                final_scores.extend(_internal_run_poly(last_batch, slidingWindow=slidingWindow))


        modelName=f"POLY naive streaming {'with' if per_batch_normalization else 'without'} per batch normalization"
        if not per_batch_normalization:
            final_scores = MinMaxScaler(feature_range=(0,1)).fit_transform(np.array(final_scores).reshape(-1,1)).ravel()
        else:
            final_scores = np.array(final_scores)

        print(f"Elapsed time: {time.time() - start_time} seconds")

        plotFig(data, label, final_scores, slidingWindow, fileName=current_file_name, modelName=modelName)
```

With per batch normalization

In [ ]:
```
run_poly_naive_streaming(True)
```

```
generated_data/normality1_NAB.out
(4031, 2)
Elapsed time: 0.005740165710449219 seconds
generated_data/normality1_Dodgers.out
(50400, 2)
Elapsed time: 0.03483223915100098 seconds
generated_data/normality1_MGAB.out
(100000, 2)
Elapsed time: 0.14795827865600586 seconds
generated_data/normality2_NAB_MGAB.out
(104031, 2)
Elapsed time: 0.15752959251403809 seconds
generated_data/normality2_MGAB_NAB.out
(104031, 2)
Elapsed time: 0.1515660285949707 seconds
generated_data/normality2_NAB_Dodgers.out
(54431, 2)
Elapsed time: 0.03609514236450195 seconds
generated_data/normality2_Dodgers_MGAB.out
(150400, 2)
Elapsed time: 0.10404300689697266 seconds
generated_data/normality2_Dodgers_NAB.out
(54431, 2)
Elapsed time: 0.03623771667480469 seconds
generated_data/normality2_MGAB_Dodgers.out
(150400, 2)
Elapsed time: 0.21425724029541016 seconds
generated_data/normality3_NAB_Dodgers_MGAB.out
(154431, 2)
Elapsed time: 0.10492730140686035 seconds
generated_data/normality3_Dodgers_MGAB_NAB.out
(154431, 2)
Elapsed time: 0.10595917701721191 seconds
generated_data/normality3_Dodgers_NAB_MGAB.out
(154431, 2)
Elapsed time: 0.10776805877685547 seconds
generated_data/normality3_MGAB_NAB_Dodgers.out
(154431, 2)
Elapsed time: 0.21622872352600098 seconds
generated_data/normality3_MGAB_Dodgers_NAB.out
(154431, 2)
Elapsed time: 0.2193915843963623 seconds
generated_data/normality3_NAB_MGAB_Dodgers.out
(154431, 2)
Elapsed time: 0.22088909149169922 seconds
```

normality1_Dodgers.out window=288 POLY naive streaming with per batch normalization
AUC=0.53 R_AUC=0.79 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.13 R_AP=0.62 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality1_MGAB.out window=49 POLY naive streaming with per batch normalization
AUC=0.49 R_AUC=0.65 Precision=0.00 Recall=0.01 F=0.00 ExistenceReward=0.10 OverlapReward=0.01
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.03 Rf=0.00

normality2_NAB_MGAB.out window=49 POLY naive streaming with per batch normalization
AUC=0.43 R_AUC=0.39 Precision=0.02 Recall=0.08 F=0.03 ExistenceReward=0.08 OverlapReward=0.02
AP=0.01 R_AP=0.01 Precision@k=0.00 Rprecision=0.02 Rrecall=0.03 Rf=0.02

normality2_MGAB_NAB.out window=49 POLY naive streaming with per batch normalization
AUC=0.43 R_AUC=0.53 Precision=0.02 Recall=0.09 F=0.03 ExistenceReward=0.17 OverlapReward=0.03
AP=0.01 R_AP=0.02 Precision@k=0.00 Rprecision=0.02 Rrecall=0.06 Rf=0.03

normality2_NAB_Dodgers.out window=288 POLY naive streaming with per batch normalization
AUC=0.55 R_AUC=0.78 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.14 R_AP=0.58 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_MGAB.out window=288 POLY naive streaming with per batch normalization
AUC=0.40 R_AUC=0.51 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.04 R_AP=0.19 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_NAB.out window=288 POLY naive streaming with per batch normalization
AUC=0.52 R_AUC=0.8 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.13 R_AP=0.61 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_Dodgers.out window=49 POLY naive streaming with per batch normalization
AUC=0.55 R_AUC=0.67 Precision=0.07 Recall=0.04 F=0.05 ExistenceReward=0.15 OverlapReward=0.13
AP=0.06 R_AP=0.12 Precision@k=0.04 Rprecision=0.06 Rrecall=0.14 Rf=0.08

normality3_NAB_Dodgers_MGAB.out window=288 POLY naive streaming with per batch normalization
AUC=0.42 R_AUC=0.52 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.04 R_AP=0.19 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_MGAB_NAB.out window=288 POLY naive streaming with per batch normalization
AUC=0.41 R_AUC=0.52 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.04 R_AP=0.2 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_NAB_MGAB.out window=288 POLY naive streaming with per batch normalization
AUC=0.42 R_AUC=0.54 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.04 R_AP=0.2 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_MGAB_NAB_Dodgers.out window=49 POLY naive streaming with per batch normalization
AUC=0.54 R_AUC=0.66 Precision=0.05 Recall=0.03 F=0.04 ExistenceReward=0.08 OverlapReward=0.03
AP=0.05 R_AP=0.12 Precision@k=0.03 Rprecision=0.05 Rrecall=0.04 Rf=0.04

Without per batch normalization

```
In [ ]: run_poly_naive_streaming(False)
```

```
generated_data/normality1_NAB.out
(4031, 2)
Elapsed time: 0.006883859634399414 seconds
generated_data/normality1_Dodgers.out
(50400, 2)
Elapsed time: 0.026671648025512695 seconds
generated_data/normality1_MGAB.out
(100000, 2)
Elapsed time: 0.13403749465942383 seconds
generated_data/normality2_NAB_MGAB.out
(104031, 2)
Elapsed time: 0.13876676559448242 seconds
generated_data/normality2_MGAB_NAB.out
(104031, 2)
Elapsed time: 0.14146733283996582 seconds
generated_data/normality2_NAB_Dodgers.out
(54431, 2)
Elapsed time: 0.030773401260375977 seconds
generated_data/normality2_Dodgers_MGAB.out
(150400, 2)
Elapsed time: 0.08703136444091797 seconds
generated_data/normality2_Dodgers_NAB.out
(54431, 2)
Elapsed time: 0.030571937561035156 seconds
generated_data/normality2_MGAB_Dodgers.out
(150400, 2)
Elapsed time: 0.19688844680786133 seconds
generated_data/normality3_NAB_Dodgers_MGAB.out
(154431, 2)
Elapsed time: 0.08883857727050781 seconds
generated_data/normality3_Dodgers_MGAB_NAB.out
(154431, 2)
Elapsed time: 0.08713507652282715 seconds
generated_data/normality3_Dodgers_NAB_MGAB.out
(154431, 2)
Elapsed time: 0.08837509155273438 seconds
generated_data/normality3_MGAB_NAB_Dodgers.out
(154431, 2)
Elapsed time: 0.20555567741394043 seconds
generated_data/normality3_MGAB_Dodgers_NAB.out
(154431, 2)
Elapsed time: 0.19721436500549316 seconds
generated_data/normality3_NAB_MGAB_Dodgers.out
(154431, 2)
Elapsed time: 0.20140647888183594 seconds
```

normality1_NAB.out window=289 POLY naive streaming without per batch normalization
AUC=0.99 R_AUC=1.0 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.82 R_AP=0.99 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality1_Dodgers.out window=288 POLY naive streaming without per batch normalization
AUC=0.58 R_AUC=0.83 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.18 R_AP=0.65 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality1_MGAB.out window=49 POLY naive streaming without per batch normalization
AUC=0.48 R_AUC=0.63 Precision=0.00 Recall=0.01 F=0.00 ExistenceReward=0.10 OverlapReward=0.01
AP=0.0 R_AP=0.01 Precision@k=0.01 Rprecision=0.00 Rrecall=0.03 Rf=0.00

normality2_NAB_MGAB.out window=49 POLY naive streaming without per batch normalization
AUC=0.33 R_AUC=0.36 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_NAB.out window=49 POLY naive streaming without per batch normalization
AUC=0.31 R_AUC=0.43 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.08 OverlapReward=0.01
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.02 Rf=0.00

normality2_NAB_Dodgers.out window=288 POLY naive streaming without per batch normalization
AUC=0.60 R_AUC=0.83 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.19 R_AP=0.65 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_MGAB.out window=288 POLY naive streaming without per batch normalization
AUC=0.72 R_AUC=0.86 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.16 R_AP=0.56 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_NAB.out window=288 POLY naive streaming without per batch normalization
AUC=0.56 R_AUC=0.82 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.18 R_AP=0.63 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_Dodgers.out window=49 POLY naive streaming without per batch normalization
AUC=0.72 R_AUC=0.78 Precision=0.14 Recall=0.03 F=0.05 ExistenceReward=0.06 OverlapReward=0.04
AP=0.09 R_AP=0.17 Precision@k=0.03 Rprecision=0.15 Rrecall=0.04 Rf=0.07

normality3_NAB_Dodgers_MGAB.out window=288 POLY naive streaming without per batch normalization
AUC=0.71 R_AUC=0.87 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.17 R_AP=0.57 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_MGAB_NAB.out window=288 POLY naive streaming without per batch normalization
AUC=0.68 R_AUC=0.85 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.16 R_AP=0.55 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_NAB_MGAB.out window=288 POLY naive streaming without per batch normalization
AUC=0.68 R_AUC=0.87 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.16 R_AP=0.56 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_MGAB_NAB_Dodgers.out window=49 POLY naive streaming without per batch normalization
AUC=0.69 R_AUC=0.77 Precision=0.14 Recall=0.03 F=0.05 ExistenceReward=0.17 OverlapReward=0.12
AP=0.08 R_AP=0.17 Precision@k=0.03 Rprecision=0.11 Rrecall=0.13 Rf=0.12

normality3_MGAB_Dodgers_NAB.out window=49 POLY naive streaming without per batch normalization
AUC=0.67 R_AUC=0.77 Precision=0.17 Recall=0.04 F=0.07 ExistenceReward=0.15 OverlapReward=0.13
AP=0.09 R_AP=0.17 Precision@k=0.04 Rprecision=0.15 Rrecall=0.14 Rf=0.14

normality3_NAB_MGAB_Dodgers.out window=49 POLY naive streaming without per batch normalization
AUC=0.69 R_AUC=0.76 Precision=0.14 Recall=0.03 F=0.05 ExistenceReward=0.17 OverlapReward=0.12
AP=0.08 R_AP=0.17 Precision@k=0.03 Rprecision=0.11 Rrecall=0.13 Rf=0.12

HBOS

In [ ]:
```
def run_hbos_naive_streaming(per_batch_normalization):
    def _internal_run_hbos(batch, slidingWindow):
        clf = HBOS()

        clf.fit(batch)

        score = clf.decision_scores_
        score = score.reshape(-1, 1)
```

```
        if per_batch_normalization:
            score = MinMaxScaler(feature_range=(0,1)).fit_transform(score)

        return score.ravel()


    for current_file_name in sorted(input_files, key=lambda filename: int(filename.split('_')[0][-1])):
        start_time = time.time()
        current_file_path = os.path.join(INPUT_FOLDER_PATH, current_file_name)
        final_scores = []

        df = pd.read_csv(current_file_path, header=None).dropna().to_numpy()
        print(current_file_path)
        print(df.shape)

        data = df[:,0].astype(float)
        label = df[:,1].astype(int)

        slidingWindow = find_length(data)
        data_windowed = Window(window = slidingWindow).convert(data).to_numpy()

        total_batches = len(data_windowed) // BATCH_SIZE

        for i in range(total_batches):
            batch = data_windowed[i * BATCH_SIZE: (i + 1) * BATCH_SIZE]

            final_scores.extend(_internal_run_hbos(batch, slidingWindow=slidingWindow).tolist())

        remaining_elements = len(data_windowed) % BATCH_SIZE
        if remaining_elements > 0:
            last_batch = data_windowed[total_batches * BATCH_SIZE:]

            final_scores.extend(_internal_run_hbos(last_batch, slidingWindow=slidingWindow).tolist())

        modelName=f"HBOS naive streaming {'with' if per_batch_normalization else 'without'} per batch normalization"
        if not per_batch_normalization:
            final_scores = MinMaxScaler(feature_range=(0,1)).fit_transform(np.array(final_scores).reshape(-1,1)).ravel()
        else:
            final_scores = np.array(final_scores)

        final_scores = np.array([final_scores[0]]*math.ceil((slidingWindow-1)/2) + list(final_scores) + [final_scores[-1]]*((slidingWindow-1)//2))

        print(f"Elapsed time: {time.time() - start_time} seconds")

        plotFig(data, label, final_scores, slidingWindow, fileName=current_file_name, modelName=modelName)
```

With per batch normalization

In [ ]:
```
run_hbos_naive_streaming(True)
```

```
generated_data/normality1_NAB.out
(4031, 2)
Elapsed time: 0.37546229362487793 seconds
generated_data/normality1_Dodgers.out
(50400, 2)
Elapsed time: 4.494317054748535 seconds
generated_data/normality1_MGAB.out
(100000, 2)
Elapsed time: 1.5146644115447998 seconds
generated_data/normality2_NAB_MGAB.out
(104031, 2)
Elapsed time: 1.5749568939208984 seconds
generated_data/normality2_MGAB_NAB.out
(104031, 2)
Elapsed time: 1.5670244693756104 seconds
generated_data/normality2_NAB_Dodgers.out
(54431, 2)
Elapsed time: 4.893996000289917 seconds
generated_data/normality2_Dodgers_MGAB.out
(150400, 2)
Elapsed time: 13.219509363174438 seconds
generated_data/normality2_Dodgers_NAB.out
(54431, 2)
Elapsed time: 4.893576622009277 seconds
generated_data/normality2_MGAB_Dodgers.out
(150400, 2)
Elapsed time: 2.3025734424591064 seconds
generated_data/normality3_NAB_Dodgers_MGAB.out
(154431, 2)
Elapsed time: 13.66287875175476 seconds
generated_data/normality3_Dodgers_MGAB_NAB.out
(154431, 2)
Elapsed time: 13.56325078010559 seconds
generated_data/normality3_Dodgers_NAB_MGAB.out
(154431, 2)
Elapsed time: 13.559232473373413 seconds
generated_data/normality3_MGAB_NAB_Dodgers.out
(154431, 2)
Elapsed time: 2.380685806274414 seconds
generated_data/normality3_MGAB_Dodgers_NAB.out
(154431, 2)
Elapsed time: 2.3651819229125977 seconds
generated_data/normality3_NAB_MGAB_Dodgers.out
(154431, 2)
Elapsed time: 2.3689897060394287 seconds
```

normality1_NAB.out window=289 HBOS naive streaming with per batch normalization
AUC=0.90 R_AUC=0.92 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.41 R_AP=0.46 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality1_Dodgers.out window=288 HBOS naive streaming with per batch normalization
AUC=0.33 R_AUC=0.79 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.08 R_AP=0.58 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality1_MGAB.out window=49 HBOS naive streaming with per batch normalization
AUC=0.53 R_AUC=0.64 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_NAB_MGAB.out window=49 HBOS naive streaming with per batch normalization
AUC=0.21 R_AUC=0.35 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_NAB.out window=49 HBOS naive streaming with per batch normalization
AUC=0.43 R_AUC=0.53 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.07 R_AP=0.02 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_NAB_Dodgers.out window=288 HBOS naive streaming with per batch normalization
AUC=0.35 R_AUC=0.79 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.08 R_AP=0.55 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_MGAB.out window=288 HBOS naive streaming with per batch normalization
AUC=0.38 R_AUC=0.77 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.03 R_AP=0.3 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_NAB.out window=288 HBOS naive streaming with per batch normalization
AUC=0.39 R_AUC=0.81 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.09 R_AP=0.59 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_Dodgers.out window=49 HBOS naive streaming with per batch normalization
AUC=0.43 R_AUC=0.71 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.04 R_AP=0.11 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_NAB_Dodgers_MGAB.out window=288 HBOS naive streaming with per batch normalization
AUC=0.38 R_AUC=0.77 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.04 R_AP=0.29 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_MGAB_NAB.out window=288 HBOS naive streaming with per batch normalization
AUC=0.40 R_AUC=0.77 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.04 R_AP=0.3 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_NAB_MGAB.out window=288 HBOS naive streaming with per batch normalization
AUC=0.40 R_AUC=0.77 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.04 R_AP=0.3 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_MGAB_NAB_Dodgers.out window=49 HBOS naive streaming with per batch normalization
AUC=0.41 R_AUC=0.68 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.04 R_AP=0.11 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_MGAB_Dodgers_NAB.out window=49 HBOS naive streaming with per batch normalization
AUC=0.44 R_AUC=0.7 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.05 R_AP=0.11 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

Without per batch normalization

In [ ]:
```
run_hbos_naive_streaming(False)
```

```
generated_data/normality1_NAB.out
(4031, 2)
Elapsed time: 0.38076090812683105 seconds
generated_data/normality1_Dodgers.out
(50400, 2)
Elapsed time: 4.483374834060669 seconds
generated_data/normality1_MGAB.out
(100000, 2)
Elapsed time: 1.5359559059143066 seconds
generated_data/normality2_NAB_MGAB.out
(104031, 2)
Elapsed time: 1.5735650062561035 seconds
generated_data/normality2_MGAB_NAB.out
(104031, 2)
Elapsed time: 1.554671049118042 seconds
generated_data/normality2_NAB_Dodgers.out
(54431, 2)
Elapsed time: 4.835142135620117 seconds
generated_data/normality2_Dodgers_MGAB.out
(150400, 2)
Elapsed time: 13.080058813095093 seconds
generated_data/normality2_Dodgers_NAB.out
(54431, 2)
Elapsed time: 4.8170082569122314 seconds
generated_data/normality2_MGAB_Dodgers.out
(150400, 2)
Elapsed time: 2.26887845993042 seconds
generated_data/normality3_NAB_Dodgers_MGAB.out
(154431, 2)
Elapsed time: 14.106380462646484 seconds
generated_data/normality3_Dodgers_MGAB_NAB.out
(154431, 2)
Elapsed time: 13.444388628005981 seconds
generated_data/normality3_Dodgers_NAB_MGAB.out
(154431, 2)
Elapsed time: 13.47631287574768 seconds
generated_data/normality3_MGAB_NAB_Dodgers.out
(154431, 2)
Elapsed time: 2.4399197101593018 seconds
generated_data/normality3_MGAB_Dodgers_NAB.out
(154431, 2)
Elapsed time: 2.4097650051116943 seconds
generated_data/normality3_NAB_MGAB_Dodgers.out
(154431, 2)
Elapsed time: 2.401535749435425 seconds
```

normality1_NAB.out window=289 HBOS naive streaming without per batch normalization
AUC=0.98 R_AUC=1.0 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.78 R_AP=0.99 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality1_Dodgers.out window=288 HBOS naive streaming without per batch normalization
AUC=0.29 R_AUC=0.8 Precision=1.00 Recall=0.00 F=0.00 ExistenceReward=0.01 OverlapReward=0.00
AP=0.09 R_AP=0.59 Precision@k=0.00 Rprecision=1.00 Rrecall=0.00 Rf=0.00

normality1_MGAB.out window=49 HBOS naive streaming without per batch normalization
AUC=0.51 R_AUC=0.63 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_NAB_MGAB.out window=49 HBOS naive streaming without per batch normalization
AUC=0.19 R_AUC=0.33 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_NAB.out window=49 HBOS naive streaming without per batch normalization
AUC=0.19 R_AUC=0.33 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_NAB_Dodgers.out window=288 HBOS naive streaming without per batch normalization
AUC=0.33 R_AUC=0.82 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.09 R_AP=0.59 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_MGAB.out window=288 HBOS naive streaming without per batch normalization
AUC=0.76 R_AUC=0.87 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.08 R_AP=0.54 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_NAB.out window=288 HBOS naive streaming without per batch normalization
AUC=0.32 R_AUC=0.8 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.08 R_AP=0.59 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_Dodgers.out window=49 HBOS naive streaming without per batch normalization
AUC=0.78 R_AUC=0.84 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.09 R_AP=0.2 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_NAB_Dodgers_MGAB.out window=288 HBOS naive streaming without per batch normalization
AUC=0.72 R_AUC=0.88 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.08 R_AP=0.54 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_MGAB_NAB.out window=288 HBOS naive streaming without per batch normalization
AUC=0.72 R_AUC=0.86 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.08 R_AP=0.53 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_NAB_MGAB.out window=288 HBOS naive streaming without per batch normalization
AUC=0.72 R_AUC=0.87 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.08 R_AP=0.53 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_MGAB_NAB_Dodgers.out window=49 HBOS naive streaming without per batch normalization
AUC=0.74 R_AUC=0.83 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.09 R_AP=0.2 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_MGAB_Dodgers_NAB.out window=49 HBOS naive streaming without per batch normalization
AUC=0.74 R_AUC=0.83 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.09 R_AP=0.2 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

CNN

In [ ]:
```
def run_cnn_naive_streaming(per_batch_normalization):
    def _internal_run_cnn(batch, slidingWindow):
        print(batch.shape)
        print(slidingWindow)
        if batch[:int(0.1*len(batch))].shape[0] < slidingWindow:
            if batch.shape[0] > 2*slidingWindow:
                batch_train = batch[:2*slidingWindow]
            else:
                return np.array([0 for i in range(batch.shape[0])])
        else:
            batch_train = batch[:int(0.1*len(batch))]

        batch_test = batch

        clf = cnn(slidingwindow = slidingWindow, predict_time_steps=1, epochs = 100, patience = 5, verbose=0)

        clf.fit(batch_train, batch_test)

        measure = Fourier()
        measure.detector = clf
        measure.set_param()

        clf.decision_function(measure=measure)
        score = clf.decision_scores_
        score = score.reshape(-1, 1)

        if per_batch_normalization:
            score = MinMaxScaler(feature_range=(0,1)).fit_transform(score)

        return score.ravel()


    for current_file_name in sorted(input_files, key=lambda filename: int(filename.split('_')[0][-1])):
        start_time = time.time()
        current_file_path = os.path.join(INPUT_FOLDER_PATH, current_file_name)
        final_scores = []

        df = pd.read_csv(current_file_path, header=None).dropna().to_numpy()
        print(current_file_path)
        print(df.shape)

        data = df[:,0].astype(float)
        label = df[:,1].astype(int)

        slidingWindow = find_length(data)

        total_batches = len(data) // BATCH_SIZE

        for i in range(total_batches):
            batch = data[i * BATCH_SIZE: (i + 1) * BATCH_SIZE]

            final_scores.extend(_internal_run_cnn(batch, slidingWindow=slidingWindow).tolist())

        remaining_elements = len(data) % BATCH_SIZE
        if remaining_elements > 0:
            last_batch = data[total_batches * BATCH_SIZE:]

            if len(last_batch) < slidingWindow:
                final_scores.extend([final_scores[-1] for i in range(len(last_batch))])
            else:
                final_scores.extend(_internal_run_cnn(last_batch, slidingWindow=slidingWindow).tolist())

        modelName=f"CNN naive streaming {'with' if per_batch_normalization else 'without'} per batch normalization"
        if not per_batch_normalization:
            final_scores = MinMaxScaler(feature_range=(0,1)).fit_transform(np.array(final_scores).reshape(-1,1)).ravel()
        else:
            final_scores = np.array(final_scores)
```

```
        print(f"Elapsed time: {time.time() - start_time} seconds")

        plotFig(data, label, final_scores, slidingWindow, fileName=current_file_name, modelName=modelName)
```

With per batch normalization

In [ ]:
```
run_cnn_naive_streaming(True)
```

```
generated_data/normality1_NAB.out
(4031, 2)
(2000,)
289
2024-06-21 17:53:41.337287: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 17:53:41.337480: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 17:53:41.382388: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 17:53:41.382559: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 17:53:41.382776: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 17:53:41.382849: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 17:53:41.485545: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 17:53:41.485705: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 17:53:41.485797: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 17:53:41.485954: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 17:53:41.486240: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 17:53:41.486323: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 17:53:42.082298: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 17:53:42.082467: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 17:53:42.082564: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 17:53:42.082640: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 17:53:42.082717: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 17:53:42.082791: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1886] Created device /job:localhost/replica:0/task:0/device:GPU:0 with 21027 MB memory:  -> device: 0, name:
NVIDIA GeForce RTX 3090, pci bus id: 0000:01:00.0, compute capability: 8.6
2024-06-21 17:53:42.083092: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 17:53:42.083159: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1886] Created device /job:localhost/replica:0/task:0/device:GPU:1 with 22275 MB memory:  -> device: 1, name:
NVIDIA GeForce RTX 3090, pci bus id: 0000:05:00.0, compute capability: 8.6
2024-06-21 17:53:44.721750: I tensorflow/compiler/xla/stream_executor/cuda/cuda_dnn.cc:442] Loaded cuDNN version 8902
2024-06-21 17:53:46.796770: I tensorflow/compiler/xla/service/service.cc:168] XLA service 0x7614ec016bf0 initialized for platform CUDA (this does not guarantee that XLA will be used). Dev
ices:
2024-06-21 17:53:46.796792: I tensorflow/compiler/xla/service/service.cc:176]   StreamExecutor device (0): NVIDIA GeForce RTX 3090, Compute Capability 8.6
2024-06-21 17:53:46.796796: I tensorflow/compiler/xla/service/service.cc:176]   StreamExecutor device (1): NVIDIA GeForce RTX 3090, Compute Capability 8.6
2024-06-21 17:53:46.802161: I tensorflow/compiler/mlir/tensorflow/utils/dump_mlir_util.cc:269] disabling MLIR crash reproducer, set env var `MLIR_CRASH_REPRODUCER_DIRECTORY` to enable.
2024-06-21 17:53:46.864687: I ./tensorflow/compiler/jit/device_compiler.h:186] Compiled cluster using XLA!  This line is logged at most once for the lifetime of the process.
```

```
54/54 [==============================] - 0s 2ms/step
(2000,)
289
54/54 [==============================] - 0s 889us/step
Elapsed time: 8.755428791046143 seconds
generated_data/normality1_Dodgers.out
(50400, 2)
(2000,)
288
54/54 [==============================] - 0s 1ms/step
(2000,)
288
54/54 [==============================] - 0s 970us/step
(2000,)
288
54/54 [==============================] - 0s 919us/step
(2000,)
288
54/54 [==============================] - 0s 1ms/step
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288
54/54 [==============================] - 0s 701us/step
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288
54/54 [==============================] - 0s 932us/step
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288
54/54 [==============================] - 0s 777us/step
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54/54 [==============================] - 0s 832us/step
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288
54/54 [==============================] - 0s 810us/step
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288
54/54 [==============================] - 0s 3ms/step
(2000,)
288
54/54 [==============================] - 0s 869us/step
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288
54/54 [==============================] - 0s 822us/step
(2000,)
288
54/54 [==============================] - 0s 678us/step
(2000,)
288
54/54 [==============================] - 0s 803us/step
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54/54 [==============================] - 0s 739us/step
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54/54 [==============================] - 0s 836us/step
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54/54 [==============================] - 0s 931us/step
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54/54 [==============================] - 0s 622us/step
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54/54 [==============================] - 0s 759us/step
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54/54 [==============================] - 0s 861us/step
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54/54 [==============================] - 0s 858us/step
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288
54/54 [==============================] - 0s 805us/step
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288
54/54 [==============================] - 0s 698us/step
(2000,)
288
54/54 [==============================] - 0s 840us/step
(2000,)
288
54/54 [==============================] - 0s 765us/step
(400,)
288
Elapsed time: 36.76207137107849 seconds
generated_data/normality1_MGAB.out
(100000, 2)
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 740us/step
(2000,)
49
61/61 [==============================] - 0s 646us/step
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49
61/61 [==============================] - 0s 1ms/step
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61/61 [==============================] - 0s 675us/step
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49
61/61 [==============================] - 0s 691us/step
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61/61 [==============================] - 0s 688us/step
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61/61 [==============================] - 0s 1ms/step
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61/61 [==============================] - 0s 986us/step
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61/61 [==============================] - 0s 1ms/step
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61/61 [==============================] - 0s 675us/step
(2000,)
49
61/61 [==============================] - 0s 677us/step
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61/61 [==============================] - 0s 1ms/step
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49
61/61 [==============================] - 0s 787us/step
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49
61/61 [==============================] - 0s 771us/step
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49
61/61 [==============================] - 0s 925us/step
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49
61/61 [==============================] - 0s 637us/step
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61/61 [==============================] - 0s 5ms/step
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61/61 [==============================] - 0s 790us/step
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61/61 [==============================] - 0s 1ms/step
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61/61 [==============================] - 0s 666us/step
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49
61/61 [==============================] - 0s 721us/step
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49
61/61 [==============================] - 0s 720us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 731us/step
Elapsed time: 73.22385549545288 seconds
generated_data/normality2_NAB_MGAB.out
(104031, 2)
(2000,)
49
61/61 [==============================] - 0s 673us/step
(2000,)
49
61/61 [==============================] - 0s 892us/step
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49
61/61 [==============================] - 0s 826us/step
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61/61 [==============================] - 0s 751us/step
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61/61 [==============================] - 0s 973us/step
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61/61 [==============================] - 0s 977us/step
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61/61 [==============================] - 0s 693us/step
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61/61 [==============================] - 0s 1ms/step
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61/61 [==============================] - 0s 764us/step
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61/61 [==============================] - 0s 908us/step
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61/61 [==============================] - 0s 730us/step
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61/61 [==============================] - 0s 696us/step
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Elapsed time: 78.49778938293457 seconds
generated_data/normality2_MGAB_NAB.out
(104031, 2)
(2000,)
49
61/61 [==============================] - 0s 695us/step
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61/61 [==============================] - 0s 727us/step
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61/61 [==============================] - 0s 886us/step
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61/61 [==============================] - 0s 2ms/step
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61/61 [==============================] - 0s 2ms/step
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61/61 [==============================] - 0s 798us/step
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(2000,)
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61/61 [==============================] - 0s 802us/step
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61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 708us/step
Elapsed time: 80.18137788772583 seconds
generated_data/normality2_NAB_Dodgers.out
(54431, 2)
(2000,)
288
54/54 [==============================] - 0s 813us/step
(2000,)
288
54/54 [==============================] - 0s 835us/step
(2000,)
288
54/54 [==============================] - 0s 1ms/step
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54/54 [==============================] - 0s 1ms/step
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54/54 [==============================] - 0s 964us/step
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54/54 [==============================] - 0s 838us/step
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288
54/54 [==============================] - 0s 1ms/step
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288
54/54 [==============================] - 0s 827us/step
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288
54/54 [==============================] - 0s 904us/step
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288
54/54 [==============================] - 0s 757us/step
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54/54 [==============================] - 0s 771us/step
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54/54 [==============================] - 0s 1ms/step
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54/54 [==============================] - 0s 958us/step
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54/54 [==============================] - 0s 853us/step
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54/54 [==============================] - 0s 756us/step
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54/54 [==============================] - 0s 755us/step
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54/54 [==============================] - 0s 943us/step
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54/54 [==============================] - 0s 687us/step
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54/54 [==============================] - 0s 906us/step
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288
54/54 [==============================] - 0s 804us/step
(2000,)
288
54/54 [==============================] - 0s 844us/step
(2000,)
288
54/54 [==============================] - 0s 1ms/step
(2000,)
288
54/54 [==============================] - 0s 855us/step
(431,)
288
Elapsed time: 39.65529227256775 seconds
generated_data/normality2_Dodgers_MGAB.out
(150400, 2)
(2000,)
288
54/54 [==============================] - 0s 816us/step
(2000,)
288
54/54 [==============================] - 0s 1ms/step
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288
54/54 [==============================] - 0s 769us/step
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54/54 [==============================] - 0s 722us/step
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288
54/54 [==============================] - 0s 992us/step
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54/54 [==============================] - 0s 3ms/step
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54/54 [==============================] - 0s 771us/step
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54/54 [==============================] - 0s 941us/step
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54/54 [==============================] - 0s 833us/step
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54/54 [==============================] - 0s 743us/step
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54/54 [==============================] - 0s 774us/step
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54/54 [==============================] - 0s 713us/step
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288
54/54 [==============================] - 0s 860us/step
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54/54 [==============================] - 0s 849us/step
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54/54 [==============================] - 0s 1ms/step
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54/54 [==============================] - 0s 727us/step
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(154431, 2)
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generated_data/normality3_MGAB_Dodgers_NAB.out
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Elapsed time: 110.8635573387146 seconds
generated_data/normality3_NAB_MGAB_Dodgers.out
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12/12 [==============================] - 0s 834us/step
Elapsed time: 120.7328052520752 seconds
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normality1_NAB.out window=289 CNN naive streaming with per batch normalization
AUC=0.52 R_AUC=0.66 Precision=0.20 Recall=0.01 F=0.01 ExistenceReward=1.00 OverlapReward=0.01
AP=0.12 R_AP=0.21 Precision@k=0.01 Rprecision=0.21 Rrecall=0.20 Rf=0.21

normality1_Dodgers.out window=288 CNN naive streaming with per batch normalization
AUC=0.51 R_AUC=0.79 Precision=0.11 Recall=0.01 F=0.03 ExistenceReward=0.19 OverlapReward=0.04
AP=0.12 R_AP=0.53 Precision@k=0.01 Rprecision=0.08 Rrecall=0.07 Rf=0.07

normality1_MGAB.out window=49 CNN naive streaming with per batch normalization
AUC=0.52 R_AUC=0.68 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_NAB_MGAB.out window=49 CNN naive streaming with per batch normalization
AUC=0.40 R_AUC=0.5 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.01 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_NAB.out window=49 CNN naive streaming with per batch normalization
AUC=0.39 R_AUC=0.52 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_NAB_Dodgers.out window=288 CNN naive streaming with per batch normalization
AUC=0.49 R_AUC=0.78 Precision=0.12 Recall=0.02 F=0.03 ExistenceReward=0.21 OverlapReward=0.04
AP=0.11 R_AP=0.53 Precision@k=0.02 Rprecision=0.08 Rrecall=0.07 Rf=0.08

normality2_Dodgers_MGAB.out window=288 CNN naive streaming with per batch normalization
AUC=0.46 R_AUC=0.66 Precision=0.01 Recall=0.00 F=0.01 ExistenceReward=0.07 OverlapReward=0.02
AP=0.03 R_AP=0.16 Precision@k=0.00 Rprecision=0.02 Rrecall=0.03 Rf=0.03

normality2_Dodgers_NAB.out window=288 CNN naive streaming with per batch normalization
AUC=0.48 R_AUC=0.76 Precision=0.08 Recall=0.01 F=0.02 ExistenceReward=0.15 OverlapReward=0.03
AP=0.11 R_AP=0.48 Precision@k=0.01 Rprecision=0.08 Rrecall=0.06 Rf=0.07

normality2_MGAB_Dodgers.out window=49 CNN naive streaming with per batch normalization
AUC=0.33 R_AUC=0.49 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.03 R_AP=0.05 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_NAB_Dodgers_MGAB.out window=288 CNN naive streaming with per batch normalization
AUC=0.40 R_AUC=0.64 Precision=0.02 Recall=0.00 F=0.01 ExistenceReward=0.08 OverlapReward=0.02
AP=0.03 R_AP=0.15 Precision@k=0.00 Rprecision=0.03 Rrecall=0.03 Rf=0.03

normality3_Dodgers_MGAB_NAB.out window=288 CNN naive streaming with per batch normalization
AUC=0.43 R_AUC=0.67 Precision=0.02 Recall=0.00 F=0.01 ExistenceReward=0.08 OverlapReward=0.02
AP=0.03 R_AP=0.16 Precision@k=0.00 Rprecision=0.03 Rrecall=0.03 Rf=0.03

normality3_Dodgers_NAB_MGAB.out window=288 CNN naive streaming with per batch normalization
AUC=0.42 R_AUC=0.63 Precision=0.02 Recall=0.00 F=0.01 ExistenceReward=0.06 OverlapReward=0.01
AP=0.03 R_AP=0.15 Precision@k=0.00 Rprecision=0.02 Rrecall=0.02 Rf=0.02

normality3_MGAB_NAB_Dodgers.out window=49 CNN naive streaming with per batch normalization
AUC=0.36 R_AUC=0.51 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.03 R_AP=0.05 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_MGAB_Dodgers_NAB.out window=49 CNN naive streaming with per batch normalization
AUC=0.34 R_AUC=0.5 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.03 R_AP=0.05 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

Without per batch normalization

In [ ]:
```
run_cnn_naive_streaming(False)
```

```
generated_data/normality1_NAB.out
(4031, 2)
(2000,)
289
2024-06-21 18:21:11.485381: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 18:21:11.485564: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 18:21:11.526480: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 18:21:11.526640: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 18:21:11.526722: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 18:21:11.526791: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 18:21:11.611599: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 18:21:11.611767: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 18:21:11.611861: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 18:21:11.611933: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 18:21:11.612001: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 18:21:11.612069: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 18:21:12.316257: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 18:21:12.360501: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 18:21:12.360719: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 18:21:12.360845: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 18:21:12.360916: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 18:21:12.361091: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1886] Created device /job:localhost/replica:0/task:0/device:GPU:0 with 21239 MB memory:  -> device: 0, name:
NVIDIA GeForce RTX 3090, pci bus id: 0000:01:00.0, compute capability: 8.6
2024-06-21 18:21:12.361416: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 18:21:12.361482: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1886] Created device /job:localhost/replica:0/task:0/device:GPU:1 with 22275 MB memory:  -> device: 1, name:
NVIDIA GeForce RTX 3090, pci bus id: 0000:05:00.0, compute capability: 8.6
2024-06-21 18:21:15.016099: I tensorflow/compiler/xla/stream_executor/cuda/cuda_dnn.cc:442] Loaded cuDNN version 8902
2024-06-21 18:21:17.248838: I tensorflow/compiler/xla/service/service.cc:168] XLA service 0x764bd89d7220 initialized for platform CUDA (this does not guarantee that XLA will be used). Dev
ices:
2024-06-21 18:21:17.248854: I tensorflow/compiler/xla/service/service.cc:176]   StreamExecutor device (0): NVIDIA GeForce RTX 3090, Compute Capability 8.6
2024-06-21 18:21:17.248857: I tensorflow/compiler/xla/service/service.cc:176]   StreamExecutor device (1): NVIDIA GeForce RTX 3090, Compute Capability 8.6
2024-06-21 18:21:17.251849: I tensorflow/compiler/mlir/tensorflow/utils/dump_mlir_util.cc:269] disabling MLIR crash reproducer, set env var `MLIR_CRASH_REPRODUCER_DIRECTORY` to enable.
2024-06-21 18:21:17.306170: I ./tensorflow/compiler/jit/device_compiler.h:186] Compiled cluster using XLA!  This line is logged at most once for the lifetime of the process.
```

```
54/54 [==============================] - 0s 2ms/step
(2000,)
289
54/54 [==============================] - 0s 766us/step
Elapsed time: 9.121267318725586 seconds
generated_data/normality1_Dodgers.out
(50400, 2)
(2000,)
288
54/54 [==============================] - 0s 1ms/step
(2000,)
288
54/54 [==============================] - 0s 941us/step
(2000,)
288
54/54 [==============================] - 0s 757us/step
(2000,)
288
54/54 [==============================] - 0s 1ms/step
(2000,)
288
54/54 [==============================] - 0s 930us/step
(2000,)
288
54/54 [==============================] - 0s 1ms/step
(2000,)
288
54/54 [==============================] - 0s 2ms/step
(2000,)
288
54/54 [==============================] - 0s 846us/step
(2000,)
288
54/54 [==============================] - 0s 1ms/step
(2000,)
288
54/54 [==============================] - 0s 1ms/step
(2000,)
288
54/54 [==============================] - 0s 832us/step
(2000,)
288
54/54 [==============================] - 0s 804us/step
(2000,)
288
54/54 [==============================] - 0s 832us/step
(2000,)
288
54/54 [==============================] - 0s 758us/step
(2000,)
288
54/54 [==============================] - 0s 817us/step
(2000,)
288
54/54 [==============================] - 0s 865us/step
(2000,)
288
54/54 [==============================] - 0s 695us/step
(2000,)
288
54/54 [==============================] - 0s 1ms/step
(2000,)
288
54/54 [==============================] - 0s 686us/step
(2000,)
288
54/54 [==============================] - 0s 854us/step
(2000,)
288
54/54 [==============================] - 0s 919us/step
(2000,)
288
54/54 [==============================] - 0s 832us/step
(2000,)
288
54/54 [==============================] - 0s 1ms/step
(2000,)
288
54/54 [==============================] - 0s 858us/step
(2000,)
288
54/54 [==============================] - 0s 915us/step
(400,)
288
Elapsed time: 39.06184649467468 seconds
generated_data/normality1_MGAB.out
(100000, 2)
(2000,)
49
61/61 [==============================] - 0s 2ms/step
(2000,)
49
61/61 [==============================] - 0s 974us/step
(2000,)
49
61/61 [==============================] - 0s 786us/step
(2000,)
49
61/61 [==============================] - 0s 960us/step
(2000,)
49
61/61 [==============================] - 0s 724us/step
(2000,)
49
61/61 [==============================] - 0s 824us/step
(2000,)
49
61/61 [==============================] - 0s 704us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 724us/step
(2000,)
49
61/61 [==============================] - 0s 971us/step
(2000,)
49
61/61 [==============================] - 0s 784us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 851us/step
(2000,)
49
61/61 [==============================] - 0s 748us/step
(2000,)
49
61/61 [==============================] - 0s 663us/step
```

```
(2000,)
49
61/61 [==============================] - 0s 748us/step
(2000,)
49
61/61 [==============================] - 0s 659us/step
(2000,)
49
61/61 [==============================] - 0s 913us/step
(2000,)
49
61/61 [==============================] - 0s 871us/step
(2000,)
49
61/61 [==============================] - 0s 799us/step
(2000,)
49
61/61 [==============================] - 0s 759us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 688us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 1s 680us/step
(2000,)
49
61/61 [==============================] - 0s 949us/step
(2000,)
49
61/61 [==============================] - 0s 827us/step
(2000,)
49
61/61 [==============================] - 0s 935us/step
(2000,)
49
61/61 [==============================] - 0s 889us/step
(2000,)
49
61/61 [==============================] - 0s 934us/step
(2000,)
49
61/61 [==============================] - 0s 931us/step
(2000,)
49
61/61 [==============================] - 0s 829us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 769us/step
(2000,)
49
61/61 [==============================] - 0s 912us/step
(2000,)
49
61/61 [==============================] - 0s 969us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 651us/step
(2000,)
49
61/61 [==============================] - 0s 670us/step
(2000,)
49
61/61 [==============================] - 0s 720us/step
(2000,)
49
61/61 [==============================] - 0s 909us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 890us/step
(2000,)
49
61/61 [==============================] - 0s 664us/step
(2000,)
49
61/61 [==============================] - 0s 705us/step
(2000,)
49
61/61 [==============================] - 0s 972us/step
(2000,)
49
61/61 [==============================] - 0s 729us/step
(2000,)
49
61/61 [==============================] - 0s 783us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
Elapsed time: 77.52867913246155 seconds
generated_data/normality2_NAB_MGAB.out
(104031, 2)
(2000,)
49
61/61 [==============================] - 0s 791us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 830us/step
(2000,)
49
61/61 [==============================] - 0s 920us/step
(2000,)
49
61/61 [==============================] - 0s 888us/step
(2000,)
49
61/61 [==============================] - 0s 832us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
```

```
(2000,)
49
61/61 [==============================] - 0s 805us/step
(2000,)
49
61/61 [==============================] - 0s 805us/step
(2000,)
49
61/61 [==============================] - 0s 996us/step
(2000,)
49
61/61 [==============================] - 0s 792us/step
(2000,)
49
61/61 [==============================] - 0s 804us/step
(2000,)
49
61/61 [==============================] - 0s 3ms/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 990us/step
(2000,)
49
61/61 [==============================] - 0s 909us/step
(2000,)
49
61/61 [==============================] - 0s 801us/step
(2000,)
49
61/61 [==============================] - 0s 809us/step
(2000,)
49
61/61 [==============================] - 0s 849us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 826us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 2ms/step
(2000,)
49
61/61 [==============================] - 0s 674us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 792us/step
(2000,)
49
61/61 [==============================] - 0s 863us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 751us/step
(2000,)
49
61/61 [==============================] - 0s 849us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 662us/step
(2000,)
49
61/61 [==============================] - 0s 808us/step
(2000,)
49
61/61 [==============================] - 0s 737us/step
(2000,)
49
61/61 [==============================] - 0s 740us/step
(2000,)
49
61/61 [==============================] - 0s 2ms/step
(2000,)
49
61/61 [==============================] - 0s 688us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 802us/step
(2000,)
49
61/61 [==============================] - 0s 678us/step
(2000,)
49
61/61 [==============================] - 0s 763us/step
(2000,)
49
61/61 [==============================] - 0s 787us/step
(2000,)
49
61/61 [==============================] - 0s 706us/step
(2000,)
49
61/61 [==============================] - 0s 798us/step
(2000,)
49
61/61 [==============================] - 0s 763us/step
(2000,)
49
61/61 [==============================] - 0s 922us/step
(2000,)
49
61/61 [==============================] - 0s 994us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 704us/step
```

```
Elapsed time: 81.22706055641174 seconds
generated_data/normality2_MGAB_NAB.out
(104031, 2)
(2000,)
49
61/61 [==============================] - 0s 925us/step
(2000,)
49
61/61 [==============================] - 0s 699us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 779us/step
(2000,)
49
61/61 [==============================] - 0s 701us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 756us/step
(2000,)
49
61/61 [==============================] - 0s 855us/step
(2000,)
49
61/61 [==============================] - 0s 964us/step
(2000,)
49
61/61 [==============================] - 0s 874us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 863us/step
(2000,)
49
61/61 [==============================] - 0s 705us/step
(2000,)
49
61/61 [==============================] - 0s 816us/step
(2000,)
49
61/61 [==============================] - 0s 848us/step
(2000,)
49
61/61 [==============================] - 0s 872us/step
(2000,)
49
61/61 [==============================] - 0s 734us/step
(2000,)
49
61/61 [==============================] - 0s 765us/step
(2000,)
49
61/61 [==============================] - 0s 921us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 903us/step
(2000,)
49
61/61 [==============================] - 0s 672us/step
(2000,)
49
61/61 [==============================] - 0s 733us/step
(2000,)
49
61/61 [==============================] - 0s 943us/step
(2000,)
49
61/61 [==============================] - 0s 804us/step
(2000,)
49
61/61 [==============================] - 0s 809us/step
(2000,)
49
61/61 [==============================] - 0s 991us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 649us/step
(2000,)
49
61/61 [==============================] - 0s 922us/step
(2000,)
49
61/61 [==============================] - 0s 845us/step
(2000,)
49
61/61 [==============================] - 0s 830us/step
(2000,)
49
61/61 [==============================] - 0s 778us/step
(2000,)
49
61/61 [==============================] - 0s 782us/step
(2000,)
49
61/61 [==============================] - 0s 869us/step
(2000,)
49
61/61 [==============================] - 0s 743us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 788us/step
(2000,)
49
61/61 [==============================] - 0s 777us/step
(2000,)
49
61/61 [==============================] - 0s 887us/step
(2000,)
49
61/61 [==============================] - 0s 908us/step
(2000,)
49
61/61 [==============================] - 0s 869us/step
```

```
(2000,)
49
61/61 [==============================] - 0s 767us/step
(2000,)
49
61/61 [==============================] - 0s 680us/step
(2000,)
49
61/61 [==============================] - 0s 2ms/step
(2000,)
49
61/61 [==============================] - 0s 806us/step
(2000,)
49
61/61 [==============================] - 0s 860us/step
(2000,)
49
61/61 [==============================] - 0s 1ms/step
(2000,)
49
61/61 [==============================] - 0s 867us/step
(2000,)
49
61/61 [==============================] - 0s 750us/step
(2000,)
49
61/61 [==============================] - 0s 828us/step
Elapsed time: 81.85118341445923 seconds
generated_data/normality2_NAB_Dodgers.out
(54431, 2)
(2000,)
288
54/54 [==============================] - 0s 974us/step
(2000,)
288
54/54 [==============================] - 0s 689us/step
(2000,)
288
54/54 [==============================] - 0s 770us/step
(2000,)
288
54/54 [==============================] - 0s 847us/step
(2000,)
288
54/54 [==============================] - 0s 919us/step
(2000,)
288
54/54 [==============================] - 0s 2ms/step
(2000,)
288
54/54 [==============================] - 0s 842us/step
(2000,)
288
54/54 [==============================] - 0s 1ms/step
(2000,)
288
54/54 [==============================] - 0s 789us/step
(2000,)
288
54/54 [==============================] - 0s 777us/step
(2000,)
288
54/54 [==============================] - 0s 777us/step
(2000,)
288
54/54 [==============================] - 0s 1ms/step
(2000,)
288
54/54 [==============================] - 0s 782us/step
(2000,)
288
54/54 [==============================] - 0s 844us/step
(2000,)
288
54/54 [==============================] - 0s 934us/step
(2000,)
288
54/54 [==============================] - 0s 695us/step
(2000,)
288
54/54 [==============================] - 0s 2ms/step
(2000,)
288
54/54 [==============================] - 0s 818us/step
(2000,)
288
54/54 [==============================] - 0s 1ms/step
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288
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Elapsed time: 130.70013070106506 seconds
generated_data/normality3_Dodgers_NAB_MGAB.out
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Elapsed time: 127.19328689575195 seconds
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Elapsed time: 121.302983045578 seconds
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Elapsed time: 122.02335143089294 seconds
generated_data/normality3_NAB_MGAB_Dodgers.out
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Elapsed time: 124.85392189025879 seconds
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normality1_NAB.out window=289 CNN naive streaming without per batch normalization
AUC=0.46 R_AUC=0.61 Precision=0.21 Recall=0.01 F=0.01 ExistenceReward=1.00 OverlapReward=0.01
AP=0.1 R_AP=0.17 Precision@k=0.01 Rprecision=0.21 Rrecall=0.20 Rf=0.21

normality1_Dodgers.out window=288 CNN naive streaming without per batch normalization
AUC=0.51 R_AUC=0.81 Precision=0.13 Recall=0.02 F=0.03 ExistenceReward=0.20 OverlapReward=0.03
AP=0.12 R_AP=0.58 Precision@k=0.02 Rprecision=0.10 Rrecall=0.06 Rf=0.08

normality1_MGAB.out window=49 CNN naive streaming without per batch normalization
AUC=0.56 R_AUC=0.68 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_NAB_MGAB.out window=49 CNN naive streaming without per batch normalization
AUC=0.48 R_AUC=0.56 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.01 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_NAB.out window=49 CNN naive streaming without per batch normalization
AUC=0.47 R_AUC=0.56 Precision=0.33 Recall=0.01 F=0.01 ExistenceReward=0.17 OverlapReward=0.00
AP=0.01 R_AP=0.01 Precision@k=0.01 Rprecision=0.33 Rrecall=0.03 Rf=0.06

normality2_NAB_Dodgers.out window=288 CNN naive streaming without per batch normalization
AUC=0.47 R_AUC=0.79 Precision=0.10 Recall=0.02 F=0.03 ExistenceReward=0.19 OverlapReward=0.02
AP=0.11 R_AP=0.58 Precision@k=0.02 Rprecision=0.11 Rrecall=0.05 Rf=0.07

normality2_Dodgers_MGAB.out window=288 CNN naive streaming without per batch normalization
AUC=0.54 R_AUC=0.76 Precision=0.07 Recall=0.02 F=0.03 ExistenceReward=0.22 OverlapReward=0.04
AP=0.05 R_AP=0.26 Precision@k=0.02 Rprecision=0.08 Rrecall=0.08 Rf=0.08

normality2_Dodgers_NAB.out window=288 CNN naive streaming without per batch normalization
AUC=0.52 R_AUC=0.78 Precision=0.08 Recall=0.01 F=0.02 ExistenceReward=0.16 OverlapReward=0.03
AP=0.12 R_AP=0.51 Precision@k=0.01 Rprecision=0.09 Rrecall=0.06 Rf=0.07

normality2_MGAB_Dodgers.out window=49 CNN naive streaming without per batch normalization
AUC=0.38 R_AUC=0.56 Precision=0.07 Recall=0.01 F=0.01 ExistenceReward=0.04 OverlapReward=0.00
AP=0.03 R_AP=0.07 Precision@k=0.01 Rprecision=0.06 Rrecall=0.01 Rf=0.02

normality3_NAB_Dodgers_MGAB.out window=288 CNN naive streaming without per batch normalization
AUC=0.47 R_AUC=0.74 Precision=0.07 Recall=0.03 F=0.04 ExistenceReward=0.23 OverlapReward=0.04
AP=0.04 R_AP=0.26 Precision@k=0.03 Rprecision=0.07 Rrecall=0.08 Rf=0.08

normality3_Dodgers_MGAB_NAB.out window=288 CNN naive streaming without per batch normalization
AUC=0.51 R_AUC=0.73 Precision=0.07 Recall=0.02 F=0.03 ExistenceReward=0.22 OverlapReward=0.03
AP=0.05 R_AP=0.22 Precision@k=0.02 Rprecision=0.07 Rrecall=0.07 Rf=0.07

normality3_Dodgers_NAB_MGAB.out window=288 CNN naive streaming without per batch normalization
AUC=0.50 R_AUC=0.71 Precision=0.06 Recall=0.02 F=0.03 ExistenceReward=0.20 OverlapReward=0.03
AP=0.04 R_AP=0.21 Precision@k=0.02 Rprecision=0.07 Rrecall=0.06 Rf=0.06

normality3_MGAB_NAB_Dodgers.out window=49 CNN naive streaming without per batch normalization
AUC=0.37 R_AUC=0.55 Precision=0.11 Recall=0.01 F=0.01 ExistenceReward=0.08 OverlapReward=0.00
AP=0.03 R_AP=0.07 Precision@k=0.01 Rprecision=0.08 Rrecall=0.02 Rf=0.03

normality3_MGAB_Dodgers_NAB.out window=49 CNN naive streaming without per batch normalization
AUC=0.38 R_AUC=0.56 Precision=0.06 Recall=0.00 F=0.01 ExistenceReward=0.05 OverlapReward=0.00
AP=0.03 R_AP=0.07 Precision@k=0.00 Rprecision=0.06 Rrecall=0.01 Rf=0.02

Variant 2 (Proposed adaptations)

HBOS

In [ ]:
```
def run_hbos_streaming_variant(per_batch_normalization):
    def _internal_run_hbos(clf, batch, slidingWindow):
        clf.fit(batch)

        score = clf.decision_scores_
        score = score.reshape(-1, 1)

        if per_batch_normalization:
            score = MinMaxScaler(feature_range=(0,1)).fit_transform(score)

        return score.ravel()


    for current_file_name in sorted(input_files, key=lambda filename: int(filename.split('_')[0][-1])):
        start_time = time.time()
        current_file_path = os.path.join(INPUT_FOLDER_PATH, current_file_name)
        final_scores = []

        df = pd.read_csv(current_file_path, header=None).dropna().to_numpy()
        print(current_file_path)
        print(df.shape)

        data = df[:,0].astype(float)
        label = df[:,1].astype(int)

        slidingWindow = find_length(data)
        data_windowed = Window(window = slidingWindow).convert(data).to_numpy()

        total_batches = len(data_windowed) // BATCH_SIZE

        clf = HBOSVariant(n_features=data_windowed.shape[1])

        for i in range(total_batches):
            batch = data_windowed[i * BATCH_SIZE: (i + 1) * BATCH_SIZE]

            final_scores.extend(_internal_run_hbos(clf, batch, slidingWindow=slidingWindow).tolist())

        remaining_elements = len(data_windowed) % BATCH_SIZE
        if remaining_elements > 0:
            last_batch = data_windowed[total_batches * BATCH_SIZE:]

            final_scores.extend(_internal_run_hbos(clf, last_batch, slidingWindow=slidingWindow).tolist())

        modelName=f"HBOS variant {'with' if per_batch_normalization else 'without'} per batch normalization"
        if not per_batch_normalization:
            final_scores = MinMaxScaler(feature_range=(0,1)).fit_transform(np.array(final_scores).reshape(-1,1)).ravel()
        else:
            final_scores = np.array(final_scores)

        final_scores = np.array([final_scores[0]]*math.ceil((slidingWindow-1)/2) + list(final_scores) + [final_scores[-1]]*((slidingWindow-1)//2))

        print(f"Elapsed time: {time.time() - start_time} seconds")

        plotFig(data, label, final_scores, slidingWindow, fileName=current_file_name, modelName=modelName)
```

With per batch normalization

In [ ]:
```
run_hbos_streaming_variant(True)
```

```
generated_data/normality1_NAB.out
(4031, 2)
Elapsed time: 2.0483176708221436 seconds
generated_data/normality1_Dodgers.out
(50400, 2)
Elapsed time: 30.592058658599854 seconds
generated_data/normality1_MGAB.out
(100000, 2)
Elapsed time: 9.927880764007568 seconds
generated_data/normality2_NAB_MGAB.out
(104031, 2)
Elapsed time: 10.197636604309082 seconds
generated_data/normality2_MGAB_NAB.out
(104031, 2)
Elapsed time: 10.434322118759155 seconds
generated_data/normality2_NAB_Dodgers.out
(54431, 2)
Elapsed time: 32.79334807395935 seconds
generated_data/normality2_Dodgers_MGAB.out
(150400, 2)
Elapsed time: 91.07603478431702 seconds
generated_data/normality2_Dodgers_NAB.out
(54431, 2)
Elapsed time: 32.51000380516052 seconds
generated_data/normality2_MGAB_Dodgers.out
(150400, 2)
Elapsed time: 14.948853731155396 seconds
generated_data/normality3_NAB_Dodgers_MGAB.out
(154431, 2)
Elapsed time: 93.50704050064087 seconds
generated_data/normality3_Dodgers_MGAB_NAB.out
(154431, 2)
Elapsed time: 92.83211731910706 seconds
generated_data/normality3_Dodgers_NAB_MGAB.out
(154431, 2)
Elapsed time: 92.88994812965393 seconds
generated_data/normality3_MGAB_NAB_Dodgers.out
(154431, 2)
Elapsed time: 15.501492500305176 seconds
generated_data/normality3_MGAB_Dodgers_NAB.out
(154431, 2)
Elapsed time: 15.463603258132935 seconds
generated_data/normality3_NAB_MGAB_Dodgers.out
(154431, 2)
Elapsed time: 15.271292448043823 seconds
```

normality1_Dodgers.out window=288 HBOS variant with per batch normalization
AUC=0.35 R_AUC=0.81 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.08 R_AP=0.57 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality1_MGAB.out window=49 HBOS variant with per batch normalization
AUC=0.52 R_AUC=0.63 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_NAB_MGAB.out window=49 HBOS variant with per batch normalization
AUC=0.19 R_AUC=0.31 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_NAB.out window=49 HBOS variant with per batch normalization
AUC=0.64 R_AUC=0.67 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.01 R_AP=0.02 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_NAB_Dodgers.out window=288 HBOS variant with per batch normalization
AUC=0.33 R_AUC=0.78 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.08 R_AP=0.54 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_MGAB.out window=288 HBOS variant with per batch normalization
AUC=0.76 R_AUC=0.82 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.08 R_AP=0.52 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_NAB.out window=288 HBOS variant with per batch normalization
AUC=0.37 R_AUC=0.8 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.08 R_AP=0.57 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_Dodgers.out window=49 HBOS variant with per batch normalization
AUC=0.48 R_AUC=0.77 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.06 R_AP=0.15 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_NAB_Dodgers_MGAB.out window=288 HBOS variant with per batch normalization
AUC=0.75 R_AUC=0.81 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.07 R_AP=0.49 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_MGAB_NAB.out window=288 HBOS variant with per batch normalization
AUC=0.74 R_AUC=0.82 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.07 R_AP=0.52 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_NAB_MGAB.out window=288 HBOS variant with per batch normalization
AUC=0.74 R_AUC=0.82 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.07 R_AP=0.52 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_MGAB_NAB_Dodgers.out window=49 HBOS variant with per batch normalization
AUC=0.45 R_AUC=0.72 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.05 R_AP=0.13 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_MGAB_Dodgers_NAB.out window=49 HBOS variant with per batch normalization
AUC=0.46 R_AUC=0.73 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.06 R_AP=0.15 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_NAB_MGAB_Dodgers.out window=49 HBOS variant with per batch normalization
AUC=0.45 R_AUC=0.72 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.06 R_AP=0.14 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

Without per batch normalization

In [ ]:
```
run_hbos_streaming_variant(False)
```

```
generated_data/normality1_NAB.out
(4031, 2)
Elapsed time: 2.0000381469726562 seconds
generated_data/normality1_Dodgers.out
(50400, 2)
Elapsed time: 29.659552812576294 seconds
generated_data/normality1_MGAB.out
(100000, 2)
Elapsed time: 9.57120394706726 seconds
generated_data/normality2_NAB_MGAB.out
(104031, 2)
Elapsed time: 9.837783098220825 seconds
generated_data/normality2_MGAB_NAB.out
(104031, 2)
Elapsed time: 10.151525259017944 seconds
generated_data/normality2_NAB_Dodgers.out
(54431, 2)
Elapsed time: 32.05707812309265 seconds
generated_data/normality2_Dodgers_MGAB.out
(150400, 2)
Elapsed time: 88.30935597419739 seconds
generated_data/normality2_Dodgers_NAB.out
(54431, 2)
Elapsed time: 31.8093523979187 seconds
generated_data/normality2_MGAB_Dodgers.out
(150400, 2)
Elapsed time: 14.926780462265015 seconds
generated_data/normality3_NAB_Dodgers_MGAB.out
(154431, 2)
Elapsed time: 93.16992926597595 seconds
generated_data/normality3_Dodgers_MGAB_NAB.out
(154431, 2)
Elapsed time: 90.80111622810364 seconds
generated_data/normality3_Dodgers_NAB_MGAB.out
(154431, 2)
Elapsed time: 91.70628547668457 seconds
generated_data/normality3_MGAB_NAB_Dodgers.out
(154431, 2)
Elapsed time: 15.2354736328125 seconds
generated_data/normality3_MGAB_Dodgers_NAB.out
(154431, 2)
Elapsed time: 15.145554542541504 seconds
generated_data/normality3_NAB_MGAB_Dodgers.out
(154431, 2)
Elapsed time: 14.900652408599854 seconds
```

normality1_Dodgers.out window=288 HBOS variant without per batch normalization
AUC=0.31 R_AUC=0.84 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.08 R_AP=0.64 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality1_MGAB.out window=49 HBOS variant without per batch normalization
AUC=0.51 R_AUC=0.62 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_NAB_MGAB.out window=49 HBOS variant without per batch normalization
AUC=0.16 R_AUC=0.24 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_NAB.out window=49 HBOS variant without per batch normalization
AUC=0.81 R_AUC=0.7 Precision=0.10 Recall=0.67 F=0.17 ExistenceReward=0.17 OverlapReward=0.17
AP=0.05 R_AP=0.03 Precision@k=0.67 Rprecision=0.05 Rrecall=0.17 Rf=0.08

normality2_NAB_Dodgers.out window=288 HBOS variant without per batch normalization
AUC=0.32 R_AUC=0.82 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.08 R_AP=0.62 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_MGAB.out window=288 HBOS variant without per batch normalization
AUC=0.77 R_AUC=0.8 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.08 R_AP=0.54 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_NAB.out window=288 HBOS variant without per batch normalization
AUC=0.34 R_AUC=0.83 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.08 R_AP=0.63 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_Dodgers.out window=49 HBOS variant without per batch normalization
AUC=0.79 R_AUC=0.83 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.1 R_AP=0.18 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_NAB_Dodgers_MGAB.out window=288 HBOS variant without per batch normalization
AUC=0.67 R_AUC=0.8 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.07 R_AP=0.52 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_MGAB_NAB.out window=288 HBOS variant without per batch normalization
AUC=0.72 R_AUC=0.79 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.08 R_AP=0.53 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_NAB_MGAB.out window=288 HBOS variant without per batch normalization
AUC=0.76 R_AUC=0.8 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.08 R_AP=0.54 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_MGAB_NAB_Dodgers.out window=49 HBOS variant without per batch normalization
AUC=0.79 R_AUC=0.83 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.1 R_AP=0.18 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

Poly

In [ ]:
```
def run_poly_streaming_variant(per_batch_normalization):
    def _internal_run_poly(batch, slidingWindow):
        clf = POLYVariant(power=3, window = slidingWindow)
        x = batch

        clf.fit(x)
        measure = Fourier()
        measure.detector = clf
```

```
        measure.set_param()
        clf.decision_function(measure=measure)
        score = clf.decision_scores_
        score = score.reshape(-1, 1)

        if per_batch_normalization:
            score = MinMaxScaler(feature_range=(0,1)).fit_transform(score)

        return score.ravel().tolist()


    for current_file_name in sorted(input_files, key=lambda filename: int(filename.split('_')[0][-1])):
        start_time = time.time()
        current_file_path = os.path.join(INPUT_FOLDER_PATH, current_file_name)
        final_scores = []

        df = pd.read_csv(current_file_path, header=None).dropna().to_numpy()
        print(current_file_path)
        print(df.shape)

        data = df[:,0].astype(float)
        label = df[:,1].astype(int)

        slidingWindow = find_length(data)

        total_batches = len(data) // BATCH_SIZE

        for i in range(total_batches):
            batch = data[i * BATCH_SIZE: (i + 1) * BATCH_SIZE]
            final_scores.extend(_internal_run_poly(batch, slidingWindow=slidingWindow))

        remaining_elements = len(data) % BATCH_SIZE
        if remaining_elements > 0:
            last_batch = data[total_batches * BATCH_SIZE:]

            if len(last_batch) < slidingWindow:
                final_scores.extend([final_scores[-1] for i in range(len(last_batch))])
            else:
                final_scores.extend(_internal_run_poly(last_batch, slidingWindow=slidingWindow))


        modelName=f"POLY variant {'with' if per_batch_normalization else 'without'} per batch normalization"
        if not per_batch_normalization:
            final_scores = MinMaxScaler(feature_range=(0,1)).fit_transform(np.array(final_scores).reshape(-1,1)).ravel()
        else:
            final_scores = np.array(final_scores)

        print(f"Elapsed time: {time.time() - start_time} seconds")

        plotFig(data, label, final_scores, slidingWindow, fileName=current_file_name, modelName=modelName)
```

With per batch normalization

In [ ]:
```
run_poly_streaming_variant(True)
```

```
generated_data/normality1_NAB.out
(4031, 2)
Elapsed time: 0.009403228759765625 seconds
generated_data/normality1_Dodgers.out
(50400, 2)
Elapsed time: 0.039185285568237305 seconds
generated_data/normality1_MGAB.out
(100000, 2)
Elapsed time: 0.4215383529663086 seconds
generated_data/normality2_NAB_MGAB.out
(104031, 2)
Elapsed time: 0.4296085834503174 seconds
generated_data/normality2_MGAB_NAB.out
(104031, 2)
Elapsed time: 0.44431543350219727 seconds
generated_data/normality2_NAB_Dodgers.out
(54431, 2)
Elapsed time: 0.04774355888366699 seconds
generated_data/normality2_Dodgers_MGAB.out
(150400, 2)
Elapsed time: 0.12745022773742676 seconds
generated_data/normality2_Dodgers_NAB.out
(54431, 2)
Elapsed time: 0.04668712615966797 seconds
generated_data/normality2_MGAB_Dodgers.out
(150400, 2)
Elapsed time: 0.6331191062927246 seconds
generated_data/normality3_NAB_Dodgers_MGAB.out
(154431, 2)
Elapsed time: 0.12757229804992676 seconds
generated_data/normality3_Dodgers_MGAB_NAB.out
(154431, 2)
Elapsed time: 0.12598466873168945 seconds
generated_data/normality3_Dodgers_NAB_MGAB.out
(154431, 2)
Elapsed time: 0.12764787673950195 seconds
generated_data/normality3_MGAB_NAB_Dodgers.out
(154431, 2)
Elapsed time: 0.6415224075317383 seconds
generated_data/normality3_MGAB_Dodgers_NAB.out
(154431, 2)
Elapsed time: 0.637371301651001 seconds
generated_data/normality3_NAB_MGAB_Dodgers.out
(154431, 2)
Elapsed time: 0.6435599327087402 seconds
```

normality1_NAB.out window=289 POLY variant with per batch normalization
AUC=0.65 R_AUC=0.73 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.2 R_AP=0.46 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality1_Dodgers.out window=288 POLY variant with per batch normalization
AUC=0.49 R_AUC=0.75 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.11 R_AP=0.58 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality1_MGAB.out window=49 POLY variant with per batch normalization
AUC=0.59 R_AUC=0.67 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_NAB_MGAB.out window=49 POLY variant with per batch normalization
AUC=0.25 R_AUC=0.27 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_NAB.out window=49 POLY variant with per batch normalization
AUC=0.30 R_AUC=0.42 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_NAB_Dodgers.out window=288 POLY variant with per batch normalization
AUC=0.52 R_AUC=0.78 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.11 R_AP=0.56 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_MGAB.out window=288 POLY variant with per batch normalization
AUC=0.36 R_AUC=0.46 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.03 R_AP=0.17 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_NAB.out window=288 POLY variant with per batch normalization
AUC=0.48 R_AUC=0.77 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.11 R_AP=0.57 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_Dodgers.out window=49 POLY variant with per batch normalization
AUC=0.47 R_AUC=0.49 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.04 R_AP=0.09 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_NAB_Dodgers_MGAB.out window=288 POLY variant with per batch normalization
AUC=0.39 R_AUC=0.53 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.03 R_AP=0.18 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_MGAB_NAB.out window=288 POLY variant with per batch normalization
AUC=0.37 R_AUC=0.48 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.03 R_AP=0.18 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_NAB_MGAB.out window=288 POLY variant with per batch normalization
AUC=0.38 R_AUC=0.49 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.03 R_AP=0.18 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_MGAB_NAB_Dodgers.out window=49 POLY variant with per batch normalization
AUC=0.46 R_AUC=0.48 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.04 R_AP=0.08 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_MGAB_Dodgers_NAB.out window=49 POLY variant with per batch normalization
AUC=0.46 R_AUC=0.49 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.05 R_AP=0.09 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

Without per batch normalization

In [ ]:
```
run_poly_streaming_variant(False)
```

```
generated_data/normality1_NAB.out
(4031, 2)
Elapsed time: 0.0060956478118896484 seconds
generated_data/normality1_Dodgers.out
(50400, 2)
Elapsed time: 0.037030935287475586 seconds
generated_data/normality1_MGAB.out
(100000, 2)
Elapsed time: 0.41701650619506836 seconds
generated_data/normality2_NAB_MGAB.out
(104031, 2)
Elapsed time: 0.4225502014160156 seconds
generated_data/normality2_MGAB_NAB.out
(104031, 2)
Elapsed time: 0.4160459041595459 seconds
generated_data/normality2_NAB_Dodgers.out
(54431, 2)
Elapsed time: 0.03934526443481445 seconds
generated_data/normality2_Dodgers_MGAB.out
(150400, 2)
Elapsed time: 0.10755681991577148 seconds
generated_data/normality2_Dodgers_NAB.out
(54431, 2)
Elapsed time: 0.041665077209472656 seconds
generated_data/normality2_MGAB_Dodgers.out
(150400, 2)
Elapsed time: 0.6281158924102783 seconds
generated_data/normality3_NAB_Dodgers_MGAB.out
(154431, 2)
Elapsed time: 0.11712217330932617 seconds
generated_data/normality3_Dodgers_MGAB_NAB.out
(154431, 2)
Elapsed time: 0.11666584014892578 seconds
generated_data/normality3_Dodgers_NAB_MGAB.out
(154431, 2)
Elapsed time: 0.1136922836303711 seconds
generated_data/normality3_MGAB_NAB_Dodgers.out
(154431, 2)
Elapsed time: 0.6301090717315674 seconds
generated_data/normality3_MGAB_Dodgers_NAB.out
(154431, 2)
Elapsed time: 0.6269237995147705 seconds
generated_data/normality3_NAB_MGAB_Dodgers.out
(154431, 2)
Elapsed time: 0.6319410800933838 seconds
```

normality1_NAB.out window=289 POLY variant without per batch normalization
AUC=0.96 R_AUC=0.99 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.61 R_AP=0.94 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality1_Dodgers.out window=288 POLY variant without per batch normalization
AUC=0.58 R_AUC=0.79 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.17 R_AP=0.62 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality1_MGAB.out window=49 POLY variant without per batch normalization
AUC=0.44 R_AUC=0.52 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_NAB_MGAB.out window=49 POLY variant without per batch normalization
AUC=0.30 R_AUC=0.35 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_NAB.out window=49 POLY variant without per batch normalization
AUC=0.25 R_AUC=0.35 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_NAB_Dodgers.out window=288 POLY variant without per batch normalization
AUC=0.58 R_AUC=0.81 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.19 R_AP=0.64 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_MGAB.out window=288 POLY variant without per batch normalization
AUC=0.72 R_AUC=0.85 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.15 R_AP=0.54 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_NAB.out window=288 POLY variant without per batch normalization
AUC=0.56 R_AUC=0.79 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.17 R_AP=0.61 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_Dodgers.out window=49 POLY variant without per batch normalization
AUC=0.72 R_AUC=0.75 Precision=0.44 Recall=0.01 F=0.01 ExistenceReward=0.01 OverlapReward=0.01
AP=0.09 R_AP=0.16 Precision@k=0.01 Rprecision=0.44 Rrecall=0.01 Rf=0.02

normality3_NAB_Dodgers_MGAB.out window=288 POLY variant without per batch normalization
AUC=0.70 R_AUC=0.85 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.17 R_AP=0.56 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_MGAB_NAB.out window=288 POLY variant without per batch normalization
AUC=0.68 R_AUC=0.83 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.15 R_AP=0.53 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_NAB_MGAB.out window=288 POLY variant without per batch normalization
AUC=0.69 R_AUC=0.84 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.15 R_AP=0.54 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_MGAB_NAB_Dodgers.out window=49 POLY variant without per batch normalization
AUC=0.68 R_AUC=0.73 Precision=0.51 Recall=0.00 F=0.01 ExistenceReward=0.01 OverlapReward=0.01
AP=0.08 R_AP=0.16 Precision@k=0.00 Rprecision=0.51 Rrecall=0.01 Rf=0.01

normality3_MGAB_Dodgers_NAB.out window=49 POLY variant without per batch normalization
AUC=0.67 R_AUC=0.74 Precision=0.44 Recall=0.01 F=0.01 ExistenceReward=0.01 OverlapReward=0.01
AP=0.09 R_AP=0.16 Precision@k=0.01 Rprecision=0.44 Rrecall=0.01 Rf=0.02

Poly streaming variant with having all the previous polynomials available and normalization

In [ ]:
```
for current_file_name in sorted(input_files, key=lambda filename: int(filename.split('_')[0][-1])):
    start_time = time.time()
    current_file_path = os.path.join(INPUT_FOLDER_PATH, current_file_name)

    df = pd.read_csv(current_file_path, header=None).dropna().to_numpy()
    print(current_file_path)
    print(df.shape)

    data = df[:,0].astype(float)
    label = df[:,1].astype(int)

    slidingWindow = find_length(data)
    data_windowed = Window(window = slidingWindow).convert(data).to_numpy()

    modelName='POLY variant wtih having all the previous polynomials available and normalization'
    clf = POLYVariant(power=3, window = slidingWindow)
    x = data
    clf.fit(x)
    measure = Fourier()
    measure.detector = clf
    measure.set_param()
    clf.decision_function(measure=measure)
    score = clf.decision_scores_
    score = MinMaxScaler(feature_range=(0,1)).fit_transform(score.reshape(-1,1)).ravel()

    print(f"Elapsed time: {time.time() - start_time} seconds")

    plotFig(data, label, score, slidingWindow, fileName=current_file_name, modelName=modelName)
```

```
generated_data/normality1_NAB.out
(4031, 2)
Elapsed time: 0.018874406814575195 seconds
generated_data/normality1_Dodgers.out
(50400, 2)
Elapsed time: 0.9285135269165039 seconds
generated_data/normality1_MGAB.out
(100000, 2)
Elapsed time: 34.8102126121521 seconds
generated_data/normality2_NAB_MGAB.out
(104031, 2)
Elapsed time: 39.969430446624756 seconds
generated_data/normality2_MGAB_NAB.out
(104031, 2)
Elapsed time: 37.54496908187866 seconds
generated_data/normality2_NAB_Dodgers.out
(54431, 2)
Elapsed time: 1.5251195430755615 seconds
generated_data/normality2_Dodgers_MGAB.out
(150400, 2)
Elapsed time: 8.90935754776001 seconds
generated_data/normality2_Dodgers_NAB.out
(54431, 2)
Elapsed time: 1.5624303817749023 seconds
generated_data/normality2_MGAB_Dodgers.out
(150400, 2)
Elapsed time: 83.16042947769165 seconds
generated_data/normality3_NAB_Dodgers_MGAB.out
(154431, 2)
Elapsed time: 10.391361474990845 seconds
generated_data/normality3_Dodgers_MGAB_NAB.out
(154431, 2)
Elapsed time: 9.846774816513062 seconds
generated_data/normality3_Dodgers_NAB_MGAB.out
(154431, 2)
Elapsed time: 10.551133871078491 seconds
generated_data/normality3_MGAB_NAB_Dodgers.out
(154431, 2)
Elapsed time: 86.20354008674622 seconds
generated_data/normality3_MGAB_Dodgers_NAB.out
(154431, 2)
Elapsed time: 87.39468884468079 seconds
generated_data/normality3_NAB_MGAB_Dodgers.out
(154431, 2)
Elapsed time: 94.37087297439575 seconds
```

normality1_NAB.out window=289 POLY variant wtih having all the previous polynomials available and normalization
AUC=0.95 R_AUC=0.99 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.58 R_AP=0.92 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality1_Dodgers.out window=288 POLY variant wtih having all the previous polynomials available and normalization
AUC=0.43 R_AUC=0.65 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.11 R_AP=0.54 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality1_MGAB.out window=49 POLY variant wtih having all the previous polynomials available and normalization
AUC=0.39 R_AUC=0.4 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.0 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_NAB_MGAB.out window=49 POLY variant wtih having all the previous polynomials available and normalization
AUC=0.24 R_AUC=0.38 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_NAB.out window=49 POLY variant wtih having all the previous polynomials available and normalization
AUC=0.14 R_AUC=0.21 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.0 R_AP=0.01 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_NAB_Dodgers.out window=288 POLY variant wtih having all the previous polynomials available and normalization
AUC=0.51 R_AUC=0.61 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.17 R_AP=0.53 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_MGAB.out window=288 POLY variant wtih having all the previous polynomials available and normalization
AUC=0.75 R_AUC=0.75 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.09 R_AP=0.45 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_Dodgers_NAB.out window=288 POLY variant wtih having all the previous polynomials available and normalization
AUC=0.42 R_AUC=0.65 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.1 R_AP=0.53 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality2_MGAB_Dodgers.out window=49 POLY variant wtih having all the previous polynomials available and normalization
AUC=0.83 R_AUC=0.78 Precision=1.00 Recall=0.00 F=0.01 ExistenceReward=0.01 OverlapReward=0.00
AP=0.17 R_AP=0.19 Precision@k=0.00 Rprecision=1.00 Rrecall=0.00 Rf=0.00

normality3_NAB_Dodgers_MGAB.out window=288 POLY variant wtih having all the previous polynomials available and normalization
AUC=0.69 R_AUC=0.66 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.14 R_AP=0.36 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_MGAB_NAB.out window=288 POLY variant wtih having all the previous polynomials available and normalization
AUC=0.71 R_AUC=0.74 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.09 R_AP=0.45 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_Dodgers_NAB_MGAB.out window=288 POLY variant wtih having all the previous polynomials available and normalization
AUC=0.75 R_AUC=0.75 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.09 R_AP=0.45 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_MGAB_NAB_Dodgers.out window=49 POLY variant wtih having all the previous polynomials available and normalization
AUC=0.74 R_AUC=0.78 Precision=1.00 Recall=0.01 F=0.01 ExistenceReward=0.01 OverlapReward=0.00
AP=0.16 R_AP=0.19 Precision@k=0.01 Rprecision=1.00 Rrecall=0.00 Rf=0.00

normality3_MGAB_Dodgers_NAB.out window=49 POLY variant wtih having all the previous polynomials available and normalization
AUC=0.82 R_AUC=0.76 Precision=0.00 Recall=0.00 F=0.00 ExistenceReward=0.00 OverlapReward=0.00
AP=0.14 R_AP=0.18 Precision@k=0.00 Rprecision=0.00 Rrecall=0.00 Rf=0.00

normality3_NAB_MGAB_Dodgers.out window=49 POLY variant wtih having all the previous polynomials available and normalization
AUC=0.79 R_AUC=0.79 Precision=1.00 Recall=0.01 F=0.01 ExistenceReward=0.01 OverlapReward=0.00
AP=0.16 R_AP=0.19 Precision@k=0.01 Rprecision=1.00 Rrecall=0.00 Rf=0.00

CNN

In [ ]:
```
for current_file_name in sorted(input_files, key=lambda filename: int(filename.split('_')[0][-1])):
    start_time = time.time()
    current_file_path = os.path.join(INPUT_FOLDER_PATH, current_file_name)

    df = pd.read_csv(current_file_path, header=None).dropna().to_numpy()
    print(current_file_path)
    print(df.shape)
```

```python
    data = df[:,0].astype(float)
    label = df[:,1].astype(int)

    slidingWindow = find_length(data)
    data_windowed = Window(window = slidingWindow).convert(data).to_numpy()

    data_train = data[:int(0.1*len(data))]
    data_test = data

    modelName=f'CNN variant with normalization'
    clf = CnnVariant(slidingwindow = slidingWindow, predict_time_steps=1, epochs = 100, patience = 5, verbose=0)
    print(data_train.shape)
    print(data_test.shape)
    clf.fit(data_train, data_test)
    measure = Fourier()
    measure.detector = clf
    measure.set_param()
    clf.decision_function(measure=measure)
    score = clf.decision_scores_
    score = MinMaxScaler(feature_range=(0,1)).fit_transform(score.reshape(-1,1)).ravel()

    print(f"Elapsed time: {time.time() - start_time} seconds")

    plotFig(data, label, score, slidingWindow, fileName=current_file_name, modelName=modelName)
```

```
generated_data/normality1_NAB.out
(4031, 2)
(403,)
(4031,)
2024-06-21 20:06:51.389921: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 20:06:51.437105: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 20:06:51.477214: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 20:06:51.477383: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 20:06:51.477463: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 20:06:51.477531: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 20:06:51.572137: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 20:06:51.572298: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 20:06:51.572379: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 20:06:51.572447: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 20:06:51.572512: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 20:06:51.572576: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 20:06:52.186120: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 20:06:52.186315: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 20:06:52.186408: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 20:06:52.186484: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 20:06:52.186561: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 20:06:52.186634: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1886] Created device /job:localhost/replica:0/task:0/device:GPU:0 with 21220 MB memory:  -> device: 0, name:
NVIDIA GeForce RTX 3090, pci bus id: 0000:01:00.0, compute capability: 8.6
2024-06-21 20:06:52.187026: I tensorflow/compiler/xla/stream_executor/cuda/cuda_gpu_executor.cc:894] successful NUMA node read from SysFS had negative value (-1), but there must be at lea
st one NUMA node, so returning NUMA node zero. See more at https://github.com/torvalds/linux/blob/v6.0/Documentation/ABI/testing/sysfs-bus-pci#L344-L355
2024-06-21 20:06:52.187111: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1886] Created device /job:localhost/replica:0/task:0/device:GPU:1 with 22275 MB memory:  -> device: 1, name:
NVIDIA GeForce RTX 3090, pci bus id: 0000:05:00.0, compute capability: 8.6
2024-06-21 20:06:54.804453: I tensorflow/compiler/xla/stream_executor/cuda/cuda_dnn.cc:442] Loaded cuDNN version 8902
2024-06-21 20:06:56.911661: I tensorflow/compiler/xla/service/service.cc:168] XLA service 0x7ace4c016eb0 initialized for platform CUDA (this does not guarantee that XLA will be used). Dev
ices:
2024-06-21 20:06:56.911677: I tensorflow/compiler/xla/service/service.cc:176]   StreamExecutor device (0): NVIDIA GeForce RTX 3090, Compute Capability 8.6
2024-06-21 20:06:56.911680: I tensorflow/compiler/xla/service/service.cc:176]   StreamExecutor device (1): NVIDIA GeForce RTX 3090, Compute Capability 8.6
2024-06-21 20:06:56.946143: I ./tensorflow/compiler/jit/device_compiler.h:186] Compiled cluster using XLA!  This line is logged at most once for the lifetime of the process.
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generated_data/normality2_NAB_Dodgers.out
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normality1_Dodgers.out window=288 CNN variant with normalization
AUC=0.67 R_AUC=0.84 Precision=0.33 Recall=0.05 F=0.08 ExistenceReward=0.50 OverlapReward=0.17
AP=0.19 R_AP=0.63 Precision@k=0.05 Rprecision=0.19 Rrecall=0.23 Rf=0.21

normality1_MGAB.out window=49 CNN variant with normalization
AUC=0.58 R_AUC=0.76 Precision=0.01 Recall=0.10 F=0.02 ExistenceReward=0.50 OverlapReward=0.08
AP=0.01 R_AP=0.05 Precision@k=0.10 Rprecision=0.00 Rrecall=0.17 Rf=0.01

normality2_NAB_MGAB.out window=49 CNN variant with normalization
AUC=0.69 R_AUC=0.78 Precision=0.07 Recall=0.19 F=0.11 ExistenceReward=0.58 OverlapReward=0.06
AP=0.03 R_AP=0.04 Precision@k=0.19 Rprecision=0.07 Rrecall=0.16 Rf=0.10

normality2_MGAB_NAB.out window=49 CNN variant with normalization
AUC=0.77 R_AUC=0.85 Precision=0.08 Recall=0.26 F=0.12 ExistenceReward=0.58 OverlapReward=0.04
AP=0.05 R_AP=0.06 Precision@k=0.26 Rprecision=0.07 Rrecall=0.15 Rf=0.09

normality2_NAB_Dodgers.out window=288 CNN variant with normalization
AUC=0.59 R_AUC=0.85 Precision=0.22 Recall=0.04 F=0.06 ExistenceReward=0.36 OverlapReward=0.07
AP=0.15 R_AP=0.61 Precision@k=0.04 Rprecision=0.12 Rrecall=0.13 Rf=0.12

normality2_Dodgers_MGAB.out window=288 CNN variant with normalization
AUC=0.48 R_AUC=0.72 Precision=0.18 Recall=0.05 F=0.08 ExistenceReward=0.64 OverlapReward=0.19
AP=0.06 R_AP=0.24 Precision@k=0.05 Rprecision=0.12 Rrecall=0.28 Rf=0.16

normality2_Dodgers_NAB.out window=288 CNN variant with normalization
AUC=0.65 R_AUC=0.84 Precision=0.32 Recall=0.05 F=0.08 ExistenceReward=0.50 OverlapReward=0.20
AP=0.18 R_AP=0.61 Precision@k=0.05 Rprecision=0.18 Rrecall=0.26 Rf=0.21

normality2_MGAB_Dodgers.out window=49 CNN variant with normalization
AUC=0.79 R_AUC=0.89 Precision=0.17 Recall=0.11 F=0.14 ExistenceReward=0.76 OverlapReward=0.13
AP=0.12 R_AP=0.27 Precision@k=0.11 Rprecision=0.11 Rrecall=0.26 Rf=0.15

normality3_NAB_Dodgers_MGAB.out window=288 CNN variant with normalization
AUC=0.47 R_AUC=0.69 Precision=0.18 Recall=0.05 F=0.08 ExistenceReward=0.57 OverlapReward=0.16
AP=0.06 R_AP=0.22 Precision@k=0.05 Rprecision=0.14 Rrecall=0.24 Rf=0.18

normality3_Dodgers_MGAB_NAB.out window=288 CNN variant with normalization
AUC=0.44 R_AUC=0.68 Precision=0.20 Recall=0.05 F=0.08 ExistenceReward=0.59 OverlapReward=0.18
AP=0.06 R_AP=0.21 Precision@k=0.05 Rprecision=0.13 Rrecall=0.26 Rf=0.18

normality3_Dodgers_NAB_MGAB.out window=288 CNN variant with normalization
AUC=0.44 R_AUC=0.67 Precision=0.22 Recall=0.05 F=0.08 ExistenceReward=0.56 OverlapReward=0.17
AP=0.06 R_AP=0.21 Precision@k=0.05 Rprecision=0.14 Rrecall=0.25 Rf=0.18

normality3_MGAB_NAB_Dodgers.out window=49 CNN variant with normalization
AUC=0.77 R_AUC=0.87 Precision=0.12 Recall=0.07 F=0.09 ExistenceReward=0.72 OverlapReward=0.13
AP=0.1 R_AP=0.21 Precision@k=0.07 Rprecision=0.10 Rrecall=0.25 Rf=0.14

normality3_MGAB_Dodgers_NAB.out window=49 CNN variant with normalization
AUC=0.77 R_AUC=0.87 Precision=0.12 Recall=0.08 F=0.09 ExistenceReward=0.73 OverlapReward=0.13
AP=0.1 R_AP=0.22 Precision@k=0.08 Rprecision=0.10 Rrecall=0.25 Rf=0.15

normality3_NAB_MGAB_Dodgers.out window=49 CNN variant with normalization
AUC=0.69 R_AUC=0.83 Precision=0.12 Recall=0.07 F=0.09 ExistenceReward=0.70 OverlapReward=0.10
AP=0.08 R_AP=0.2 Precision@k=0.07 Rprecision=0.10 Rrecall=0.22 Rf=0.14