Introduction

The music data set I am working with is a subset of the Kaggle dataset: Spotify Charts. Spotify publishes a new chart every 2-3 days and this dataset tracks its entire collection of published charts from January 1, 2017 to December 31, 2021 world-wide. The original dataset contains over 26 million observations based on Spotify's Top 200 and Viral 50 charts. Since 26 million observations is an immensely large quantity of data, I decided to clean the original dataset into a more manageable one. I decided to only focus on countries where the main language is English so that I would be able to focus mainly on artists and songs that I know. This adjustment brought me down to 4 countries, the US, the UK, Australia and Canada. Next, I decided to only look at the Top 200 charts, rather than the Viral 50. I did this because I am more interested in music that is doing well on Spotify based on content, not Tik Tok trends. Lastly, I removed the column where the Spotify link was included because it was unnecessary for my project. Overall, my subset includes 361,873 observations of the original 26 million.

The dataset contains the following columns:

- title: The title of the song.
- rank: number describing the song's popularity relative to the others.
- date: Day, monh and year of the top 200 chart release.
- artist: person who sings the song that placed in the Top 200 on the day.
- region: Country the song placed in the Top 200 in, in this project only Australia, UK, US and Canada.
- chart: Either top 200 or Viral 50. In this case, only the top 200.
- trend: Whether the song moved up, down, or stayed the same from its - - - rankings in the previous Top 200
- streams: the number of streams the song received

Throughout this project I investigated which artists were most successful overall in all 4 regions, in each individual region and in certain years. I defined success in two different ways: total appearances on the Top 200 Spotify Charts and total number of streams their songs received. I visualized this data through bar graphs and scatterplots and was able to conclude that the amount of times an artist is featured on the Top 200 Charts is often also correlated with streaming success, however it is not exact. In other words, since this data is recorded over the duration of 3 years "one hit wonders" who release a hit song that is featured on Top 200 Chart for a few days will not prove significant in the overall distributions. The big name artists who have dedicated fanbases write hits and generate longevity in streams. From this conclusion, I decided to use an artist’s total streams as the driving value behind calculating an artist’s popularity score because I decided it is a more indicicative measure of success. At the end of this report, you will find an experiment that I conducted from my own research and the insights from the Spotify dataset where I measured and compared how “mainstream” my friend’s music tastes are.

Loading Data and Importing Packages

```
import pandas as pd
```

```
import numpy as np
```

```
import matplotlib.pyplot as plt
```

```
%matplotlib inline
```

```
import seaborn as sns
```

```
df = pd.read_csv("music data csv .csv")
```

```
df
```

	title	rank	date	artist	region	chart	trend	streams
0	Starboy	1	1/1/2017	The Weeknd, Daft Punk	Australia	top200	MOVE_UP	107350
1	Rockabye (feat. Sean Paul & Anne-Marie)	2	1/1/2017	Clean Bandit	Australia	top200	MOVE_UP	105111
2	Closer	3	1/1/2017	The Chainsmokers, Halsey	Australia	top200	MOVE_DOWN	100617
3	I Don't Wanna Live Forever (Fifty Shades Darke	4	1/1/2017	ZAYN, Taylor Swift	Australia	top200	MOVE_UP	88335

This is the raw dataset that I uploaded into Python. There are 361873 songs that are featured over 3 years of Spotify Top 200 Charts in the United States, Australia, the UK and Canada.

Popular artists accross all 4 regions

In this first section I investigated artist popularity over all four regions featured. The first visualization shows the 20 artists that were featured the most times on the Top 200 Charts. The visualization, "Overall Appearances Accross All Regions" shows that the artists Drake, Post Malone and Ed Sheeran had the most appearances on the Top 200 Charts.

I then went on to investigate popularity based on streams rather than just count of appearances. In order to accomplish this, I created a new dataset where I manipulated the orginal dataset by grouping together arists. From this dataset, I created a dataframe where I added two columns: the artists and the sum of all of their streams accross every song that was featured in the Spotify's Top 200 dataset. This is where the visualization, "Overall Streams Accross All Regions" comes from. As expected, the visualization includes many of the same as the counts visualization. However, there is a change of order and a few different appearances such as The Weekend and Cardi B.

From these visualizations it is important to note that the artists who frequent the Top 200 charts are seasoned professionals and therefor they have dedicated fanbases who provide a consistent source of streams. It is important to note that these visualizations are created from data that stretches over 3 years and because of this a one hit wonder will not appear significant.

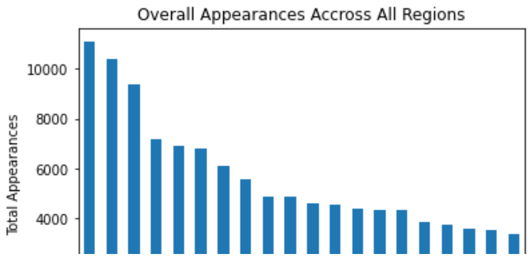
```
counts = df['artist'].value_counts()
```

```
counts.head(20)
```

```
Drake             11081
Post Malone       10366
Ed Sheeran         9373
Ariana Grande      7148
Billie Eilish      6927
Juice WRLD         6791
The Weeknd         6081
Dua Lipa           5579
Olivia Rodrigo     4863
Justin Bieber      4862
Lewis Capaldi      4596
Khalid             4550
Doja Cat           4391
XXXTENTACION       4352
Taylor Swift       4324
Lil Nas X          3876
Travis Scott       3731
Harry Styles       3576
Pop Smoke          3509
Kendrick Lamar     3378
Name: artist, dtype: int64
```

```
overallappearances = counts.head(20)
```

```
overallappearances.plot(kind='bar')
plt.ylabel('Total Appearances')
plt.xlabel('Artist')
plt.title('Overall Appearances Accross All Regions');
```



This visualization features the top 20 most featured artists on Spotify's Top 200 charts over all three years in all four regions.

```
dfstreams=df[['artist', 'streams']]
```

```
dfstreams.head(20)
```

	artist	streams
0	The Weeknd, Daft Punk	107350
1	Clean Bandit	105111
2	The Chainsmokers, Halsey	100617
3	ZAYN, Taylor Swift	88335
4	Starley	83729
5	James Arthur	81542
6	The Weeknd, Daft Punk	81455
7	NEIKED, Dyo	80609
8	DJ Snake, Justin Bieber	75363
9	Nevada, Mark Morrison, Fetty Wap	74950
10	Maroon 5, Kendrick Lamar	72216
11	Bruno Mars	72054
12	Peking Duk	70552
13	Major Lazer	68561
14	Rae Sremmurd, Gucci Mane	67650
15	Andy Grammer	65459
16	Mura Masa	64332
17	Zara Larsson	63033
18	Alessia Cara	62689
19	Drake	62524

```
d2 = dfstreams.groupby(['artist'])
```

```
new_df = pd.DataFrame({'sumstreams': d2['streams'].sum()}).reset_index().sort_values(by=['sumstreams'], ascending=False)
```

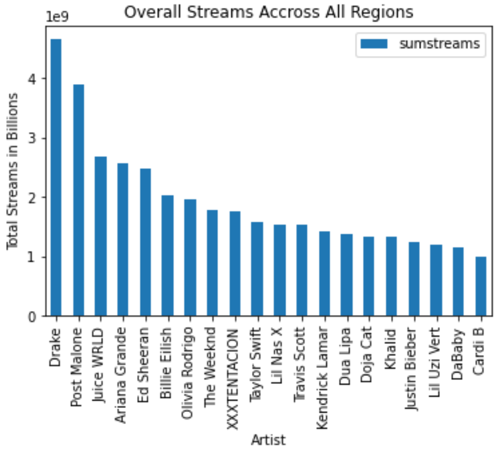
```
streamsgraph= new_df[['artist', 'sumstreams']].head(20)
```

```
streamsgraph
```

	artist	sumstreams
358	Drake	4659276639
985	Post Malone	3885515577
599	Juice WRLD	2678846471
84	Ariana Grande	2562433264
392	Ed Sheeran	2473124563
167	Billie Eilish	2027896426
942	Olivia Rodrigo	1955990054
1185	The Weeknd	1785584010
1271	XXXTENTACION	1750557617
1150	Taylor Swift	1579147632
710	Lil Nas X	1537197170
1217	Travis Scott	1524285117
642	Kendrick Lamar	1408048021
351	Doja Cat	1334247031

```
streamsgraph=new_df.head(20)
```

```
streamsgraph.plot(x="artist", kind="bar")
plt.ylabel('Total Streams in Billions')
plt.xlabel('Artist')
plt.title('Overall Streams Accross All Regions');
```



This visualization features the top 20 artists with the highest number of total streams on Spotify's Top 200 charts over all three years in all four regions.

Popular Artists in Australia

In this section and the following three, I investigate the artists who have had the most success in individual countries. In this section I am focusing in on Australia. I found that Australians listen to Tones and I and Lewis Capaldi more than other countries which is an interesting takeaway.

```
df['region'].value_counts().head()
```

```
United States     91044
Australia         90542
Canada            90342
United Kingdom    89945
Name: region, dtype: int64
```

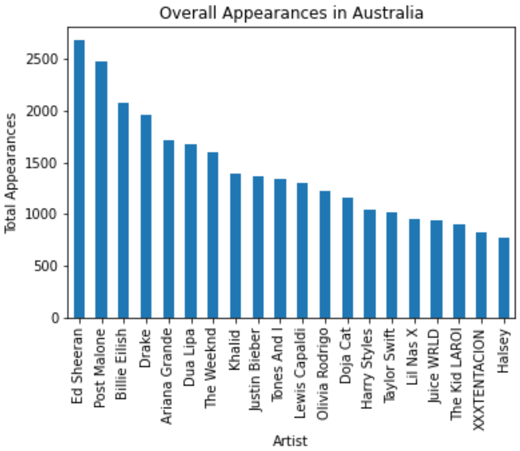
```
Australiadf = df[(df.region == "Australia")]
```

```
Australiadf
```

	title	rank	date	artist	region	chart	trend	streams
0	Starboy	1	1/1/2017	The Weeknd, Daft Punk	Australia	top200	MOVE_UP	107350
1	Rockabye (feat. Sean Paul & Anne-Marie)	2	1/1/2017	Clean Bandit	Australia	top200	MOVE_UP	105111
2	Closer	3	1/1/2017	The Chainsmokers, Halsey	Australia	top200	MOVE_DOWN	100617
3	I Don't Wanna Live Forever (Fifty Shades Darke...	4	1/1/2017	ZAYN, Taylor Swift	Australia	top200	MOVE_UP	88335
4	Call On Me - Ryan Riback Extended Remix	5	1/1/2017	Starley	Australia	top200	MOVE_UP	83729
...	...	...	...	...	...	...	...	...
361718	No Limit	46	1/31/2018	G-Eazy, A$AP Rocky, Cardi B	Australia	top200	SAME_POSITION	72698
361719	Too Good At Goodbyes	47	1/31/2018	Sam Smith	Australia	top200	MOVE_UP	72058
361720	Lay It on Me	48	1/31/2018	Vance Joy	Australia	top200	MOVE_DOWN	69389
361721	Perfect	49	1/31/2018	Ed Sheeran	Australia	top200	MOVE_DOWN	68911

```
Australiaappearances= Australiadf['artist'].value_counts().head(20)
```

```
Australiaappearances.plot(kind='bar')
plt.ylabel('Total Appearances')
plt.xlabel('Artist')
plt.title('Overall Appearances in Australia');
```



This visualization features the top 20 most featured artists on Spotify's Top 200 charts over all three years in Australia.

```
dfstreamsaus=Australiadf[['artist', 'streams']]
```

```
d2aus = dfstreamsaus.groupby(['artist'])
```

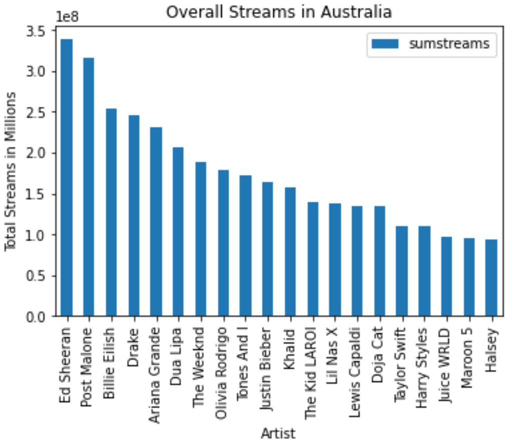
```
aus_df = pd.DataFrame({'sumstreams': d2aus['streams'].sum()}).reset_index().sort_values(by=['sumstreams'], ascending=False)
```

```
ausstreamsgraph= aus_df[['artist', 'sumstreams']].head(20)
```

```
ausstreamsgraph
```

	artist	sumstreams
160	Ed Sheeran	338813326
440	Post Malone	315958830
63	Billie Eilish	254126594
141	Drake	246082820
31	Ariana Grande	231842025
154	Dua Lipa	206408890
535	The Weeknd	189167947
417	Olivia Rodrigo	179021020
543	Tones And I	171919397
257	Justin Bieber	164306379
291	Khalid	157288994
529	The Kid LAROI	139241546
320	Lil Nas X	137130356
314	Lewis Capaldi	135003112

```
ausstreamsgraph.plot(x="artist", kind="bar")
plt.ylabel('Total Streams in Millions')
plt.xlabel('Artist')
plt.title('Overall Streams in Australia');
```



This visualization features the top 20 artists with the highest number of total streams on Spotify's Top 200 charts over all three years in Australia.

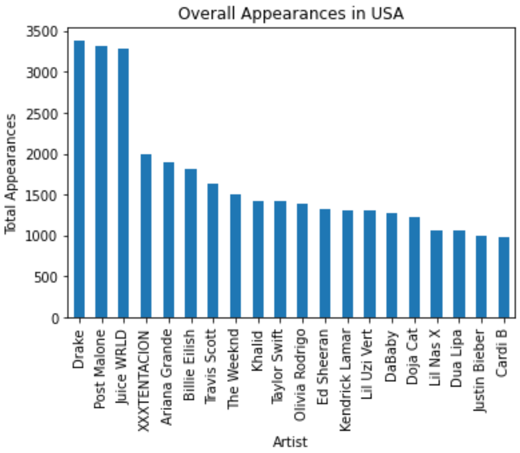
Popular Artists in the United States

Lamar, Future & Jam... States

Showman Ensemble States

```
USAappearances= USAdf['artist'].value_counts().head(20)
```

```
USAappearances.plot(kind='bar')
plt.ylabel('Total Appearances')
plt.xlabel('Artist')
plt.title('Overall Appearances in USA');
```



This visualization features the top 20 most featured artists on Spotify's Top 200 charts over all three years in the United States.

```
dfstreamsUSA=USAdf[['artist', 'streams']]
```

```
USAdf = dfstreamsUSA.groupby(['artist'])
```

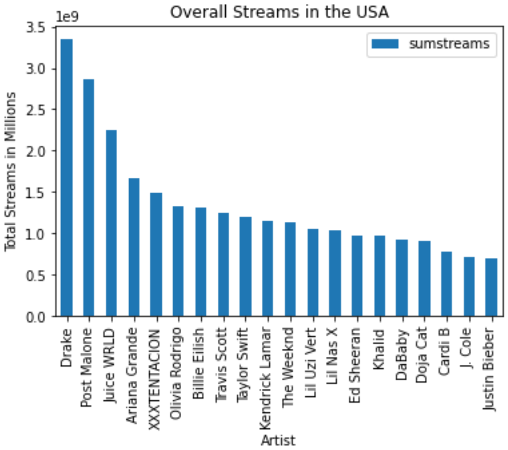
```
USA_df = pd.DataFrame({'sumstreams': USAdf['streams'].sum()}).reset_index().sort_values(by=['sumstreams'], ascending=False)
```

```
USAstreamsgraph= USA_df[['artist', 'sumstreams']].head(20)
```

```
USAstreamsgraph
```

	artist	sumstreams
223	Drake	3349607731
603	Post Malone	2861699768
353	Juice WRLD	2254934845
58	Ariana Grande	1661959601
774	XXXTENTACION	1483090091
577	Olivia Rodrigo	1328139140
115	Billie Eilish	1309747101
735	Travis Scott	1250664838
698	Taylor Swift	1201240444
387	Kendrick Lamar	1148711404
720	The Weeknd	1133213878
445	Lil Uzi Vert	1045410455
433	Lil Nas X	1029479643

```
USAstreamsgraph.plot(x="artist", kind="bar")
plt.ylabel('Total Streams in Millions')
plt.xlabel('Artist')
plt.title('Overall Streams in the USA');
```



This visualization features the top 20 artists with the highest number of total streams on Spotify's Top 200 charts over all three years in the United States.

Popular Artists in the UK

This section features the most popular artists in the UK. Ed Sheeran is the most popular in both streaming and appearance categories which is different than any of the other regions we look at. This is most likely due to Ed Sheeran being from the UK originally.

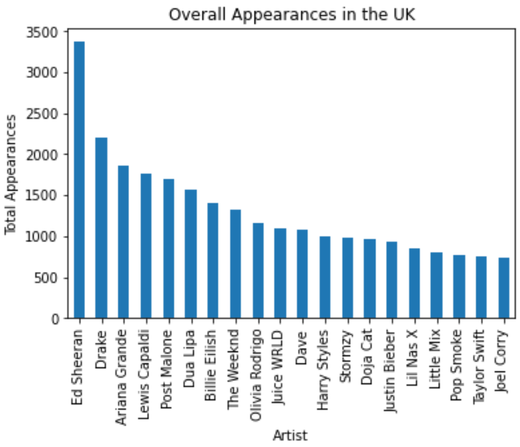
```
UKdf = df[(df.region == "United Kingdom")]
```

```
UKdf
```

	title	rank	date	artist	region	chart	trend	streams	year
100	Rockabye (feat. Sean Paul & Anne-Marie)	1	1/1/2017	Clean Bandit	United Kingdom	top200	SAME_POSITION	272020	2017
101	Starboy	2	1/1/2017	The Weeknd, Daft Punk	United Kingdom	top200	SAME_POSITION	209873	2017
102	Say You Won't Let Go	3	1/1/2017	James Arthur	United Kingdom	top200	MOVE_UP	194633	2017
103	Sexual	4	1/1/2017	NEIKED, Dyo	United Kingdom	top200	SAME_POSITION	184896	2017
104	I Would Like	5	1/1/2017	Zara Larsson	United Kingdom	top200	MOVE_UP	182520	2017
...	...	...	...	...	...	...	...	...	...
361818	Perfect	46	1/31/2018	Ed Sheeran	United Kingdom	top200	MOVE_DOWN	124817	2018
361819	From Now On	47	1/31/2018	Hugh Jackman, The Greatest Showman Ensemble	United Kingdom	top200	MOVE_DOWN	123919	2018

```
UKappearances= UKdf['artist'].value_counts().head(20)
```

```
UKappearances.plot(kind='bar')
plt.ylabel('Total Appearances')
plt.xlabel('Artist')
plt.title('Overall Appearances in the UK');
```



This visualization features the top 20 most featured artists on Spotify's Top 200 charts over all three years in the UK.

```
dfstreamsUK=UKdf[['artist', 'streams']]
```

```
UKdf = dfstreamsUK.groupby(['artist'])
```

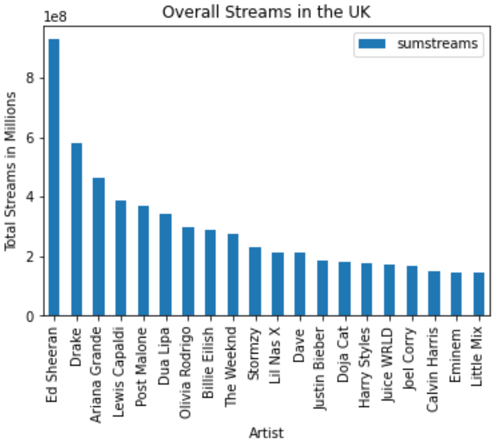
```
UK_df = pd.DataFrame({'sumstreams': UKdf['streams'].sum()}).reset_index().sort_values(by=['sumstreams'], ascending=False)
```

```
UKstreamsgraph= UK_df[['artist', 'sumstreams']].head(20)
```

```
UKstreamsgraph
```

	artist	sumstreams
229	Ed Sheeran	928926903
202	Drake	578480008
44	Ariana Grande	462359207
409	Lewis Capaldi	385156755
553	Post Malone	370687638
220	Dua Lipa	343171934
534	Olivia Rodrigo	298822397
83	Billie Eilish	287512769
677	The Weeknd	272810403
642	Stormzy	228275998
419	Lil Nas X	211738807
169	Dave	211245473
353	Justin Bieber	184429680

```
UKstreamsgraph.plot(x="artist", kind="bar")
plt.ylabel('Total Streams in Millions')
plt.xlabel('Artist')
plt.title('Overall Streams in the UK');
```



This visualization features the top 20 artists with the highest number of total streams on Spotify's Top 200 charts over all three years in the UK.

Popuar Artists in Canada

In this section the top artists in Canada are investigated. Similar to the UK, Canada has an artist, Drake, that is much more popular in their region relative to others. Just like Ed Sheeran in the UK, the reasoning for Drake in Canada is most likely because he is from Canada.

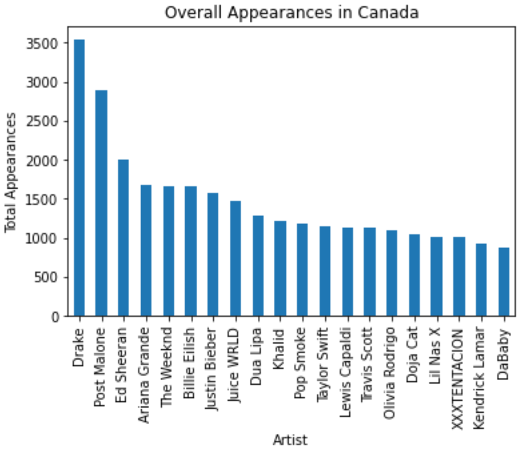
```
Canadadf = df[(df.region == "Canada")]
```

```
Canadadf
```

	title	rank	date	artist	region	chart	trend	streams
50	Starboy	1	1/1/2017	The Weeknd, Daft Punk	Canada	top200	SAME_POSITION	139175
51	Closer	2	1/1/2017	The Chainsmokers, Halsey	Canada	top200	MOVE_UP	128481
52	Fake Love	3	1/1/2017	Drake	Canada	top200	MOVE_DOWN	118532
53	Bad and Boujee (feat. Lil Uzi Vert)	4	1/1/2017	Migos	Canada	top200	SAME_POSITION	100524
54	One Dance	5	1/1/2017	Drake, WizKid, Kyla	Canada	top200	MOVE_UP	90257

```
Canadaappearances= Canadadf['artist'].value_counts().head(20)
```

```
Canadaappearances.plot(kind='bar')
plt.ylabel('Total Appearances')
plt.xlabel('Artist')
plt.title('Overall Appearances in Canada');
```



This visualization features the top 20 most featured artists on Spotify's Top 200 charts over all three years in Canada.

```
dfstreamsCAN=Canadadf[['artist', 'streams']]
```

```
Canadadf = dfstreamsCAN.groupby(['artist'])
```

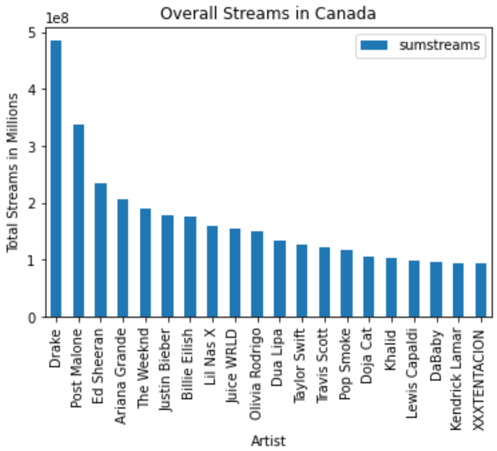
```
CAN_df = pd.DataFrame({'sumstreams': Canadadf['streams'].sum()}).reset_index().sort_values(by=['sumstreams'], ascending=False)
```

```
Canadastreamsgraph= CAN_df[['artist', 'sumstreams']].head(20)
```

```
Canadastreamsgraph
```

	artist	sumstreams
183	Drake	485106080
550	Post Malone	337169341
211	Ed Sheeran	234370107
47	Ariana Grande	206272431
664	The Weeknd	190391782
315	Justin Bieber	178162921

```
Canadastreamsgraph.plot(x="artist", kind="bar")
plt.ylabel('Total Streams in Millions')
plt.xlabel('Artist')
plt.title('Overall Streams in Canada');
```



This visualization features the top 20 artists with the highest number of total streams on Spotify's Top 200 charts over all three years in Canada.

Tracking artist success by year

In this portion of the project, I broke the dataset up into years so that I can investigate success in individual years. As mentioned in my introduction, I am using streams as my key indicator of success. At the end of this section, I have included all three years in visualizations next to each other for easy comparison.

```
df.head(3)
```

	title	rank	date	artist	region	chart	trend	streams
0	Starboy	1	1/1/2017	The Weeknd, Daft Punk	Australia	top200	MOVE_UP	107350
1	Rockabye (feat. Sean Paul & Anne-Marie)	2	1/1/2017	Clean Bandit	Australia	top200	MOVE_UP	105111
2	Closer	3	1/1/2017	The Chainsmokers, Halsey	Australia	top200	MOVE_DOWN	100617

```
df['year'] = pd.to_datetime(df['date']).dt.year
```

```
df[['artist', 'title','streams','year']].head()
```

	artist	title	streams	year
0	The Weeknd, Daft Punk	Starboy	107350	2017
1	Clean Bandit	Rockabye (feat. Sean Paul & Anne-Marie)	105111	2017
2	The Chainsmokers, Halsey	Closer	100617	2017
3	ZAYN, Taylor Swift	I Don't Wanna Live Forever (Fifty Shades Darke...	88335	2017
4	Starley	Call On Me - Ryan Riback Extended Remix	83729	2017

```
dfyear=df[['artist', 'title','streams','year']]
```

```
dfyear2017 = dfyear[dfyear['year'] == 2017]
```

```
dfyear2017
```

	artist	title	streams	year
0	The Weeknd, Daft Punk	Starboy	107350	2017
1	Clean Bandit	Rockabye (feat. Sean Paul & Anne-Marie)	105111	2017
2	The Chainsmokers, Halsey	Closer	100617	2017
3	ZAYN, Taylor Swift	I Don’t Wanna Live Forever (Fifty Shades Darke...	88335	2017
4	Starley	Call On Me - Ryan Riback Extended Remix	83729	2017
...	...	...	...	...
361368	Demi Lovato	Tell Me You Love Me	432289	2017
361369	Demi Lovato	Sorry Not Sorry	424287	2017
361370	NAV	Wanted You (feat. Lil Uzi Vert)	420113	2017
361371	Lil Uzi Vert	The Way Life Goes (feat. Oh Wonder)	414829	2017
361372	Taylor Swift, Ed Sheeran, Future	End Game	414273	2017

72373 rows × 4 columns

```
dfstreams2017=dfyear2017[['artist', 'streams']]
```

```
d22017 = dfstreams2017.groupby(['artist'])
```

```
yr2017_df = pd.DataFrame({'sumstreams': d22017['streams'].sum()}).reset_index().sort_values(by=['sumstreams'], ascending=False)
```

```
yr2017streamsgraph= yr2017_df[['artist', 'sumstreams']].head(20)
```

```
yr2017streamsgraph
```

artist sumstreams

```
dfyear2018 = dfyear[dfyear['year'] == 2018]
```

```
dfyear2018
```

	artist	title	streams	year
300	Drake	God's Plan	377837	2018
301	Post Malone	Psycho (feat. Ty Dolla $ign)	340699	2018
302	Kendrick Lamar	All The Stars (with SZA)	249560	2018
303	Post Malone	I Fall Apart	187239	2018
304	Bazzi	Mine	181584	2018
...	...	...	...	...
361868	Khalid	Location	490047	2018
361869	Jay Rock	King's Dead (with Kendrick Lamar, Future & Jam...	489847	2018
361870	Keala Settle, The Greatest Showman Ensemble	This Is Me	484681	2018
361871	Gucci Mane	I Get the Bag (feat. Migos)	481263	2018
361872	Lil Pump	Gucci Gang	472479	2018

73000 rows × 4 columns

51 Bruno Mars 259314963

```
dfstreams2018=dfyear2018[['artist', 'streams']]
```

```
d22018 = dfstreams2018.groupby(['artist'])
```

199 Kodak Black 218624801

```
yr2018_df = pd.DataFrame({'sumstreams': d22018['streams'].sum()}).reset_index().sort_values(by=['sumstreams'], ascending=False)
```

```
yr2018streamsgraph= yr2018_df[['artist', 'sumstreams']].head(20)
```

```
yr2018streamsgraph
```

```
dfyear2019 = dfyear[dfyear['year'] == 2019]
```

```
dfyear2019
```

	artist	title	streams	year
70250	Post Malone, Swae Lee	Sunflower - Spider-Man: Into the Spider-Verse	235128	2019
70251	Ariana Grande	thank u, next	208884	2019
70252	Halsey	Without Me	199646	2019
70253	Post Malone	Wow.	184674	2019
70254	Ava Max	Sweet but Psycho	181987	2019
...	...	...	...	...
195695	Post Malone	Goodbyes (Feat. Young Thug)	483807	2019
195696	Trippie Redd, DaBaby	Death	478399	2019
195697	French Montana	Writing on the Wall (feat. Post Malone, Cardi ...	471678	2019
195698	J. Cole	MIDDLE CHILD	465864	2019
195699	Post Malone	Wow.	459329	2019

73000 rows × 4 columns

```
dfstreams2019=dfyear2019[['artist', 'streams']]
```

```
d22019 = dfstreams2019.groupby(['artist'])
```

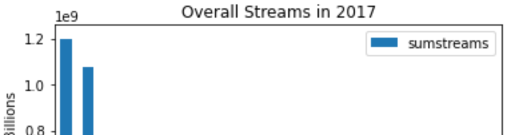
```
yr2019_df = pd.DataFrame({'sumstreams': d22019['streams'].sum()}).reset_index().sort_values(by=['sumstreams'], ascending=False)
```

```
yr2019streamsgraph= yr2019_df[['artist', 'sumstreams']].head(20)
```

```
yr2019streamsgraph
```

	artist	sumstreams
327	Post Malone	1460081345
43	Billie Eilish	1175806590
18	Ariana Grande	1156757806
129	Ed Sheeran	707868082
245	Lil Nas X	645203830
328	Post Malone, Swae Lee	548594313
205	Juice WRLD	545814562
219	Khalid	491802172
238	Lewis Capaldi	470494544
256	Lizzo	420594963
381	Taylor Swift	403929829
252	Lil Tecca	383981142
98	DaBaby	363663069
6	A Boogie Wit da Hoodie	357902830
404	Travis Scott	357471314
429	YNW Melly	325242525
357	Shawn Mendes, Camila Cabello	298774008
121	Drake	292358490
173	J. Cole	289141724
351	Sam Smith	272446818

```
yr2017streamsgraph.plot(x="artist", kind="bar")
plt.ylabel('Total Streams in Billions')
plt.xlabel('Artist')
plt.title('Overall Streams in 2017');
yr2018streamsgraph.plot(x="artist", kind="bar")
plt.ylabel('Total Streams in Billions')
plt.xlabel('Artist')
plt.title('Overall Streams in 2018');
yr2019streamsgraph.plot(x="artist", kind="bar")
plt.ylabel('Total Streams in Billions')
plt.xlabel('Artist')
plt.title('Overall Streams in 2019');
```



These three graphs measure total streams of the top artists in each year. Although they are not directly comparible because the years feature different top artists there are still some valuable takeaways. The first takeway are the repeats, artists who place in the top 20 for total streams in all three years. Some of these "timeless artists" are Post Malone and Drake. It is important to note that a shortcoming of this dataset is that it only tracks 3 years. My guess is that if this went back 30 years artists who are timeless will be very different than artists who appear to be timeless over this 3 year time span. Another take away from these visualizations is the amount of streams each year. It seems that 2018 had the most streams and one could assume the best music released out of all three of the years. It would be interesting to look at the data from 202 when the pandemic hit and see how many total streams the top 20 artists brought in.

Individual Artists

In this section I looked at 3 of the most consitantly popular and successul artists, Post Malone, Ed Sheeran and Drake. I narrowed in on just these individual artists and tracked their streams overtime. This works nicely with these artists because they are all three popular in the sense that they have consistant streaming but they all also release tons of new music that often gets featured on the Top 200. In all three of these visualizations it is clear when a new song is released because the streams soar up and then dip down. This is also replicable to any artist and is in the form of a scatterplot because it tracks streaming patterns over time.

```
postmalonedf = df[(df.artist == "Post Malone")]
```

```
postmalonedf
```

	title	rank	date	artist	region	chart	trend	streams	year
301	Psycho (feat. Ty Dolla $ign)	2	3/1/2018	Post Malone	Australia	top200	SAME_POSITION	340699	2018
303	I Fall Apart	4	3/1/2018	Post Malone	Australia	top200	SAME_POSITION	187239	2018
329	Candy Paint	30	3/1/2018	Post Malone	Australia	top200	MOVE_UP	97954	2018
352	Psycho (feat. Ty Dolla $ign)	2	3/1/2018	Post Malone	Canada	top200	SAME_POSITION	333922	2018
365	I Fall Apart	15	3/1/2018	Post Malone	Canada	top200	MOVE_UP	99914	2018
...	...	...	...	...	...	...	...	...	...
361697	Candy Paint	25	1/31/2018	Post Malone	Australia	top200	MOVE_UP	100640	2018
361731	I Fall Apart	9	1/31/2018	Post Malone	Canada	top200	MOVE_UP	106470	2018
361801	I Fall Apart	28	1/31/2018	Post Malone	United Kingdom	top200	MOVE_DOWN	171966	2018
361829	I Fall Apart	7	1/31/2018	Post Malone	United States	top200	SAME_POSITION	963598	2018
361848	Candy Paint	26	1/31/2018	Post Malone	United States	top200	MOVE_UP	646017	2018

10366 rows × 9 columns

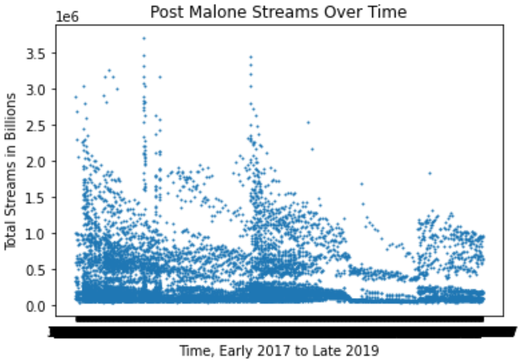
```
postmalonegraph=postmalonedf[['date', 'streams']]
```

```
postmalonegraph
```

	date	streams
301	3/1/2018	340699
303	3/1/2018	187239
329	3/1/2018	97954

```
post = postmalonegraph.plot.scatter(x='date',
                      y='streams', s=1)
plt.ylabel('Total Streams in Billions')
plt.xlabel('Time, Early 2017 to Late 2019')
plt.title('Post Malone Streams Over Time')
```

```
Text(0.5, 1.0, 'Post Malone Streams Over Time')
```



This visualization tracks Post Malone's streams over all three years. It is clear that he had 3 massive hits and from the spikes in the plot.

```
Drakedf = df[(df.artist == "Drake")]
```

```
Drakedf
```

	title	rank	date	artist	region	chart	trend	streams	year
19	Fake Love	20	1/1/2017	Drake	Australia	top200	MOVE_DOWN	62524	2017
52	Fake Love	3	1/1/2017	Drake	Canada	top200	MOVE_DOWN	118532	2017
97	Controlla	48	1/1/2017	Drake	Canada	top200	MOVE_UP	40453	2017
114	Fake Love	15	1/1/2017	Drake	United Kingdom	top200	MOVE_UP	147038	2017
141	Controlla	42	1/1/2017	Drake	United Kingdom	top200	MOVE_UP	82401	2017
...	...	...	...	...	...	...	...	...	...
361743	Diplomatic Immunity	21	1/31/2018	Drake	Canada	top200	MOVE_DOWN	88433	2018
361774	God's Plan	1	1/31/2018	Drake	United Kingdom	top200	SAME_POSITION	679004	2018
361822	Diplomatic Immunity	50	1/31/2018	Drake	United Kingdom	top200	MOVE_DOWN	117627	2018
361823	God's Plan	1	1/31/2018	Drake	United States	top200	SAME_POSITION	3805533	2018
361856	Diplomatic Immunity	34	1/31/2018	Drake	United States	top200	MOVE_DOWN	602454	2018

11081 rows × 9 columns

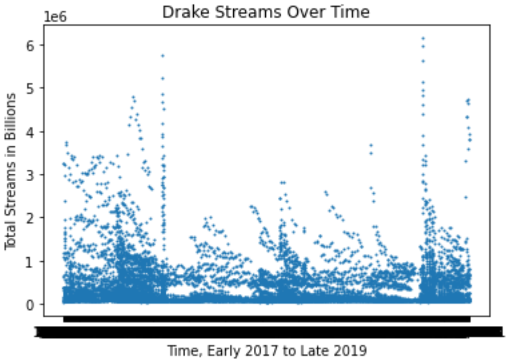
```
drakegraph=Drakedf[['date', 'streams']]
```

```
drakegraph
```

	date	streams
19	1/1/2017	62524
52	1/1/2017	118532
97	1/1/2017	40453
114	1/1/2017	147038
141	1/1/2017	82401

```
drake = drakegraph.plot.scatter(x='date',
                                y='streams', s=1)
plt.ylabel('Total Streams in Billions')
plt.xlabel('Time, Early 2017 to Late 2019')
plt.title('Drake Streams Over Time')
```

```
Text(0.5, 1.0, 'Drake Streams Over Time')
```



This visualization tracks Drake's streams over all three years. From this plot you can see that Drake has a consitant and solid follower base and two evident spikes in streams which are most likely associated with new songs.

```
edsheerandf = df[(df.artist == "Ed Sheeran")]
```

```
edsheerandf
```

	title	rank	date	artist	region	chart	trend	streams	year
339	Shape of You	40	3/1/2018	Ed Sheeran	Australia	top200	MOVE_UP	81955	2018
384	Perfect	35	3/1/2018	Ed Sheeran	Canada	top200	MOVE_UP	67433	2018
448	Shape of You	49	3/1/2018	Ed Sheeran	United Kingdom	top200	MOVE_DOWN	109926	2018
533	Shape of You	34	3/2/2018	Ed Sheeran	Australia	top200	MOVE_UP	89250	2018
549	Perfect	50	3/2/2018	Ed Sheeran	Australia	top200	MOVE_UP	69611	2018
...	...	...	...	...	...	...	...	...	...
361767	Shape of You	45	1/31/2018	Ed Sheeran	Canada	top200	MOVE_DOWN	61152	2018
361814	Perfect Duet (Ed Sheeran & Beyoncé)	42	1/31/2018	Ed Sheeran	United Kingdom	top200	MOVE_DOWN	137165	2018
361815	Shape of You	43	1/31/2018	Ed Sheeran	United Kingdom	top200	SAME_POSITION	130711	2018
361818	Perfect	46	1/31/2018	Ed Sheeran	United Kingdom	top200	MOVE_DOWN	124817	2018
361864	Perfect	42	1/31/2018	Ed Sheeran	United States	top200	SAME_POSITION	533903	2018

9373 rows × 9 columns

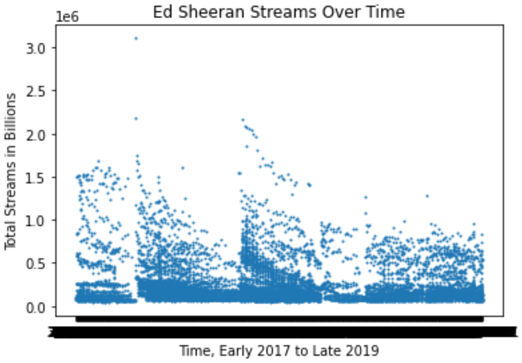
```
edgraph=edsheerandf[['date', 'streams']]
```

```
edgraph
```

	date	streams
339	3/1/2018	81955
384	3/1/2018	67433
448	3/1/2018	109926
533	3/2/2018	89250
549	3/2/2018	69611
...	...	...
361767	1/31/2018	61152
361814	1/31/2018	137165
361815	1/31/2018	130711

```
ed = edgraph.plot.scatter(x='date',
                      y='streams', s=1)
plt.ylabel('Total Streams in Billions')
plt.xlabel('Time, Early 2017 to Late 2019')
plt.title('Ed Sheeran Streams Over Time')
```

```
Text(0.5, 1.0, 'Ed Sheeran Streams Over Time')
```



This visualization tracks Ed Sheeran's streams over all three years. From this plot you can see that similar to Drake, Ed Sheeran has a consitant and solid follower base but unlike Drake and Post Malone, Ed Sheeran has more spikes (dramatic upticks in streams most likely attributed to a new song release).

Calculating how "mainstream" a person's music taste is

Lastly, I decided to take this data and my findings and apply them to my own friends. I wanted to see how "basic" or "mainstream" my friend's music tastes were. In order to do this here are the steps that I took:

- Surveyed my friend group and asked them to record their top 3 most played artists
- Created a dataset from the survey results
- Took the dataset from the all regions streaming section and manipulated it so that it just had two columns, artist and sum of all their streams
- I then calculated the sum of all streams in all four regions over all three years (104,358,975,705 streams)
- I made a new dataset which featured a column called popularity score percent where I took the total number of streams of the featured artist and divided it by the total streams, then multiplied it by 100
- Each artist was then assigned a popularity score
- I was then able to merge my two dataframes together by artist
- I then created my final data frame with the mainstream score which came from adding up every friend's 3 artist popularity scores

In a perfect world I would be able to make this model more replicable by figuring out a way to code in Python so that the machine automatically creates a new dataframe with a friend's top three artist's popularity scores added together. Additionally, in a perfect world, friends with music preferences not on the Top 200 lists should be counted as a zero and songs with artists who are featured on the song but not the primary singer should also be accounted for. This model of calculating mainstream scores is not perfect, but it is a start and I was able to see how "basic" my friends music tastes are.

This personal experiment came at a perfect time because Spotify Wrapped was recently released and it is all the buzz accross Gen Zers and all over social media. In my opinion, Spotify Wrapped is one of the most incredible marketing campaigns to ever launch because it encourages people to be proud users and ambassadors of Spotify. In short, Spotify Wrapped is when at the end of the year (Decemeber 1) Spotify releases your data in the form of individualized, repostable content that shows your personal top songs and artists of the year. The reason why I think it is a genius marketing campaign is because it sparks conversion and gets users excited to share their favorite artists and songs with their friends.

```
frienddf = pd.read_csv("friend data.csv")
```

```
frienddf
```

	friend	artist
0	Riley	Harry Styles
1	Riley	Adele
2	Riley	Ariana Grande
3	Tyler	Lewis Capaldi
4	Tyler	Anderson .Paak
5	Tyler	Khalid
6	Zenko	Lil Wayne
7	Zenko	Harry Styles
8	Zenko	Lady Gaga
9	Bella	Harry Styles
10	Bella	Justin Bieber
11	Bella	Adele
12	Alex	Louis The Child
13	Alex	21 Savage
14	Alex	Portugal. The Man
15	Hank	Drake
16	Hank	Mac Miller
17	Hank	Lil Wayne
18	Sophie	Miley Cyrus
19	Sophie	Harry Styles
20	Sophie	Ed Sheeran

```
streamstotal= new_df[['artist', 'sumstreams']]
```

```
streamstotal
```

	artist	sumstreams
358	Drake	4659276639
985	Post Malone	3885515577
599	Juice WRLD	2678846471
84	Ariana Grande	2562433264
392	Ed Sheeran	2473124563
...	...	...
189	Bow Wow Wow	65197
102	Avril Lavigne	63479
487	Harry Belafonte	61480
175	Black Eyed Peas, Shakira	58435
832	Marvin Gaye, Tammi Terrell	55577

1325 rows × 2 columns

```
totalstreams = streamstotal['sumstreams'].sum()
```

```
totalstreams
```

```
104358975705
```

```
streamstotal['popularity score percent'] = streamstotal.apply(lambda row: row.sumstreams /
                                  (totalstreams)*100, axis = 1)
```

```
print(streamstotal)
```

```
                         artist  sumstreams  popularity score percent
358                       Drake  4659276639                  4.464663
985                 Post Malone  3885515577                  3.723221
599                  Juice WRLD  2678846471                  2.566954
84               Ariana Grande  2562433264                  2.455403
392                  Ed Sheeran  2473124563                  2.369824
..                          ...         ...                       ...
189                 Bow Wow Wow       65197                  0.000062
102               Avril Lavigne       63479                  0.000061
487             Harry Belafonte       61480                  0.000059
175    Black Eyed Peas, Shakira       58435                  0.000056
832  Marvin Gaye, Tammi Terrell       55577                  0.000053

[1325 rows x 3 columns]
```

```
streamstotal[streamstotal['artist'] == 'Harry Styles']
```

	artist	sumstreams	popularity score percent
488	Harry Styles	829109641	0.794479

```
mergeddf = pd.merge(frienddf, streamstotal, on = 'artist', how = 'inner')
```

```
mergeddf.head()
```

	friend	artist	sumstreams	popularity score percent
0	Riley	Harry Styles	829109641	0.794479
1	Zenko	Harry Styles	829109641	0.794479
2	Bella	Harry Styles	829109641	0.794479
3	Sophie	Harry Styles	829109641	0.794479
4	Riley	Adele	375176688	0.359506

```
streamstotal[streamstotal['artist'] == 'Harry Styles']
```

	artist	sumstreams	popularity score percent
488	Harry Styles	829109641	0.794479

```
mergeddf
```

	friend	artist	sumstreams	popularity score percent
0	Riley	Harry Styles	829109641	0.794479
1	Zenko	Harry Styles	829109641	0.794479
2	Bella	Harry Styles	829109641	0.794479
3	Sophie	Harry Styles	829109641	0.794479
4	Riley	Adele	375176688	0.359506
5	Bella	Adele	375176688	0.359506
6	Riley	Ariana Grande	2562433264	2.455403
7	Tyler	Lewis Capaldi	864224337	0.828127
8	Tyler	Anderson .Paak	682875	0.000654
9	Tyler	Khalid	1325388342	1.270028

```
Sophie = mergeddf.loc[mergeddf['friend'] == 'Sophie', 'popularity score percent'].sum()
```

11	Hank	Lil W	314514374	0.305554

```
Sophie
```

```
    3.384585102660001
```

```
Hank = mergeddf.loc[mergeddf['friend'] == 'Hank', 'popularity score percent'].sum()
```

15	Alex	21 Savage	444844236	0.426264

```
Hank
```

```
    4.791472960730129
```

18	Hank	Mac Miller	126541190	0.121256

```
Bella = mergeddf.loc[mergeddf['friend'] == 'Bella', 'popularity score percent'].sum()
```

```
Bella
```

```
    2.3314070692660405
```

```
Tyler = mergeddf.loc[mergeddf['friend'] == 'Tyler', 'popularity score percent'].sum()
```

```
Tyler
```

```
    2.0988089804479175
```

```
Riley = mergeddf.loc[mergeddf['friend'] == 'Riley', 'popularity score percent'].sum()
```

```
Riley
```

```
    3.6093872784337133
```

```
Alex = mergeddf.loc[mergeddf['friend'] == 'Alex', 'popularity score percent'].sum()
```

```
Alex
```

```
    0.5624151579056551
```

```
Zenko = mergeddf.loc[mergeddf['friend'] == 'Zenko', 'popularity score percent'].sum()
```

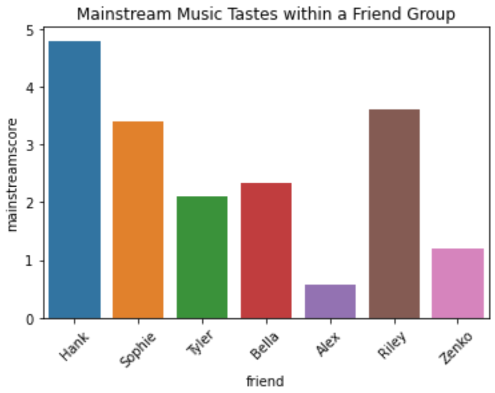
```
Zenko
```

```
    1.2073610779409287
```

```
d = {'friend': ['Hank', 'Sophie','Tyler','Bella','Alex', 'Riley','Zenko'], 'mainstreamscore': [Hank, Sophie,Tyler,Bella, Alex, Riley,Zenko]}
mainstream = pd.DataFrame(data=d)
mainstream
```

	friend	mainstreamscore
0	Hank	4.791473
1	Sophie	3.384585
2	Tyler	2.098809
3	Bella	2.331407
4	Alex	0.562415

```
mainstreamfriends = sns.barplot(y=mainstream.mainstreamscore, x=df.friend)
mainstreamfriends.set_title("Mainstream Music Tastes within a Friend Group")
mainstreamfriends.set_xticklabels(mainstreamfriends.get_xticklabels(), rotation=45);
```



This graph compares the mainstream scores between the friends in my friend group. Alex has the least basic and most niche music taste, while Hank seems to listen to what everyone else is listening to. This is a great model to predict what kinds of music people are going to like and has potential to improve.