Data Mining
Lab 01

Names:

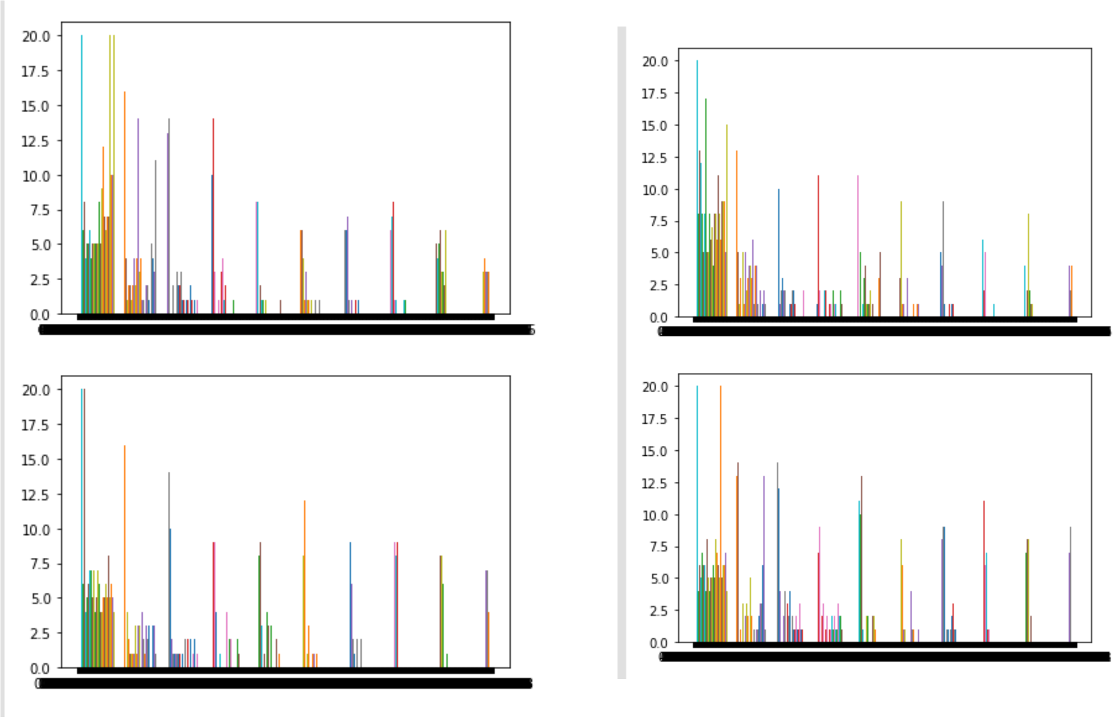
- Ahmed Mohamed EL-Bawab (08)
- Khalil Ismail Khalil (23)

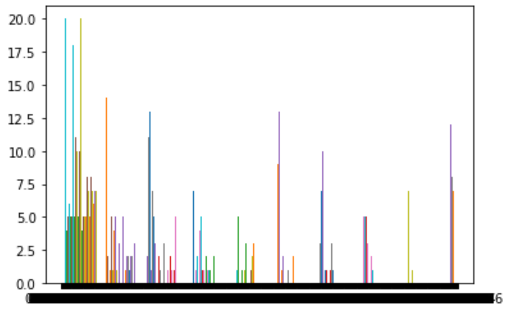
- Number of instances = 2310 instances.
- Number of attributes = 19 attributes.
- Number of classes = 7 classes.

1)Data Exploration:

1)Histograms:

1)

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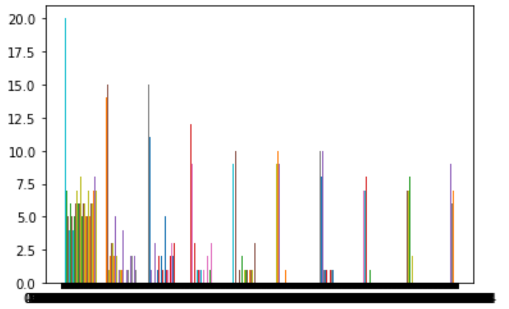
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0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17.5
15.0
12.5
10.0
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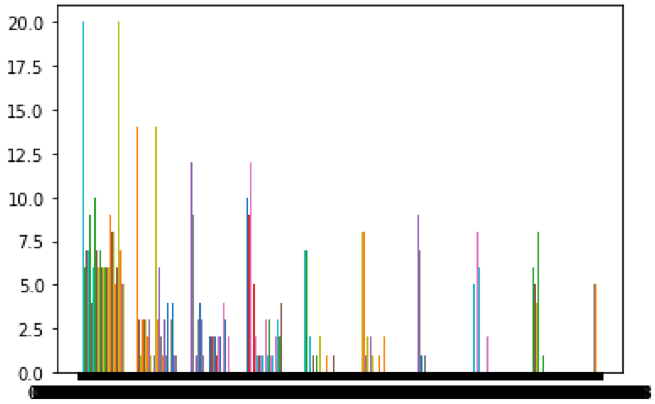
0.0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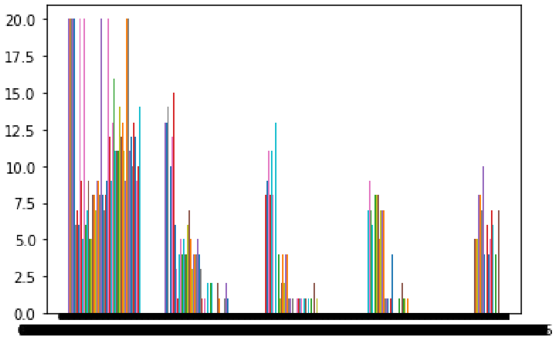
15.0
12.5
10.0
7.5
5.0
2.5
0.0

2)

- at bins = 5,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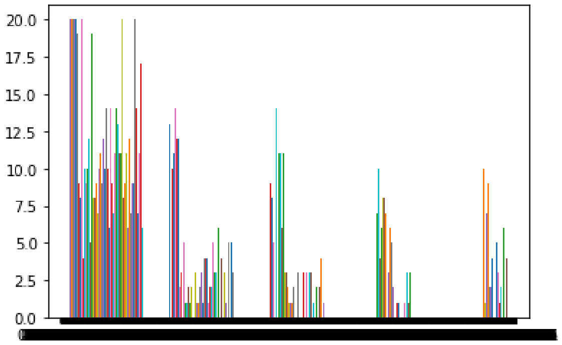
2.5
0.0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7.5
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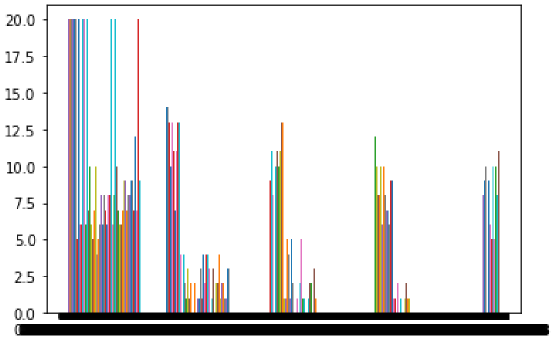
2.5
0.0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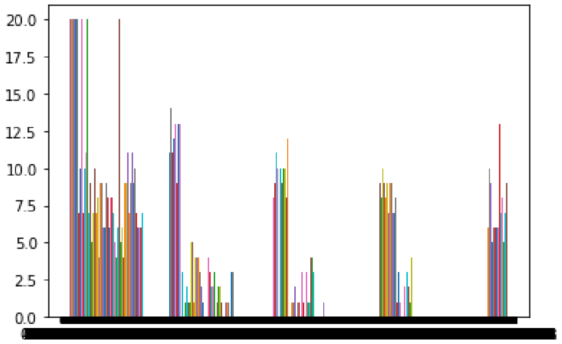
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7.5
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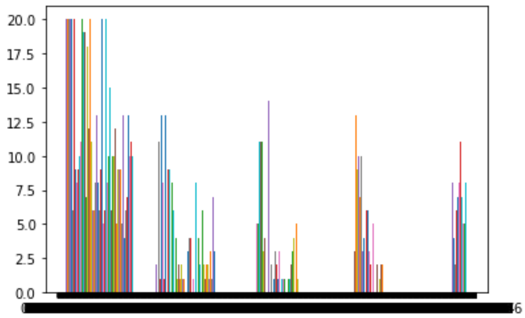
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7.5
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2.5
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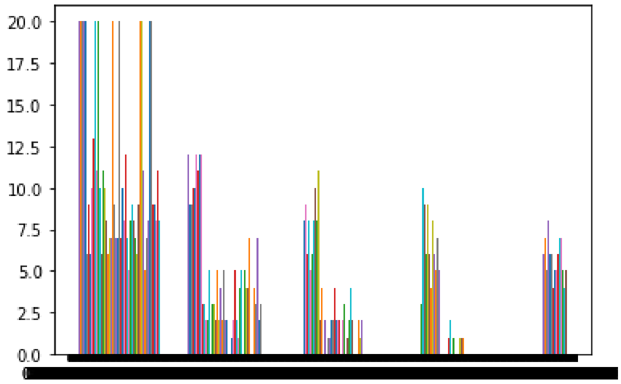
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10.0
7.5
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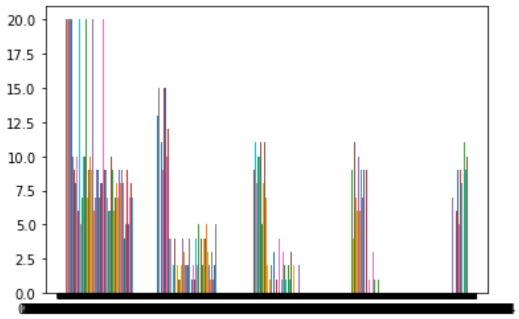
0.0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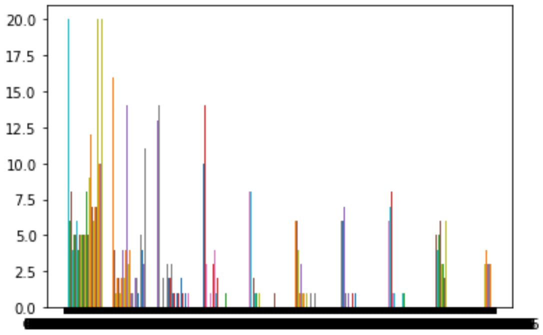
- at bins = 10,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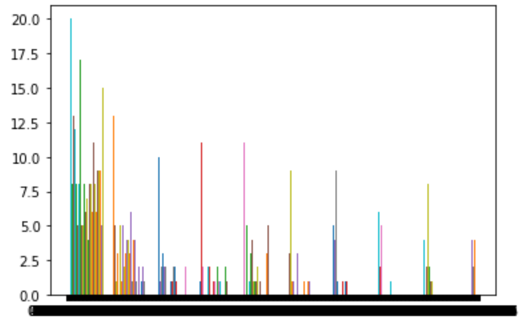
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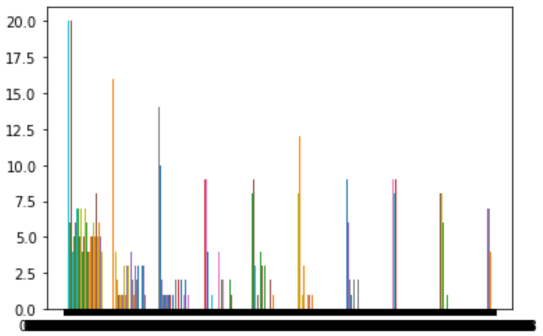
0.0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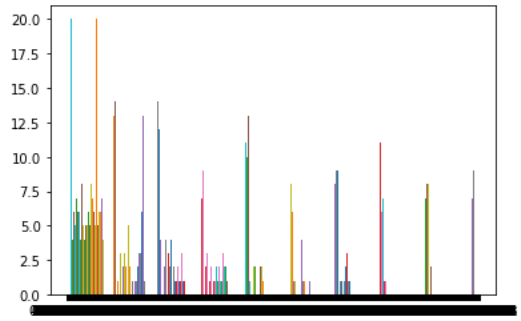
2.5
0.0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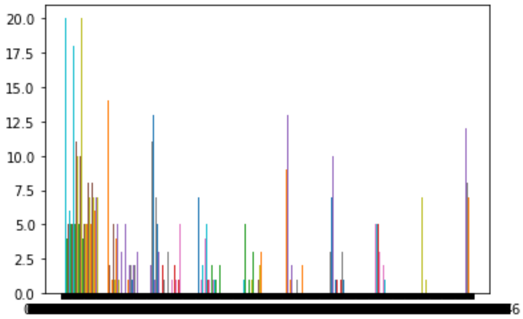
12.5
10.0
7.5
5.0
2.5
0.0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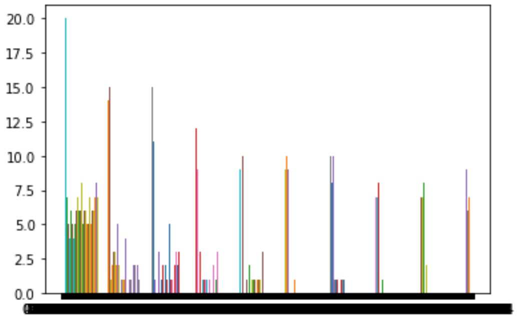
10.0
7.5
5.0
2.5
0.0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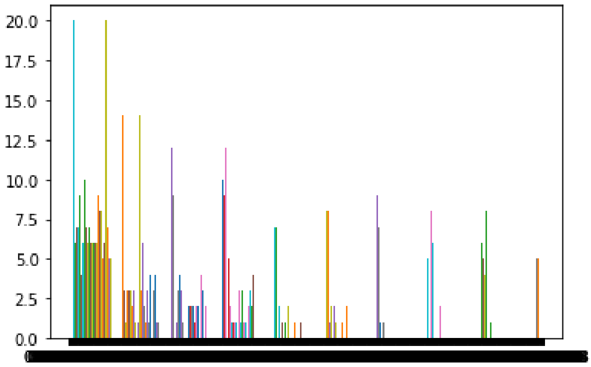
7.5
5.0
2.5
0.0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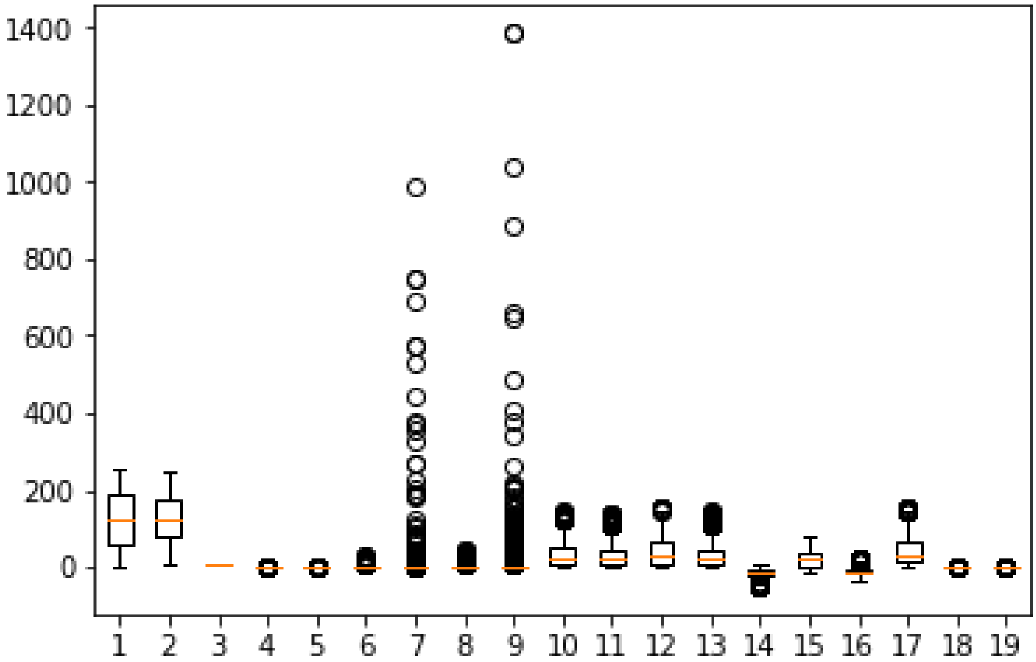
15.0
12.5
10.0
7.5
5.0
2.5
0.0

2)Boxplots: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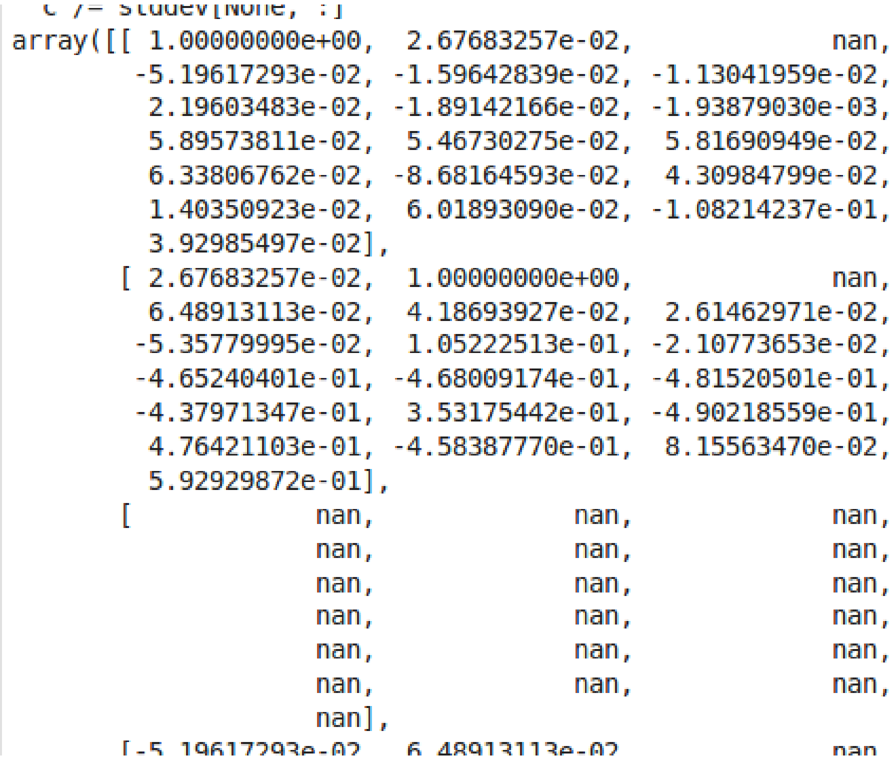
1200
1000
800
600
400
200
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19

3)Correlation Matrix:

1)dxd symmetric matrix(d=19):



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         3.92985497e-02],
       [ 2.67683257e-02,  1.00000000e+00,             nan,
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        -4.65240401e-01, -4.68009174e-01, -4.81520501e-01,
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         5.92929872e-01],
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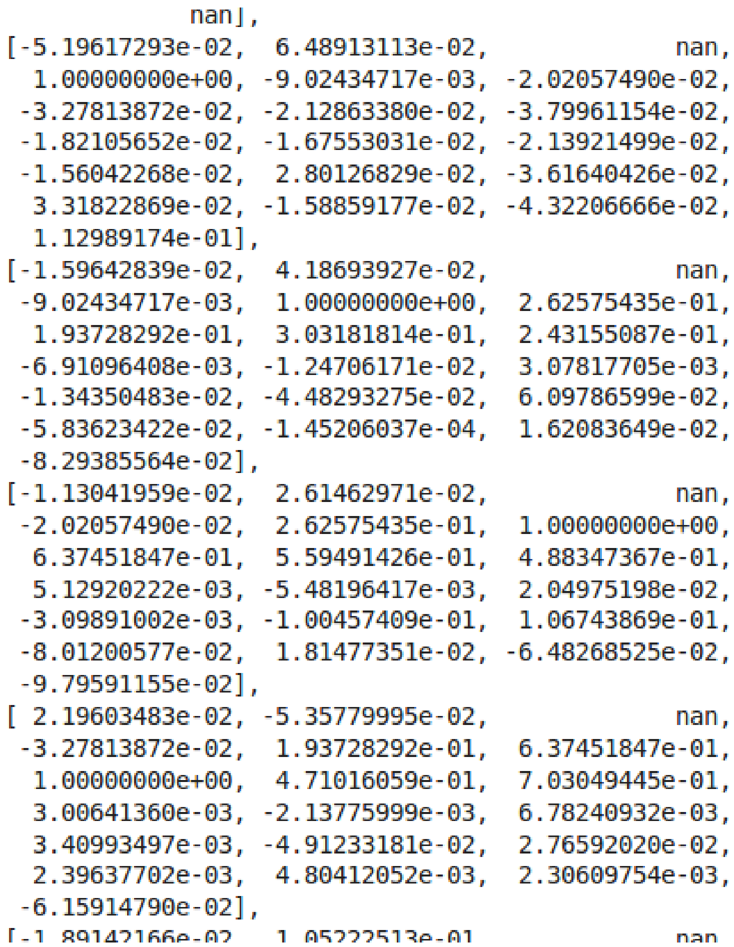

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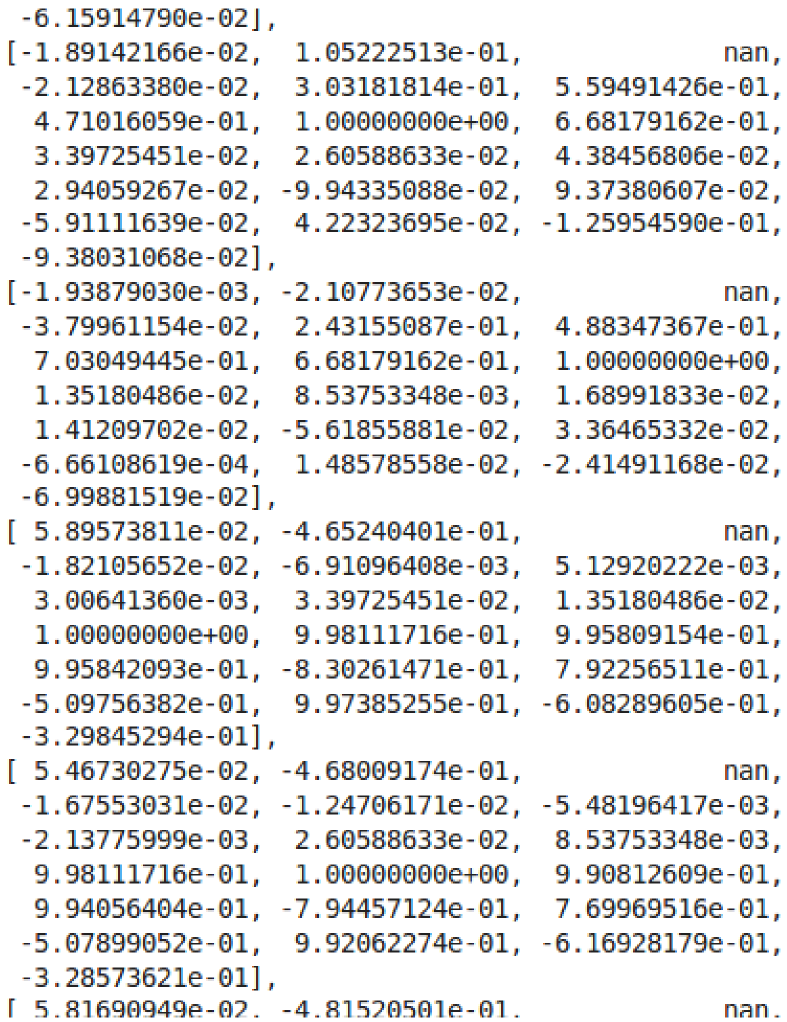

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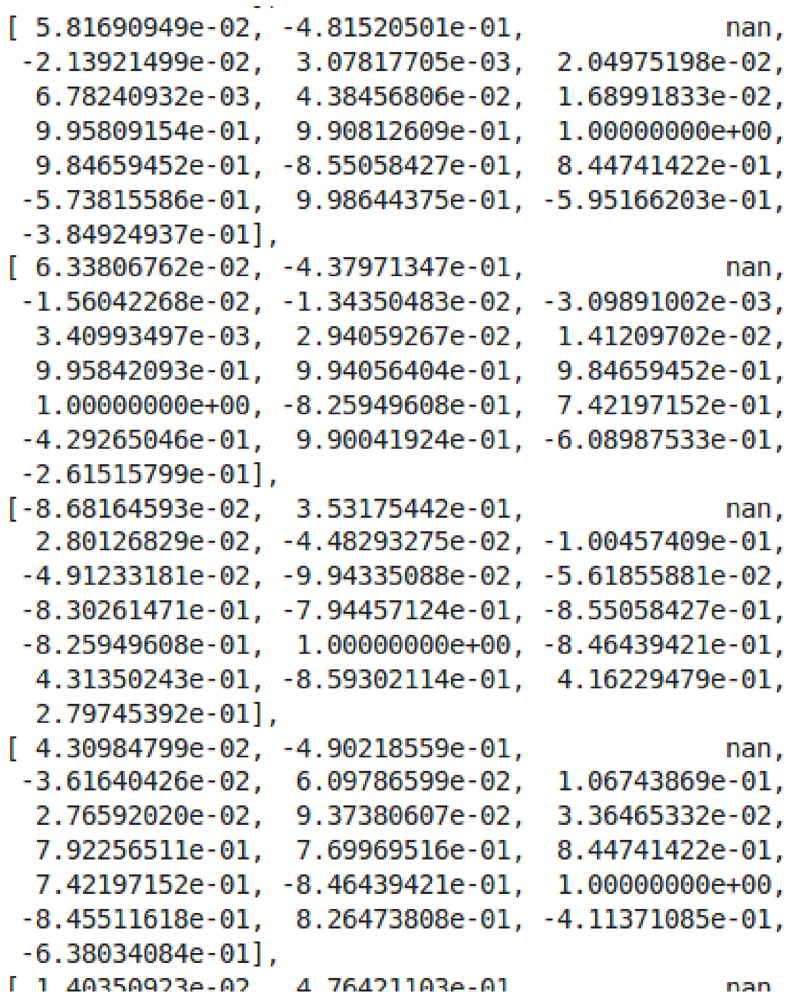

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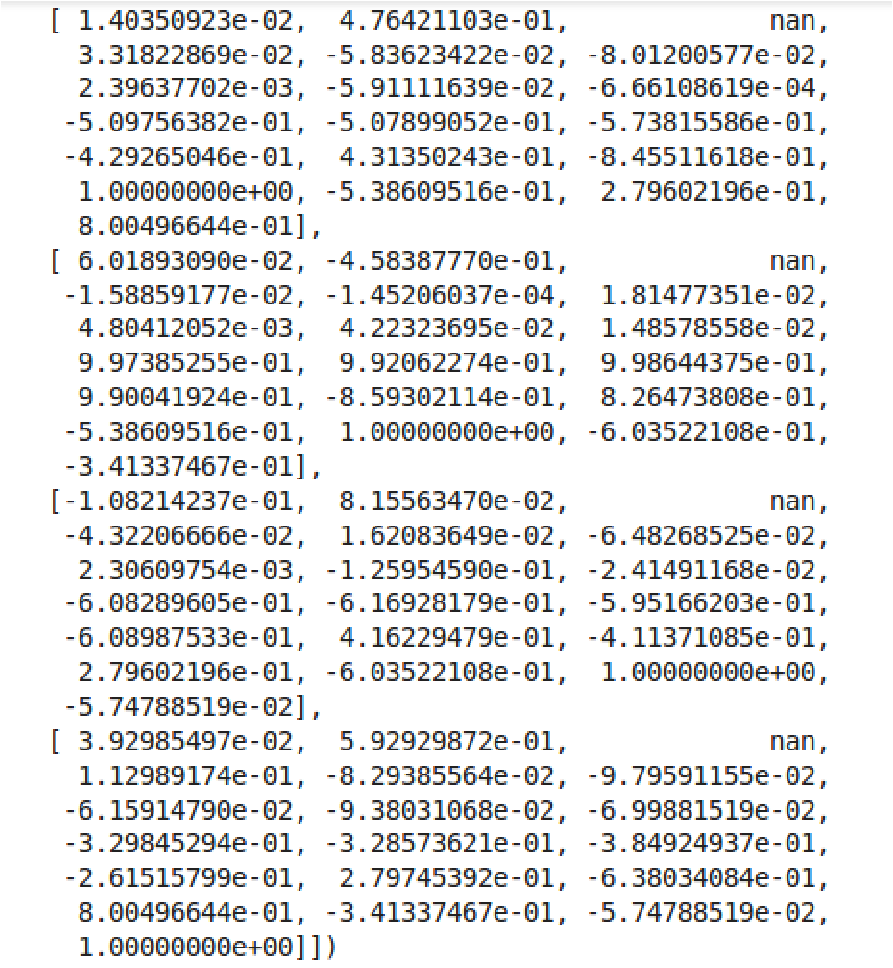

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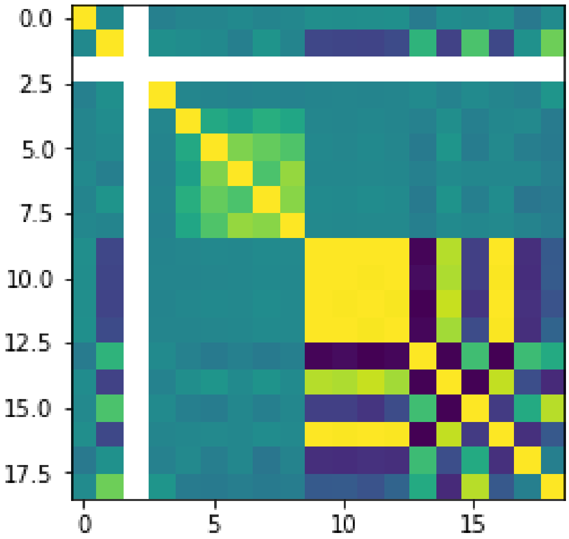
2)

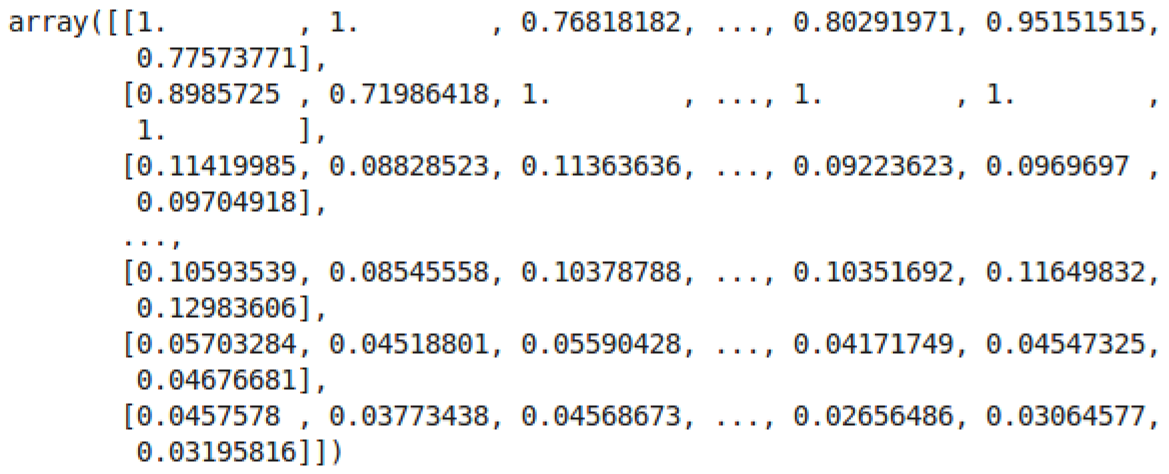


2)Preprocessing:

1)Normalization:

1)Min-max scaler:

- normalizedMinmaxList:



```
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        1.        ],
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       ...,
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```
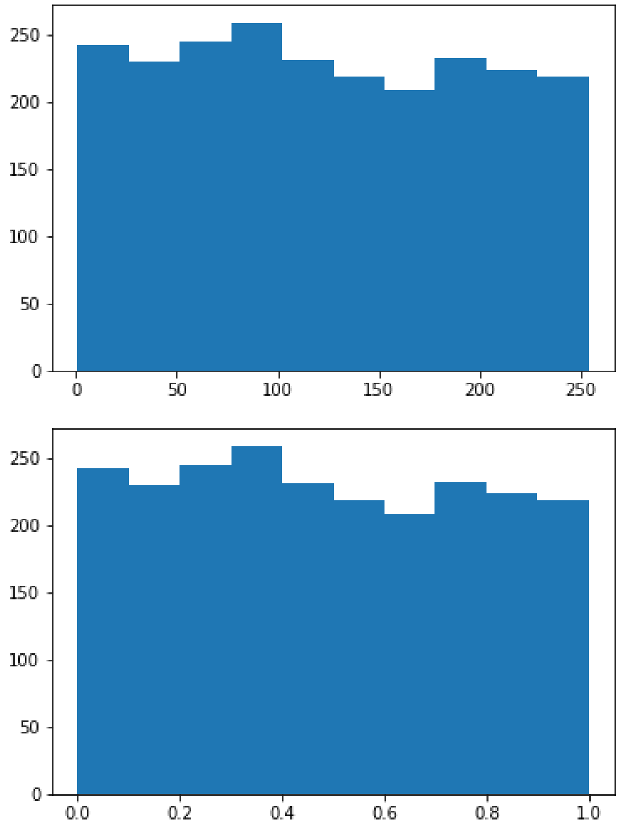
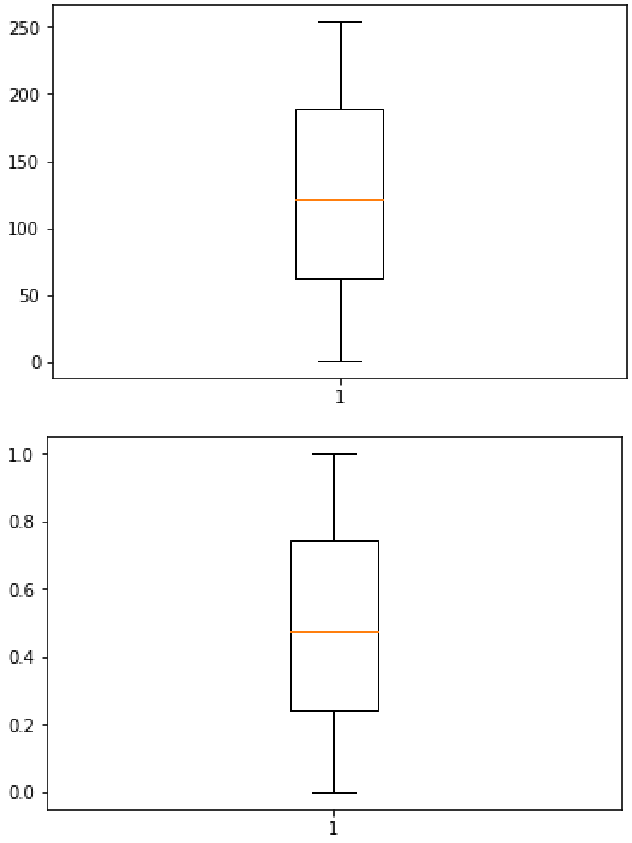

- Histograms before and after normalization:

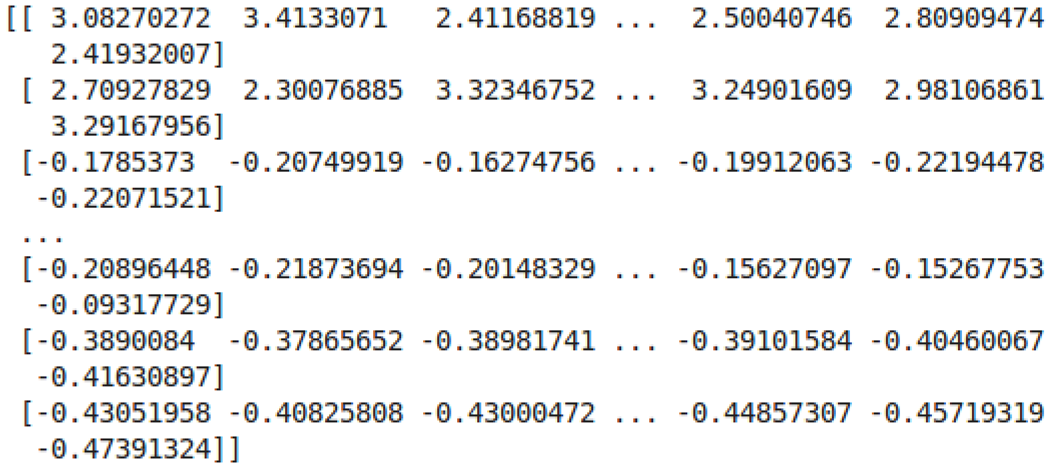


- Boxplots before and after normalization:



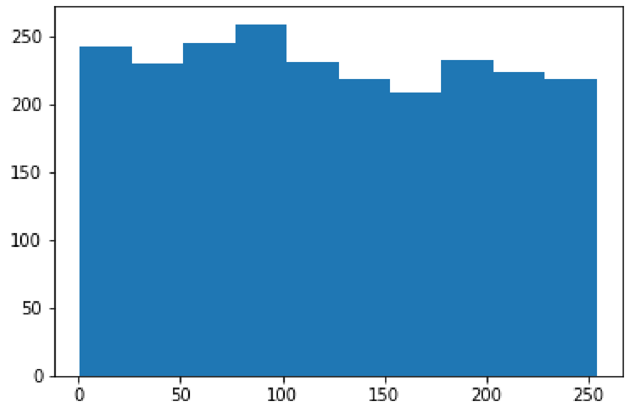
2)Z-score:

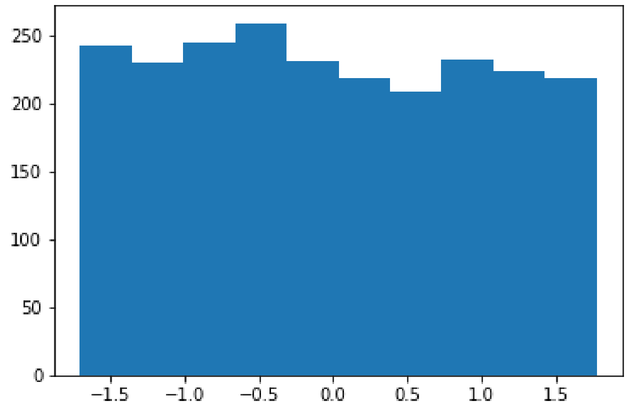
- normalizedZscoreList:



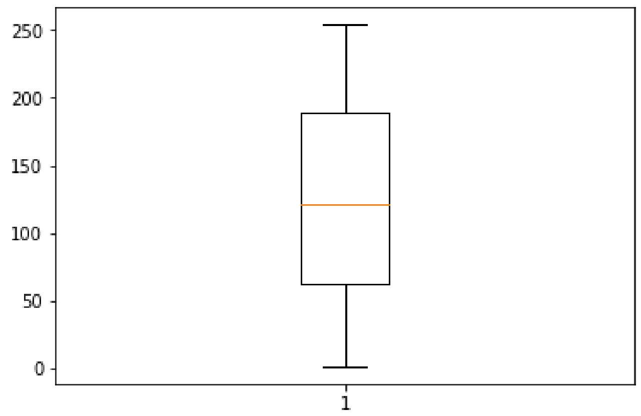
```
[[ 3.08270272  3.4133071   2.41168819 ...  2.50040746  2.80909474
   2.41932007]
 [ 2.70927829  2.30076885  3.32346752 ...  3.24901609  2.98106861
   3.29167956]
 [-0.1785373  -0.20749919 -0.16274756 ... -0.19912063 -0.22194478
  -0.22071521]
 ...
 [-0.20896448 -0.21873694 -0.20148329 ... -0.15627097 -0.15267753
  -0.09317729]
 [-0.3890084  -0.37865652 -0.38981741 ... -0.39101584 -0.40460067
  -0.41630897]
 [-0.43051958 -0.40825808 -0.43000472 ... -0.44857307 -0.45719319
  -0.47391324]]
```

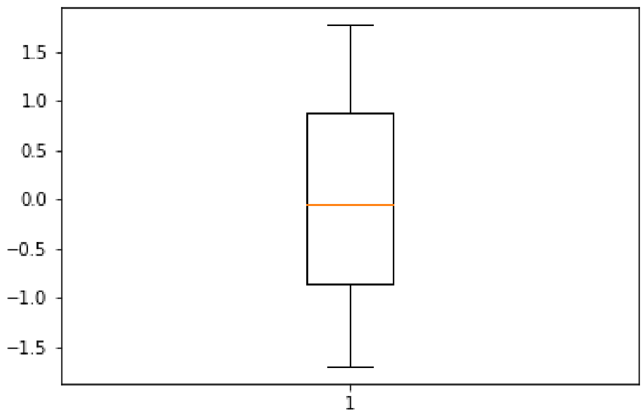
- Histograms before and after normalization:





- Boxplots before and after normalization:



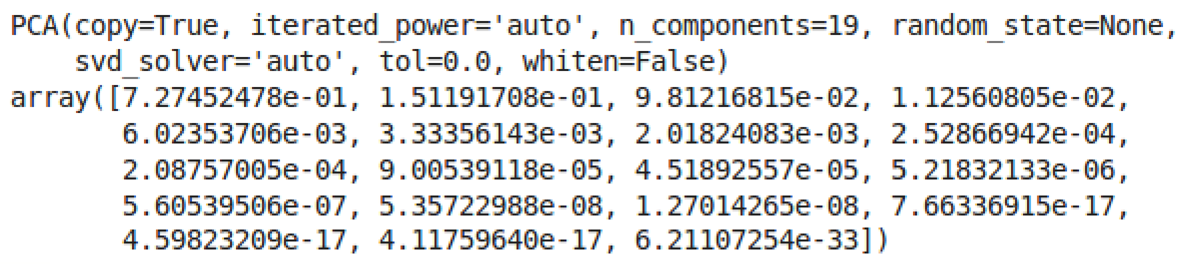


1)Dimensionality reduction:

1)Feature Projection:

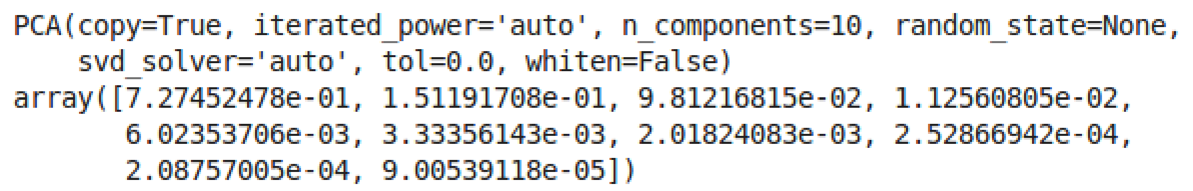
- Variance_ratio after applying PCA with:

components = 19,



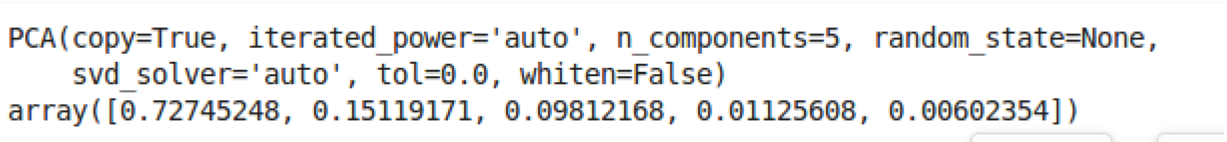
```
PCA(copy=True, iterated_power='auto', n_components=19, random_state=None,
    svd_solver='auto', tol=0.0, whiten=False)
array([7.27452478e-01, 1.51191708e-01, 9.81216815e-02, 1.12560805e-02,
       6.02353706e-03, 3.33356143e-03, 2.01824083e-03, 2.52866942e-04,
       2.08757005e-04, 9.00539118e-05, 4.51892557e-05, 5.21832133e-06,
       5.60539506e-07, 5.35722988e-08, 1.27014265e-08, 7.66336915e-17,
       4.59823209e-17, 4.11759640e-17, 6.21107254e-33])
```

components = 10,



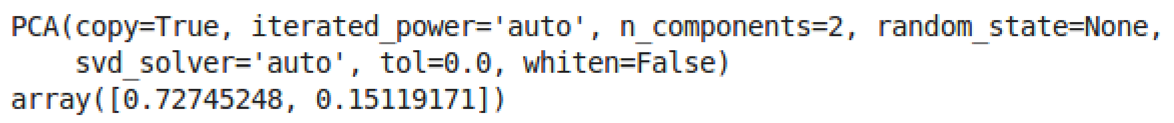
```
PCA(copy=True, iterated_power='auto', n_components=10, random_state=None,
    svd_solver='auto', tol=0.0, whiten=False)
array([7.27452478e-01, 1.51191708e-01, 9.81216815e-02, 1.12560805e-02,
       6.02353706e-03, 3.33356143e-03, 2.01824083e-03, 2.52866942e-04,
       2.08757005e-04, 9.00539118e-05])
```

components = 5,



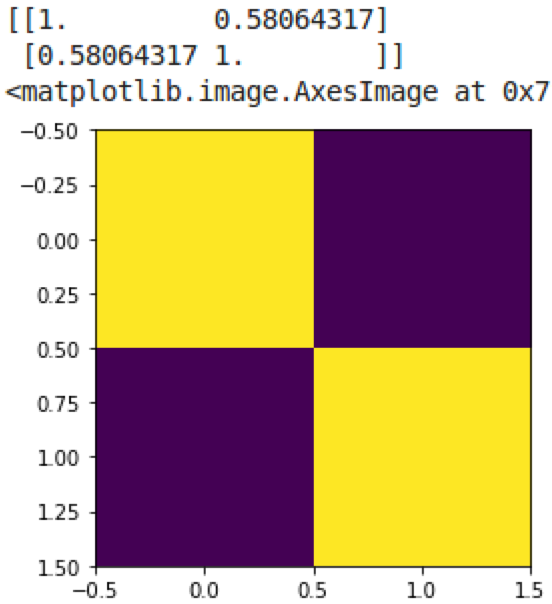
```
PCA(copy=True, iterated_power='auto', n_components=5, random_state=None,
    svd_solver='auto', tol=0.0, whiten=False)
array([0.72745248, 0.15119171, 0.09812168, 0.01125608, 0.00602354])
```

components = 2,



```
PCA(copy=True, iterated_power='auto', n_components=2, random_state=None,
    svd_solver='auto', tol=0.0, whiten=False)
array([0.72745248, 0.15119171])
```

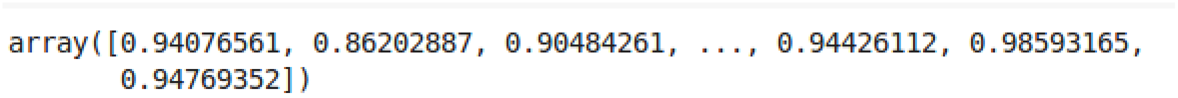
- Correlation matrix of your dataset after applying PCA:



```
[[1.         0.58064317]
 [0.58064317 1.        ]]
<matplotlib.image.AxesImage at 0x7f83d9d08908>
```

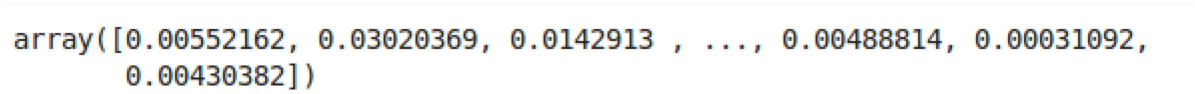
2)Feature selection:

- Pvalues after applying SelectKBest:



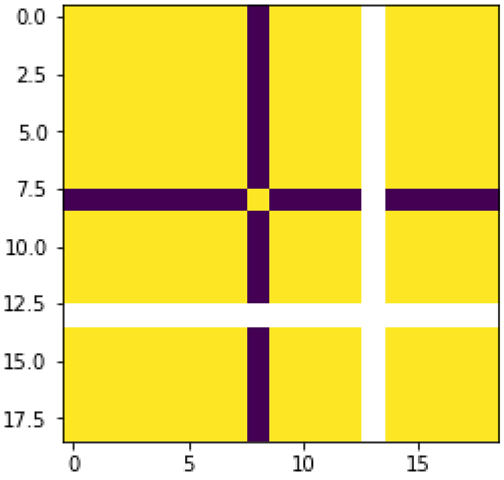
```
array([0.94076561, 0.86202887, 0.90484261, ..., 0.94426112, 0.98593165,
       0.94769352])
```

- Scores after applying SelectKBest:



```
array([0.00552162, 0.03020369, 0.0142913 , ..., 0.00488814, 0.00031092,
       0.00430382])
```

- Correlation matrix of your dataset after applying SelectKBest:



0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
0
5
10
15