In [83]: #import requried module

In [84]: import pandas as pd
   ...: import matplotlib.pyplot as plt
   ...: from sklearn.cluster.bicluster import SpectralCoclustering
   ...:

In [85]: #reading of file using pandas data frame

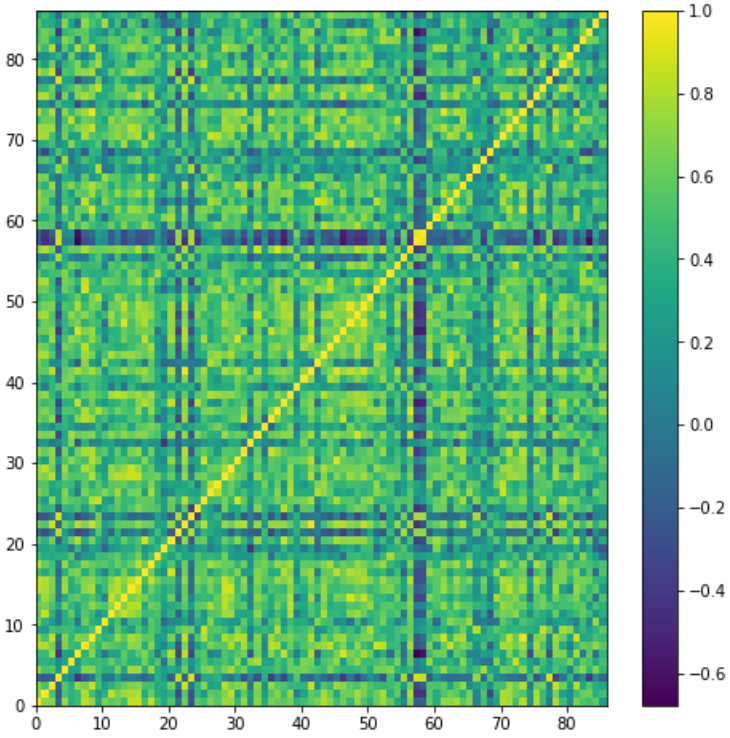
In [86]: df=pd.read_csv("file:///C:/Users/dell/Desktop/whiskey_clustering/whisky.txt",engine='python')
   ...: df["Region"] = pd.read_csv("file:///C:/Users/dell/Desktop/whiskey_clustering/regions.txt")
   ...: flavour=df.iloc[:,2:14] #extraction of all 12 different flavour matrix
   ...:

In [87]: #find co-relation coefficient matrix

In [88]: corr_whisky=pd.DataFrame.corr(flavour.transpose()) #computing of co-relation coefficient

In [89]: #for pltting of graph

In [90]: plt.figure(figsize=(8,8))
   ...: plt.pcolor(corr_whisky)
   ...: plt.colorbar()
   ...:
Out[90]: <matplotlib.colorbar.Colorbar at 0x1af51bb08d0>



In [91]: #ALGORITHM

In [92]: model=SpectralCoclustering(n_clusters=5,random_state=45) #instantiation of Algorithm
   ...: model.fit(corr_whisky) #training
   ...:
Out[92]:
SpectralCoclustering(init='k-means++', mini_batch=False, n_clusters=5,
          n_init=10, n_jobs=1, n_svd_vecs=None, random_state=45,
          svd_method='randomized')

In [93]: #co-clustering algorithm make cluster row and column wise simultenously

In [94]: y=model.column_labels_
   ...: x=model.row_labels_
   ...: print("co-clustering meaning (row ,clomn): ",list(zip(x,y)))
   ...:
co-clustering meaning (row ,clomn): [(1, 1), (4, 4), (0, 0), (2, 2), (1, 1), (3, 3), (0, 0), (4, 4), (1, 1), (0, 0), (4, 4), (3, 3), (1, 1), (3, 3), (1, 1), (1, 1), (3, 3), (1, 1), (3, 3), (0, 0),
(0, 0), (2, 2), (0, 0), (2, 2), (0, 0), (0, 0), (4, 4), (4, 4), (0, 0), (4, 4), (0, 0), (1, 1), (3, 3), (3, 3), (3, 3), (1, 1), (4, 4), (0, 0), (3, 3), (1, 1), (3, 3), (0, 0), (4, 4), (4, 4), (4, 4), (3, 3
(1, 1), (3, 3), (3, 3), (0, 0), (0, 0), (4, 4), (4, 4), (4, 4), (3, 3), (2, 2), (4, 4), (2, 2), (2, 2), (3, 3), (0, 0), (1, 1), (4, 4), (1, 1), (1, 1), (4, 4), (2, 2), (1, 1), (2, 2), (3, 3), (4, 4), (1, 1
(3, 3), (1, 1), (2, 2), (1, 1), (0, 0), (2, 2), (1, 1), (0, 0), (3, 3), (0, 0), (4, 4), (3, 3), (4, 4), (3, 3)]

In [95]: #see both element of tuple are equal

In [96]: #sorting according to cluster

In [97]: df["disteliries_group"]=pd.Series(model.row_labels_,index=df.index)
   ...: cluster=list(zip(df.iloc[:,1],df.iloc[:,18]))

```
   ...: cluster=sorted(cluster, key=lambda x: x[1])
   ...:

In [98]: print("the resultant grouped classified whiskey based on their flavour")
   ...: print(pd.DataFrame(cluster))
   ...:
the resultant grouped classified whiskey based on their flavour
                0  1
0          AnCnoc  0
1     Auchentoshan  0
2        Balblair  0
3    Bruichladdich  0
4     Bunnahabhain  0
5          Cardhu  0
6    Craigallechie  0
7     Craigganmore  0
8      Dalwhinnie  0
9        Dufftown  0
10       GlenMoray  0
11    Glenallachie  0
12      Glenlossie  0
13    Glenmorangie  0
14     Loch Lomond  0
15      Strathmill  0
16      Tamnavulin  0
17       Tobermory  0
18       Aberfeldy  1
19         Ardmore  1
20        Aultmore  1
21        BenNevis  1
22        Benrinnes  1
23        Benromach  1
24       BlairAthol  1
25         Edradour  1
26        GlenGrant  1
27       GlenScotia  1
28        Glengoyne  1
29         Longmorn  1
..              ... ..
56         GlenSpey  3
57      Glenfiddich  3
58      Glenkinchie  3
59        Glenlivet  3
60        Inchgower  3
61         Linkwood  3
62     RoyalBrackla  3
63         Speyburn  3
64        Teaninich  3
65        Tomintoul  3
66     Tullibardine  3
67         Aberlour  4
68        Auchroisk  4
69        Balmenach  4
70        Dailuaine  4
71          Dalmore  4
72         Deanston  4
73        GlenKeith  4
74      Glendronach  4
75      Glendullan  4
76      Glenfarclas  4
77      Glenrothes  4
78      Glenturret  4
79    Highland Park  4
80        Knochando  4
81         Macallan  4
82         Mortlach  4
83  RoyalLochnagar  4
84          Tomatin  4
85          Tormore  4

[86 rows x 2 columns]

In [99]: #co-relation coefficient matrix

In [100]: corr_whisky
Out[100]:
          0         1         2         3         4             5  \
0  1.000000  0.708632  0.697354 -0.147311  0.731902  3.890863e-01
1  0.708632  1.000000  0.503074 -0.228591  0.511834  4.009832e-01
2  0.697354  0.503074  1.000000 -0.140435  0.557020  3.896275e-01
3 -0.147311 -0.228591 -0.140435  1.000000  0.231617  1.231300e-01
4  0.731902  0.511834  0.557020  0.231617  1.000000  2.862513e-01
5  0.389086  0.400983  0.389627  0.123130  0.286251  1.000000e+00
6  0.464312  0.460830  0.730465 -0.430674  0.286065  2.433196e-01
7  0.823842  0.793052  0.647298 -0.216957  0.679366  4.815434e-01
8  0.713395  0.510144  0.846651 -0.009969  0.691939  4.259217e-01
9  0.310460  0.242821  0.502091  0.436534  0.485363  4.791864e-01
```

10	0.654848	0.396526	0.244535	-0.010331	0.377426	4.414148e-01
11	0.580019	0.857816	0.394962	-0.025788	0.376845	6.010025e-01
12	0.628808	0.662652	0.518328	0.307534	0.650444	4.400862e-01
13	0.498571	0.757616	0.606250	-0.017417	0.349957	5.412081e-01
14	0.841948	0.781722	0.684286	0.039849	0.776419	3.611576e-01
15	0.855422	0.799096	0.697354	-0.005892	0.731902	3.890863e-01
16	0.508278	0.348036	0.515899	-0.145399	0.376964	6.376296e-01
17	0.855422	0.618169	0.500454	-0.005892	0.731902	3.890863e-01
18	0.503003	0.359694	0.342518	0.386580	0.385164	5.460189e-01
19	0.328672	0.304008	0.360039	0.244612	0.255321	-2.714626e-02
20	0.539969	0.399292	0.635100	-0.168054	0.350823	6.061281e-01
21	-0.049088	-0.307148	-0.033426	0.840269	0.263117	1.035288e-17
22	0.623518	0.557342	0.869382	-0.159734	0.636595	5.076300e-01
23	-0.245440	-0.245718	-0.033426	0.888284	0.087706	1.865010e-01
24	0.564135	0.408718	0.424582	-0.246861	0.424397	3.948233e-01
25	0.469917	0.228024	0.698750	0.342391	0.651120	5.647577e-01
26	0.676632	0.579353	0.266750	0.330923	0.699913	3.720806e-01
27	0.559690	0.538772	0.322485	0.400066	0.500000	4.498235e-01
28	0.731902	0.673466	0.820871	0.105281	0.653846	5.316095e-01
29	0.731902	0.835097	0.644970	-0.021056	0.769231	4.089304e-01
..	...	...	...	...	...	...
56	0.697097	0.793052	0.647298	-0.216957	0.452911	6.019293e-01
57	-0.204157	-0.447100	-0.330173	0.873670	0.022798	4.847862e-02
58	-0.176519	-0.441798	-0.168280	0.846044	0.126155	2.011958e-01
59	0.605408	0.557071	0.533500	-0.174170	0.254514	7.441611e-01
60	0.380235	0.356873	0.517838	0.185963	0.509525	3.611576e-01
61	0.728094	0.538405	0.585936	-0.032372	0.739140	3.457820e-01
62	0.713611	0.632919	0.306655	-0.098264	0.470392	4.080007e-01
63	0.772031	0.566352	0.561967	-0.091140	0.475651	2.528609e-01
64	0.560377	0.400722	0.730465	-0.054813	0.543523	6.995439e-01
65	0.686481	0.650109	0.138974	-0.045370	0.364646	3.524537e-01
66	0.077615	0.097129	0.264258	0.721230	0.485363	1.474420e-01
67	0.503003	0.539542	0.440380	-0.105431	0.770329	-3.031014e-17
68	0.085023	-0.319197	0.173688	0.540573	0.303822	0.000000e+00
69	0.301372	0.377141	0.498386	0.147393	0.269231	6.951817e-01
70	0.801666	0.780279	0.505455	0.101649	0.636595	2.820167e-01
71	0.765207	0.744793	0.752649	-0.041583	0.607644	4.845437e-01
72	0.495204	0.619705	0.626242	-0.034599	0.505590	8.511256e-01
73	0.827379	0.538405	0.788761	-0.113302	0.709575	4.400862e-01
74	0.156627	0.196005	-0.008204	0.500859	0.301372	2.975366e-01
75	0.797802	0.789418	0.593796	-0.263147	0.662994	1.409815e-01
76	0.463332	0.455573	0.631008	0.032372	0.413919	5.029557e-01
77	-0.021124	0.132175	0.014384	0.898820	0.301941	2.809003e-01
78	0.801060	0.658758	0.857180	-0.347003	0.531610	4.782609e-01
79	0.463332	0.269202	0.631008	-0.016186	0.413919	5.029557e-01
80	0.163033	0.132014	0.280806	0.417436	0.068539	6.376296e-01
81	0.662651	0.467396	0.828621	-0.100172	0.559690	2.975366e-01
82	0.543305	0.607054	0.343536	0.151838	0.693375	5.897678e-01
83	0.504753	0.631655	0.545891	-0.392074	0.424397	5.076300e-01
84	0.572186	0.372342	0.358457	0.145517	0.695182	3.043478e-01
85	0.267222	0.483030	0.303273	-0.101649	0.424397	5.076300e-01

	6	7	8	9	...	76	77	\
0	4.643121e-01	0.823842	0.713395	0.310460	...	0.463332	-0.021124	
1	4.608302e-01	0.793052	0.510144	0.242821	...	0.455573	0.132175	
2	7.304649e-01	0.647298	0.846651	0.502091	...	0.631008	0.014384	
3	-4.306744e-01	-0.216957	-0.009969	0.436534	...	0.032372	0.898820	
4	2.860648e-01	0.679366	0.691939	0.485363	...	0.413919	0.301941	
5	2.433196e-01	0.481543	0.425922	0.479186	...	0.502956	0.280900	
6	1.000000e+00	0.421076	0.704248	0.335212	...	0.681689	-0.252646	
7	4.210760e-01	1.000000	0.643268	0.408248	...	0.522233	0.037037	
8	7.042477e-01	0.643268	1.000000	0.525226	...	0.699866	0.107211	
9	3.352119e-01	0.408248	0.525226	1.000000	...	0.852803	0.612372	
10	-2.807173e-02	0.629630	0.393108	0.340207	...	0.348155	0.061728	
11	2.802851e-01	0.554700	0.446026	0.169842	...	0.362103	0.277350	
12	3.078596e-01	0.522233	0.727860	0.586302	...	0.636364	0.522233	
13	5.915607e-01	0.468293	0.572351	0.401478	...	0.635851	0.312195	
14	3.970145e-01	0.714286	0.781111	0.262445	...	0.373024	0.206349	
15	5.603767e-01	0.697097	0.713395	0.543305	...	0.661903	0.232366	
16	6.754470e-01	0.353103	0.567850	0.339791	...	0.605893	-0.050443	
17	4.643121e-01	0.697097	0.591099	0.543305	...	0.661903	0.147869	
18	-1.060164e-17	0.251976	0.243132	0.462910	...	0.296078	0.461957	
19	4.367701e-01	0.075165	0.265930	0.230144	...	0.196267	0.275604	
20	8.154101e-01	0.387298	0.664364	0.316228	...	0.573070	-0.086066	
21	-3.261640e-01	-0.258199	0.083045	0.553399	...	0.202260	0.717219	
22	8.285888e-01	0.676753	0.853923	0.669456	...	0.815591	0.052058	
23	-3.261640e-01	-0.172133	0.000000	0.632456	...	0.269680	0.889352	
24	5.129359e-01	0.260290	0.552538	0.191273	...	0.407795	-0.190879	
25	5.480042e-01	0.453990	0.794990	0.864923	...	0.816638	0.420361	
26	4.732485e-02	0.655610	0.512104	0.544862	...	0.538028	0.499512	
27	1.430324e-01	0.566139	0.400596	0.554700	...	0.561747	0.603881	
28	5.435231e-01	0.566139	0.801193	0.485363	...	0.591312	0.301941	
29	4.577037e-01	0.792594	0.691939	0.277350	...	0.413919	0.226455	
..	...	...	...	...	...	...	...	
56	5.895063e-01	0.777778	0.643268	0.612372	...	0.783349	0.111111	
57	-6.782584e-01	-0.268462	-0.215866	0.205499	...	-0.192775	0.671156	
58	-6.098964e-01	-0.185695	-0.059726	0.284287	...	-0.145464	0.639617	

59	4.495861e-01	0.655610	0.481980	0.401478	...	0.635851	0.062439
60	6.316139e-01	0.166667	0.643268	0.306186	...	0.391675	0.222222
61	6.377093e-01	0.609272	0.895828	0.426401	...	0.636364	0.058026
62	1.196899e-01	0.838167	0.433676	0.223161	...	0.361593	0.085031
63	6.014168e-01	0.560112	0.765641	0.428746	...	0.694709	0.046676
64	4.893617e-01	0.673722	0.785507	0.644638	...	0.681689	0.084215
65	9.862273e-02	0.585540	0.219718	0.328688	...	0.433200	0.162650
66	1.031421e-01	0.204124	0.328266	0.812500	...	0.533002	0.816497
67	2.864732e-01	0.503953	0.364698	0.231455	...	0.197386	0.041996
68	2.259731e-01	-0.149071	0.431517	0.410792	...	0.350325	0.347833
69	4.004907e-01	0.339683	0.400596	0.554700	...	0.650444	0.377426
70	2.761963e-01	0.780869	0.552538	0.478183	...	0.570914	0.364405
71	6.779192e-01	0.745356	0.863034	0.410792	...	0.583874	0.149071
72	4.073788e-01	0.620174	0.598406	0.455733	...	0.518200	0.206725
73	6.596992e-01	0.754337	0.951817	0.426401	...	0.636364	-0.019342
74	-2.721830e-01	0.190117	0.020383	0.388075	...	0.033095	0.528104
75	6.903591e-01	0.780720	0.690541	0.328688	...	0.586094	-0.032530
76	6.816892e-01	0.522233	0.699866	0.852803	...	1.000000	0.290129
77	-2.526456e-01	0.037037	0.107211	0.612372	...	0.290129	1.000000
78	6.995439e-01	0.722315	0.774403	0.147442	...	0.408651	-0.200643
79	6.816892e-01	0.348155	0.615882	0.772853	...	0.863636	0.116052
80	2.166528e-01	0.050443	0.275813	0.710472	...	0.684922	0.554877
81	7.845274e-01	0.443607	0.876457	0.271653	...	0.529523	-0.021124
82	2.578553e-02	0.612372	0.328266	0.437500	...	0.293151	0.340207
83	5.918492e-01	0.572637	0.351615	0.286910	...	0.407795	-0.156174
84	-6.082991e-02	0.722315	0.503362	0.405465	...	0.251478	0.200643
85	4.340227e-01	0.572637	0.452077	0.573819	...	0.734032	0.190879

	78	79	80	81	82	83	\
0	8.010601e-01	0.463332	0.163033	0.662651	0.543305	5.047526e-01	
1	6.587581e-01	0.269202	0.132014	0.467396	0.607054	6.316546e-01	
2	8.571804e-01	0.631008	0.280806	0.828621	0.343536	5.458910e-01	
3	-3.470028e-01	-0.016186	0.417436	-0.100172	0.151838	-3.920737e-01	
4	5.316095e-01	0.413919	0.068539	0.559690	0.693375	4.243967e-01	
5	4.782609e-01	0.502956	0.637630	0.297537	0.589768	5.076300e-01	
6	6.995439e-01	0.681689	0.216653	0.784527	0.025786	5.918492e-01	
7	7.223151e-01	0.348155	0.050443	0.443607	0.612372	5.726371e-01	
8	7.744031e-01	0.615882	0.275813	0.876457	0.328266	3.516153e-01	
9	1.474420e-01	0.772853	0.710472	0.271653	0.437500	2.869095e-01	
10	2.809003e-01	0.290129	0.218588	0.063372	0.476290	1.214685e-01	
11	6.010025e-01	0.217262	0.377742	0.474561	0.594445	4.764629e-01	
12	4.400862e-01	0.500000	0.500520	0.562618	0.586302	2.446773e-01	
13	6.426846e-01	0.489116	0.566934	0.676632	0.401478	5.265725e-01	
14	7.739091e-01	0.298419	0.108093	0.733309	0.612372	4.239002e-01	
15	6.637355e-01	0.661903	0.393196	0.662651	0.659728	6.235179e-01	
16	6.376296e-01	0.684922	0.541985	0.700081	0.247121	5.435768e-01	
17	5.264109e-01	0.661903	0.393196	0.518072	0.543305	5.047526e-01	
18	2.730095e-01	0.493464	0.629171	0.215573	0.694365	4.131969e-01	
19	2.986089e-01	0.314027	0.193369	0.442993	0.092057	3.169459e-01	
20	7.460038e-01	0.674200	0.429806	0.785409	0.197642	6.048584e-01	
21	-3.730019e-01	0.269680	0.507952	-0.049088	0.158114	-3.629150e-01	
22	7.332434e-01	0.815591	0.354507	0.742283	0.478183	7.073171e-01	
23	-3.730019e-01	0.134840	0.586098	-0.147264	0.079057	-3.629150e-01	
24	5.076300e-01	0.652473	0.307239	0.564135	0.478183	5.609756e-01	
25	4.554497e-01	0.816638	0.603053	0.623360	0.401571	3.545066e-01	
26	2.706040e-01	0.317925	0.368507	0.284898	0.544862	8.776208e-02	
27	3.271443e-01	0.295656	0.548312	0.344425	0.346688	1.060992e-01	
28	7.769678e-01	0.591312	0.479773	0.818009	0.589369	5.304959e-01	
29	7.769678e-01	0.236525	0.068539	0.688849	0.589369	5.304959e-01	
..	...	...	...	...	...	...	
56	6.019293e-01	0.696311	0.453990	0.443607	0.612372	6.767530e-01	
57	-4.605469e-01	-0.245350	0.264072	-0.331756	-0.041100	-6.289018e-01	
58	-3.353264e-01	-0.145464	0.252911	-0.247127	0.113715	-4.930126e-01	
59	6.426846e-01	0.489116	0.566934	0.462959	0.315447	4.388104e-01	
60	5.417363e-01	0.522233	0.302660	0.760469	0.306186	4.685213e-01	
61	6.286946e-01	0.568182	0.184402	0.761189	0.346451	3.262363e-01	
62	4.869686e-01	0.076125	0.071692	0.242489	0.357057	1.536648e-01	
63	5.562939e-01	0.585018	0.360237	0.665544	0.171499	1.968183e-01	
64	6.082991e-01	0.681689	0.369584	0.496334	0.567282	5.129359e-01	
65	2.467176e-01	0.356753	0.369207	0.092768	0.507972	3.200610e-01	
66	-7.372098e-02	0.373101	0.432461	0.155230	0.250000	-6.370671e-17	
67	4.095142e-01	0.296078	-0.171592	0.359288	0.694365	6.493095e-01	
68	-1.793172e-17	0.350325	0.338384	0.425115	-0.273861	-3.492151e-01	
69	4.498235e-01	0.561747	0.753929	0.473584	0.346688	4.243967e-01	
70	5.076300e-01	0.326236	0.307239	0.445370	0.478183	2.682927e-01	
71	8.075729e-01	0.467099	0.203030	0.765207	0.410792	4.889012e-01	
72	6.719412e-01	0.518200	0.431714	0.495204	0.759555	7.167259e-01	
73	8.173030e-01	0.545455	0.184402	0.827379	0.319801	3.534227e-01	
74	-1.144372e-01	0.132381	0.182213	-0.228916	0.620920	2.078393e-01	
75	6.696620e-01	0.433200	0.014768	0.649374	0.328688	5.029530e-01	
76	4.086515e-01	0.863636	0.684922	0.529523	0.293151	4.077954e-01	
77	-2.006431e-01	0.116052	0.554877	-0.021124	0.340207	-1.561738e-01	
78	1.000000e+00	0.408651	0.091090	0.846835	0.368605	6.204367e-01	
79	4.086515e-01	1.000000	0.684922	0.529523	0.373101	5.709136e-01	
80	9.108994e-02	0.684922	1.000000	0.239754	0.247121	1.654364e-01	
81	8.468349e-01	0.529523	0.239754	1.000000	0.155230	3.859873e-01	
82	3.686049e-01	0.373101	0.247121	0.155230	1.000000	6.694555e-01	

```
83  6.204367e-01  0.570914  0.165436  0.385987  0.669456  1.000000e+00
84  3.043478e-01  0.157174 -0.091090  0.114437  0.626628  1.692100e-01
85  2.820167e-01  0.489355  0.354507  0.267222  0.382546  4.146341e-01
```

```
              84        85
0   5.721858e-01  0.267222
1   3.723415e-01  0.483030
2   3.584573e-01  0.303273
3   1.455173e-01 -0.101649
4   6.951817e-01  0.424397
5   3.043478e-01  0.507630
6  -6.082991e-02  0.434023
7   7.223151e-01  0.572637
8   5.033620e-01  0.452077
9   4.054654e-01  0.573819
10  7.624437e-01  0.190879
11  2.003342e-01  0.389833
12  5.029557e-01  0.407795
13 -3.382550e-02  0.526572
14  5.675333e-01  0.245416
15  4.348612e-01  0.385987
16 -9.108994e-02  0.543577
17  4.348612e-01  0.504753
18  2.730095e-01 -0.059028
19 -1.357313e-01 -0.246514
20 -4.662524e-02  0.362915
21  1.865010e-01 -0.120972
22  3.948233e-01  0.609756
23  9.325048e-02  0.120972
24  1.692100e-01  0.170732
25  4.190137e-01  0.543577
26  6.426846e-01  0.526572
27  2.862513e-01  0.530496
28  3.271443e-01  0.318298
29  4.498235e-01  0.530496
..           ...       ...
56  4.815434e-01  0.572637
57  1.696752e-01 -0.251561
58  3.353264e-01 -0.203005
59  1.691275e-01  0.614335
60  0.000000e+00  0.156174
61  5.029557e-01  0.489355
62  6.185817e-01  0.495142
63  3.540052e-01  0.328031
64  6.691290e-01  0.512936
65  3.876991e-01  0.320061
66  2.948839e-01  0.382546
67  4.095142e-01  0.295141
68 -1.793172e-17  0.069843
69 -8.178608e-02  0.636595
70  5.076300e-01  0.463415
71  4.845437e-01  0.349215
72  4.031647e-01  0.561758
73  5.658252e-01  0.462168
74  5.264109e-01 -0.148457
75  3.876991e-01  0.502953
76  2.514778e-01  0.734032
77  2.006431e-01  0.190879
78  3.043478e-01  0.282017
79  1.571737e-01  0.489355
80 -9.108994e-02  0.354507
81  1.144372e-01  0.267222
82  6.266283e-01  0.382546
83  1.692100e-01  0.414634
84  1.000000e+00  0.282017
85  2.820167e-01  1.000000

[86 rows x 86 columns]
```

In [**101**]: #for any query email:saurabhsukant75@gmail.com

In [**102**]: #THANK YOU

In [**103**]: