In [275…
```
import warnings
warnings.filterwarnings('ignore')
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
import sklearn
```

In [276…
```
master_stocks=pd.read_csv(r"D:\PG-DAI\MachineLearning\Assessment\2 Stocks\Stocks.csv",index_col=0, parse_dates=True)
```

In [277…
```
from sklearn.preprocessing import Normalizer
normalizer = Normalizer()
normalized = normalizer.fit_transform(master_stocks)
normalized = pd.DataFrame(normalized)
```

In [278…
```
index = master_stocks.T.index
normalized.index = master_stocks.index
normalized = normalized.T
normalized.index = master_stocks.T.index
normalized = normalized.T
```

In [279…
```
week_num = [x for x in range(0,963,7)]
custom_df = pd.DataFrame()
list = []
for i in week_num:
    if(i==7):
        Data15 = normalized.T.loc[index[0]:index[7]].mean()
        custom_df[i] = Data15
    else:
        Data15 = normalized.T.loc[index[i-7]:index[i]].mean()
#         list.append(Data15)
        custom_df[i] = Data15
```

In [280…
```
del custom_df[0]
```

In [281…
```
dataset = custom_df
```

In [ ]:
```
```

In [282…
```
from sklearn.cluster import KMeans
from sklearn.decomposition import PCA
from sklearn.preprocessing import StandardScaler
```

In [283…
```
pca=PCA()
```

In [284…
```
pca.fit(dataset)
pca.explained_variance_ratio_
```

Out[284…
```
array([1.15185212e-01, 6.15639081e-02, 5.12857905e-02, 4.43884346e-02,
       4.30770972e-02, 3.87488686e-02, 3.42430288e-02, 3.36650169e-02,
       3.10300125e-02, 3.00252142e-02, 2.87179370e-02, 2.75829783e-02,
       2.47622471e-02, 2.33290120e-02, 2.21797676e-02, 2.14671271e-02,
       2.02166109e-02, 1.89381302e-02, 1.85677379e-02, 1.66693075e-02,
       1.55767530e-02, 1.54985450e-02, 1.49893165e-02, 1.47343943e-02,
       1.42167716e-02, 1.34904715e-02, 1.32006438e-02, 1.27980827e-02,
       1.19458882e-02, 1.12023852e-02, 1.10072857e-02, 1.06766159e-02,
       9.90735792e-03, 9.52003737e-03, 8.70162829e-03, 8.38759561e-03,
       7.64010473e-03, 7.50346872e-03, 7.08524827e-03, 6.36005399e-03,
       6.31054299e-03, 5.81817477e-03, 5.34920129e-03, 5.17916731e-03,
       5.07158041e-03, 4.73206830e-03, 4.59280172e-03, 4.30993672e-03,
       3.94484416e-03, 3.63569908e-03, 3.28619858e-03, 3.23031620e-03,
       2.66063975e-03, 2.46751949e-03, 2.31287811e-03, 2.20595761e-03,
       1.72116746e-03, 1.55753722e-03, 1.52768231e-03, 2.27162776e-32])
```

In [285…
```
pca.explained_variance_ratio_.cumsum()
```

Out[285…
```
array([0.11518521, 0.17674912, 0.22803491, 0.27242334, 0.31550044,
       0.35424931, 0.38849234, 0.42215736, 0.45318737, 0.48321258,
       0.51193052, 0.5395135 , 0.56427575, 0.58760476, 0.60978452,
       0.63125165, 0.65146826, 0.67040639, 0.68897413, 0.70564344,
       0.72122019, 0.73671874, 0.75170805, 0.76644245, 0.78065922,
       0.79414969, 0.80735033, 0.82014842, 0.8320943 , 0.84329669,
```

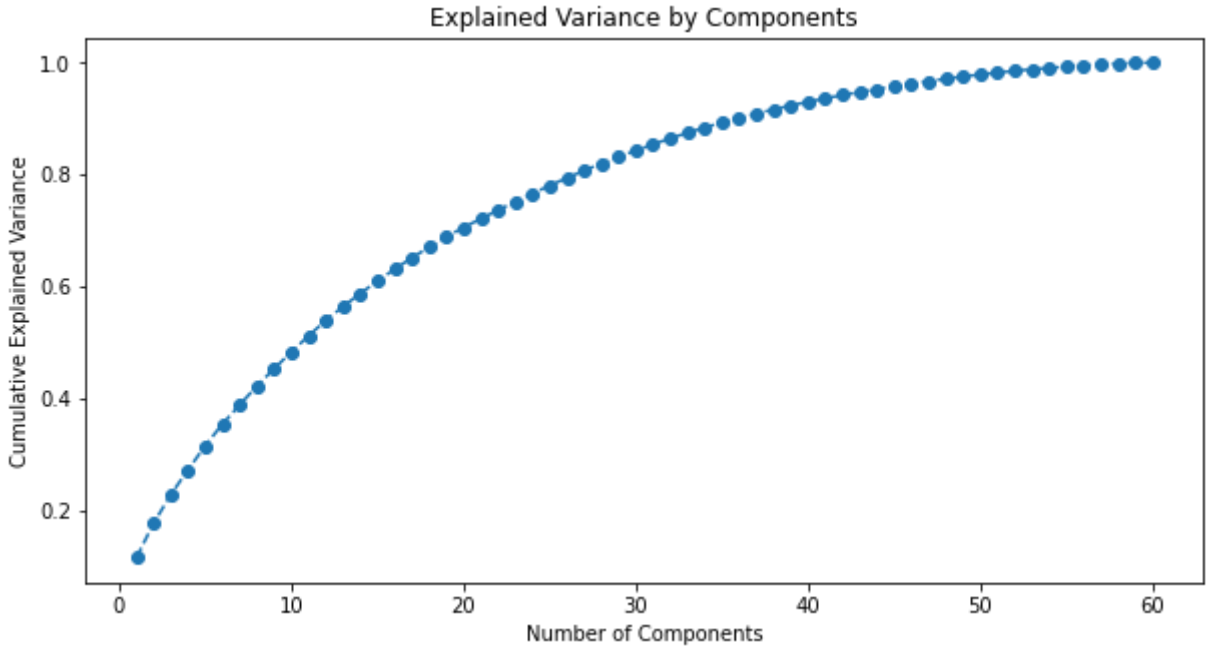
```
0.85430398, 0.86498059, 0.87488795, 0.88440799, 0.89310962,
0.90149721, 0.90913732, 0.91664078, 0.92372603, 0.93008609,
0.93639663, 0.9422148 , 0.94756401, 0.95274317, 0.95781475,
0.96254682, 0.96713962, 0.97144956, 0.9753944 , 0.9790301 ,
0.9823163 , 0.98554662, 0.98820726, 0.99067478, 0.99298766,
0.99519361, 0.99691478, 0.99847232, 1.        , 1.        ])
```

In [286…

```
# Plot the cumulative variance explained by total number of components.

# On this graph we choose the subset of components we want to keep.
# Generally, we want to keep around 80 % - 90% of the explained variance.
plt.figure(figsize=(10,5))

plt.plot (range (1,61), pca.explained_variance_ratio_.cumsum (), marker = 'o', linestyle = '--')

plt.title('Explained Variance by Components')

plt.xlabel('Number of Components')

plt.ylabel('Cumulative Explained Variance')
```

Out[286…

```
Text(0, 0.5, 'Cumulative Explained Variance')
```



In [ ]:

In [287…
```
pca=PCA(n_components= 2)
pca.fit(dataset)
pca.explained_variance_ratio_
```

Out[287…
```
array([0.11518521, 0.06156391])
```

In [288…
```
df= pca.transform(dataset)
print(df)
df1=np.transpose(df)
PCA1=df1[0]
PCA2=df1[1]
```

```
[[-0.0125523  -0.00680774]
 [-0.02154652 -0.0433906 ]
 [ 0.00975332  0.0124307 ]
 [-0.00740795 -0.00741061]
```

```
[-0.00622924  0.00484245]
[-0.05628879 -0.05996524]
[ 0.03942691  0.048471  ]
[-0.02088516  0.024726  ]
[-0.06998658  0.0328736 ]
[ 0.08210763 -0.00577556]
[-0.01875792  0.04340521]
[-0.0253272  -0.02467512]
[-0.01932779  0.04288842]
[-0.02748194  0.02518409]
[-0.00930608 -0.00684038]
[-0.04996844 -0.03394563]
[-0.01757079 -0.00580819]
[-0.00024993 -0.03041926]
[-0.04453373 -0.04606934]
[ 0.01808078  0.0234393 ]
[ 0.02562705 -0.00734018]
[-0.04506024  0.04461851]
[-0.01940754 -0.02068468]
[-0.00940203  0.0228709 ]
[ 0.004076   -0.01671532]
[ 0.05361492 -0.0297001 ]
[-0.04536073 -0.03883196]
[ 0.10228692 -0.0106367 ]
[ 0.06570608 -0.00875662]
[ 0.01392765  0.00993309]
[ 0.02489042 -0.01671934]
[ 0.05148864 -0.0165494 ]
[-0.00140248  0.0112839 ]
[-0.02783406 -0.01272733]
[-0.01984208 -0.01830885]
[-0.0428112  -0.01430388]
[-0.00216387  0.01273555]
[ 0.01415932  0.02835036]
[ 0.05907904 -0.02482812]
[ 0.0545347   0.00077411]
[ 0.06230811 -0.00021638]
[ 0.05230005  0.00802347]
[ 0.00272911  0.0628577 ]
[-0.01299354  0.01980972]
[-0.03835463  0.02364271]
[-0.0415396   0.00066646]
[ 0.01104303  0.03603868]
[-0.00623491 -0.02544158]
```

```
[-0.03427658 -0.00019472]
[-0.01594899  0.0326655 ]
[ 0.00197084 -0.04404144]
[-0.01685837  0.00212297]
[ 0.01434412  0.03749812]
[-0.02659175  0.00192675]
[ 0.03311507 -0.02059726]
[-0.03357289 -0.00604073]
[ 0.05825496 -0.00991354]
[ 0.00144767  0.03734966]
[-0.02126539 -0.00934587]
[ 0.01206886 -0.02842724]]
```

In [289…

```
from sklearn.cluster import KMeans
```

In [290…

```
sse = []
kmeans = range(1,10)
for k in kmeans:
    km = KMeans(n_clusters=k)
    km.fit(df)
    sse.append(km.inertia_)

print(sse)
```

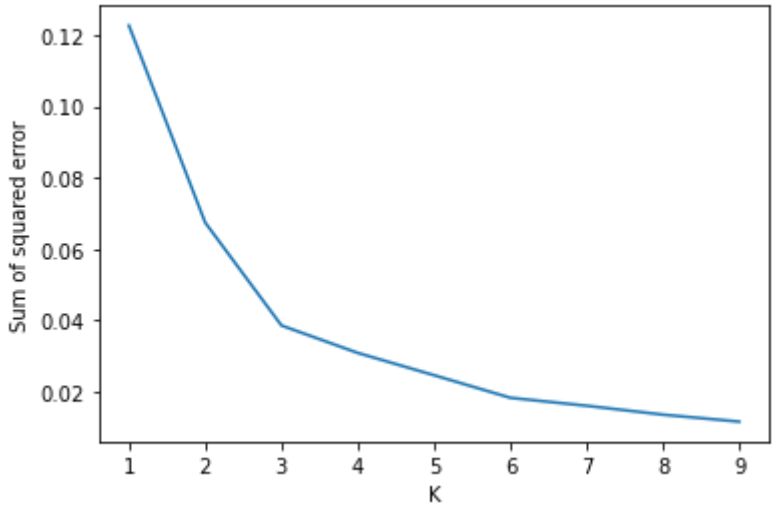
```
[0.12268329268657943, 0.06737709569813136, 0.0384813208558734, 0.030777531641940203, 0.02452014371600446, 0.01818335111576915, 0.0
15948131658061224, 0.01344863846251134, 0.011488033595044989]
```

In [291…

```
plt.xlabel('K')
plt.ylabel('Sum of squared error')
plt.plot(kmeans,sse)
```

Out[291…

```
[<matplotlib.lines.Line2D at 0x1e5cb910190>]
```



In [292…
```
km = KMeans(n_clusters=10)
y_predicted = km.fit_predict(df)
y_predicted
```

Out[292…
```
array([0, 6, 8, 0, 8, 6, 2, 4, 7, 1, 4, 0, 4, 4, 0, 6, 0, 9, 6, 2, 5, 7,
       0, 4, 9, 1, 6, 1, 1, 8, 5, 1, 8, 3, 0, 3, 8, 2, 1, 1, 1, 1, 2, 4,
       4, 3, 2, 9, 3, 4, 9, 0, 2, 3, 5, 3, 1, 2, 0, 9])
```

In [293…
```
km.cluster_centers_
```

Out[293…
```
array([[-0.0166153 , -0.01086205],
       [ 0.06416811, -0.00975789],
       [ 0.01446156,  0.03914355],
       [-0.03443768, -0.00511224],
       [-0.020394  ,  0.02939907],
       [ 0.02787751, -0.01488559],
       [-0.04353964, -0.04444056],
       [-0.05752341,  0.03874606],
       [ 0.00277707,  0.01024514],
       [ 0.00232617, -0.02900897]])
```

In [294…
```
df_plot= pd.DataFrame()
df_plot['pca1']=np.transpose(PCA1)
df_plot['pca2']=np.transpose(PCA2)
```

```
df_plot['cluster']=y_predicted
df_plot
```

Out[294...

	pca1	pca2	cluster
0	-0.012552	-0.006808	0
1	-0.021547	-0.043391	6
2	0.009753	0.012431	8
3	-0.007408	-0.007411	0
4	-0.006229	0.004842	8
5	-0.056289	-0.059965	6
6	0.039427	0.048471	2
7	-0.020885	0.024726	4
8	-0.069987	0.032874	7
9	0.082108	-0.005776	1
10	-0.018758	0.043405	4
11	-0.025327	-0.024675	0
12	-0.019328	0.042888	4
13	-0.027482	0.025184	4
14	-0.009306	-0.006840	0
15	-0.049968	-0.033946	6
16	-0.017571	-0.005808	0
17	-0.000250	-0.030419	9
18	-0.044534	-0.046069	6
19	0.018081	0.023439	2
20	0.025627	-0.007340	5
21	-0.045060	0.044619	7

	pca1	pca2	cluster
22	-0.019408	-0.020685	0
23	-0.009402	0.022871	4
24	0.004076	-0.016715	9
25	0.053615	-0.029700	1
26	-0.045361	-0.038832	6
27	0.102287	-0.010637	1
28	0.065706	-0.008757	1
29	0.013928	0.009933	8
30	0.024890	-0.016719	5
31	0.051489	-0.016549	1
32	-0.001402	0.011284	8
33	-0.027834	-0.012727	3
34	-0.019842	-0.018309	0
35	-0.042811	-0.014304	3
36	-0.002164	0.012736	8
37	0.014159	0.028350	2
38	0.059079	-0.024828	1
39	0.054535	0.000774	1
40	0.062308	-0.000216	1
41	0.052300	0.008023	1
42	0.002729	0.062858	2
43	-0.012994	0.019810	4
44	-0.038355	0.023643	4
45	-0.041540	0.000666	3

	pca1	pca2	cluster
46	0.011043	0.036039	2
47	-0.006235	-0.025442	9
48	-0.034277	-0.000195	3
49	-0.015949	0.032666	4
50	0.001971	-0.044041	9
51	-0.016858	0.002123	0
52	0.014344	0.037498	2
53	-0.026592	0.001927	3
54	0.033115	-0.020597	5
55	-0.033573	-0.006041	3
56	0.058255	-0.009914	1
57	0.001448	0.037350	2
58	-0.021265	-0.009346	0
59	0.012069	-0.028427	9

In [295…

```
df_plot1 = df_plot[df_plot.cluster==0]
df_plot2 = df_plot[df_plot.cluster==1]
df_plot3 = df_plot[df_plot.cluster==2]
df_plot4 = df_plot[df_plot.cluster==3]
df_plot5 = df_plot[df_plot.cluster==4]
df_plot6 = df_plot[df_plot.cluster==5]
df_plot7 = df_plot[df_plot.cluster==6]
df_plot8 = df_plot[df_plot.cluster==7]
df_plot9 = df_plot[df_plot.cluster==8]
df_plot10 = df_plot[df_plot.cluster==9]
```

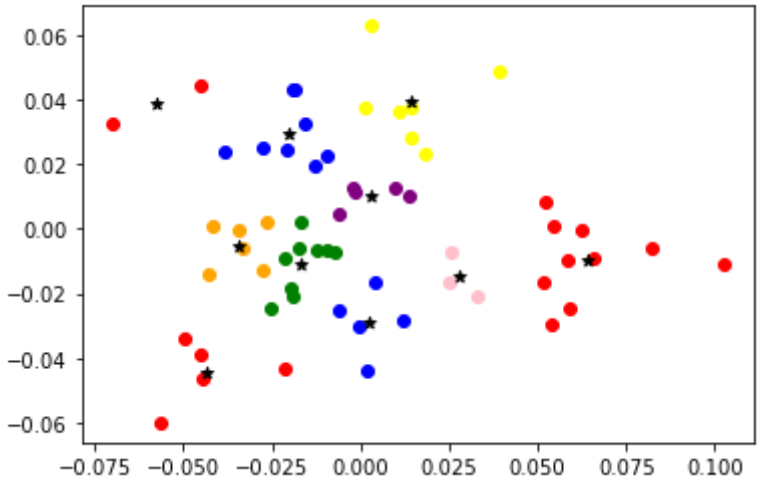
In [299…

```
plt.scatter(df_plot1['pca1'],df_plot1['pca2'],color='green',label='cluster 1')
plt.scatter(df_plot2['pca1'],df_plot2['pca2'],color='red',label='cluster 2')
plt.scatter(df_plot3['pca1'],df_plot3['pca2'],color='yellow',label='cluster 3')
```

```
plt.scatter(df_plot4['pca1'],df_plot4['pca2'],color='orange',label='cluster 4')
plt.scatter(df_plot5['pca1'],df_plot5['pca2'],color='blue',label='cluster 5')
plt.scatter(df_plot6['pca1'],df_plot6['pca2'],color='pink',label='cluster 6')
plt.scatter(df_plot7['pca1'],df_plot7['pca2'],color='red',label='cluster 7')
plt.scatter(df_plot8['pca1'],df_plot8['pca2'],color='red',label='cluster 8')
plt.scatter(df_plot9['pca1'],df_plot9['pca2'],color='purple',label='cluster 9')
plt.scatter(df_plot10['pca1'],df_plot10['pca2'],color='blue',label='cluster 10')

plt.scatter(km.cluster_centers_[:,0],km.cluster_centers_[:,1],color='black',marker='*',label='centroid')
# plt.legend()
```

Out[299…

```
<matplotlib.collections.PathCollection at 0x1e5cbb2e8b0>
```



In [297…

Out[297…

```
"C:\\Users\\God's Fav"
```

In [ ]: