Analysis_Out

March 11, 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
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['Stats Model MAE'].data,nb.scraps['Catboost MAE'].data]
    baseLine_data.append(nbList)
df = pd.DataFrame(baseLine_data, columns = ["Stats Model","Catboost"])
#baseLine_data = np.reshape(baseLine_data,(2,10))
display(df)
print(df.mean())
```

```
   Stats Model  Catboost
0     0.343250  0.077727
1     0.322866  0.064946
2     0.386471  0.090121
3     0.417323  0.155601
4     0.328342  0.143718
5     0.393020  0.088314
6     0.362717  0.103711
7     0.428908  0.104581
8     0.387171  0.071411
9     0.327260  0.093738
```

```
Stats Model    0.369733
Catboost       0.099387
dtype: float64
```

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("MEAN:")
print(df.mean(axis = 0))
gan_data = np.array(gan_data)
```

```
<pandas.io.formats.style.Styler at 0x7f7c0a70dc10>
```

```
MEAN:
MSE                    0.152839
MAE                    0.259342
Euclidean Distance     3.898182
Manhattan Distance    26.452834
dtype: float64
```

3 ABC_GAN Analysis

3.1 ABC Pre-generator - Catboost

[5]:
```
book = sb.read_notebooks("./ABC_GAN_Catboost")
paramVal = [1,0.1,0.01]
abc_mae = [[] for i in range(3)]
abc_mae_skip = [[] for i in range(3)]
abc_mae_mean = [[] for i in range(3)]
abc_mae_skip_mean = [[] for i in range(3)]
abc_weights = [[] for i in range(3)]
prior_model = [[] for i in range(3)]
abc_pre_generator = [[] for i in range(3)]

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'])

    #Divide data according to parameters
    for i in range(3):
        if paramVar == paramVal[i]:
            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]:
```
for i in range(3):
    data = []
    for j in range(len(abc_weights[i])):
        data.append([paramVal[i],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, columns = ['Variance','Prior Model MAE',
                                       'ABC pre-generator MAE','Skip Node␣
↪weight','ABC GAN MAE','ABC_GAN MAE (skip connection)'])
    display(df.round(5))
    print(df.mean(axis=0))
    print("----------------------------------------------------------------")
```

	Variance	Prior Model MAE	ABC pre-generator MAE	Skip Node weight	\
0	1	0.08175	1.14402	0.67706	
1	1	0.12537	1.17901	0.84510	
2	1	0.15930	1.35492	0.96218	
3	1	0.11766	0.83472	0.86231	
4	1	0.20120	1.53223	0.19647	
5	1	0.10357	0.93368	0.60734	
6	1	0.10208	1.01596	0.98683	
7	1	0.07172	0.94114	0.92982	
8	1	0.24232	1.12395	0.25798	
9	1	0.08963	1.18496	0.22481	

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.24144	0.22711
1	0.26088	0.24889
2	0.25470	0.24627
3	0.27078	0.27839
4	0.24995	0.25269
5	0.22465	0.26580
6	0.26044	0.24644

```
7      0.21405                         0.21928
8      0.25240                         0.28794
9      0.22233                         0.21726

Variance                          1.000000
Prior Model MAE                   0.129461
ABC pre-generator MAE             1.124458
Skip Node weight                  0.654989
ABC GAN MAE                       0.245161
ABC_GAN MAE (skip connection)     0.249005
dtype: float64
------------------------------------------------------------

   Variance  Prior Model MAE  ABC pre-generator MAE  Skip Node weight  \
0       0.1          0.11433                0.12711           0.07704
1       0.1          0.18189                0.19910           0.38519
2       0.1          0.06773                0.08859           0.38973
3       0.1          0.12855                0.14961           0.06259
4       0.1          0.24304                0.25729           0.46108
5       0.1          0.08148                0.09058           0.24821
6       0.1          0.06897                0.08378           0.53694
7       0.1          0.09379                0.10558           0.31672
8       0.1          0.07683                0.08479           0.31771
9       0.1          0.09655                0.10810           0.46972

   ABC GAN MAE  ABC_GAN MAE (skip connection)
0      0.24489                         0.26398
1      0.27501                         0.26845
2      0.20589                         0.20944
3      0.21159                         0.23800
4      0.28814                         0.28751
5      0.21760                         0.22616
6      0.19305                         0.19243
7      0.20912                         0.21530
8      0.21533                         0.20556
9      0.20117                         0.22464

Variance                          0.100000
Prior Model MAE                   0.115317
ABC pre-generator MAE             0.129453
Skip Node weight                  0.326494
ABC GAN MAE                       0.226179
ABC_GAN MAE (skip connection)     0.233148
dtype: float64
------------------------------------------------------------

   Variance  Prior Model MAE  ABC pre-generator MAE  Skip Node weight  \
0      0.01          0.07781                0.07788           0.00000
1      0.01          0.05547                0.05523           0.09143
2      0.01          0.07085                0.07124           0.00000
```

```
3      0.01          0.15915               0.15889          0.00000
4      0.01          0.07393               0.07361          0.22466
5      0.01          0.11786               0.11736          0.03973
6      0.01          0.12419               0.12356          0.04787
7      0.01          0.08595               0.08423          0.00000
8      0.01          0.11725               0.11693          0.24885
9      0.01          0.07515               0.07481          0.00000
```

```
   ABC GAN MAE  ABC_GAN MAE (skip connection)
0      0.21825                        0.19977
1      0.22774                        0.18915
2      0.20751                        0.19753
3      0.24712                        0.23677
4      0.19955                        0.20190
5      0.23024                       13.10767
6      0.25047                       24.39800
7      0.21890                        0.21072
8      0.23724                        0.23271
9      0.20994                        0.19772
```

```
Variance                          0.010000
Prior Model MAE                   0.095762
ABC pre-generator MAE             0.095374
Skip Node weight                  0.065254
ABC GAN MAE                       0.224697
ABC_GAN MAE (skip connection)     3.917194
dtype: float64
------------------------------------------------------------
```

3.2 ABC Pre-generator - Stats

[7]:
```
book = sb.read_notebooks("./ABC_GAN_Stats")
paramVal = [1,0.1,0.01]
abc_mae = [[] for i in range(3)]
abc_mae_skip = [[] for i in range(3)]
abc_mae_mean = [[] for i in range(3)]
abc_mae_skip_mean = [[] for i in range(3)]
abc_weights = [[] for i in range(3)]
prior_model = [[] for i in range(3)]
abc_pre_generator = [[] for i in range(3)]

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'])

    #Divide data according to parameters
    for i in range(3):
```

```
        if paramVar == paramVal[i]:
            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,:]))
```

[8]:
```
for i in range(3):
    data = []
    for j in range(len(abc_weights[i])):
        data.append([paramVal[i],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, columns = ['Variance','Prior Model MAE',
                                       'ABC pre-generator MAE','Skip Node␣
↪weight','ABC GAN MAE','ABC_GAN MAE (skip connection)'])
    display(df.round(5))
    print(df.mean(axis=0))
    print("----------------------------------------------------------------")
```

	Variance	Prior Model MAE	ABC pre-generator MAE	Skip Node weight	\
0	1	0.24223	0.99940	0.99635	
1	1	0.28663	1.19125	1.00000	
2	1	0.25505	1.30307	0.99619	
3	1	0.25217	1.06199	1.00000	
4	1	0.24029	1.70515	0.99301	
5	1	0.23649	1.10980	0.98162	
6	1	0.33275	1.19835	0.98465	
7	1	0.24465	1.03430	1.00000	
8	1	0.32976	1.53234	0.99516	
9	1	0.26877	1.50405	1.00000	

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.27037	0.23360
1	0.27484	0.22987
2	0.25619	0.31436
3	0.23780	0.27920
4	0.27039	0.25326
5	0.25109	0.24382
6	0.26515	0.28727
7	0.23744	0.24412
8	0.31144	0.26092
9	0.23729	0.24053

```
Variance                          1.000000
Prior Model MAE                   0.268880
ABC pre-generator MAE             1.263971
Skip Node weight                  0.994697
ABC GAN MAE                       0.261201
ABC_GAN MAE (skip connection)     0.258694
dtype: float64
------------------------------------------------------------
```

	Variance	Prior Model MAE	ABC pre-generator MAE	Skip Node weight	\
0	0.1	0.22290	0.22514	0.56073	
1	0.1	0.38615	0.38287	0.57990	
2	0.1	0.18117	0.19920	0.65527	
3	0.1	0.30758	0.31153	0.77783	
4	0.1	0.34458	0.33966	0.60911	
5	0.1	0.33496	0.35338	0.65151	
6	0.1	0.27268	0.25931	0.54054	
7	0.1	0.31116	0.30521	0.73658	
8	0.1	0.23010	0.22624	0.56280	
9	0.1	0.29679	0.33553	0.52794	

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.24708	0.31755
1	0.31581	0.27134
2	0.26338	0.22896
3	0.27138	0.24257
4	0.31061	0.28738
5	0.28690	0.28600
6	0.32492	0.24832
7	0.24850	0.27129
8	0.24652	0.21886
9	0.27152	0.23941

```
Variance                          0.100000
Prior Model MAE                   0.288806
ABC pre-generator MAE             0.293807
Skip Node weight                  0.620222
ABC GAN MAE                       0.278663
ABC_GAN MAE (skip connection)     0.261168
dtype: float64
------------------------------------------------------------
```

	Variance	Prior Model MAE	ABC pre-generator MAE	Skip Node weight	\
0	0.01	0.24562	0.24494	0.15695	
1	0.01	0.23342	0.23461	0.17637	
2	0.01	0.24961	0.25078	0.17172	
3	0.01	0.18738	0.18771	0.13672	
4	0.01	0.33314	0.33410	0.14596	
5	0.01	0.16787	0.16786	0.16095	

```
6      0.01          0.27483               0.27385          0.18940
7      0.01          0.24932               0.25006          0.12253
8      0.01          0.36417               0.36314          0.15154
9      0.01          0.27643               0.27743          0.13916
```

```
   ABC GAN MAE  ABC_GAN MAE (skip connection)
0      0.26876                         0.27196
1      0.32652                         0.21256
2      0.26085                         0.24503
3      0.24846                         0.24836
4      0.34341                         0.40510
5      0.25512                         0.21705
6      0.33990                         0.27076
7      0.29004                        50.62289
8      0.30586                       124.05198
9      0.23209                         0.24345
```

```
Variance                          0.010000
Prior Model MAE                   0.258179
ABC pre-generator MAE             0.258448
Skip Node weight                  0.155129
ABC GAN MAE                       0.287101
ABC_GAN MAE (skip connection)    17.678914
dtype: float64
----------------------------------------------------------------
```