Analysis_Out

February 13, 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     0.206277  0.019123
1     0.263053  0.042150
2     0.294179  0.116115
3     0.290315  0.175373
4     0.252740  0.040753
5     0.216558  0.041667
6     0.230875  0.028887
7     0.339092  0.056652
8     0.281234  0.079000
9     0.297648  0.020032
```

```
Stats Model    0.267197
Catboost       0.061975
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 0x7ff6084f54c0>
```

```
MEAN:
MSE                    0.006750
MAE                    0.061220
Euclidean Distance     0.354710
Manhattan Distance     1.224407
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	0.10788	0.76100	0.11782	
1	1	0.20434	0.90008	0.77668	
2	1	0.10045	0.80006	0.60629	
3	1	0.12839	0.70060	0.17109	
4	1	0.13194	1.17897	0.12581	
5	1	0.13342	0.87695	0.11167	
6	1	0.18659	0.78768	0.70052	
7	1	0.22818	0.76508	0.17886	
8	1	0.16487	0.94808	0.46595	
9	1	0.12184	0.69085	0.34320	

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.05104	0.04500
1	0.08154	0.06273
2	0.05128	0.06920
3	0.07111	0.07460
4	0.04023	0.06413
5	0.07748	0.06036
6	0.05928	0.06252

```
7      0.09258                          0.06739
8      0.07319                          0.08841
9      0.07653                          0.05635

Variance                          1.000000
Prior Model MAE                   0.150789
ABC pre-generator MAE             0.840935
Skip Node weight                  0.359790
ABC GAN MAE                       0.067426
ABC_GAN MAE (skip connection)     0.065070
dtype: float64
------------------------------------------------------------

   Variance  Prior Model MAE  ABC pre-generator MAE  Skip Node weight  \
0       0.1          0.08610                0.10649           0.24291
1       0.1          0.14578                0.17192           0.19878
2       0.1          0.27600                0.32599           0.12608
3       0.1          0.20339                0.23446           0.16555
4       0.1          0.11525                0.17474           0.15023
5       0.1          0.11410                0.12623           0.76903
6       0.1          0.19848                0.21207           0.63820
7       0.1          0.17982                0.17983           0.08306
8       0.1          0.15664                0.18423           0.11701
9       0.1          0.09684                0.13393           0.50819

   ABC GAN MAE  ABC_GAN MAE (skip connection)
0      0.05106                        0.05227
1      0.07733                        0.06649
2      0.15341                        0.16496
3      0.12026                        0.12518
4      0.08733                        0.06879
5      0.06090                        0.06627
6      0.12676                        0.10630
7      0.06794                        0.07698
8      0.05735                        0.07405
9      0.06954                        0.04589

Variance                          0.100000
Prior Model MAE                   0.157241
ABC pre-generator MAE             0.184988
Skip Node weight                  0.299905
ABC GAN MAE                       0.087187
ABC_GAN MAE (skip connection)     0.084718
dtype: float64
------------------------------------------------------------

   Variance  Prior Model MAE  ABC pre-generator MAE  Skip Node weight  \
0      0.01          0.13239                0.13099           0.00000
1      0.01          0.14519                0.14465           0.01253
2      0.01          0.08648                0.08992           0.73053
```

```
3      0.01          0.18924               0.19195          0.00000
4      0.01          0.17649               0.17745          0.05321
5      0.01          0.12250               0.12316          0.03582
6      0.01          0.20298               0.20220          0.24620
7      0.01          0.09669               0.09531          0.00000
8      0.01          0.12978               0.13138          0.00000
9      0.01          0.05960               0.05845          0.03325
```

```
   ABC GAN MAE  ABC_GAN MAE (skip connection)
0      0.12973                        0.13319
1      0.06455                        0.14832
2      0.05710                        0.07577
3      0.13691                        0.18974
4      0.13017                        0.16263
5      0.09453                        0.12250
6      0.13170                        0.23248
7      0.07266                        0.09735
8      0.08713                        0.13023
9      0.09965                        0.05914
```

```
Variance                          0.010000
Prior Model MAE                   0.134132
ABC pre-generator MAE             0.134546
Skip Node weight                  0.111155
ABC GAN MAE                       0.100414
ABC_GAN MAE (skip connection)     0.135135
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	0.28921	0.63763	0.85161	
1	1	0.25018	0.65117	0.85935	
2	1	0.32242	0.85269	0.95050	
3	1	0.26235	0.81121	0.89665	
4	1	0.21099	0.68084	0.97935	
5	1	0.21117	0.73699	0.91408	
6	1	0.29112	0.99918	0.97004	
7	1	0.26079	0.90658	0.91450	
8	1	0.24676	0.77659	0.84250	
9	1	0.26143	1.14343	0.85480	

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.08383	0.06319
1	0.09515	0.07222
2	0.08791	0.03898
3	0.16655	0.04544
4	0.10690	0.07061
5	0.04837	0.07332
6	0.09318	0.05352
7	0.07810	0.06554
8	0.09461	0.04639
9	0.11415	0.04475

```
Variance                          1.000000
Prior Model MAE                   0.260642
ABC pre-generator MAE             0.819632
Skip Node weight                  0.903338
ABC GAN MAE                       0.096873
ABC_GAN MAE (skip connection)     0.057394
dtype: float64
------------------------------------------------------------
```

	Variance	Prior Model MAE	ABC pre-generator MAE	Skip Node weight	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.1	0.34432	0.33676	0.17433	0.09368	0.04923
1	0.1	0.31233	0.29145	0.37617	0.10208	0.03134
2	0.1	0.28497	0.33115	0.21448	0.09397	0.03947
3	0.1	0.43792	0.45244	0.19750	0.14619	0.05760
4	0.1	0.27773	0.29404	0.18846	0.10421	0.04965
5	0.1	0.37456	0.39479	0.33893	0.09203	0.06755
6	0.1	0.31085	0.29013	0.26912	0.05988	0.04297
7	0.1	0.29824	0.32685	0.22959	0.07756	0.05399
8	0.1	0.19577	0.22169	0.16420	0.10572	0.03996
9	0.1	0.33483	0.38819	0.23619	0.10192	0.06850

```
Variance                          0.100000
Prior Model MAE                   0.317153
ABC pre-generator MAE             0.332750
Skip Node weight                  0.238897
ABC GAN MAE                       0.097724
ABC_GAN MAE (skip connection)     0.050027
dtype: float64
------------------------------------------------------------
```

	Variance	Prior Model MAE	ABC pre-generator MAE	Skip Node weight
0	0.01	0.40060	0.39975	0.13826
1	0.01	0.33354	0.33284	0.11976
2	0.01	0.29560	0.29768	0.11707
3	0.01	0.22913	0.22901	0.13696
4	0.01	0.17458	0.17201	0.14208
5	0.01	0.28481	0.28361	0.16206

```
6      0.01          0.40926               0.40535          0.11268
7      0.01          0.31863               0.31712          0.19647
8      0.01          0.30141               0.29938          0.16383
9      0.01          0.22362               0.21858          0.20322

   ABC GAN MAE  ABC_GAN MAE (skip connection)
0      0.10040                        0.28486
1      0.09927                        0.07045
2      0.09921                        0.09135
3      0.09848                        0.04657
4      0.09638                        0.05697
5      0.13889                        0.06364
6      0.07469                        0.07512
7      0.16729                        0.06359
8      0.12697                        0.05477
9      0.13462                        0.04799

Variance                          0.010000
Prior Model MAE                   0.297117
ABC pre-generator MAE             0.295533
Skip Node weight                  0.149238
ABC GAN MAE                       0.113621
ABC_GAN MAE (skip connection)     0.085531
dtype: float64
------------------------------------------------------------
```