DBSCAN Algorithm

Imports 👇

In [213]:
```
import pandas
import numpy
from sklearn.metrics import confusion_matrix,classification_report
from sklearn.cluster import DBSCAN
from sklearn.preprocessing import StandardScaler
from sklearn.preprocessing import normalize
from sklearn.decomposition import PCA
import seaborn
import matplotlib.pyplot as pyplot
```

👇 ***setting the matplotlib configurations***

In [214]:
```
%matplotlib inline
pyplot.rcParams["figure.figsize"] = (15, 12)
```

Data Reading 👇

In [215]:
```
data=pandas.read_csv('./Stress-Lysis.csv')
```

👇 cheking the columns, data, data type information, correlation between attributes

In [216]:
```
data.columns
```

Out[216]:
```
Index(['Humidity', 'Temperature', 'Step count', 'Stress Level'], dtype='object')
```

In [217]:
```
data['Stress Level'].value_counts()
```

Out[217]:
```
1    790
2    710
0    501
Name: Stress Level, dtype: int64
```

In [218]:
```
data
```

Out[218]:

	Humidity	Temperature	Step count	Stress Level
0	21.33	90.33	123	1
1	21.41	90.41	93	1
2	27.12	96.12	196	2
3	27.64	96.64	177	2
4	10.87	79.87	87	0
...	...	...	...	...
1996	21.82	90.82	96	1
1997	10.45	79.45	45	0
1998	27.22	96.22	135	2
1999	12.46	81.46	64	0
2000	16.87	85.87	50	1

2001 rows × 4 columns

In [219]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2001 entries, 0 to 2000
Data columns (total 4 columns):
 #   Column        Non-Null Count  Dtype  
---  ------        --------------  -----  
 0   Humidity      2001 non-null   float64
 1   Temperature   2001 non-null   float64
 2   Step count    2001 non-null   int64  
 3   Stress Level  2001 non-null   int64  
dtypes: float64(2), int64(2)
memory usage: 62.7 KB
```

In [220]:
```
data.describe()
```

Out[220]:

	Humidity	Temperature	Step count	Stress Level
count	2001.000000	2001.000000	2001.000000	2001.000000
mean	20.000000	89.000000	100.141429	1.104448
std	5.777833	5.777833	58.182948	0.771094
min	10.000000	79.000000	0.000000	0.000000
25%	15.000000	84.000000	50.000000	0.000000
50%	20.000000	89.000000	101.000000	1.000000
75%	25.000000	94.000000	150.000000	2.000000
max	30.000000	99.000000	200.000000	2.000000

In [221]:
```
data.corr()
```

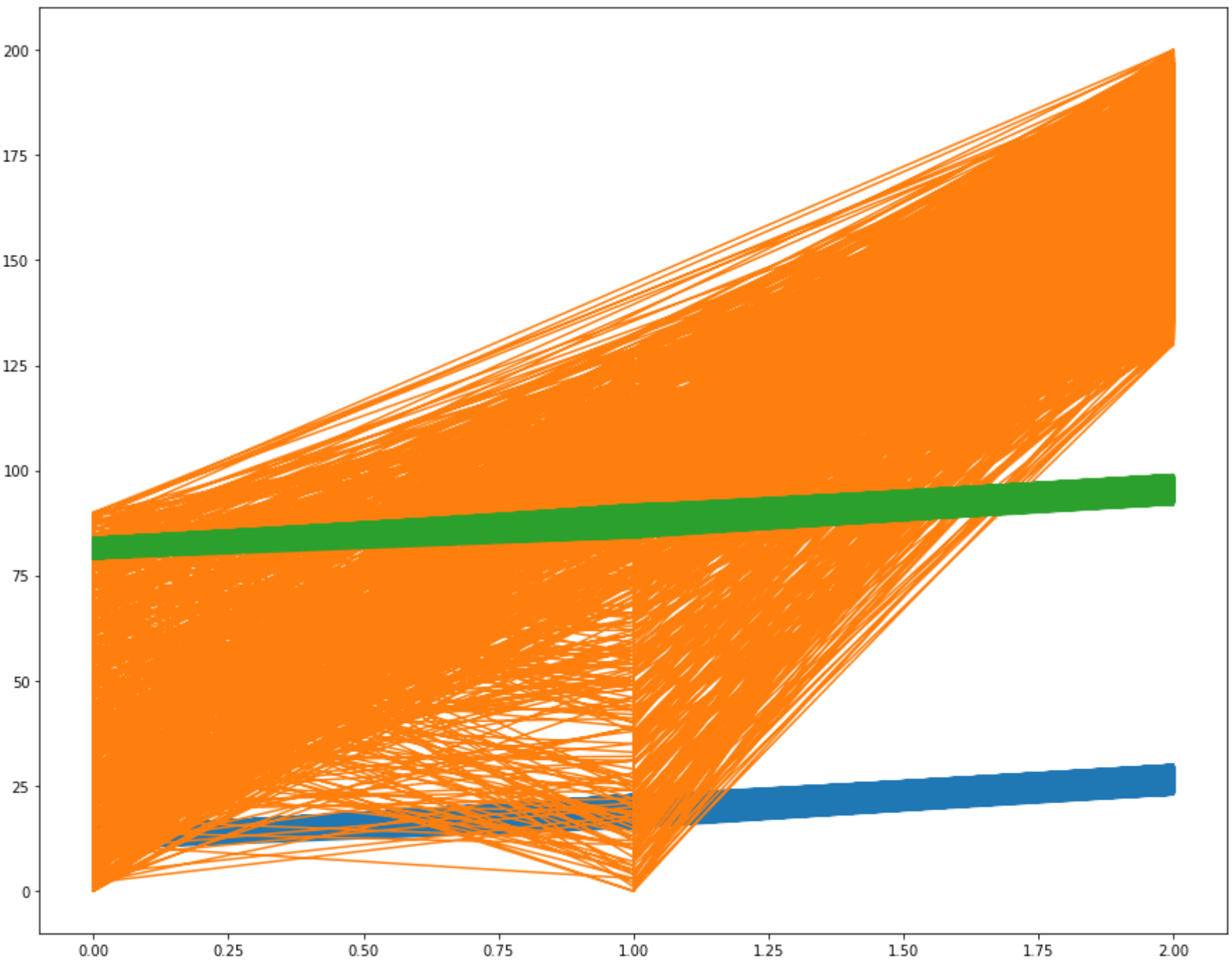
Out[221]:

	Humidity	Temperature	Step count	Stress Level
Humidity	1.000000	1.000000	0.870486	0.936036
Temperature	1.000000	1.000000	0.870486	0.936036
Step count	0.870486	0.870486	1.000000	0.832623
Stress Level	0.936036	0.936036	0.832623	1.000000

Data Visualization 👇

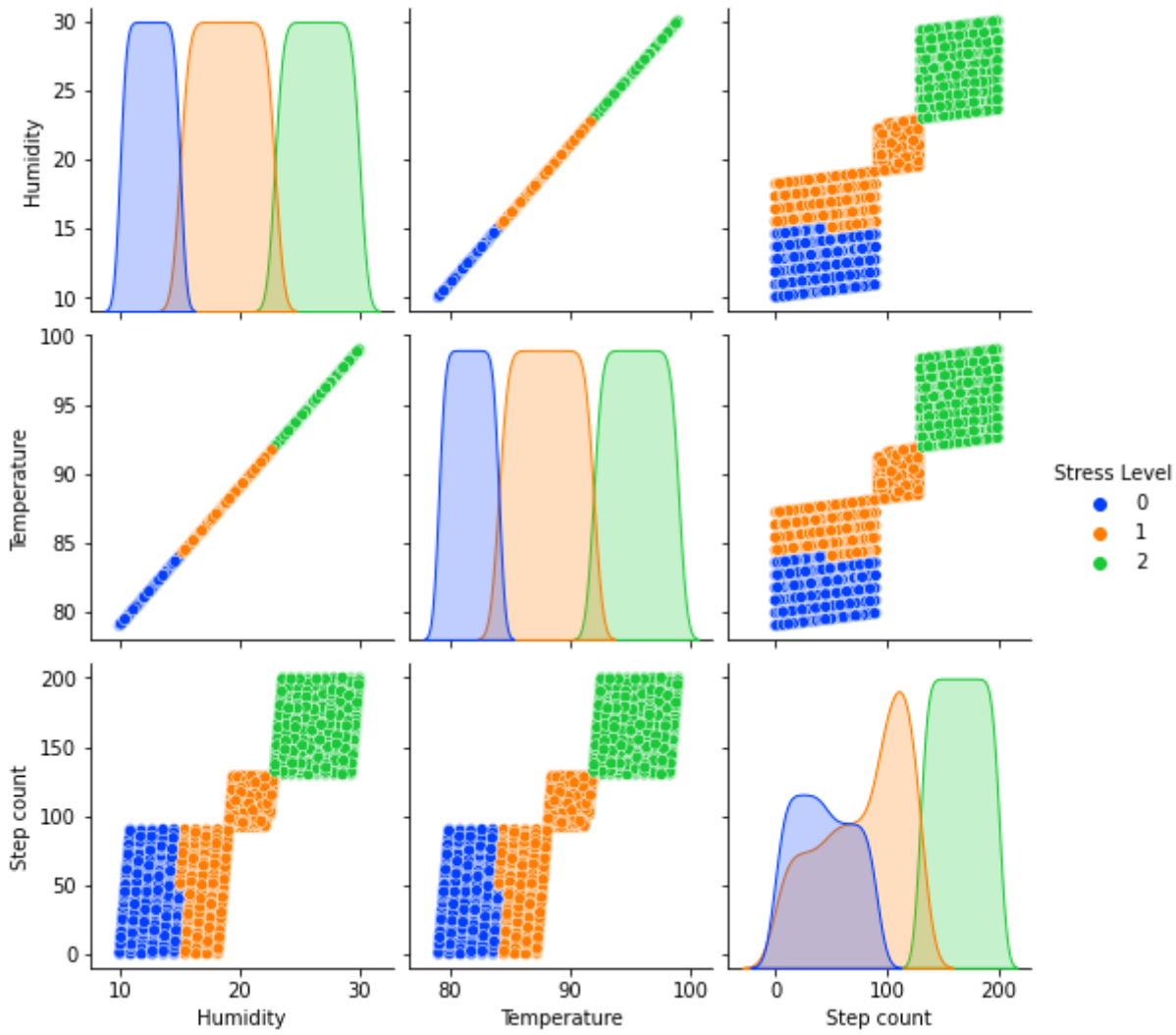
In [222]:
```
pyplot.plot(data['Stress Level'],data[['Humidity','Step count','Temperature']])
```

Out[222]:
```
[<matplotlib.lines.Line2D at 0x2d883535f70>,
 <matplotlib.lines.Line2D at 0x2d885baaca0>,
 <matplotlib.lines.Line2D at 0x2d885baadf0>]
```



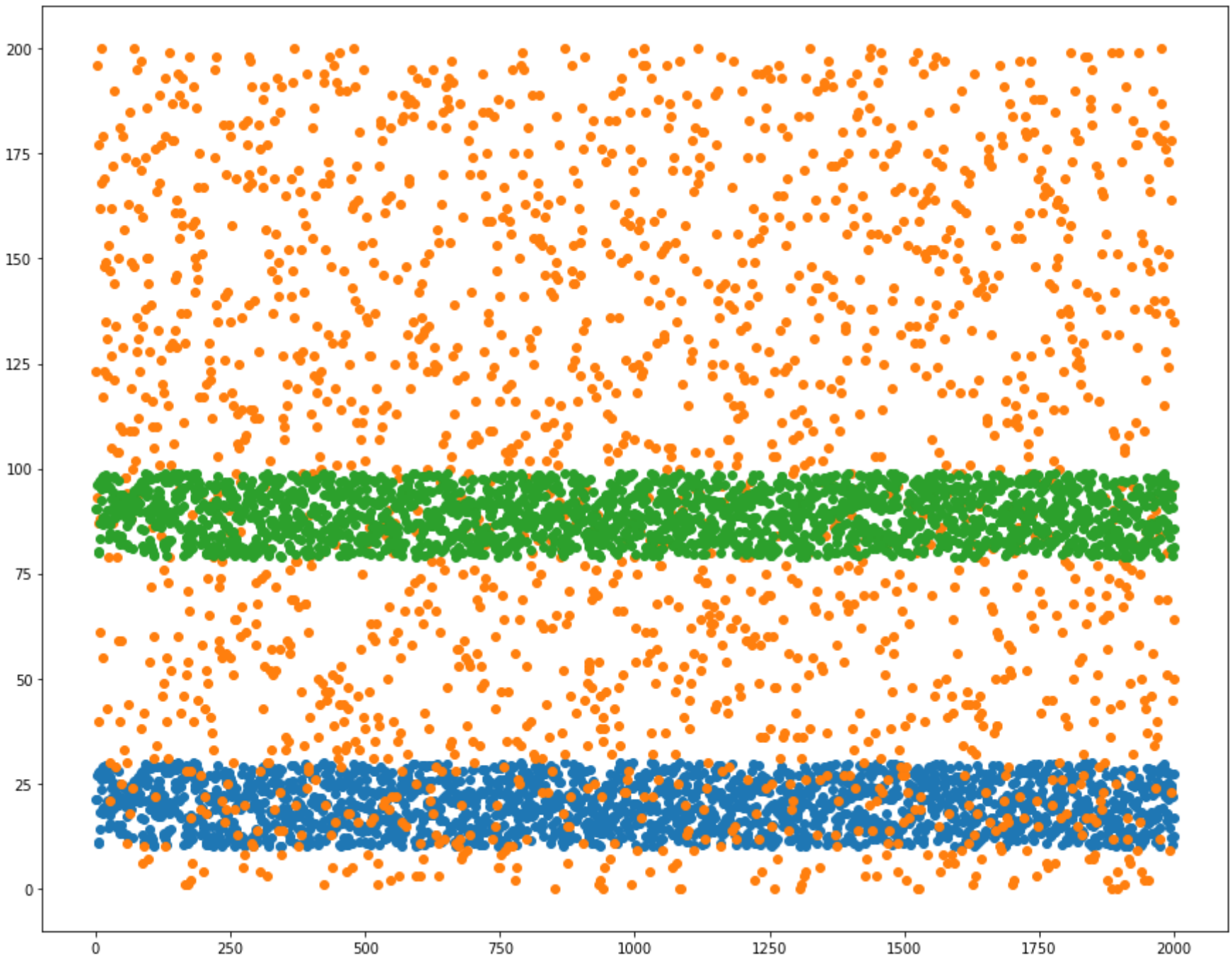
In [223]:
```
seaborn.pairplot(data.iloc[:,:4], hue="Stress Level",palette="bright")
```

Out[223]: <seaborn.axisgrid.PairGrid at 0x2d882508ca0>



In [224]:
```
pyplot.scatter(x=[i for i in range(1,len(data)+1)],y=data['Humidity'])
pyplot.scatter(x=[i for i in range(1,len(data)+1)],y=data['Step count'])
pyplot.scatter(x=[i for i in range(1,len(data)+1)],y=data['Temperature'])
```

Out[224]: <matplotlib.collections.PathCollection at 0x2d864c1f5b0>



Data Tranfomation

Standization

In [235]:
```
standard_scaler = StandardScaler()
```

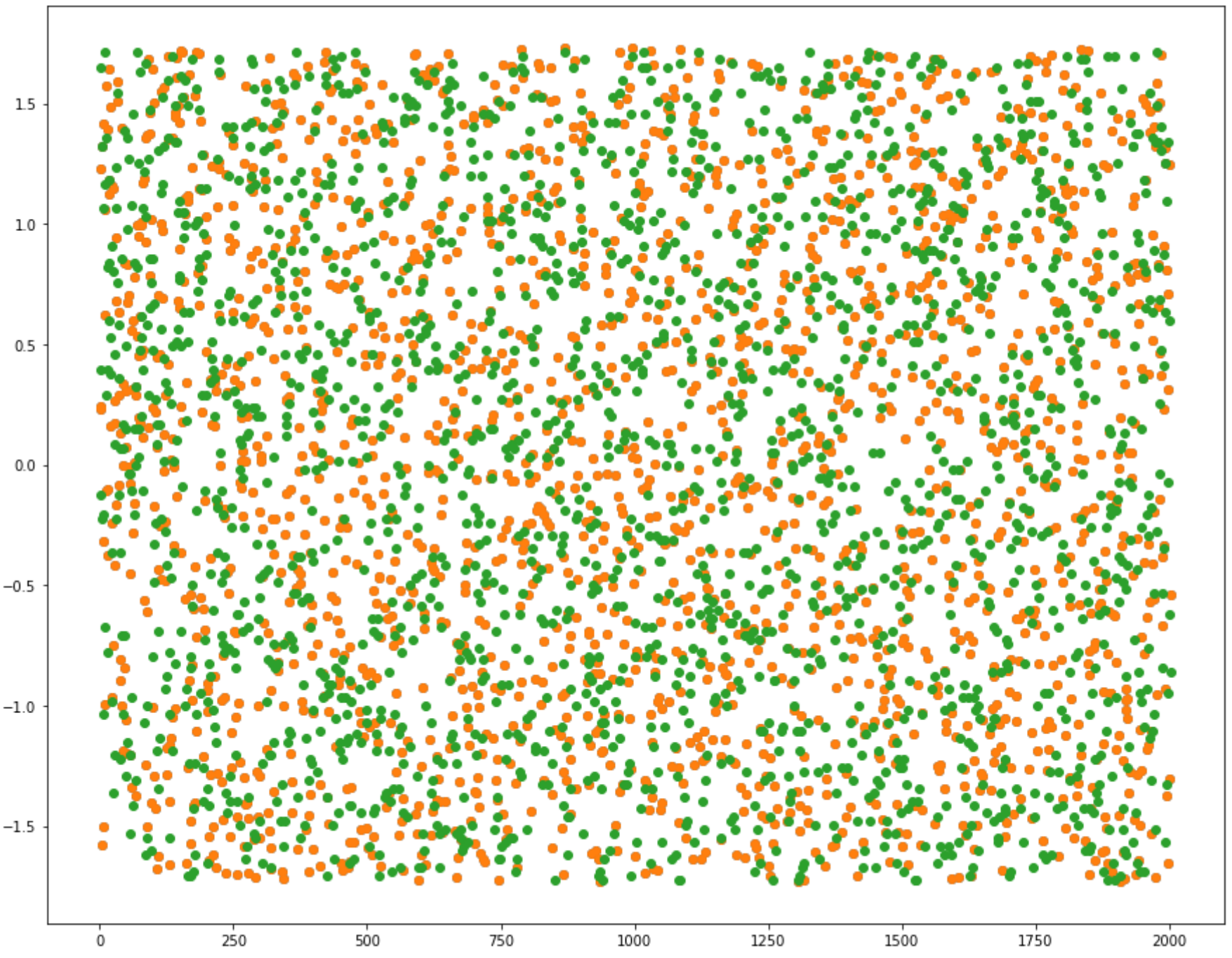
In [292]:
```
data_scaled=standard_scaler.fit_transform(data.iloc[:,:3])
```

In [293]:
```
data_scaled
```

Out[293]:
```
array([[ 0.23024766,  0.23024766,  0.39297226],
       [ 0.24409715,  0.24409715, -0.12277161],
       [ 1.23260403,  1.23260403,  1.64794901],
       ...,
       [ 1.24991588,  1.24991588,  0.59926981],
       [-1.30531382, -1.30531382, -0.62132402],
       [-0.54186104, -0.54186104, -0.86200449]])
```

In [294]:
```
pyplot.scatter(x=[i for i in range(1,len(data)+1)],y=data_scaled[:,0])
pyplot.scatter(x=[i for i in range(1,len(data)+1)],y=data_scaled[:,1])
pyplot.scatter(x=[i for i in range(1,len(data)+1)],y=data_scaled[:,2])
```

Out[294]:
```
<matplotlib.collections.PathCollection at 0x2d88f9fd610>
```



Normalization

In [238]:
```
data_normalized = normalize(data_scaled)
```

In [239]:
```
data_normalized
```

Out[239]:
```
array([[ 0.23024766,  0.23024766,  0.39297226],
       [ 0.24409715,  0.24409715, -0.12277161],
       [ 1.23260403,  1.23260403,  1.64794901],
       ...,
       [ 1.24991588,  1.24991588,  0.59926981],
       [-1.30531382, -1.30531382, -0.62132402],
       [-0.54186104, -0.54186104, -0.86200449]])
```

In [249]:
```
pyplot.scatter(x=[i for i in range(1,len(data)+1)],y=data_normalized[:,0])
pyplot.scatter(x=[i for i in range(1,len(data)+1)],y=data_normalized[:,1])
pyplot.scatter(x=[i for i in range(1,len(data)+1)],y=data_normalized[:,2])
```

Out[249]:
```
<matplotlib.collections.PathCollection at 0x2d88764b370>
```

Dimentiality Reduction by PCA

In [241]:
```
Principal_Component_Analyser=PCA(n_components=2)
```

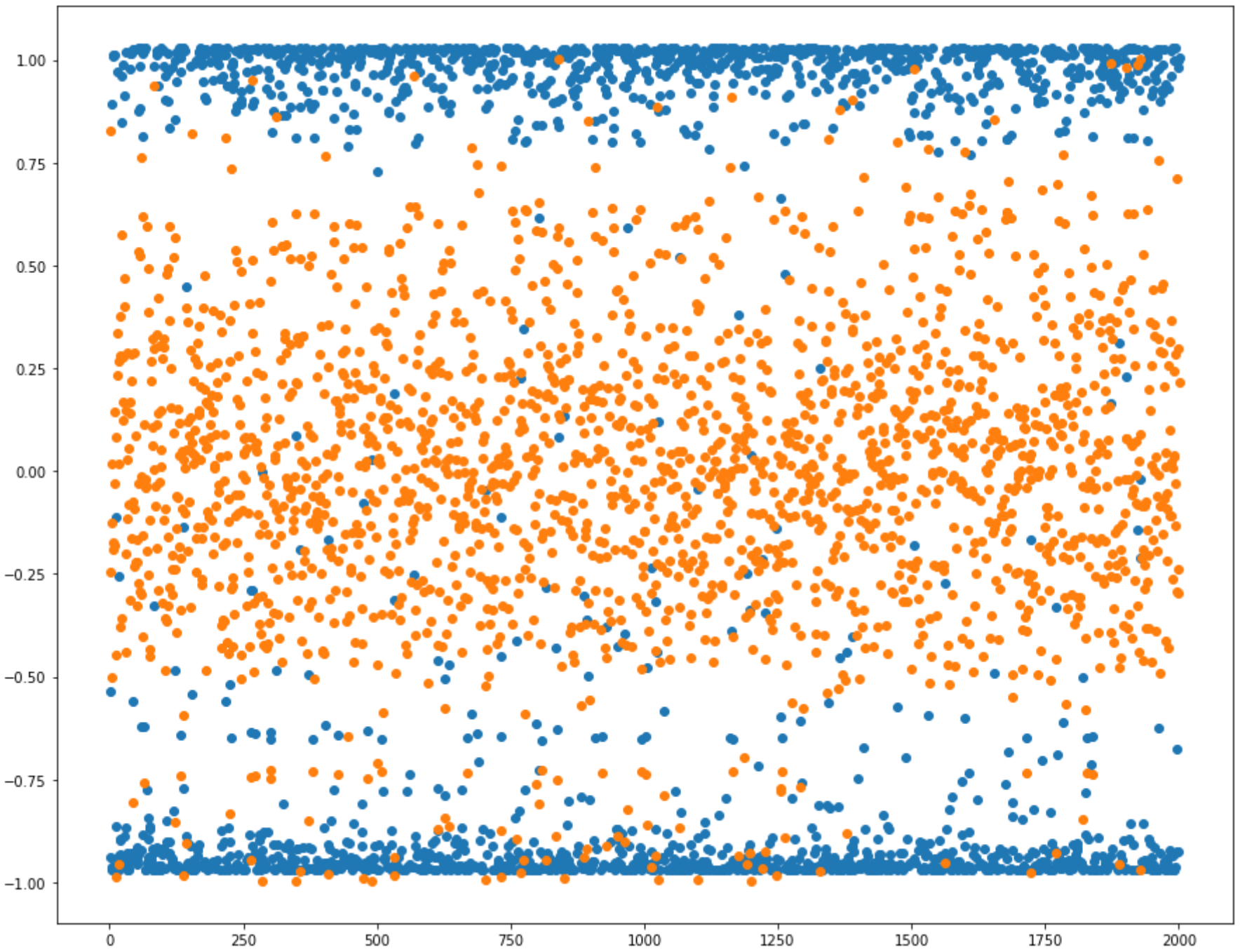
In [250]:
```
Component_Data=Principal_Component_Analyser.fit_transform(data_normalized[:,:3])
```

In [251]:
```
Component_Data
```

Out[251]:
```
array([[-0.93938567, -0.24463135],
       [-0.53520737,  0.82792848],
       [-0.96221965, -0.12534513],
       ...,
       [-0.92516271,  0.30019518],
       [ 0.9836129 , -0.29694036],
       [ 1.00649774,  0.21616158]])
```

In [252]:
```
pyplot.scatter(x=[i for i in range(1,len(data)+1)],y=Component_Data[:,0])
pyplot.scatter(x=[i for i in range(1,len(data)+1)],y=Component_Data[:,1])
```

Out[252]: <matplotlib.collections.PathCollection at 0x2d88767ea30>



Creating the DBSCAN instance👇

In [308]:
```
DBSCAN_Model=DBSCAN(eps=0.1,min_samples=10)
```

fitting the model 👇

In [309]:
```
DBSCAN_Model.fit(Component_Data[:,:2])
```

Out[309]: DBSCAN(eps=0.1, min_samples=10)

In [310]:
```
set(list(DBSCAN_Model.labels_))
```

Out[310]: {-1, 0, 1, 2}

In [311]:
```
Transformed_data=pandas.DataFrame({
    "column1_by_PCA":Component_Data[:,0],
    "column2_by_PCA":Component_Data[:,1],
    "predicted_cluster_by_DBSCAN":DBSCAN_Model.labels_,
})
```

In [312]:
```
Transformed_data
```

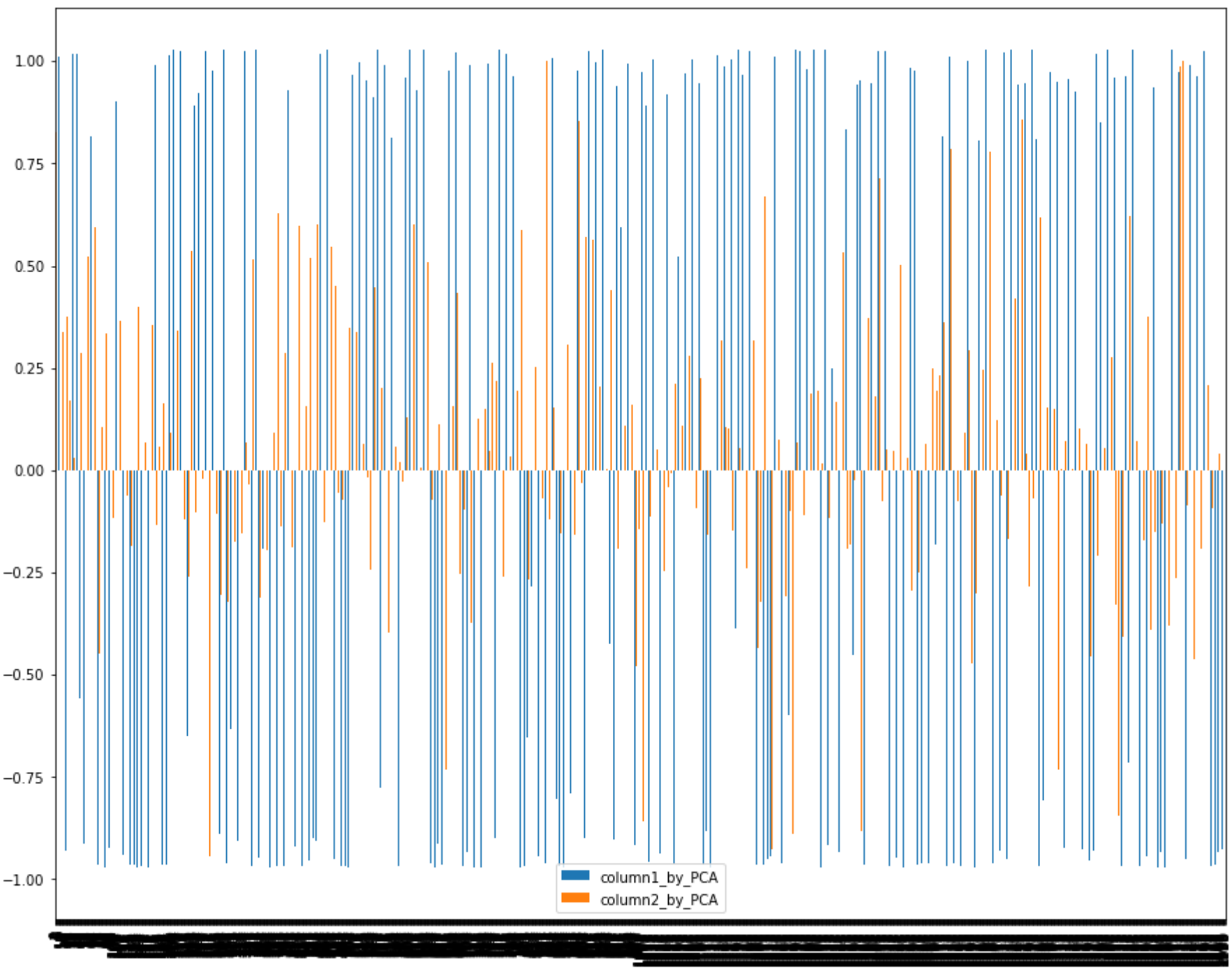
Out[312]:

	column1_by_PCA	column2_by_PCA	predicted_cluster_by_DBSCAN
0	-0.939386	-0.244631	0
1	-0.535207	0.827928	0
2	-0.962220	-0.125345	0
3	-0.970351	0.016618	0
4	0.893254	-0.501331	1
...	...	...	...
1996	-0.676137	0.711195	0
1997	0.999988	-0.238688	1
1998	-0.925163	0.300195	0
1999	0.983613	-0.296940	1
2000	1.006498	0.216162	1

2001 rows × 3 columns

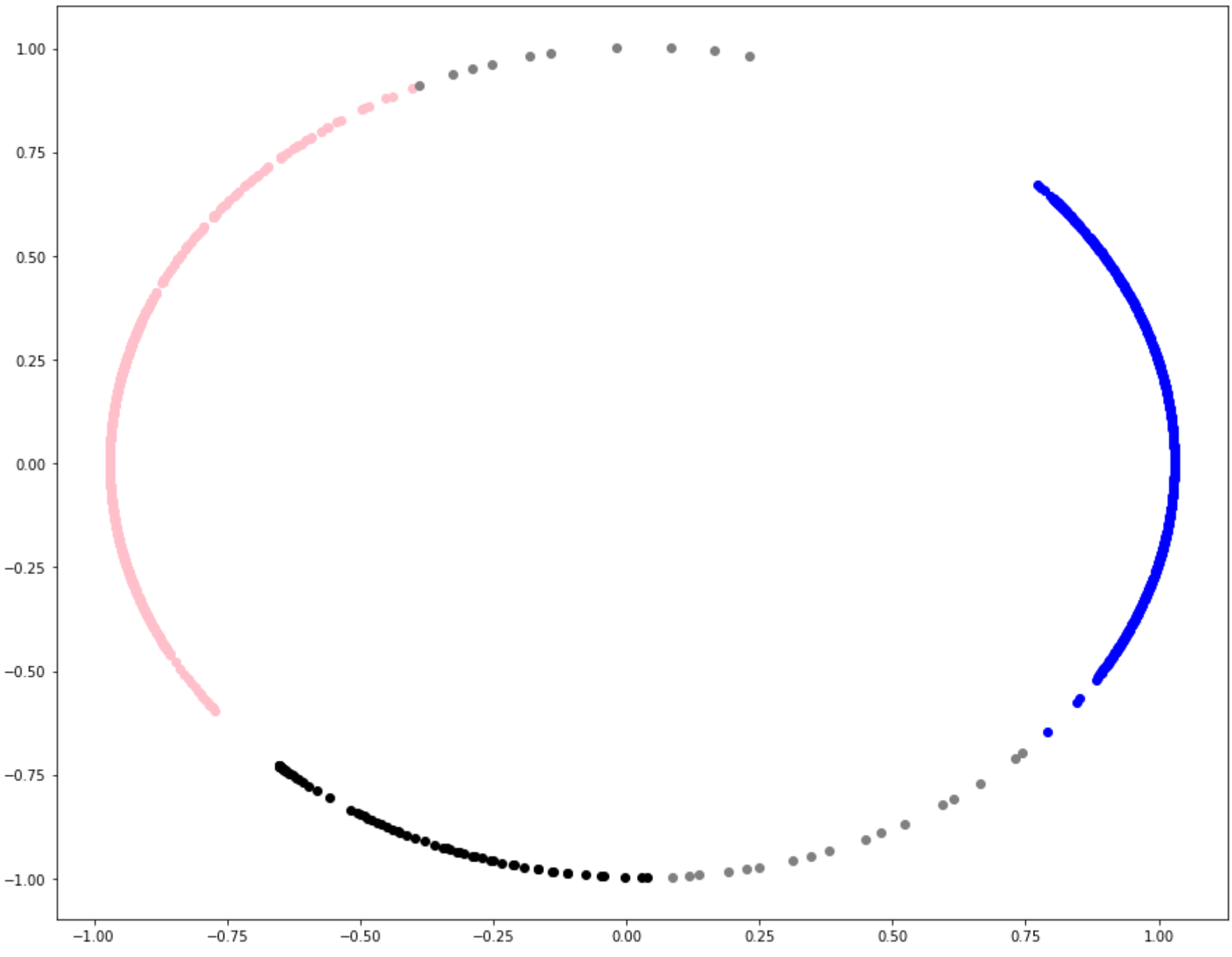
In [313]:
```
Transformed_data.iloc[:,:2].plot(kind="bar")
```

Out[313]: <AxesSubplot:>



In [314]:
```
[Transformed_data['predicted_cluster_by_DBSCAN']==1].iloc[:,0],y=Transformed_data[Transformed_data['predicted_cluster_by_
[Transformed_data['predicted_cluster_by_DBSCAN']==0].iloc[:,0],y=Transformed_data[Transformed_data['predicted_cluster_by_
[Transformed_data['predicted_cluster_by_DBSCAN']==2].iloc[:,0],y=Transformed_data[Transformed_data['predicted_cluster_by_
[Transformed_data['predicted_cluster_by_DBSCAN']==-1].iloc[:,0],y=Transformed_data[Transformed_data['predicted_cluster_by
```

Out[314]: <matplotlib.collections.PathCollection at 0x2d89f3f4af0>



In [315]:
```
seaborn.pairplot(Transformed_data.iloc[:,:3], hue="predicted_cluster_by_DBSCAN",palette="bright")
```

Out[315]: <seaborn.axisgrid.PairGrid at 0x2d89f839f10>