Friedman3_LR0.02

June 22, 2022

An Exception was encountered at 'In [7]'.

[1]:
```
import warnings
warnings.filterwarnings('ignore')
```

[2]:
```
import scrapbook as sb
import pandas as pd
import numpy as np
import seaborn as sns
import numpy as np
from statistics import mean , median
import matplotlib.pyplot as plt
```

1 Baseline

[3]:
```
books = sb.read_notebooks("./BaseLine_Model_Output")
baseLine_data = []
for nb in books.notebooks:
    nbList=[nb.scraps['TabNet MAE'].data]
    baseLine_data.append(nbList)
df = pd.DataFrame(baseLine_data, columns = ["TabNet(LR=0.02)"])
baseline_data = np.array(baseLine_data)
tabnet = median(baseline_data[:,0])
```

2 GAN Model

[4]:
```
book = sb.read_notebooks("./GAN_Output")
gan_data = []
gan_mse = []
for nb in book.notebooks:
    metrics = nb.scraps['GAN_1 Metrics'].data
    for i in range(1000):
        gan_mse.append(metrics[0][i])
    nbList = [nb.scraps['GAN Model MSE'].data,
              nb.scraps['GAN Model MAE'].data,
              nb.scraps['GAN Model Euclidean distance'].data,
```

```
                nb.scraps['GAN Model Manhattan Distance'].data]
    gan_data.append(nbList)

df = pd.DataFrame(gan_data, columns = ['MSE','MAE','Euclidean␣
 ↪Distance','Manhattan Distance'])
display(df.style)
print("MEDIAN:")
print(df.median(axis = 0))
gan_data = np.array(gan_data)
gan_median = median(gan_data[:,1])
print(gan_median)
```

```
<pandas.io.formats.style.Styler at 0x7ff5a8674fa0>
```

```
MEDIAN:
MSE                    0.268850
MAE                    0.422420
Euclidean Distance     2.318020
Manhattan Distance     8.448406
dtype: float64
0.4224202967224643
```

3 ABC_GAN Analysis

3.1 ABC Pre-generator - TabNet

[5]:
```
book = sb.read_notebooks("./ABC_GAN_TabNet")
paramVal = [[1,1],[1,0.1],[1,0.01],[1,0],[0.1,1],[0.1,0.1],[0.1,0.01],[0.
 ↪1,0],[0.01,1],[0.01,0.1],[0.01,0.01],[0.01,0]]
abc_mae = [[] for i in range(12)]
abc_mae_skip = [[] for i in range(12)]
abc_mae_mean = [[] for i in range(12)]
abc_mae_skip_mean = [[] for i in range(12)]
abc_weights = [[] for i in range(12)]
prior_model = [[] for i in range(12)]
abc_pre_generator = [[] for i in range(12)]

for nb in book.notebooks:
    metrics1 = np.array(nb.scraps['ABC_GAN_1 Metrics'].data)
    metrics3 = np.array(nb.scraps['ABC_GAN_3 Metrics'].data)
    paramVar = float(nb.papermill_dataframe.iloc[0]['value'])
    paramBias = float(nb.papermill_dataframe.iloc[1]['value'])
    #Divide data according to parameters
    for i in range(9):
        if paramVar == paramVal[i][0] and paramBias == paramVal[i][1]:
            for j in range(100):
                abc_mae[i].append(metrics1[1,j])
```

```
                abc_mae_skip[i].append(metrics3[1,j])
            abc_weights[i].append(nb.scraps['Skip Connection Weight'].data)
            prior_model[i].append(nb.scraps['Prior Model MSE'].data)
            abc_pre_generator[i].append(nb.scraps['ABC Pre-generator MSE'].data)
            abc_mae_skip_mean[i].append(mean(metrics3[1,:]))
            abc_mae_mean[i].append(mean(metrics1[1,:]))
```

[6]:
```
data = [[] for i in range(12)]
for i in range(12):
    for j in range(len(abc_weights[i])):
        data[i].append([paramVal[i][0], paramVal[i][1],prior_model[i][j],
                        ␣
 ↪abc_pre_generator[i][j],abc_weights[i][j],abc_mae_mean[i][j],abc_mae_skip_mean[i][j]])
    df = pd.DataFrame(data[i], columns = ['Variance','Bias','Prior Model MAE',
                                          'ABC pre-generator MAE','Skip Node␣
 ↪weight','ABC GAN MAE','ABC_GAN MAE (skip connection)'])
    display(df.round(5))
    print(df.median(axis=0))
    print("----------------------------------------------------------------")
```

	Variance	Bias	Prior Model MAE	ABC pre-generator MAE	Skip Node weight	\
0	1	1	0.26224	1.27267	0.12315	
1	1	1	0.25144	1.07432	0.14760	
2	1	1	0.41890	1.24208	0.12715	
3	1	1	0.51930	1.16254	0.45957	
4	1	1	0.44460	1.28810	0.12771	
5	1	1	0.32573	1.19235	0.28127	
6	1	1	0.22804	1.20343	0.12735	
7	1	1	0.23102	1.45562	0.14964	
8	1	1	0.53576	1.28282	0.94479	

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.32825	0.32203
1	0.31595	0.26913
2	0.40338	0.39426
3	0.63657	0.58900
4	0.37620	0.45012
5	0.41018	0.50470
6	0.30351	0.40672
7	0.38760	0.44308
8	0.41346	0.44656

```
Variance                    1.000000
Bias                        1.000000
Prior Model MAE             0.325734
ABC pre-generator MAE       1.242078
Skip Node weight            0.147605
ABC GAN MAE                 0.387603
```

```
ABC_GAN MAE (skip connection)    0.443077
dtype: float64
------------------------------------------------------------
```

	Variance	Bias	Prior Model MAE	ABC pre-generator MAE	Skip Node weight	\
0	1	0.1	0.29111	0.77469	0.62749	
1	1	0.1	0.52418	0.87545	0.11390	
2	1	0.1	0.32478	0.98204	0.11363	
3	1	0.1	0.47642	1.04031	0.66740	
4	1	0.1	0.53412	1.24429	0.56379	
5	1	0.1	0.46425	0.88024	0.75464	
6	1	0.1	0.49534	1.10523	0.11544	
7	1	0.1	0.42269	1.22662	0.48783	
8	1	0.1	0.69312	1.21353	0.38721	

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.32577	0.34152
1	0.43034	0.38303
2	0.30166	0.31600
3	0.58580	0.50100
4	0.52147	0.56731
5	0.45532	0.41256
6	0.34506	0.44616
7	0.45874	0.48113
8	0.70186	0.71003

```
Variance                         1.000000
Bias                             0.100000
Prior Model MAE                  0.476416
ABC pre-generator MAE            1.040309
Skip Node weight                 0.487834
ABC GAN MAE                      0.455324
ABC_GAN MAE (skip connection)    0.446155
dtype: float64
------------------------------------------------------------
```

	Variance	Bias	Prior Model MAE	ABC pre-generator MAE	Skip Node weight	\
0	1	0.01	0.61028	1.04074	0.32656	
1	1	0.01	0.56538	1.32502	0.13755	
2	1	0.01	0.41642	1.14973	0.85105	
3	1	0.01	0.31729	0.97637	0.11704	
4	1	0.01	0.40903	1.03853	0.19117	
5	1	0.01	0.27117	1.02937	0.12269	
6	1	0.01	0.39891	0.90763	0.09889	
7	1	0.01	0.42114	0.98713	0.82241	
8	1	0.01	0.48365	1.06418	0.64058	

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.55082	0.60523

```
1      0.57429                          0.64330
2      0.53674                          0.45692
3      0.26510                          0.34305
4      0.47557                          0.55545
5      0.32293                          0.36248
6      0.49571                          0.51086
7      0.50938                          0.46778
8      0.56357                          0.44793
```

```
Variance                          1.000000
Bias                              0.010000
Prior Model MAE                   0.416424
ABC pre-generator MAE             1.038532
Skip Node weight                  0.191165
ABC GAN MAE                       0.509380
ABC_GAN MAE (skip connection)     0.467776
dtype: float64
------------------------------------------------------------
```

```
Empty DataFrame
Columns: [Variance, Bias, Prior Model MAE, ABC pre-generator MAE, Skip Node␣
 ↪weight, ABC GAN MAE, ABC_GAN MAE (skip connection)]
Index: []
```

```
Variance                          NaN
Bias                              NaN
Prior Model MAE                   NaN
ABC pre-generator MAE             NaN
Skip Node weight                  NaN
ABC GAN MAE                       NaN
ABC_GAN MAE (skip connection)     NaN
dtype: object
------------------------------------------------------------
```

```
   Variance  Bias  Prior Model MAE  ABC pre-generator MAE  Skip Node weight  \
0       0.1     1          0.35488                0.78704           0.17125
1       0.1     1          0.32466                0.87304           0.91601
2       0.1     1          0.34348                0.80941           0.20607
3       0.1     1          0.25704                0.94214           0.81797
4       0.1     1          0.46143                0.77057           0.87207
5       0.1     1          0.28672                0.80604           0.75429
6       0.1     1          0.35837                0.61847           0.74792
7       0.1     1          0.36707                0.95131           0.15140
8       0.1     1          0.30916                0.66621           0.77060

   ABC GAN MAE  ABC_GAN MAE (skip connection)
0      0.35666                        0.30502
1      0.48066                        0.30332
2      0.46908                        0.39461
```

```
3      0.23783                          0.22467
4      0.67852                          0.62076
5      0.29414                          0.24885
6      0.46754                          0.47843
7      0.36826                          0.35278
8      0.30507                          0.28372

Variance                          0.100000
Bias                              1.000000
Prior Model MAE                   0.343482
ABC pre-generator MAE             0.806040
Skip Node weight                  0.754294
ABC GAN MAE                       0.368264
ABC_GAN MAE (skip connection)     0.305021
dtype: float64
------------------------------------------------------------

   Variance  Bias  Prior Model MAE  ABC pre-generator MAE  Skip Node weight  \
0       0.1   0.1          0.33890                0.33164           0.16884
1       0.1   0.1          0.40527                0.42417           0.16416
2       0.1   0.1          0.22530                0.26488           0.95100
3       0.1   0.1          0.46241                0.46884           0.32872
4       0.1   0.1          0.42003                0.40519           0.61856
5       0.1   0.1          0.39054                0.43130           0.23177
6       0.1   0.1          0.40297                0.40299           0.11625
7       0.1   0.1          0.34911                0.35909           0.55760
8       0.1   0.1          0.28944                0.30447           0.20110

   ABC GAN MAE  ABC_GAN MAE (skip connection)
0      0.49810                         0.38393
1      0.41150                         0.43755
2      0.28544                         0.22867
3      0.39055                         0.31078
4      0.44226                         0.46556
5      0.44167                         0.42319
6      0.48521                         0.54893
7      0.33668                         0.40793
8      0.46559                         0.37388

Variance                          0.100000
Bias                              0.100000
Prior Model MAE                   0.390544
ABC pre-generator MAE             0.402991
Skip Node weight                  0.231775
ABC GAN MAE                       0.441673
ABC_GAN MAE (skip connection)     0.407928
dtype: float64
------------------------------------------------------------

   Variance  Bias  Prior Model MAE  ABC pre-generator MAE  Skip Node weight  \
```

```
0       0.1  0.01          0.23085                0.25941           0.74110
1       0.1  0.01          0.35381                0.37860           0.11472
2       0.1  0.01          0.45516                0.50017           0.54931
3       0.1  0.01          0.48277                0.47195           0.61459
4       0.1  0.01          0.56948                0.62516           0.11598
5       0.1  0.01          0.27366                0.30952           0.29303
6       0.1  0.01          0.44535                0.45269           0.46618
7       0.1  0.01          0.40434                0.40670           0.40868
8       0.1  0.01          0.55577                0.57182           0.10872

   ABC GAN MAE  ABC_GAN MAE (skip connection)
0      0.27876                        0.24930
1      0.39574                        0.45028
2      0.49565                        0.45415
3      0.52586                        0.56952
4      0.61619                        0.62907
5      0.36969                        0.36188
6      0.44009                        0.47855
7      0.39191                        0.43287
8      0.62657                        0.62871

Variance                          0.100000
Bias                              0.010000
Prior Model MAE                   0.445348
ABC pre-generator MAE             0.452693
Skip Node weight                  0.408681
ABC GAN MAE                       0.440095
ABC_GAN MAE (skip connection)     0.454146
dtype: float64
------------------------------------------------------------

Empty DataFrame
Columns: [Variance, Bias, Prior Model MAE, ABC pre-generator MAE, Skip Node␣
 ↪weight, ABC GAN MAE, ABC_GAN MAE (skip connection)]
Index: []

Variance                          NaN
Bias                              NaN
Prior Model MAE                   NaN
ABC pre-generator MAE             NaN
Skip Node weight                  NaN
ABC GAN MAE                       NaN
ABC_GAN MAE (skip connection)     NaN
dtype: object
------------------------------------------------------------

   Variance  Bias  Prior Model MAE  ABC pre-generator MAE  Skip Node weight  \
0      0.01     1          0.36756                0.81512           0.49201
1      0.01     1          0.36758                0.89253           0.14603
```

```
2      0.01     1          0.33931                0.80807          0.51593
3      0.01     1          0.36606                0.91895          0.47661
4      0.01     1          0.33845                0.83928          0.53094
5      0.01     1          0.49218                0.81003          0.22425
6      0.01     1          0.41328                0.84767          0.21794
7      0.01     1          0.37879                0.75985          0.99369
8      0.01     1          0.43971                0.99345          0.96467
```

```
   ABC GAN MAE  ABC_GAN MAE (skip connection)
0      0.44731                        0.29406
1      0.31764                        0.38864
2      0.30160                        0.25019
3      0.35218                        0.32829
4      0.32283                        0.33518
5      0.50500                        0.36572
6      0.40953                        0.44265
7      0.33536                        0.38595
8      0.46655                        0.52038
```

```
Variance                          0.010000
Bias                              1.000000
Prior Model MAE                   0.367583
ABC pre-generator MAE             0.839285
Skip Node weight                  0.492011
ABC GAN MAE                       0.352176
ABC_GAN MAE (skip connection)     0.365719
dtype: float64
------------------------------------------------------------
```

```
Empty DataFrame
Columns: [Variance, Bias, Prior Model MAE, ABC pre-generator MAE, Skip Node␣
 ↪weight, ABC GAN MAE, ABC_GAN MAE (skip connection)]
Index: []
```

```
Variance                          NaN
Bias                              NaN
Prior Model MAE                   NaN
ABC pre-generator MAE             NaN
Skip Node weight                  NaN
ABC GAN MAE                       NaN
ABC_GAN MAE (skip connection)     NaN
dtype: object
------------------------------------------------------------
```

```
Empty DataFrame
Columns: [Variance, Bias, Prior Model MAE, ABC pre-generator MAE, Skip Node␣
 ↪weight, ABC GAN MAE, ABC_GAN MAE (skip connection)]
Index: []
```

```
Variance                          NaN
```

```
Bias                                NaN
Prior Model MAE                     NaN
ABC pre-generator MAE               NaN
Skip Node weight                    NaN
ABC GAN MAE                         NaN
ABC_GAN MAE (skip connection)       NaN
dtype: object
------------------------------------------------------------

Empty DataFrame
Columns: [Variance, Bias, Prior Model MAE, ABC pre-generator MAE, Skip Node␣
 ↪weight, ABC GAN MAE, ABC_GAN MAE (skip connection)]
Index: []

Variance                            NaN
Bias                                NaN
Prior Model MAE                     NaN
ABC pre-generator MAE               NaN
Skip Node weight                    NaN
ABC GAN MAE                         NaN
ABC_GAN MAE (skip connection)       NaN
dtype: object
------------------------------------------------------------
```

Execution using papermill encountered an exception here and stopped:

[7]:
```
# Display TabNet Summary Tables
data = np.array(data)
tabnetData = []
for i in range(12):
    print(median(data[i][:,3]))
    tabnetData.append([paramVal[i][0], paramVal[i][1],tabnet,median(data[i][:
 ↪,3]),median(data[i][:,5]),median(data[i][:,6]),median(data[i][:,4])])
df = pd.DataFrame(tabnetData, columns = ['Variance','Bias','TabNet','Prior␣
 ↪Model MAE','mGAN','skipGAN','Skip Node weight'])
display(df.round(5))
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
<ipython-input-7-aec3cdab1458> in <module>
      3 tabnetData = []
      4 for i in range(12):
----> 5     print(median(data[i][:,3]))
      6     tabnetData.append([paramVal[i][0],␣
 ↪paramVal[i][1],tabnet,median(data[i][:,3]),median(data[i][:
 ↪,5]),median(data[i][:,6]),median(data[i][:,4])])
      7 df = pd.DataFrame(tabnetData, columns =␣
 ↪['Variance','Bias','TabNet','Prior Model MAE','mGAN','skipGAN','Skip Node␣
 ↪weight'])
```

```
TypeError: list indices must be integers or slices, not tuple
```