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     0.384634  0.143490
1     0.679533  0.249754
2     0.658534  0.723003
3     0.575827  0.536705
4     0.521046  0.334735
5     0.560545  0.214166
6     0.394293  0.354267
7     0.558400  0.228594
8     0.543642  0.486789
9     0.624801  0.789319

Stats Model    0.550126
Catboost       0.406082
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 0x7fd492ce2670>
```

```
MEAN:
MSE                    0.310808
MAE                    0.416814
Euclidean Distance     2.410793
Manhattan Distance     8.336271
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	0.42621	0.82744	0.54711	
1	1	0.65297	0.99704	0.46737	
2	1	0.38057	0.88378	0.86772	
3	1	0.45171	0.94320	0.18296	
4	1	0.39427	1.25127	0.15235	
5	1	0.34438	0.88897	0.26114	
6	1	0.32108	1.01084	0.22016	
7	1	0.35707	1.26602	0.46595	
8	1	0.51546	0.94426	0.59526	
9	1	0.44264	1.21359	0.86627	

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.54191	0.53726
1	0.51650	0.50965
2	0.40616	0.40200
3	0.59997	0.49786
4	0.44808	0.48046
5	0.39261	0.39230
6	0.28764	0.35946

```
7      0.25860                        0.31355
8      0.47219                        0.44014
9      0.58922                        0.60535

Variance                          1.000000
Prior Model MAE                   0.428637
ABC pre-generator MAE             1.022641
Skip Node weight                  0.462629
ABC GAN MAE                       0.451289
ABC_GAN MAE (skip connection)     0.453804
dtype: float64
------------------------------------------------------------

   Variance  Prior Model MAE  ABC pre-generator MAE  Skip Node weight  \
0       0.1          0.53668                0.51651           0.62019
1       0.1          0.47355                0.47965           0.53377
2       0.1          0.33190                0.38638           0.29185
3       0.1          0.39706                0.41030           0.43129
4       0.1          0.34925                0.32784           0.31799
5       0.1          0.51984                0.51396           0.34955
6       0.1          0.35432                0.35693           0.10565
7       0.1          0.53064                0.56628           0.02329
8       0.1          0.71232                0.71499           0.13962
9       0.1          0.36771                0.39040           0.64944

   ABC GAN MAE  ABC_GAN MAE (skip connection)
0      0.54104                        0.51962
1      0.46734                        0.46421
2      0.34245                        0.31963
3      0.37943                        0.40711
4      0.36975                        0.36937
5      0.51153                        0.52991
6      0.30971                        0.36567
7      0.55765                        0.55152
8      0.71460                        0.76575
9      0.30918                        0.32917

Variance                          0.100000
Prior Model MAE                   0.457329
ABC pre-generator MAE             0.466326
Skip Node weight                  0.346264
ABC GAN MAE                       0.450268
ABC_GAN MAE (skip connection)     0.462195
dtype: float64
------------------------------------------------------------

   Variance  Prior Model MAE  ABC pre-generator MAE  Skip Node weight  \
0      0.01          0.33287                0.33551           0.00000
1      0.01          0.42998                0.42820           0.00000
2      0.01          0.50122                0.50413           0.06712
```

```
3      0.01          0.43676               0.44261          0.00000
4      0.01          0.33455               0.33644          0.07439
5      0.01          0.78088               0.77916          0.23687
6      0.01          0.47672               0.47625          0.65262
7      0.01          0.38560               0.38509          0.06908
8      0.01          0.39985               0.40152          0.66324
9      0.01          0.48295               0.48434          0.25610
```

```
   ABC GAN MAE  ABC_GAN MAE (skip connection)
0      0.33310                        0.33333
1      0.42432                        0.43007
2      0.53061                        0.51043
3      0.45985                        0.43671
4      0.35703                        0.34343
5      0.81768                        0.80321
6      0.46068                        0.50837
7      0.41339                        0.39242
8      0.39199                        0.41233
9      0.48473                        0.48003
```

```
Variance                          0.010000
Prior Model MAE                   0.456137
ABC pre-generator MAE             0.457325
Skip Node weight                  0.201942
ABC GAN MAE                       0.467338
ABC_GAN MAE (skip connection)     0.465033
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	0.56200	0.95637	0.98965	
1	1	0.59398	0.99105	1.00000	
2	1	0.57489	1.09791	0.99835	
3	1	0.53514	1.14123	0.98582	
4	1	0.49943	1.00669	0.99685	
5	1	0.40170	0.92629	0.98808	
6	1	0.40741	0.70083	1.00000	
7	1	0.65974	0.91241	0.99395	
8	1	0.51646	0.62034	0.98755	
9	1	0.71367	1.12624	0.98142	

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.58176	0.46248
1	0.45958	0.42152
2	0.41223	0.33756
3	0.41946	0.54810
4	0.41806	0.38833
5	0.39980	0.42166
6	0.41765	0.36945
7	0.38540	0.33890
8	0.59699	0.65632
9	0.77017	0.60436

```
Variance                          1.000000
Prior Model MAE                   0.546443
ABC pre-generator MAE             0.947936
Skip Node weight                  0.992167
ABC GAN MAE                       0.486111
ABC_GAN MAE (skip connection)     0.454868
dtype: float64
------------------------------------------------------------
```

	Variance	Prior Model MAE	ABC pre-generator MAE	Skip Node weight	\
0	0.1	0.63862	0.63696	0.56790	
1	0.1	0.61852	0.60149	0.35249	
2	0.1	0.54850	0.53720	0.64919	
3	0.1	0.47923	0.49727	0.73570	
4	0.1	0.57902	0.61939	0.86923	
5	0.1	0.42007	0.44082	0.44208	
6	0.1	0.63264	0.65136	0.35998	
7	0.1	0.35147	0.37293	0.74450	
8	0.1	0.42532	0.45043	0.41286	
9	0.1	0.58336	0.56493	0.31535	

	ABC GAN MAE	ABC_GAN MAE (skip connection)
0	0.40297	0.43240
1	0.58207	0.48299
2	0.63439	0.51157
3	0.57385	0.40636
4	0.43976	0.22853
5	0.40088	0.34960
6	0.56938	0.48246
7	0.44832	0.30263
8	0.32823	0.43937
9	0.67975	0.63128

```
Variance                          0.100000
Prior Model MAE                   0.527676
ABC pre-generator MAE             0.537278
Skip Node weight                  0.544928
ABC GAN MAE                       0.505961
ABC_GAN MAE (skip connection)     0.426718
dtype: float64
------------------------------------------------------------
```

	Variance	Prior Model MAE	ABC pre-generator MAE	Skip Node weight	\
0	0.01	0.50899	0.51005	0.17819	
1	0.01	0.59421	0.59443	0.28878	
2	0.01	0.61136	0.60947	0.25617	
3	0.01	0.59228	0.59332	0.24635	
4	0.01	0.51754	0.51260	0.18660	
5	0.01	0.52575	0.52621	0.31640	

```
6      0.01          0.47344               0.47543          0.20956
7      0.01          0.53252               0.52901          0.31251
8      0.01          0.58162               0.58059          0.17613
9      0.01          0.49243               0.49508          0.16200

   ABC GAN MAE  ABC_GAN MAE (skip connection)
0      0.60887                        0.48184
1      0.63566                        0.46730
2      0.57071                        0.55873
3      0.51744                        0.47719
4      0.60983                        0.52483
5      0.41617                        0.46530
6      0.29510                        0.35082
7      0.38626                        0.37939
8      0.77086                        0.69248
9      0.43190                        0.53707

Variance                          0.010000
Prior Model MAE                   0.543013
ABC pre-generator MAE             0.542619
Skip Node weight                  0.233269
ABC GAN MAE                       0.524280
ABC_GAN MAE (skip connection)     0.493495
dtype: float64
------------------------------------------------------------
```