

Analysis_Out

April 18, 2022

```
[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.scrap['Stats Model MAE'].data,nb.scrap['Catboost MAE'].data]
    baseLine_data.append(nbList)
df = pd.DataFrame(baseLine_data, columns = ["Stats Model","Catboost"])
baseline_data = np.array(baseLine_data)
stats = median(baseline_data[:,0])
catboost = median(baseline_data[:,1])
```

2 GAN Model

```
[4]: book = sb.read_notebooks("./GAN_Output")
gan_data = []
gan_mse = []
for nb in book.notebooks:
    metrics = nb.scrap['GAN_1 Metrics'].data
    for i in range(1000):
        gan_mse.append(metrics[0][i])
nbList = [nb.scrap['GAN Model MSE'].data,
          nb.scrap['GAN Model MAE'].data,
          nb.scrap['GAN Model Euclidean distance'].data,
          nb.scrap['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 0x7fc362438d90>

MEDIAN:

```

MSE                0.085055
MAE                0.208172
Euclidean Distance  1.292234
Manhattan Distance  4.163449
dtype: float64
0.208172444485737757

```

3 ABC_GAN Analysis

3.1 ABC Pre-generator - Catboost

```

[5]: book = sb.read_notebooks("./ABC_GAN_Catboost")
paramVal = [[1,1],[1,0.1],[1,0.01],[0.1,1],[0.1,0.1],[0.1,0.01],[0.01,1],[0.
↳01,0.1],[0.01,0.01]]
abc_mae = [[] for i in range(9)]
abc_mae_skip = [[] for i in range(9)]
abc_mae_mean = [[] for i in range(9)]
abc_mae_skip_mean = [[] for i in range(9)]
abc_weights = [[] for i in range(9)]
prior_model = [[] for i in range(9)]
abc_pre_generator = [[] for i in range(9)]

for nb in book.notebooks:
    metrics1 = np.array(nb.scrap['ABC_GAN_1 Metrics'].data)
    metrics3 = np.array(nb.scrap['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.scrap['Skip Connection Weight'].data)

```

```
prior_model[i].append(nb.scrap['Prior Model MSE'].data)
abc_pre_generator[i].append(nb.scrap['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(9)]
for i in range(9):
    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	0.33940	1.23536	0.94826
1	1	1	0.33737	1.37975	0.61124
2	1	1	0.30833	1.32396	0.14149
3	1	1	0.24887	1.30517	0.73428
4	1	1	0.35931	1.69546	0.11051
5	1	1	0.27828	1.06569	0.17545
6	1	1	0.30177	1.24321	0.13008
7	1	1	0.24163	0.89242	0.12000
8	1	1	0.28360	1.11022	0.19241
9	1	1	0.23384	0.92098	0.19288

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.11357	0.17955
1	0.17546	0.22571
2	0.26229	0.20108
3	0.15933	0.12770
4	0.21945	0.25125
5	0.19590	0.17233
6	0.18765	0.16587
7	0.14820	0.14466
8	0.17033	0.15950
9	0.17871	0.16900

Variance	1.000000
Bias	1.000000
Prior Model MAE	0.292687
ABC pre-generator MAE	1.239285
Skip Node weight	0.183931
ABC GAN MAE	0.177082

ABC_GAN MAE (skip connection) 0.170664
dtype: float64

	Variance	Bias	Prior Model MAE	ABC pre-generator MAE	Skip Node weight \
0	1	0.1	0.43561	0.74859	0.35479
1	1	0.1	0.28184	0.99126	0.08113
2	1	0.1	0.19014	1.05491	0.07380
3	1	0.1	0.26453	1.07082	0.08049
4	1	0.1	0.24599	1.07991	0.07133
5	1	0.1	0.33888	1.02142	0.08047
6	1	0.1	0.40806	1.06797	0.81499
7	1	0.1	0.32971	1.07045	0.07399
8	1	0.1	0.28961	0.98322	0.29144
9	1	0.1	0.52755	1.14063	0.47393

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.22145	0.29530
1	0.20912	0.26460
2	0.15305	0.16566
3	0.20056	0.20810
4	0.22864	0.22342
5	0.28885	0.31943
6	0.22694	0.31548
7	0.26911	0.33766
8	0.24735	0.24618
9	0.39080	0.47710

Variance 1.000000
Bias 0.100000
Prior Model MAE 0.309664
ABC pre-generator MAE 1.061440
Skip Node weight 0.080813
ABC GAN MAE 0.227788
ABC_GAN MAE (skip connection) 0.279954
dtype: float64

	Variance	Bias	Prior Model MAE	ABC pre-generator MAE	Skip Node weight \
0	1	0.01	0.27758	1.18640	0.07398
1	1	0.01	0.46227	0.89042	0.06550
2	1	0.01	0.32098	0.97452	0.07880
3	1	0.01	0.35196	1.09613	0.79278
4	1	0.01	0.27458	0.92471	0.12406
5	1	0.01	0.24247	1.13035	0.19510
6	1	0.01	0.37039	1.04197	0.07143
7	1	0.01	0.37543	0.79576	0.34068
8	1	0.01	0.33676	1.04347	0.06413
9	1	0.01	0.22450	1.07060	0.06762

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.21384	0.25977
1	0.49664	0.47271
2	0.25224	0.33090
3	0.31431	0.31587
4	0.21252	0.26446
5	0.21490	0.26332
6	0.32317	0.35455
7	0.35818	0.34678
8	0.29465	0.32400
9	0.16308	0.19894

Variance	1.000000
Bias	0.010000
Prior Model MAE	0.328871
ABC pre-generator MAE	1.042719
Skip Node weight	0.076387
ABC GAN MAE	0.273448
ABC_GAN MAE (skip connection)	0.319932
dtype: float64	

	Variance	Bias	Prior Model MAE	ABC pre-generator MAE	Skip Node weight	\
0	0.1	1	0.34522	0.91613	0.86654	
1	0.1	1	0.42982	0.54821	0.20623	
2	0.1	1	0.37364	0.89897	0.45629	
3	0.1	1	0.30149	0.89776	0.11980	
4	0.1	1	0.32270	1.03394	0.10645	
5	0.1	1	0.43163	1.06819	0.19981	
6	0.1	1	0.27770	0.85109	0.23155	
7	0.1	1	0.29862	0.62391	0.20230	
8	0.1	1	0.28327	1.06640	0.62501	
9	0.1	1	0.44805	1.03807	0.80594	

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.26365	0.20268
1	0.21470	0.18884
2	0.23385	0.18193
3	0.14368	0.11256
4	0.26111	0.18188
5	0.20641	0.14709
6	0.19811	0.18025
7	0.21804	0.15272
8	0.20653	0.20672
9	0.22724	0.17899

Variance	0.100000
Bias	1.000000

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Prior Model MAE          0.333960
ABC pre-generator MAE    0.907547
Skip Node weight        0.218894
ABC GAN MAE             0.216369
ABC_GAN MAE (skip connection) 0.181066
dtype: float64

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      Variance  Bias  Prior Model MAE  ABC pre-generator MAE  Skip Node weight  \
0      0.1    0.1      0.43950      0.46254      0.52780
1      0.1    0.1      0.27478      0.26016      0.04903
2      0.1    0.1      0.33685      0.38292      0.80767
3      0.1    0.1      0.25214      0.31656      0.10125
4      0.1    0.1      0.33587      0.35658      0.66519
5      0.1    0.1      0.26255      0.30937      0.06615
6      0.1    0.1      0.60386      0.61524      0.06667
7      0.1    0.1      0.28395      0.34426      0.08852
8      0.1    0.1      0.24195      0.24939      0.08934
9      0.1    0.1      0.38222      0.32636      0.74403

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      ABC GAN MAE  ABC_GAN MAE (skip connection)
0      0.38173      0.37531
1      0.18777      0.21756
2      0.26388      0.24969
3      0.19014      0.21465
4      0.26158      0.20687
5      0.21574      0.21770
6      0.51544      0.44774
7      0.26835      0.21137
8      0.16007      0.20482
9      0.34925      0.32487

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Variance          0.100000
Bias              0.100000
Prior Model MAE   0.309908
ABC pre-generator MAE 0.335309
Skip Node weight  0.095297
ABC GAN MAE       0.262730
ABC_GAN MAE (skip connection) 0.217627
dtype: float64

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      Variance  Bias  Prior Model MAE  ABC pre-generator MAE  Skip Node weight  \
0      0.1    0.01      0.33745      0.34370      0.02917
1      0.1    0.01      0.24996      0.29032      0.03959
2      0.1    0.01      0.31676      0.35565      0.23461
3      0.1    0.01      0.27503      0.26694      0.01949
4      0.1    0.01      0.28844      0.31127      0.37802
5      0.1    0.01      0.34123      0.36295      0.04284

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6	0.1	0.01	0.36247	0.35394	0.57680
7	0.1	0.01	0.39652	0.43883	0.03971
8	0.1	0.01	0.38956	0.40877	0.03805
9	0.1	0.01	0.33376	0.34394	0.04291

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.29314	0.33796
1	0.21448	0.24310
2	0.23542	0.32889
3	0.21190	0.26835
4	0.24617	0.28877
5	0.33728	0.33237
6	0.34596	0.33463
7	0.32287	0.36958
8	0.34555	0.38855
9	0.29818	0.32839

Variance	0.100000
Bias	0.010000
Prior Model MAE	0.335605
ABC pre-generator MAE	0.348943
Skip Node weight	0.041275
ABC GAN MAE	0.295663
ABC_GAN MAE (skip connection)	0.330630

dtype: float64

	Variance	Bias	Prior Model MAE	ABC pre-generator MAE	Skip Node weight \
0	0.01	1	0.25246	0.84264	0.13170
1	0.01	1	0.26360	0.61303	0.84795
2	0.01	1	0.32241	0.75332	0.13259
3	0.01	1	0.40234	0.85302	0.19845
4	0.01	1	0.23324	0.74013	0.12878
5	0.01	1	0.38712	0.62617	0.77245
6	0.01	1	0.37999	0.67656	0.11361
7	0.01	1	0.26258	0.65570	0.15128
8	0.01	1	0.34960	0.80329	0.12742
9	0.01	1	0.33424	0.84481	0.63255

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.13808	0.11835
1	0.12200	0.13767
2	0.19736	0.18479
3	0.24229	0.17864
4	0.14509	0.15236
5	0.13587	0.17123
6	0.26438	0.17171
7	0.20190	0.15850
8	0.19761	0.21005

9 0.13561 0.15046

Variance 0.010000
Bias 1.000000
Prior Model MAE 0.328327
ABC pre-generator MAE 0.746724
Skip Node weight 0.141935
ABC GAN MAE 0.171229
ABC_GAN MAE (skip connection) 0.164863
dtype: float64

 Variance Bias Prior Model MAE ABC pre-generator MAE Skip Node weight \
0 0.01 0.1 0.30430 0.30129 0.15095
1 0.01 0.1 0.39774 0.38213 0.13709
2 0.01 0.1 0.28413 0.26740 0.41843
3 0.01 0.1 0.36408 0.39441 0.17876
4 0.01 0.1 0.23620 0.27116 0.47520
5 0.01 0.1 0.23179 0.25252 0.66364
6 0.01 0.1 0.27544 0.28041 0.10142
7 0.01 0.1 0.28580 0.35268 0.72014
8 0.01 0.1 0.25405 0.26982 0.17634
9 0.01 0.1 0.33591 0.34922 0.75330

 ABC GAN MAE ABC_GAN MAE (skip connection)
0 0.23484 0.29508
1 0.27188 0.35350
2 0.25492 0.24405
3 0.29581 0.33370
4 0.21088 0.18163
5 0.23508 0.20055
6 0.28224 0.25594
7 0.21666 0.24109
8 0.18361 0.18345
9 0.26488 0.23432

Variance 0.010000
Bias 0.100000
Prior Model MAE 0.284960
ABC pre-generator MAE 0.290849
Skip Node weight 0.298597
ABC GAN MAE 0.244997
ABC_GAN MAE (skip connection) 0.242570
dtype: float64

 Variance Bias Prior Model MAE ABC pre-generator MAE Skip Node weight \
0 0.01 0.01 0.27262 0.27318 0.02091
1 0.01 0.01 0.32522 0.32539 0.09307
2 0.01 0.01 0.23807 0.23956 0.03329

3	0.01	0.01	0.26071	0.25984	0.00000
4	0.01	0.01	0.36726	0.36846	0.01966
5	0.01	0.01	0.42144	0.42595	0.24959
6	0.01	0.01	0.25616	0.25749	0.01207
7	0.01	0.01	0.45660	0.45366	0.16975
8	0.01	0.01	0.48094	0.47900	0.00000
9	0.01	0.01	0.27894	0.27478	0.17984

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.25381	0.26873
1	0.27625	0.32448
2	0.23518	0.23842
3	0.27751	0.25573
4	0.34628	0.36449
5	0.37507	0.40614
6	0.24578	0.25556
7	0.43720	0.46657
8	0.42872	0.47976
9	0.23169	0.27350

Variance	0.010000
Bias	0.010000
Prior Model MAE	0.302076
ABC pre-generator MAE	0.300085
Skip Node weight	0.027104
ABC GAN MAE	0.276881
ABC_GAN MAE (skip connection)	0.298988
dtype: float64	

```
[7]: # Display Catboost Summary Tables
data = np.array(data)
catboostData = []
for i in range(9):
    catboostData.append([paramVal[i][0],
        paramVal[i][1],catboost,median(data[i][:,3]),median(data[i][:,5]),median(data[i][:,6]),median(data[i][:,4])])
df = pd.DataFrame(catboostData, columns = ['Variance','Bias','Catboost','Prior_
Model MAE','mGAN','skipGAN','Skip Node weight'])
display(df.round(5))
```

	Variance	Bias	Catboost	Prior Model MAE	mGAN	skipGAN	\
0	1.00	1.00	0.14426	1.23929	0.17708	0.17066	
1	1.00	0.10	0.14426	1.06144	0.22779	0.27995	
2	1.00	0.01	0.14426	1.04272	0.27345	0.31993	
3	0.10	1.00	0.14426	0.90755	0.21637	0.18107	
4	0.10	0.10	0.14426	0.33531	0.26273	0.21763	
5	0.10	0.01	0.14426	0.34894	0.29566	0.33063	

6	0.01	1.00	0.14426	0.74672	0.17123	0.16486
7	0.01	0.10	0.14426	0.29085	0.24500	0.24257
8	0.01	0.01	0.14426	0.30009	0.27688	0.29899

	Skip Node weight
0	0.18393
1	0.08081
2	0.07639
3	0.21889
4	0.09530
5	0.04127
6	0.14193
7	0.29860
8	0.02710

3.2 ABC Pre-generator - Stats

```
[8]: book = sb.read_notebooks("./ABC_GAN_Stats")
paramVal = [[1,1],[0.1,1],[0.01,1],[1,0.1],[0.1,0.1],[0.01,0.1],[1,0.01],[0.1,0.01],[0.01,0.01]]
abc_mae = [[] for i in range(9)]
abc_mae_skip = [[] for i in range(9)]
abc_mae_mean = [[] for i in range(9)]
abc_mae_skip_mean = [[] for i in range(9)]
abc_weights = [[] for i in range(9)]
prior_model = [[] for i in range(9)]
abc_pre_generator = [[] for i in range(9)]

for nb in book.notebooks:
    metrics1 = np.array(nb.scrapes['ABC_GAN_1 Metrics'].data)
    metrics3 = np.array(nb.scrapes['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.scrapes['Skip Connection Weight'].data)
            prior_model[i].append(nb.scrapes['Prior Model MSE'].data)
            abc_pre_generator[i].append(nb.scrapes['ABC Pre-generator MSE'].data)
            abc_mae_skip_mean[i].append(mean(metrics3[1,:]))
            abc_mae_mean[i].append(mean(metrics1[1,:]))

[9]: data = [[] for i in range(9)]
for i in range(9):
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```

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	0.29031	1.25478	0.88258
1	1	1	0.44975	1.23064	0.87832
2	1	1	0.42078	1.42587	0.98379
3	1	1	0.43359	1.24520	1.00000
4	1	1	0.36823	1.10807	0.89985
5	1	1	0.34959	1.06025	0.99644
6	1	1	0.40612	1.07032	1.00000
7	1	1	0.47881	1.22904	0.97343
8	1	1	0.29692	1.26820	0.96820
9	1	1	0.32433	1.36152	0.99623

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.18901	0.11431
1	0.35030	0.18303
2	0.19155	0.25245
3	0.31754	0.36813
4	0.35659	0.17494
5	0.22893	0.23016
6	0.25452	0.27736
7	0.35585	0.20099
8	0.20240	0.20051
9	0.15719	0.23160

Variance	1.000000
Bias	1.000000
Prior Model MAE	0.387177
ABC pre-generator MAE	1.237921
Skip Node weight	0.978611
ABC GAN MAE	0.241726
ABC_GAN MAE (skip connection)	0.215575
dtype:	float64

	Variance	Bias	Prior Model MAE	ABC pre-generator MAE	Skip Node weight \
0	0.1	1	0.31186	0.99195	0.98998

1	0.1	1	0.43040	0.72982	1.00000
2	0.1	1	0.35791	1.05063	0.99555
3	0.1	1	0.42437	0.79663	0.95032
4	0.1	1	0.25302	0.95273	0.98694
5	0.1	1	0.36768	0.84921	0.99555
6	0.1	1	0.43353	1.12283	0.86891
7	0.1	1	0.37974	0.97706	0.90165
8	0.1	1	0.30989	0.81079	0.85959
9	0.1	1	0.35632	1.03301	0.91324

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.23428	0.22337
1	0.52050	0.31388
2	0.22909	0.19770
3	0.31949	0.16097
4	0.28690	0.17581
5	0.36063	0.38644
6	0.30905	0.14942
7	0.26076	0.25680
8	0.28656	0.13385
9	0.32711	0.09685

Variance	0.100000
Bias	1.000000
Prior Model MAE	0.362792
ABC pre-generator MAE	0.964899
Skip Node weight	0.968629
ABC GAN MAE	0.297976
ABC_GAN MAE (skip connection)	0.186758
dtype: float64	

	Variance	Bias	Prior Model MAE	ABC pre-generator MAE	Skip Node weight \
0	0.01	1	0.38728	1.09869	0.93346
1	0.01	1	0.53611	1.03067	0.91697
2	0.01	1	0.43641	0.76017	0.99795
3	0.01	1	0.46893	1.05125	0.95772
4	0.01	1	0.41863	0.85753	0.99077
5	0.01	1	0.52122	0.71846	0.97956
6	0.01	1	0.48707	1.00235	0.99346
7	0.01	1	0.25713	0.71231	0.94414
8	0.01	1	0.39914	0.78874	0.99098
9	0.01	1	0.29066	0.89550	1.00000

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.21018	0.11905
1	0.36758	0.16454
2	0.23458	0.21013
3	0.26912	0.25218

4	0.39182	0.18677
5	0.38481	0.24568
6	0.39385	0.29901
7	0.22267	0.11580
8	0.29706	0.20774
9	0.28060	0.27047

Variance	0.010000
Bias	1.000000
Prior Model MAE	0.427520
ABC pre-generator MAE	0.876513
Skip Node weight	0.985163
ABC GAN MAE	0.288832
ABC_GAN MAE (skip connection)	0.208934
dtype: float64	

	Variance	Bias	Prior Model MAE	ABC pre-generator MAE	Skip Node weight \
0	1	0.1	0.41257	0.79406	0.44040
1	1	0.1	0.45371	0.95611	0.57612
2	1	0.1	0.39688	0.95095	0.32445
3	1	0.1	0.45879	0.97770	0.43378
4	1	0.1	0.42251	0.92074	0.39263
5	1	0.1	0.34619	1.07108	0.33271
6	1	0.1	0.34900	1.10251	0.46944
7	1	0.1	0.39553	0.89850	0.49149
8	1	0.1	0.38196	0.90301	0.35572
9	1	0.1	0.35319	1.00198	0.55072

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.35662	0.23211
1	0.25812	0.35093
2	0.27764	0.13033
3	0.31853	0.25538
4	0.51337	0.14063
5	0.31402	0.15233
6	0.30748	0.22303
7	0.25137	0.15429
8	0.30805	0.20916
9	0.31537	0.25513

Variance	1.000000
Bias	0.100000
Prior Model MAE	0.396203
ABC pre-generator MAE	0.953528
Skip Node weight	0.437087
ABC GAN MAE	0.311033
ABC_GAN MAE (skip connection)	0.216094
dtype: float64	

	Variance	Bias	Prior Model MAE	ABC pre-generator MAE	Skip Node weight \
0	0.1	0.1	0.33899	0.37605	0.27250
1	0.1	0.1	0.41764	0.42555	0.15203
2	0.1	0.1	0.48043	0.51058	0.13231
3	0.1	0.1	0.39148	0.43552	0.22965
4	0.1	0.1	0.34328	0.33604	0.34110
5	0.1	0.1	0.32535	0.34664	0.21488
6	0.1	0.1	0.32878	0.37201	0.27566
7	0.1	0.1	0.46466	0.48811	0.18800
8	0.1	0.1	0.49138	0.50282	0.23848
9	0.1	0.1	0.41160	0.41921	0.21276

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.25143	0.17562
1	0.36053	0.18397
2	0.35165	0.16087
3	0.29790	0.20947
4	0.34118	0.19303
5	0.21494	0.17605
6	0.25026	0.14851
7	0.45523	0.26467
8	0.39383	0.16588
9	0.30211	0.11726

Variance 0.100000
 Bias 0.100000
 Prior Model MAE 0.401537
 ABC pre-generator MAE 0.422377
 Skip Node weight 0.222268
 ABC GAN MAE 0.321644
 ABC_GAN MAE (skip connection) 0.175832
 dtype: float64

	Variance	Bias	Prior Model MAE	ABC pre-generator MAE	Skip Node weight \
0	0.01	0.1	0.37124	0.37097	0.15151
1	0.01	0.1	0.47783	0.51363	0.22145
2	0.01	0.1	0.47916	0.49072	0.17568
3	0.01	0.1	0.47156	0.51861	0.15731
4	0.01	0.1	0.42035	0.41502	0.17332
5	0.01	0.1	0.43866	0.43418	0.23907
6	0.01	0.1	0.44115	0.45978	0.16887
7	0.01	0.1	0.28050	0.24813	0.11513
8	0.01	0.1	0.35283	0.36159	0.27447
9	0.01	0.1	0.41108	0.48806	0.05591

ABC GAN MAE ABC_GAN MAE (skip connection)

0	0.38960	0.21936
1	0.30370	0.21842
2	0.40445	0.13892
3	0.31611	1615.63033
4	0.32743	0.15381
5	0.33322	0.20196
6	0.24306	590.99878
7	0.20883	175.39932
8	0.21419	0.10956
9	0.35662	159.88891

Variance	0.010000
Bias	0.100000
Prior Model MAE	0.429502
ABC pre-generator MAE	0.446981
Skip Node weight	0.171094
ABC GAN MAE	0.321769
ABC_GAN MAE (skip connection)	0.218890
dtype: float64	

	Variance	Bias	Prior Model MAE	ABC pre-generator MAE	Skip Node weight \
0	1	0.01	0.33825	1.06361	0.30817
1	1	0.01	0.44252	1.10204	0.29916
2	1	0.01	0.36814	0.97746	0.31601
3	1	0.01	0.42011	1.06187	0.29280
4	1	0.01	0.37682	0.98590	0.32761
5	1	0.01	0.52305	1.02595	0.30050
6	1	0.01	0.37340	0.96680	0.34648
7	1	0.01	0.48357	1.05886	0.26469
8	1	0.01	0.35782	0.84048	0.27136
9	1	0.01	0.35840	1.04120	0.29938

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.22549	0.32862
1	0.36002	0.32687
2	0.31995	0.26308
3	0.27231	0.23630
4	0.19788	0.25539
5	0.30124	0.29729
6	0.23836	0.21219
7	0.42704	0.28547
8	0.16703	0.19012
9	0.28642	0.17383

Variance	1.000000
Bias	0.010000
Prior Model MAE	0.375113
ABC pre-generator MAE	1.033574

Skip Node weight 0.299942
 ABC_GAN MAE 0.279367
 ABC_GAN MAE (skip connection) 0.259238
 dtype: float64

	Variance	Bias	Prior Model MAE	ABC pre-generator MAE	Skip Node weight \
0	0.1	0.01	0.51085	0.50383	0.13876
1	0.1	0.01	0.38288	0.39016	0.24636
2	0.1	0.01	0.35142	0.31922	0.13227
3	0.1	0.01	0.30469	0.34309	0.19530
4	0.1	0.01	0.28459	0.31449	0.10088
5	0.1	0.01	0.59744	0.56481	0.17860
6	0.1	0.01	0.27812	0.26587	0.17723
7	0.1	0.01	0.48638	0.48275	0.13708
8	0.1	0.01	0.41875	0.37538	0.11681
9	0.1	0.01	0.38843	0.42875	0.31244

	ABC_GAN MAE	ABC_GAN MAE (skip connection)
0	0.35834	0.22991
1	0.23741	0.18503
2	0.30161	0.19806
3	0.23678	24.90852
4	0.31357	12.18260
5	0.24711	0.34491
6	0.17466	0.19405
7	0.28122	0.32425
8	0.31075	79.04335
9	0.32104	0.25826

Variance 0.100000
 Bias 0.010000
 Prior Model MAE 0.385658
 ABC pre-generator MAE 0.382770
 Skip Node weight 0.157999
 ABC_GAN MAE 0.291414
 ABC_GAN MAE (skip connection) 0.291257
 dtype: float64

	Variance	Bias	Prior Model MAE	ABC pre-generator MAE	Skip Node weight \
0	0.01	0.01	0.35989	0.36228	0.12434
1	0.01	0.01	0.49100	0.48709	0.14930
2	0.01	0.01	0.31965	0.31279	0.14853
3	0.01	0.01	0.48614	0.48666	0.07869
4	0.01	0.01	0.44581	0.44646	0.18750
5	0.01	0.01	0.33082	0.33031	0.16819
6	0.01	0.01	0.34958	0.35190	0.12512
7	0.01	0.01	0.42027	0.41859	0.21003

8	0.01	0.01	0.43336	0.43338	0.12368
9	0.01	0.01	0.38277	0.38477	0.14843

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.27899	0.16319
1	0.47686	0.32685
2	0.38471	324.35423
3	0.36744	47.89028
4	0.37733	0.27410
5	0.30089	170.24077
6	0.25503	122.50966
7	0.29019	76.77868
8	0.27799	0.33361
9	0.24476	58.47750

Variance	0.010000
Bias	0.010000
Prior Model MAE	0.401518
ABC pre-generator MAE	0.401684
Skip Node weight	0.148480
ABC GAN MAE	0.295540
ABC_GAN MAE (skip connection)	53.183891
dtype: float64	

```
[10]: # Display Stats Summary Tables
data = np.array(data)
catboostData = []
for i in range(9):
    catboostData.append([paramVal[i][0], paramVal[i][1], stats, median(data[i][:
↪,3]), median(data[i][:,5]), median(data[i][:,6]), median(data[i][:,4])])
df = pd.DataFrame(catboostData, columns = ['Variance', 'Bias', 'Stats', 'Prior_
↪Model MAE', 'mGAN', 'skipGAN', 'Skip Node weight'])
display(df.round(5))
```

	Variance	Bias	Stats	Prior Model MAE	mGAN	skipGAN \
0	1.00	1.00	0.37071	1.23792	0.24173	0.21557
1	0.10	1.00	0.37071	0.96490	0.29798	0.18676
2	0.01	1.00	0.37071	0.87651	0.28883	0.20893
3	1.00	0.10	0.37071	0.95353	0.31103	0.21609
4	0.10	0.10	0.37071	0.42238	0.32164	0.17583
5	0.01	0.10	0.37071	0.44698	0.32177	0.21889
6	1.00	0.01	0.37071	1.03357	0.27937	0.25924
7	0.10	0.01	0.37071	0.38277	0.29141	0.29126
8	0.01	0.01	0.37071	0.40168	0.29554	53.18389

Skip Node weight	
0	0.97861

1	0.96863
2	0.98516
3	0.43709
4	0.22227
5	0.17109
6	0.29994
7	0.15800
8	0.14848