Analysis_Test

December 24, 2021

[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
```

0.1 BaseLine Models

We have used Random Forest, Catboost, Vanilla NN and Stats Model as the Baseline Model for the problem

Importing data of baseline Models

[3]:
```
books = sb.read_notebooks("./BaseLine_Model_Output")
baseLine_data = []
for nb in books.notebooks:
    nbList=[nb.scraps['Catboost MSE'].data,
            nb.scraps['Stats Model MSE'].data,
            nb.scraps['Random Forest MSE'].data,
            nb.scraps['Vanilla NN MSE'].data]
    baseLine_data.append(nbList)
print("BASELINE MODEL MSE VALUES")
df = pd.DataFrame(baseLine_data, columns = ["Catboost","Stats Model","Random␣
 ↪Forest","Vanilla Neural Network"])
print(df)
print("MEAN:")
print(df.mean(axis = 0))
baseLine_data = np.array(baseLine_data)
```

```
BASELINE MODEL MSE VALUES
   Catboost  Stats Model  Random Forest  Vanilla Neural Network
0  0.134360     0.308435       0.182300                0.911658
1  0.088122     0.305280       0.123892                1.015526
2  0.101181     0.309786       0.173017                1.117976
```

```
3  0.093362     0.280718       0.178366                0.978198
4  0.115354     0.237479       0.198445                0.972637
5  0.088785     0.326439       0.119403                0.919878
6  0.097160     0.336741       0.228378                0.805377
7  0.078201     0.379283       0.121724                0.681750
8  0.076088     0.348601       0.101290                0.861582
9  0.136799     0.286368       0.207355                0.881409
MEAN:
Catboost                  0.100941
Stats Model               0.311913
Random Forest             0.163417
Vanilla Neural Network    0.914599
dtype: float64
```

0.2 GAN

Simple C-GAN was used to train the dataset

[4]:
```
book = sb.read_notebooks("./Main/GAN")
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,
              nb.scraps['GAN Model n_epochs'].data]
    gan_data.append(nbList)
print("GAN Performance Metrics")
df = pd.DataFrame(gan_data, columns = ['MSE','MAE','Euclidean␣
 ↪Distance','Manhattan Distance','Epochs'])
print(df)
print("MEAN:")
print(df.mean(axis = 0))
gan_data = np.array(gan_data)
```

```
GAN Performance Metrics
        MSE       MAE  Euclidean Distance  Manhattan Distance  Epochs
0  0.108423  0.251182            3.308940           25.369408     171
1  0.310981  0.371125            5.600692           37.483586     142
2  0.222287  0.312892            4.738119           31.602059    5000
3  0.382009  0.469235            6.210758           47.392747    5000
4  0.288838  0.324927            5.401011           32.817620    5000
5  0.213533  0.313193            4.643706           31.632467    5000
6  0.122288  0.262596            3.514324           26.522194    1983
```

```
7  0.244608  0.315503            4.966387           31.865806    5000
8  0.168282  0.312029            4.122393           31.514973     263
9  0.763354  0.560267            8.779184           56.586946    5000
MEAN:
MSE                       0.282460
MAE                       0.349295
Euclidean Distance        5.128551
Manhattan Distance       35.278780
Epochs                 3255.900000
dtype: float64
```

0.3 ABC_GAN Analysis

[5]:
```
book = sb.read_notebooks("./Test")
paramVal = [0.01,0.1,1]
abc_mse = [[] for i in range(3)]
abc_mse_skip = [[] for i in range(3)]
abc_mse_mean = [[] for i in range(3)]
abc_mse_skip_mean = [[] for i in range(3)]
abc_weights = [[] for i in range(3)]
abc_epochs = [[] for i in range(3)]

for nb in book.notebooks:
    metrics1 = np.array(nb.scraps['ABC_GAN_1 Metrics'].data)
    metrics2 = np.array(nb.scraps['ABC_GAN_2 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(1000):
                abc_mse[i].append(metrics1[0,j])
                abc_mse_skip[i].append(metrics3[0,j])
            abc_epochs[i].append(nb.scraps['ABC-GAN Model n_epochs'].data)
            abc_weights[i].append(nb.scraps['Skip Connection Weight'].data)
            abc_epochs[i].append(nb.scraps['ABC-GAN Model n_epochs'].data)
            abc_mse_mean[i].append(mean(metrics1[0,:]))
            abc_mse_skip_mean[i].append(mean(metrics3[0,:]))
```

[6]:
```
for i in range(3):
    data = []
    for j in range(len(abc_weights[i])):
        data.
 ↪append([paramVal[i],abc_weights[i][j],abc_mse_mean[i][j],abc_mse_skip_mean[i][j],abc_epochs
    df = pd.DataFrame(data, columns = ['Variance','Weight','ABC_Mean','Skip␣
 ↪Connection ABC Mean','Epochs'])
    print(df)
```

```
    print(df.mean(axis=0))
```

```
    Variance    Weight  ABC_Mean  Skip Connection ABC Mean  Epochs
0       0.01  0.000000  0.142007                  0.005896      62
1       0.01  0.000000  0.060067                  0.005693      62
2       0.01  0.015057  0.254994                  0.021283      42
3       0.01  0.002985  0.243528                  0.005128      42
4       0.01  0.005365  0.132533                  0.003611     178
5       0.01  0.035787  0.388269                  0.011524     178
6       0.01  0.071458  0.157338                  5.350273      63
7       0.01  0.073413  0.277285                  0.010582      63
8       0.01  0.000087  0.090055                  0.004755    5000
9       0.01  0.006217  0.110667                  0.005384    5000
10      0.01  0.017501  0.101729                  0.006248      58
11      0.01  0.139940  0.116963                  0.025114      58
Variance                    0.010000
Weight                      0.030651
ABC_Mean                    0.172953
Skip Connection ABC Mean    0.454624   Mean Excluding the outlier :  0.00956527272727273
Epochs                    900.500000
dtype: float64
    Variance    Weight  ABC_Mean  Skip Connection ABC Mean  Epochs
0        0.1  0.033136  0.241343                  0.015642      53
1        0.1  0.011148  0.069785                  0.015451      53
2        0.1  0.007397  0.059361                  0.015510      29
3        0.1  0.048406  0.207625                  0.027378      29
4        0.1  0.000000  0.132892                  0.015136      48
5        0.1  0.002828  0.110457                  0.015003      48
6        0.1  0.039032  0.169502                  0.015846      36
7        0.1  0.012134  0.056144                  0.017275      36
8        0.1  0.007834  0.091934                  0.014463     193
9        0.1  0.006314  0.090706                  0.016932     193
10       0.1  0.032581  0.121959                  0.016522      45
11       0.1  0.000007  0.100863                  0.013994      45
Variance                    0.100000
Weight                      0.016735
ABC_Mean                    0.121048
Skip Connection ABC Mean    0.016596
Epochs                     67.333333
dtype: float64
    Variance    Weight  ABC_Mean  Skip Connection ABC Mean  Epochs
0          1  0.717305  0.199444                  0.181074     554
1          1  0.927315  0.186651                  0.152681     554
2          1  0.970261  0.193092                  0.133733    5000
3          1  0.747636  0.112559                  0.116968    5000
4          1  0.741823  0.295416                  0.220009     326
5          1  0.973936  0.125268                  0.490795     326
6          1  0.886234  0.375375                  0.589509     430
```

```
7          1  0.833734  0.316354                0.132037     430
8          1  0.802353  0.159330                0.121161    5000
9          1  0.747843  0.158700                0.152564    5000
10         1  0.897789  0.201753                0.309947    3439
11         1  0.938318  0.326075                0.327597    3439
Variance                      1.000000
Weight                        0.848712
ABC_Mean                      0.220835
Skip Connection ABC Mean      0.244006
Epochs                     2458.166667
dtype: float64
```