Audio Tracks Segmentation

spotify

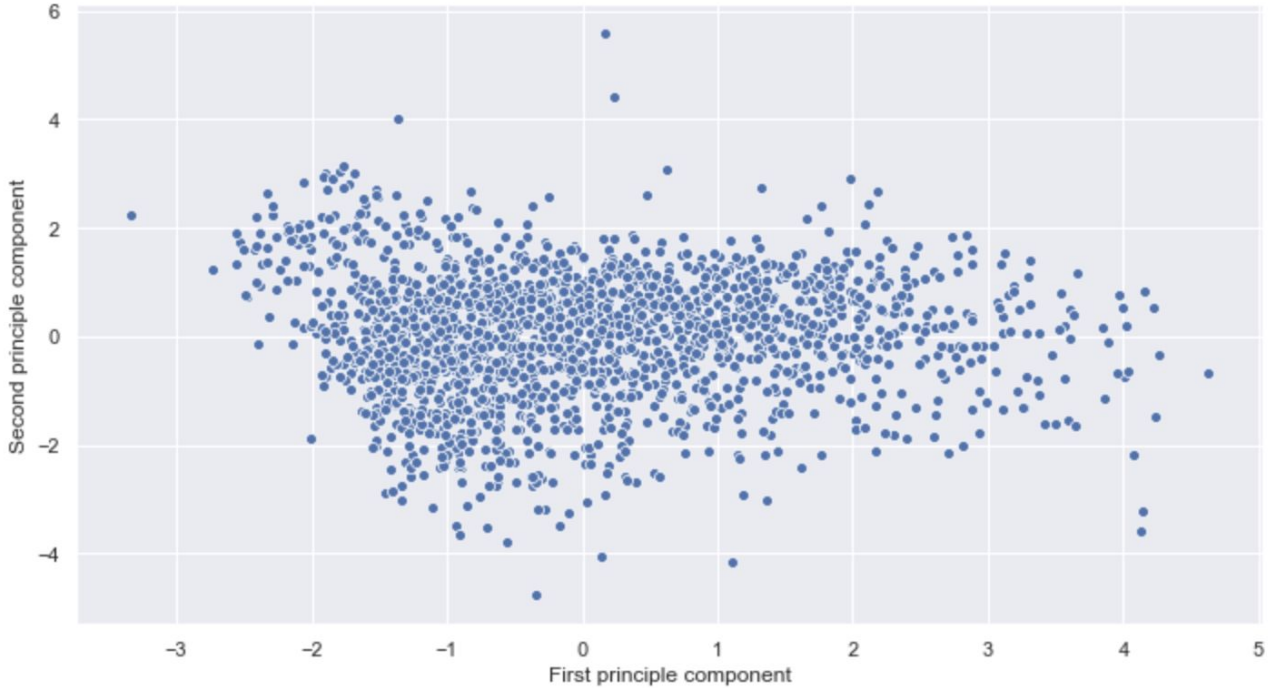
Problem definition:

Examine a set of audio tracks extracted from spotify and use clustering techniques to identify patterns and determine the potential genre of a track. Investigate how different the segments are by exploring their characteristics.

Approach:

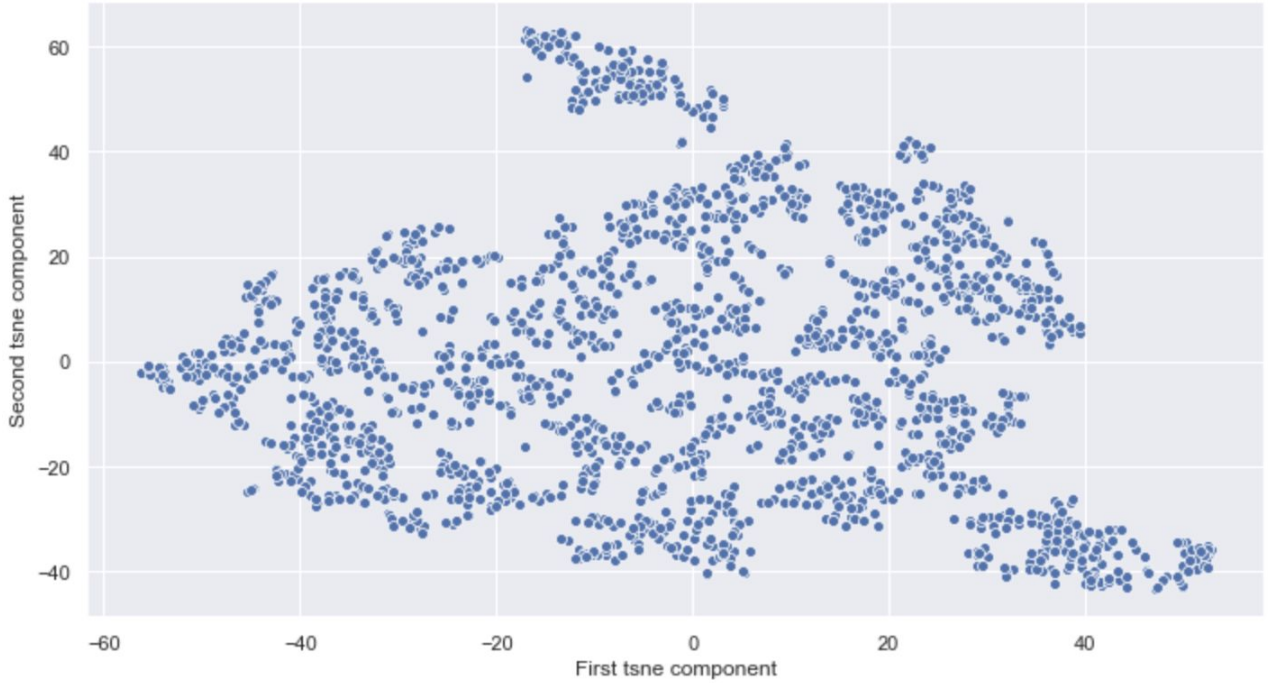
- Extract data using spotify API
- Delete duplicates if applicable, scale data
- EDA using dimensionality reduction techniques
- Identify patterns and build a model
- **Present results**

Data Analysis PCA



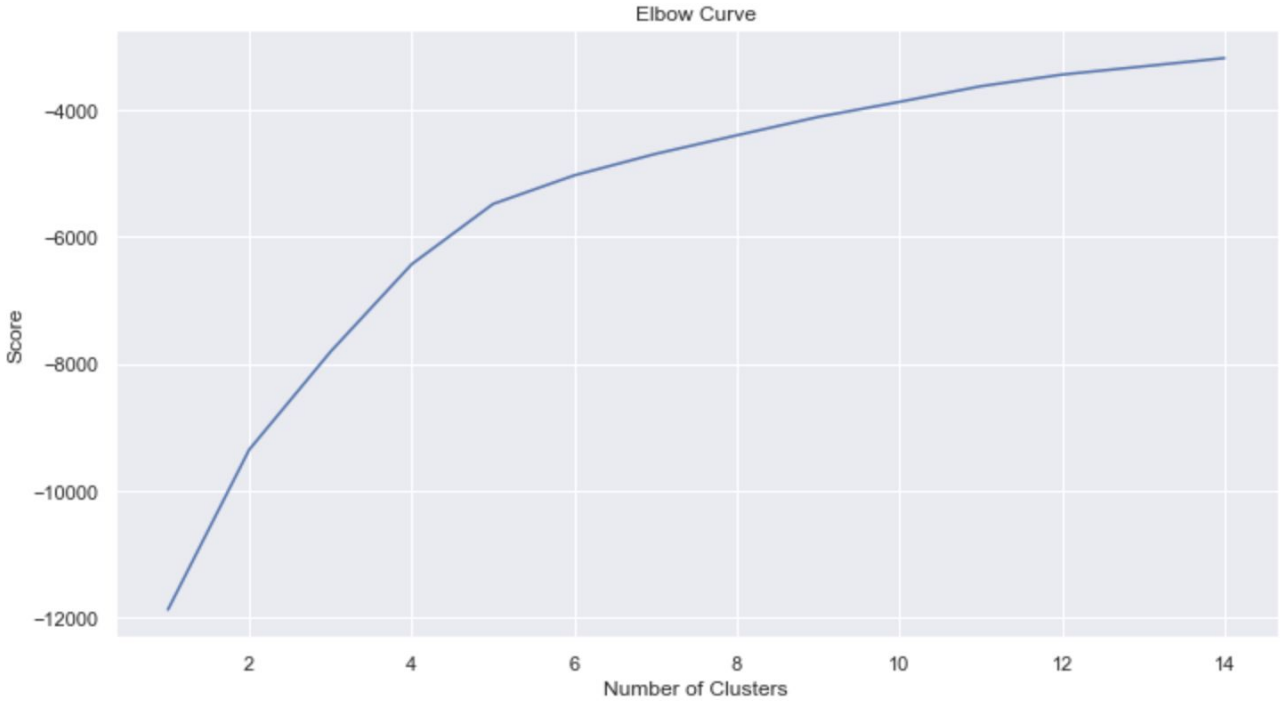
Visualize scaled dataset using dimensionality reduction technique. By reducing from **6** dimensions to **2** dimensions,
50% of the information of the data is preserved, ratio: ([**0.300, 0.218**])
Data has an even distribution

Data Analysis TSNE



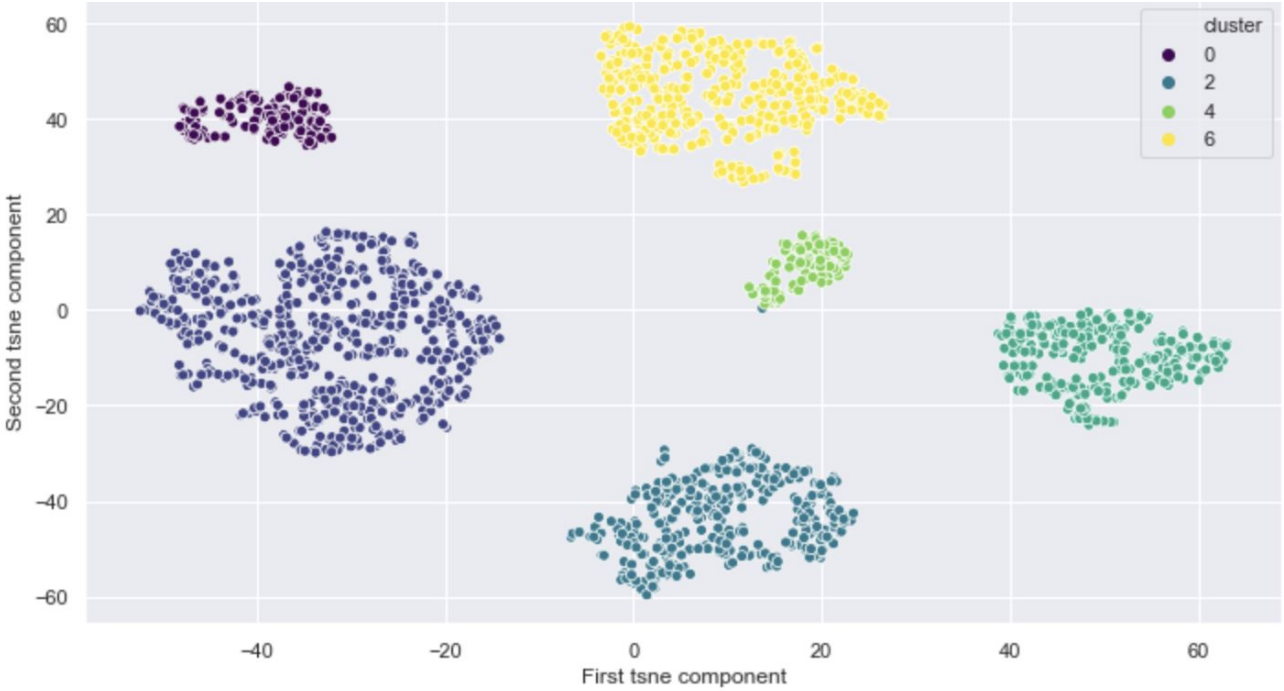
Visualization of scaled data using TSNE technique.

K-Means Elbow Method



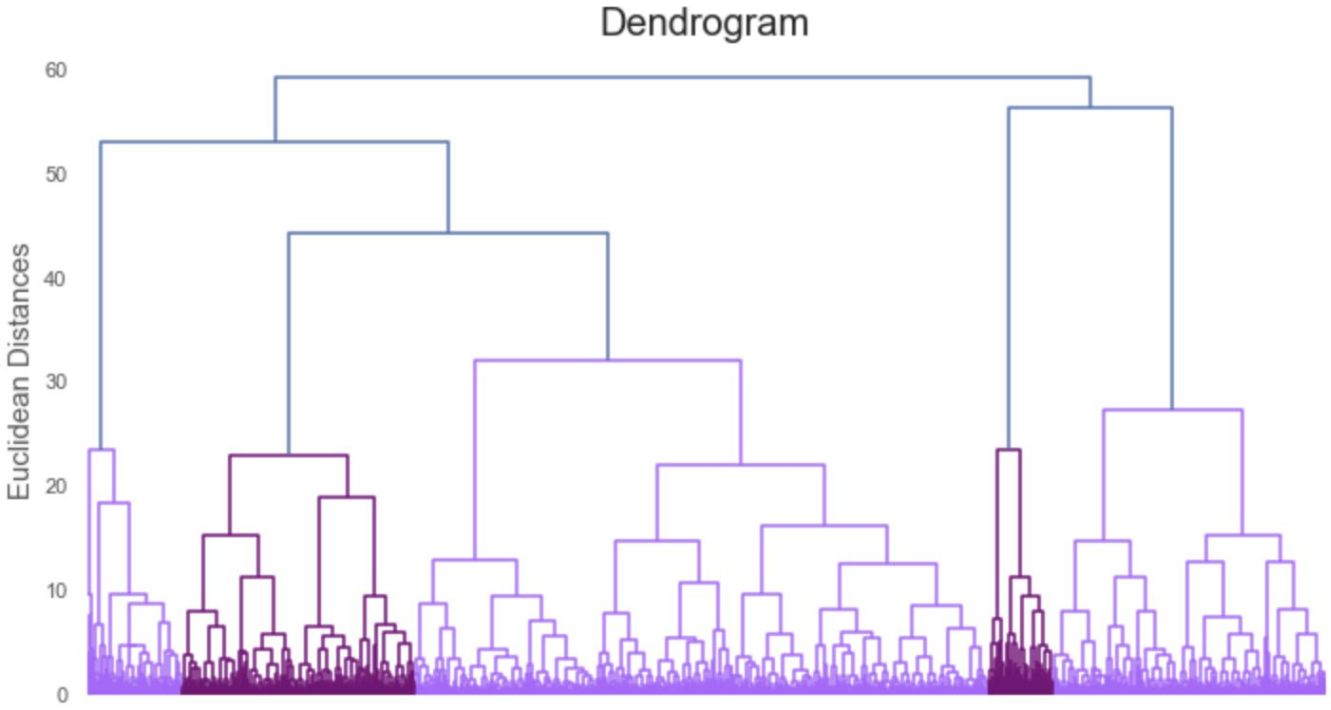
Based on the elbow method, 6 looks like the most reasonable number of clusters, because the line starts to flatten.

K-Means TSNE



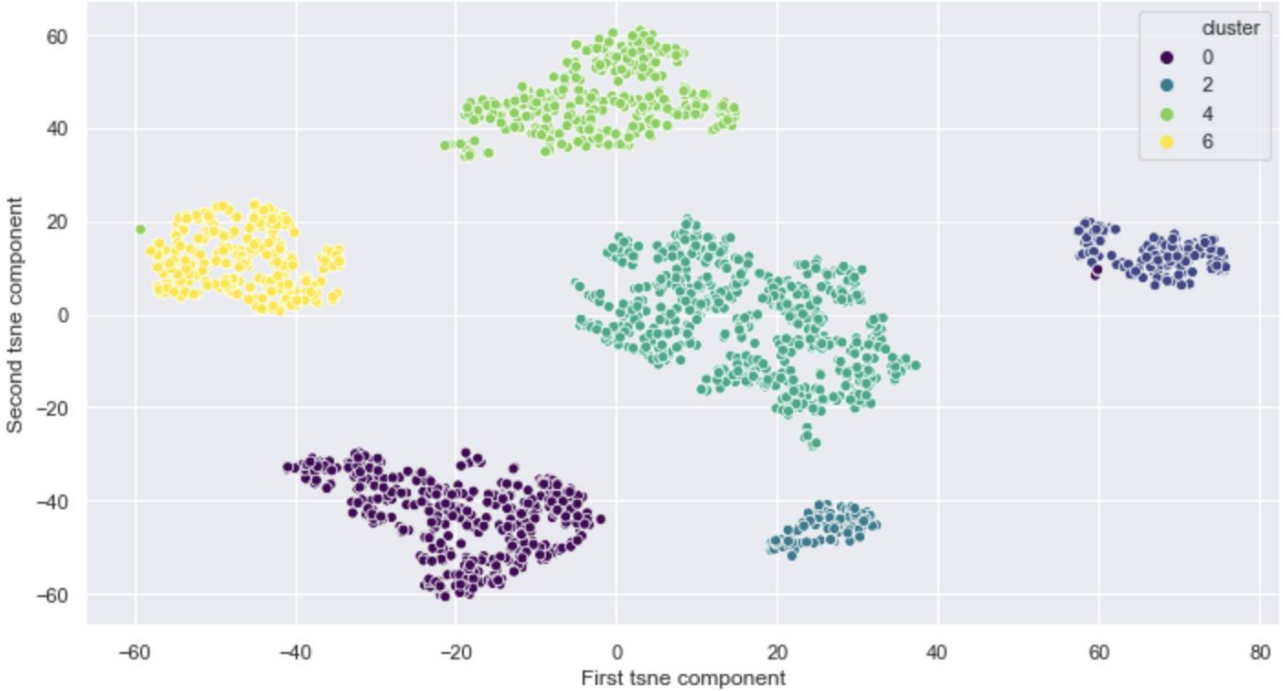
There are three big clusters that could represent Pop, Rock and Dance musical class. Other segments could be Classical and Jazz genres.

Dendrogram

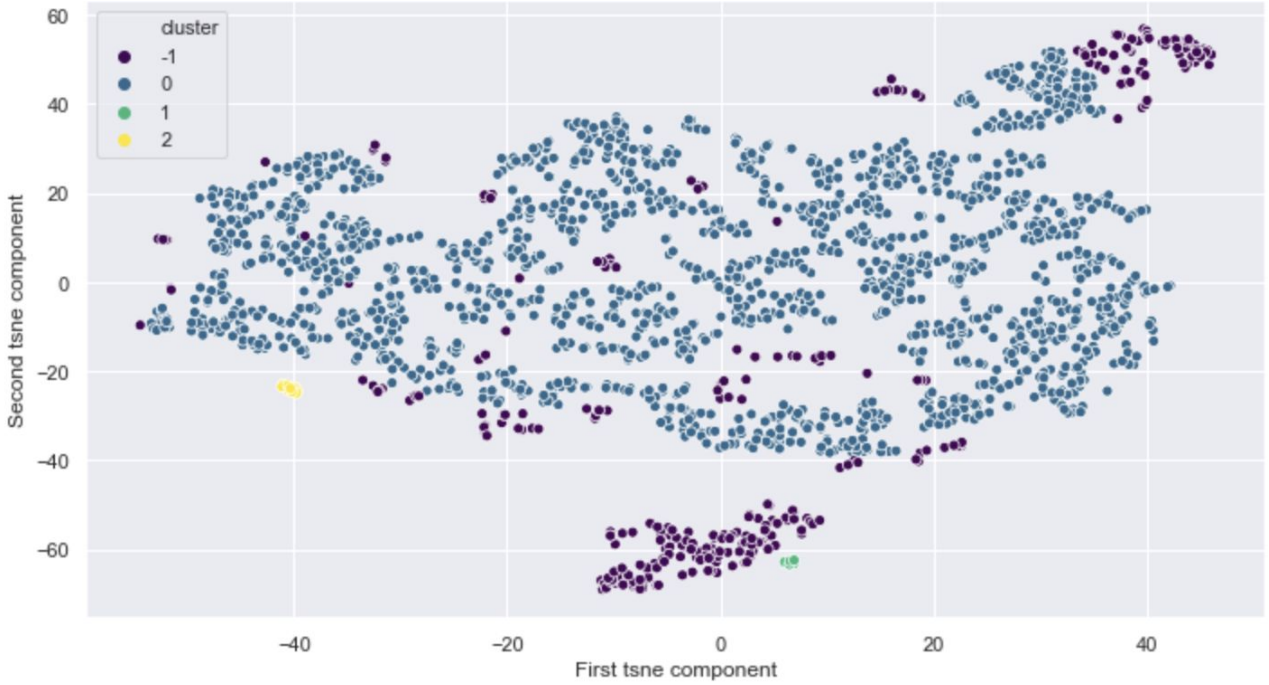


According to Dendrogram I chose 6 clusters

Agglomerative Clustering TSNE



DBSCAN TSNE



Because the data mostly has an even distribution DBSCAN algorithm identified the majority of audio tracks as a one big cluster and defined small surrounding groups.

HDBSCAN TSNE

HDBSCAN algorithm has a similar picture as DBSCAN due to the same issues.

Discovered

Cluster 1 HIGH: acousticness, instrumentalness; LOW: energy, speechiness => **CLASSICAL**

Cluster 2 MID: energy, danceability

Cluster 3 LOW: energy, tempo

Cluster 4 HIGH: energy, danceability; MID: acousticness, speechiness => **POP**

Cluster 5 HIGH: acousticness, instrumentalness; MID: energy => **JAZZ**

Cluster 6 HIGH: energy, tempo; MID: acousticness, speechiness => **ROCK**

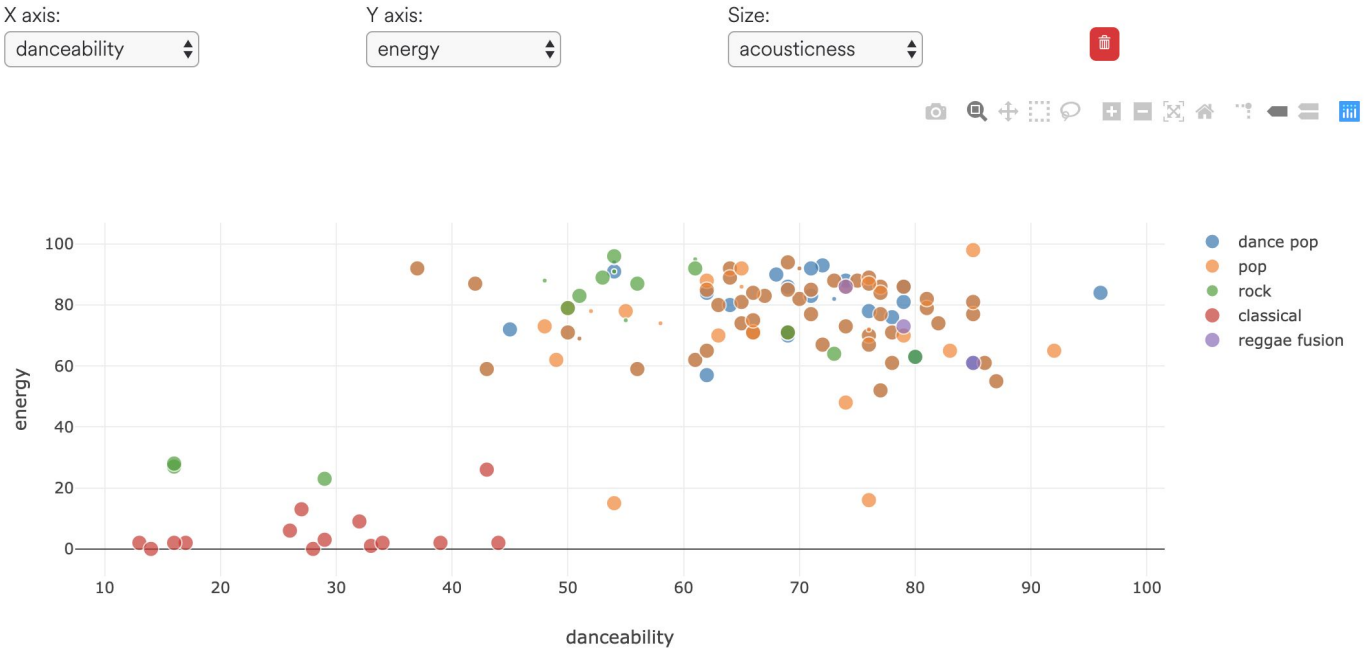
Artists genre

	genre	count
94	pop	71
97	rock	64
60	folk	18
42	dance	14
69	hip hop	13
79	metal	11
32	classical	10
72	jazz	6
62	funk	4
54	electronic	3

The most popular genres: Pop, Rock, Folk, Dance, Hip hop, Metal, Classical

But we could also see some representatives from Jazz, Funk and Electronic.

Plot provided by Spotify



Classical genre has low danceability and energy, but high acousticness.

Rock genre has lower acousticness.

All other genres have similar parameters

Results

After clustering analysis and visualization I got a rough idea of the audio track genres that were in 1996. I was able to identify only four clusters: **Classical, Pop, Rock, Jazz.**

I checked my results by extracting artist genres of the audio tracks from 1996. The most common genres were defined by grouping music types. **Pop, Rock, Folk, Dance, Metal and Classical**

In the plot, that Spotify provided there is a significant difference only for **Classical** music (low: danceability, energy) and **Rock** music (lower: acousticness)

Popular music in the 1990s (wiki): The Red Hot Chili Peppers, Nirvana, No Doubt, Green Day, The Offspring, Marilyn Manson, Aerosmith, Bon Jovi,Backstreet Boys, *NSYNC, Christina Aguilera, Britney Spears, Jennifer Lopez and Destiny's Child, Michael Jackson