Clustering

I create new dataset with the models. The dataset includes artist name, rank, future growth. Finally I recommend artists for our advertisement clients.

Import Packages

In [1]:
```
import pickle
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
from scipy.cluster.hierarchy import linkage, dendrogram
from sklearn.cluster import AgglomerativeClustering
from sklearn.preprocessing import MinMaxScaler
```

Load Data

In [2]:
```
with open('../data/final/rank_df.pickle', 'rb') as rank:
    rank_df = pickle.load(rank)
    rank.close()
with open('../data/final/future_growth.pickle', 'rb') as growth:
    growth_dict = pickle.load(growth)
    growth.close()
```

In [3]:
```
rank_df.head()
```

Out[3]:

Artist	Rank
Post Malone	1
Ed Sheeran	2
Billie Eilish	3
Drake	4
Ariana Grande	5

Create New Dataset

In [4]:
```
rank_df['Future Growth'] = growth_dict.values()
```

In [5]:
```
rank_df.head()
```

Out[5]:

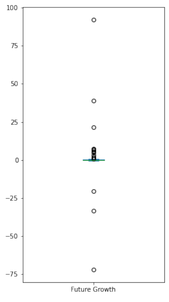
Artist	Rank	Future Growth
Post Malone	1	0.153796
Ed Sheeran	2	-0.036148
Billie Eilish	3	3.318439
Drake	4	0.014655
Ariana Grande	5	1.241825

In [21]:
```
rank_df.loc['Lil Mosey']
```

Out[21]:
```
Rank              96.000000
Future Growth      0.275643
Name: Lil Mosey, dtype: float64
```

Outliers

In [6]:
```
rank_df['Future Growth'].plot(kind='box', figsize=(4,8));
```



In [7]:
```
q1, q3 = np.percentile(rank_df['Future Growth'], [25, 75])
iqr = q3 - q1
lower_bound = q1 - (iqr * 1.5)
upper_bound = q3 + (iqr * 1.5)
outliers = np.where((rank_df['Future Growth'] > upper_bound)|(rank_df['Future Growth'] < lower_bound))
```

In [8]:
```
outliers_df = rank_df.iloc[outliers]
artists_outliers = outliers_df.index
```

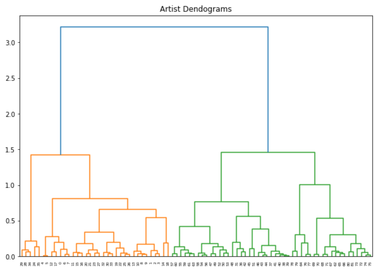
In [9]:
```
rank_df.drop(artists_outliers, inplace=True)
```

Clustering

In [10]:
```
sc = MinMaxScaler()
rank_df.loc[:, ['Rank', 'Future Growth']] = sc.fit_transform(rank_df)
```

In [11]:
```
link = linkage(rank_df, method='ward')
```

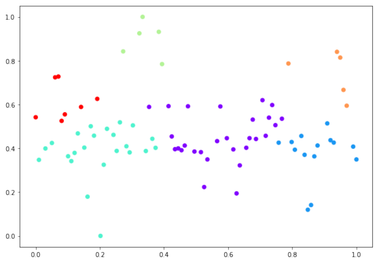
In [12]:
```
plt.figure(figsize=(10, 7))
plt.title("Artist Dendograms")
dend = dendrogram(link)
```



In [13]:
```
cluster = AgglomerativeClustering(n_clusters=6, affinity='euclidean', linkage='ward')
cluster.fit_predict(rank_df);
```

In [14]:
```
plt.figure(figsize=(10, 7))
plt.scatter(rank_df.iloc[:, 0], rank_df.iloc[:, 1], c=cluster.labels_, cmap='rainbow')
```

Out[14]:
```
<matplotlib.collections.PathCollection at 0x121f42610>
```



In [15]:
```
rank_df.iloc[:, 0:2] = sc.inverse_transform(rank_df)
```

In [16]:
```
rank_df['label'] = cluster.labels_
```

In [17]:
```
rank_df.groupby('label').mean()
```

Out[17]:

label	Rank	Future Growth
0	58.428571	0.065065
1	87.500000	-0.009393
2	20.695652	0.005791
3	34.800000	0.500323
4	92.200000	0.347846
5	10.000000	0.222892

In [18]:
```
rank_df.loc[rank_df.label == 3, :].index
```

Out[18]:
```
Index(['Lady Gaga', 'Queen', 'Pop Smoke', 'KAROL G', 'BTS'], dtype='object', name='Artist')
```

In [19]:
```
rank_df.loc[rank_df.label == 4, :].index
```

Out[19]:
```
Index(['benny blanco', 'A Boogie Wit da Hoodie', 'SAINt JHN', 'Lil Mosey',
       'Tyga'],
      dtype='object', name='Artist')
```

In [20]:
```
rank_df.loc[rank_df.label == 5, :].index
```

Out[20]:
```
Index(['Post Malone', 'Bad Bunny', 'Juice WRLD', 'Travis Scott', 'Dua Lipa',
       'Khalid', 'Marshmello'],
      dtype='object', name='Artist')
```

In [32]:
```
rank_df.loc[rank_df.label == 1].index
```

Out[32]:
```
Index(['Logic', 'Jonas Blue', 'Hailee Steinfeld', 'Piso 21', 'Shakira',
       'Nio Garcia', 'Miley Cyrus', 'Major Lazer', 'French Montana',
       'Kodak Black', 'Alan Walker', 'Manuel Turizo', 'Danny Ocean',
       'Chris Brown'],
      dtype='object', name='Artist')
```

Conclusion

Group 3: 'Lady Gaga', 'Queen', 'Pop Smoke', 'KAROL G', 'BTS'

Group 4: 'benny blanco', 'A Boogie Wit da Hoodie', 'SAINt JHN', 'Lil Mosey', 'Tyga'

Group 5: 'Post Malone', 'Bad Bunny', 'Juice WRLD', 'Travis Scott', 'Dua Lipa', 'Khalid', 'Marshmello'

Finally, I recommend 17 artists from top 100 artists.