spotify-wrapped

July 1, 2023

1 Spotify Wrapped: Exploratory Data Analysis Project

In this project, I have delved into my Spotify usage `Spotify Wrapped`. Spotify is renowned as one of the most popular and widely used music streaming platforms. The dataset utilized here represents my personal usage of this platform.

The dataset provides insights into the following aspects: * The songs I have played * The artists behind those songs * The duration of my usage, and more

I obtained this dataset by downloading my personal usage data from Spotify's `Privacy Setting` section. Spotify allows users to access and download their personal usage data, and it typically takes up to 30 days to receive the complete dataset. Fortunately, I received my entire history within a maximum of 23 days, but generally, it may take the full 30-day duration. With this dataset at hand, I aim to analyze my streaming history and extract valuable insights from it.

[1]:
```
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

2 0. Imports

[2]:
```
%matplotlib inline
import pandas as pd
import numpy as np
import matplotlib
import matplotlib.pyplot as plt
import seaborn as sns
from wordcloud import WordCloud
```

3 1. Downloading the Dataset

One can can download the ZIP file with a copy of most of the personal data by using the automated `Download your data` function on the `Privacy Settings` section of account page in `Spotify`.

3.0.1 Instructions for downloading the dataset

1. Go to the `Privacy Settting` Page of your Spotify Account.

2. Scroll to the bottom and you'll see a section called `Download Your Data`.
3. You'll see a three step process with instruction to download the data.
4. You have to to `Request` for your data the you'll get an confirmation email from Spotify to `Confirm` the request.
5. After collecting the required information, Spotify will create a `Zip File` and send you an email with the `link` to download it.
6. If you can't find the email, you can request again from your `Privacy Settting` Page.

- For More Information: https://support.spotify.com/us/article/data-rights-and-privacy-settings/

3.1 1.1 Read the data

[3]:
```
df1 = pd.read_json("/content/drive/MyDrive/Colab Notebooks/Self practice␣
↪projects/Spotify/endsong_0.json")
df2 = pd.read_json("/content/drive/MyDrive/Colab Notebooks/Self practice␣
↪projects/Spotify/endsong_1.json")
df3 = pd.read_json("/content/drive/MyDrive/Colab Notebooks/Self practice␣
↪projects/Spotify/endsong_2.json")
df4 = pd.read_json("/content/drive/MyDrive/Colab Notebooks/Self practice␣
↪projects/Spotify/endvideo.json")
```

[4]:
```
df1.head(2)
```

[4]:

	ts	username	platform	ms_played	conn_country	ip_addr_decrypted	user_agent_decrypted	master_metadata_track_name	master_metadata_album_artist_name	master_metadata_album_album_name	…	episode_name	episode_show_name	spotify_episode_uri	reason_start	reason_end	shuffle	skipped	offline	offline_timestamp	incognito_mode
0	2020-02-24T03:25:10Z	31qv3lgbx4jn45gkwql77frnwvpu	Android OS 8.0.0 API 26 (lenovo, Lenovo K8 Note)	66094	IN	42.106.46.255	unknown	Feel so Lucky	T.L.I.D	Feel so Lucky	…	None	None	None	playbtn	trackdone	False	NaN	False	1582514642643	False
1	2020-02-24T03:27:51Z	31qv3lgbx4jn45gkwql77frnwvpu	Android OS 8.0.0 API 26 (lenovo, Lenovo K8 Note)	160353	IN	42.106.46.255	unknown	Me & You	T.L.I.D	Me & You	…	None	None	None	trackdone	trackdone	False	NaN	False	1582514709146	False

```
[2 rows x 21 columns]
```

[5]:
```
df4.tail(2)
```

[5]:
```
                      ts                      username  \
9   2021-12-28T02:33:46Z  31qv3lgbx4jn45gkwql77frnwvpu
10  2021-12-28T02:33:47Z  31qv3lgbx4jn45gkwql77frnwvpu

                                      platform  ms_played conn_country  \
9   Android-tablet OS 11 API 30 (realme, RMX2002)       7404           IN
10  Android-tablet OS 11 API 30 (realme, RMX2002)       7404           IN

   ip_addr_decrypted user_agent_decrypted  master_metadata_track_name  \
9      42.105.168.99              unknown                        NaN
10     42.105.168.99              unknown                        NaN

    master_metadata_album_artist_name  master_metadata_album_album_name  …  \
9                                 NaN                               NaN  …
10                                NaN                               NaN  …

    episode_name episode_show_name                    spotify_episode_uri  \
9       Dua Lipa      2021 Wrapped  spotify:episode:5In9wJ7E5acQOYziK06lnh
10      Dua Lipa      2021 Wrapped  spotify:episode:5In9wJ7E5acQOYziK06lnh

   reason_start reason_end shuffle  skipped  offline  offline_timestamp  \
9        fwdbtn  trackdone   False      NaN      NaN                NaN
10       fwdbtn  trackdone   False      NaN      NaN                NaN

    incognito_mode
9            False
10           False

[2 rows x 21 columns]
```

3.2 1.2 Merging the Data

[6]:
```
spotify_df = pd.concat([df1,df2,df3,df4], ignore_index=True)
```

```
<ipython-input-6-500c12763f1b>:1: FutureWarning: Behavior when concatenating
bool-dtype and numeric-dtype arrays is deprecated; in a future version these
will cast to object dtype (instead of coercing bools to numeric values). To
retain the old behavior, explicitly cast bool-dtype arrays to numeric dtype.
  spotify_df = pd.concat([df1,df2,df3,df4], ignore_index=True)
```

4 2. Data Preparation and Cleaning

4.1 2.1 Prepare the data

[7]:
```
spotify_df.to_csv("/content/drive/MyDrive/Colab Notebooks/Self practice␣
↪projects/Spotify/spotify_data.csv")
```

[8]:
```
spotify_df.head(3)
```

[8]:
```
                    ts                      username  \
0  2020-02-24T03:25:10Z  31qv3lgbx4jn45gkwql77frnwvpu
1  2020-02-24T03:27:51Z  31qv3lgbx4jn45gkwql77frnwvpu
2  2020-02-24T03:29:52Z  31qv3lgbx4jn45gkwql77frnwvpu

                                          platform  ms_played conn_country  \
0  Android OS 8.0.0 API 26 (lenovo, Lenovo K8 Note)      66094           IN
1  Android OS 8.0.0 API 26 (lenovo, Lenovo K8 Note)     160353           IN
2  Android OS 8.0.0 API 26 (lenovo, Lenovo K8 Note)     119683           IN

  ip_addr_decrypted user_agent_decrypted master_metadata_track_name  \
0     42.106.46.255              unknown              Feel so Lucky
1     42.106.46.255              unknown                   Me & You
2     42.106.46.255              unknown              Lost in Space

  master_metadata_album_artist_name master_metadata_album_album_name  …  \
0                           T.L.I.D                   Feel so Lucky  …
1                           T.L.I.D                        Me & You  …
2                           T.L.I.D                   Lost in Space  …

  episode_name episode_show_name spotify_episode_uri reason_start reason_end  \
0         None              None                None      playbtn  trackdone
1         None              None                None    trackdone  trackdone
2         None              None                None    trackdone    endplay

  shuffle  skipped  offline  offline_timestamp  incognito_mode
0   False      NaN      0.0       1.582515e+12           False
1   False      NaN      0.0       1.582515e+12           False
2   False      NaN      0.0       1.582515e+12           False

[3 rows x 21 columns]
```

[9]:
```
spotify_df.shape
```

[9]:
```
(41389, 21)
```

[10]:
```
spotify_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
```

```
RangeIndex: 41389 entries, 0 to 41388
Data columns (total 21 columns):
 #   Column                                Non-Null Count  Dtype
---  ------                                --------------  -----
 0   ts                                    41389 non-null  object
 1   username                              41389 non-null  object
 2   platform                              41389 non-null  object
 3   ms_played                             41389 non-null  int64
 4   conn_country                          41389 non-null  object
 5   ip_addr_decrypted                     41389 non-null  object
 6   user_agent_decrypted                  41389 non-null  object
 7   master_metadata_track_name            40638 non-null  object
 8   master_metadata_album_artist_name     40638 non-null  object
 9   master_metadata_album_album_name      40638 non-null  object
 10  spotify_track_uri                     40638 non-null  object
 11  episode_name                          39 non-null     object
 12  episode_show_name                     39 non-null     object
 13  spotify_episode_uri                   39 non-null     object
 14  reason_start                          41389 non-null  object
 15  reason_end                            41389 non-null  object
 16  shuffle                               41389 non-null  bool
 17  skipped                               6016 non-null   float64
 18  offline                               41378 non-null  float64
 19  offline_timestamp                     41378 non-null  float64
 20  incognito_mode                        41389 non-null  bool
dtypes: bool(2), float64(3), int64(1), object(15)
memory usage: 6.1+ MB
```

[11]:
```
spotify_df.nunique()
```

[11]:
```
ts                                    38675
username                                  1
platform                                 16
ms_played                             24683
conn_country                              1
ip_addr_decrypted                      2282
user_agent_decrypted                      1
master_metadata_track_name             2584
master_metadata_album_artist_name      1062
master_metadata_album_album_name       1979
spotify_track_uri                      2804
episode_name                             27
episode_show_name                        14
spotify_episode_uri                      27
reason_start                              9
reason_end                                9
shuffle                                   2
```

```
skipped                                 2
offline                                 2
offline_timestamp                   41085
incognito_mode                          1
dtype: int64
```

4.2 2.2 Clean the data

We can see that we have a lot of columns, some of which are not useful anymore, so we'll make a new dataframe with the required colums.

[12]:
```
spotify_stream_df = spotify_df[['ts', 'ms_played',␣
 ↪'master_metadata_track_name', 'master_metadata_album_artist_name']].copy()
spotify_stream_df.head(3)
```

[12]:
```
                    ts  ms_played master_metadata_track_name  \
0  2020-02-24T03:25:10Z      66094              Feel so Lucky
1  2020-02-24T03:27:51Z     160353                   Me & You
2  2020-02-24T03:29:52Z     119683              Lost in Space

  master_metadata_album_artist_name
0                           T.L.I.D
1                           T.L.I.D
2                           T.L.I.D
```

Convert the 'ts' column to datetime format

[13]:
```
spotify_stream_df['ts'] = pd.to_datetime(spotify_stream_df['ts'])

# Change the format of the timestamps
spotify_stream_df['ts'] = spotify_stream_df['ts'].dt.strftime('%Y-%m-%d %H:%M')

# Print the updated DataFrame
spotify_stream_df.sample(10)
```

[13]:
```
                    ts  ms_played master_metadata_track_name  \
12132  2020-10-26 05:32       1716                 Gentleman
22400  2021-08-17 11:34       2571                 Suit Suit
36857  2022-12-12 09:51       3165      Running in the Dark
8465   2020-07-31 22:00     101270              Just Hold On
30194  2022-04-17 18:53      19108     I Wanna Fall In Love
33306  2022-07-14 10:48       6550     Richie - Theme Music
24663  2021-11-18 02:29       3985              Kaatrukullai
11111  2020-09-27 05:22     103690   Orasaadha - Madras Gig
10610  2020-09-17 03:15     328992              Humnava Mere
3345   2020-04-13 18:22     160007                  Takeaway

      master_metadata_album_artist_name
```

```
12132                              PSY
22400                    Guru Randhawa
36857                           Smantx
8465                       Steve Aoki
30194                     Justin Mylo
33306               B. Ajaneesh Loknath
24663                Yuvan Shankar Raja
11111                    Vivek - Mervin
10610                    Jubin Nautiyal
3345                   The Chainsmokers
```

[14]:
```
len(spotify_stream_df["master_metadata_album_artist_name"].unique()) # Length␣
 ↪of unique artist
```

[14]: 1064

[15]:
```
len(spotify_stream_df["master_metadata_track_name"].unique()) # Length of␣
 ↪unique tracks
```

[15]: 2586

4.3 2.3 Data formatting

[16]:
```
spotify_stream_df["Play-Time"]= pd.to_datetime(spotify_stream_df["ts"]) # To␣
 ↪create a additional column
```

[17]:
```
spotify_stream_df['year'] = pd.DatetimeIndex(spotify_stream_df["Play-Time"]).
 ↪year
spotify_stream_df['month'] = pd.DatetimeIndex(spotify_stream_df["Play-Time"]).
 ↪month
spotify_stream_df['day'] = pd.DatetimeIndex(spotify_stream_df["Play-Time"]).day
spotify_stream_df['weekday'] = pd.DatetimeIndex(spotify_stream_df["Play-Time"]).
 ↪weekday
spotify_stream_df['time'] = pd.DatetimeIndex(spotify_stream_df["Play-Time"]).
 ↪time
spotify_stream_df['hours'] = pd.DatetimeIndex(spotify_stream_df["Play-Time"]).
 ↪hour
spotify_stream_df['day-name'] = spotify_stream_df["Play-Time"].apply(lambda x:␣
 ↪x.day_name())
spotify_stream_df['Count'] = 1
```

[18]:
```
spotify_stream_df["Time-Played (hh-mm-ss)"] = pd.
 ↪to_timedelta(spotify_stream_df["ms_played"], unit='ms')
```

[19]:
```
def hours(td):
    # To get the hour information
```

```
    return td.seconds/3600

def minutes(td):
    # To get the minutes information
    return (td.seconds/60)%60

spotify_stream_df["Listening Time(Hours)"] = spotify_stream_df["Time-Played␣
 ↪(hh-mm-ss)"].apply(hours).round(3)
spotify_stream_df["Listening Time(Minutes)"] = spotify_stream_df["Time-Played␣
 ↪(hh-mm-ss)"].apply(minutes).round(3)
```

[20]:
```
spotify_stream_df.head() # To check the newly formed dataset with additional␣
 ↪columns
```

[20]:

	ts	ms_played	master_metadata_track_name	master_metadata_album_artist_name	Play-Time	year	month	day	weekday	time	hours	day-name	Count	Time-Played (hh-mm-ss)	Listening Time(Hours)	Listening Time(Minutes)
0	2020-02-24 03:25	66094	Feel so Lucky	T.L.I.D	2020-02-24 03:25:00	2020	2	24	0	03:25:00	3	Monday	1	0 days 00:01:06.094000	0.018	1.100
1	2020-02-24 03:27	160353	Me & You	T.L.I.D	2020-02-24 03:27:00	2020	2	24	0	03:27:00	3	Monday	1	0 days 00:02:40.353000	0.044	2.667
2	2020-02-24 03:29	119683	Lost in Space	T.L.I.D	2020-02-24 03:29:00	2020	2	24	0	03:29:00	3	Monday	1	0 days 00:01:59.683000	0.033	1.983
3	2020-02-24 03:30	13409	Just The Way You Are	Bruno Mars	2020-02-24 03:30:00	2020	2	24	0	03:30:00	3	Monday	1	0 days 00:00:13.409000	0.004	0.217
4	2020-02-24 03:30	43399	HIGHEST IN THE ROOM	Travis Scott	2020-02-24 03:30:00	2020	2	24	0	03:30:00	3	Monday	1	0 days 00:00:43.399000	0.012	0.717

We can see that now we have a lot of columns, some of which are not useful anymore, so we'll drop few of them.

[21]:
```
spotify_stream_df.drop(columns=["ts","Time-Played (hh-mm-ss)","ms_played"],␣
 ↪inplace=True)
```

[22]:
```
spotify_stream_df.describe() # Final check for any abnormality
```

[22]:

	year	month	day	weekday	hours
count	41389.000000	41389.000000	41389.000000	41389.000000	41389.000000
mean	2021.068376	6.282877	15.792409	2.805987	11.589021
std	0.995259	3.529967	8.622256	1.970462	6.500725
min	2020.000000	1.000000	1.000000	0.000000	0.000000
25%	2020.000000	3.000000	8.000000	1.000000	6.000000
50%	2021.000000	6.000000	16.000000	3.000000	11.000000
75%	2022.000000	9.000000	23.000000	5.000000	18.000000
max	2023.000000	12.000000	31.000000	6.000000	23.000000

	Count	Listening Time(Hours)	Listening Time(Minutes)
count	41389.0	41389.000000	41389.000000
mean	1.0	0.028755	1.725259
std	0.0	0.032211	1.932578
min	1.0	0.000000	0.000000
25%	1.0	0.001000	0.083000
50%	1.0	0.018000	1.050000
75%	1.0	0.054000	3.250000
max	1.0	0.836000	50.183000

4.3.1 Note: Now we have a clean and properly formatted data we can go on with our analysis.

5 3. Exploratory Analysis and Visualization

[23]:
```
sns.set_style('darkgrid')
plt.style.use('seaborn-darkgrid')

matplotlib.rcParams['font.size'] = 14
matplotlib.rcParams['figure.figsize'] = (9, 5)
matplotlib.rcParams['figure.facecolor'] = '#00000000'
```

```
<ipython-input-23-7c90d945e6ad>:2: MatplotlibDeprecationWarning: The seaborn
styles shipped by Matplotlib are deprecated since 3.6, as they no longer
correspond to the styles shipped by seaborn. However, they will remain available
as 'seaborn-v0_8-<style>'. Alternatively, directly use the seaborn API instead.
  plt.style.use('seaborn-darkgrid')
```

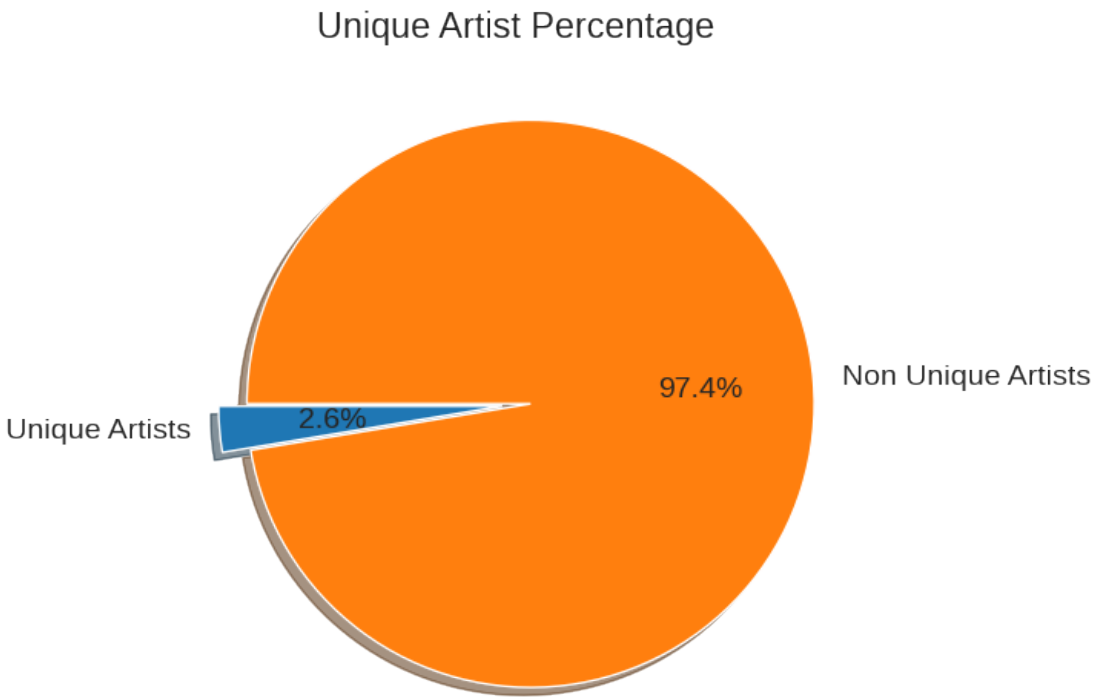
5.1 3.1 Artist Name (Exploration)

5.2 3.1.1 We can check what is the percentage of unique artist we have.

[24]:
```
unique_artists = spotify_stream_df["master_metadata_album_artist_name"].
 ↪nunique() # Count number of unique artist in dataset
total_artists = spotify_stream_df["master_metadata_album_artist_name"].count()␣
 ↪# Count total artist in dataset
unique_artist_percentage = unique_artists/total_artists*100 # Get the␣
 ↪percentage of the unique
unique_artist_percentage
```

[24]:
```
2.6133175845267975
```

[25]:
```
unique_artist_list = np.array([unique_artists, total_artists-unique_artists])
unique_artist_list_labels = [" Unique Artists", "Non Unique Artists"]

fig, ax = plt.subplots(figsize=(12,6))
ax.pie(unique_artist_list, labels= unique_artist_list_labels, autopct='%1.
 ↪1f%%',explode=[0.05,0.05] ,startangle=180, shadow = True);
plt.title("Unique Artist Percentage")
plt.show()
```



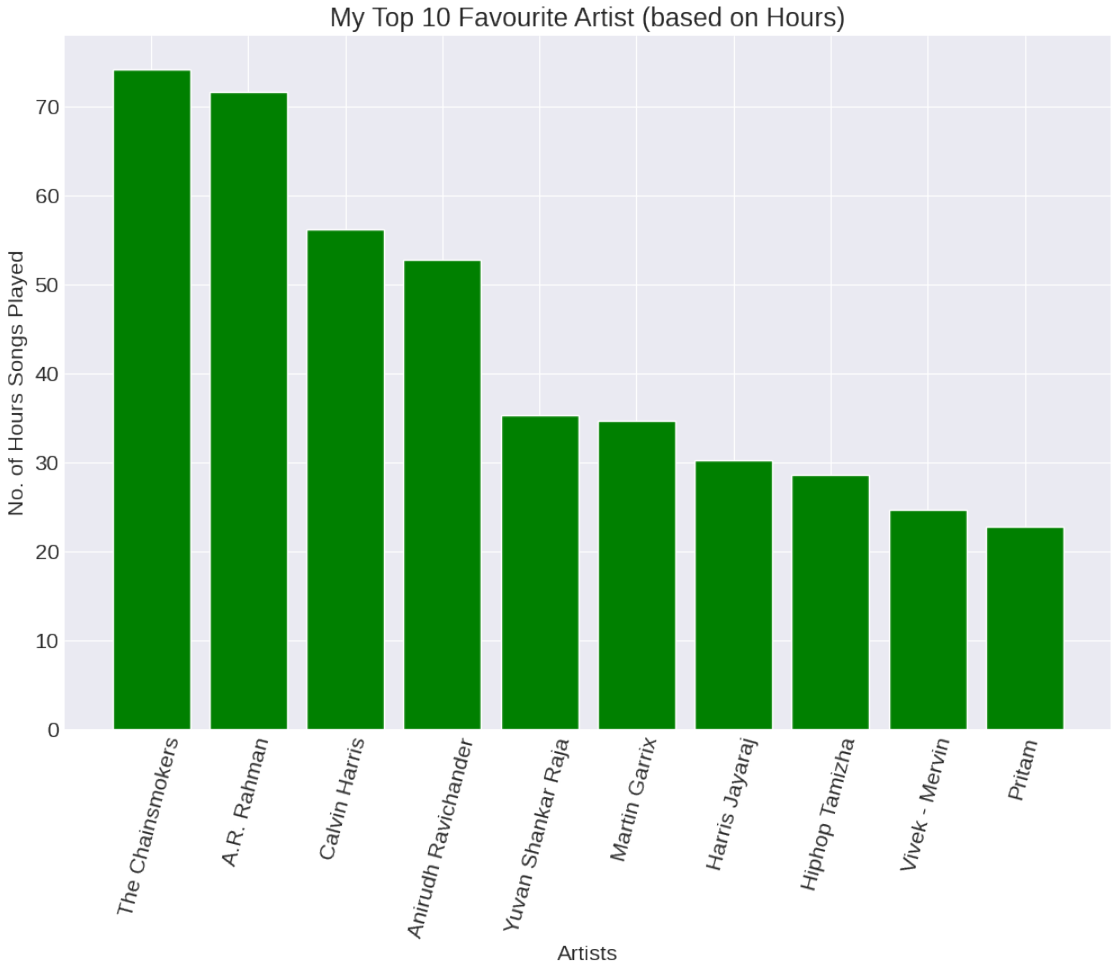
5.3 3.1.2 We can also check the top 10 unique artist we have.

[26]:
```
top_10_artist_df = spotify_stream_df.
 ↪groupby(["master_metadata_album_artist_name"])[["Listening␣
 ↪Time(Hours)","Listening Time(Minutes)","Count"]].sum().
 ↪sort_values(by="Listening Time(Minutes)",ascending=False)
top_10_artist_df.head(10)
```

[26]:

master_metadata_album_artist_name	Listening Time(Hours)	Listening Time(Minutes)	Count
The Chainsmokers	74.279	4452.327	2448
A.R. Rahman	71.725	4301.592	1610
Calvin Harris	56.292	3375.265	1957
Anirudh Ravichander	52.776	3166.078	1595
Yuvan Shankar Raja	35.305	2119.520	998
Martin Garrix	34.727	2084.966	1335
Harris Jayaraj	30.283	1818.136	826
Hiphop Tamizha	28.602	1711.259	776
Vivek - Mervin	24.749	1489.636	523
Pritam	22.814	1368.699	665

[27]:
```
fig,ax = plt.subplots(figsize=(12,8))
ax.bar(top_10_artist_df.head(10).index,top_10_artist_df["Listening␣
 ↪Time(Hours)"].head(10),color='green')
ax.set(title="My Top 10 Favourite Artist (based on␣
 ↪Hours)",xlabel="Artists",ylabel="No. of Hours Songs Played");
plt.xticks(rotation=75);
```



5.4 3.1.3 Top 10 Unique Artist (count) : Based on the number of count

[28]:
```
top_10_artist_count_df = spotify_stream_df.
 ↪groupby(["master_metadata_album_artist_name"])[["Listening␣
 ↪Time(Hours)","Listening Time(Minutes)","Count"]].sum().
 ↪sort_values(by="Count",ascending=False)
top_10_artist_count_df.head(10)
```

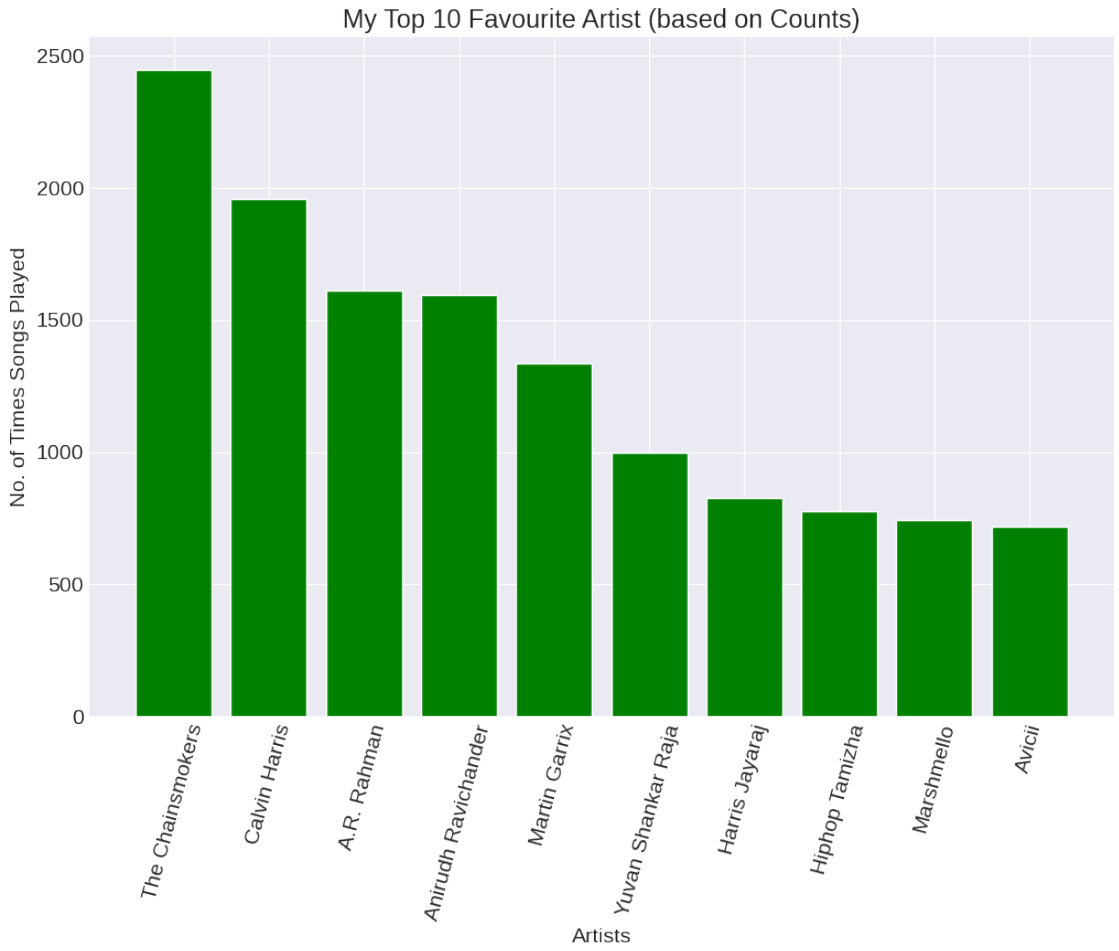
[28]:

master_metadata_album_artist_name	Listening Time(Hours)	\
The Chainsmokers	74.279	
Calvin Harris	56.292	
A.R. Rahman	71.725	
Anirudh Ravichander	52.776	
Martin Garrix	34.727	
Yuvan Shankar Raja	35.305	

```
Harris Jayaraj                                  30.283
Hiphop Tamizha                                  28.602
Marshmello                                      17.724
Avicii                                          21.882
```

master_metadata_album_artist_name	Listening Time(Minutes)	Count
The Chainsmokers	4452.327	2448
Calvin Harris	3375.265	1957
A.R. Rahman	4301.592	1610
Anirudh Ravichander	3166.078	1595
Martin Garrix	2084.966	1335
Yuvan Shankar Raja	2119.520	998
Harris Jayaraj	1818.136	826
Hiphop Tamizha	1711.259	776
Marshmello	1064.366	743
Avicii	1312.234	719

[29]:
```
fig,ax = plt.subplots(figsize=(12,8))
ax.bar(top_10_artist_count_df.head(10).index,top_10_artist_count_df["Count"].
 ↪head(10),color='green')
ax.set(title="My Top 10 Favourite Artist (based on␣
 ↪Counts)",xlabel="Artists",ylabel="No. of Times Songs Played");
plt.xticks(rotation=75);
```



5.5 3.2 Song Tracks (Exploration)

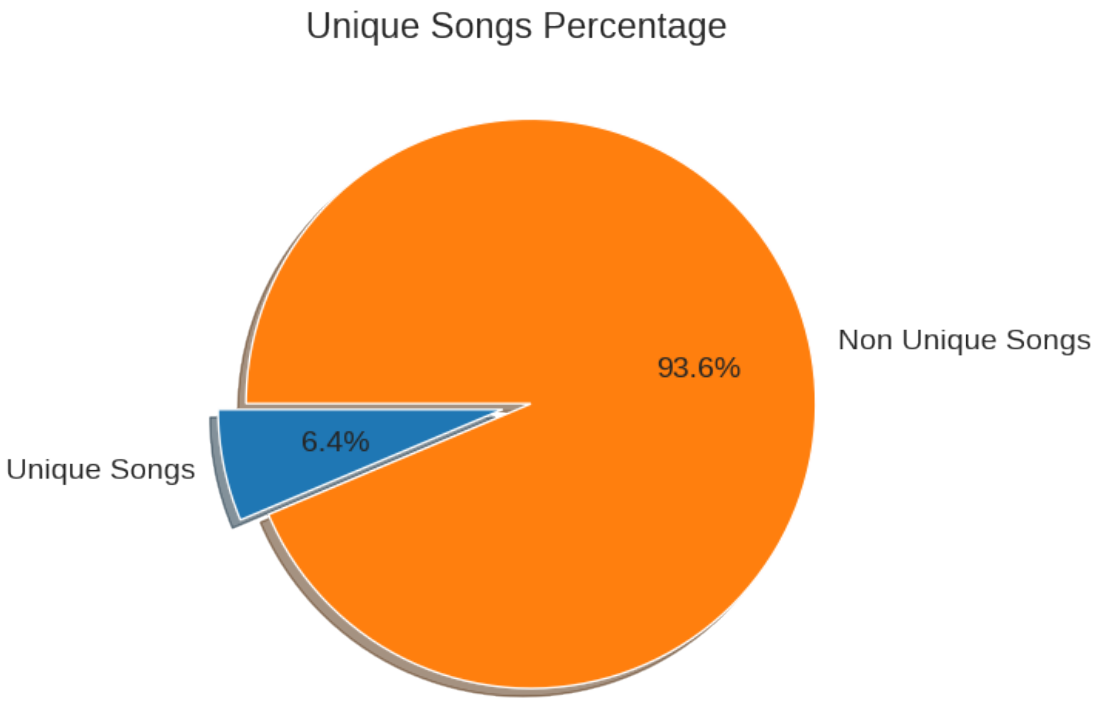
5.6 3.2.1 We can check what is the percentage of unique songs we have

[30]:
```
unique_songs = spotify_stream_df["master_metadata_track_name"].nunique()
total_songs = spotify_stream_df["master_metadata_track_name"].count()
unique_songs_percentage = unique_songs/total_songs*100
unique_songs_percentage
```

[30]: 6.358580638810965

[31]:
```
unique_songs_list = np.array([unique_songs, total_songs-unique_songs])
unique_songs_list_labels = [" Unique Songs", "Non Unique Songs"]

fig, ax = plt.subplots(figsize=(12,6))
ax.pie(unique_songs_list, labels= unique_songs_list_labels, autopct='%1.1f%%',␣
 ↪explode=[0.05,0.05], startangle=180, shadow = True);
```

```
plt.title("Unique Songs Percentage");
```

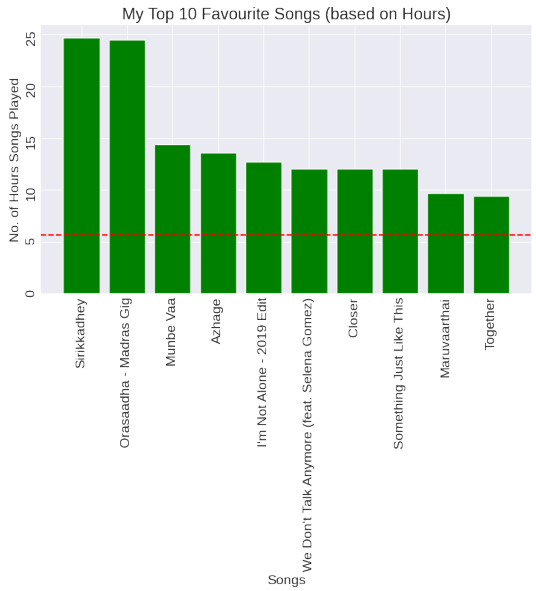


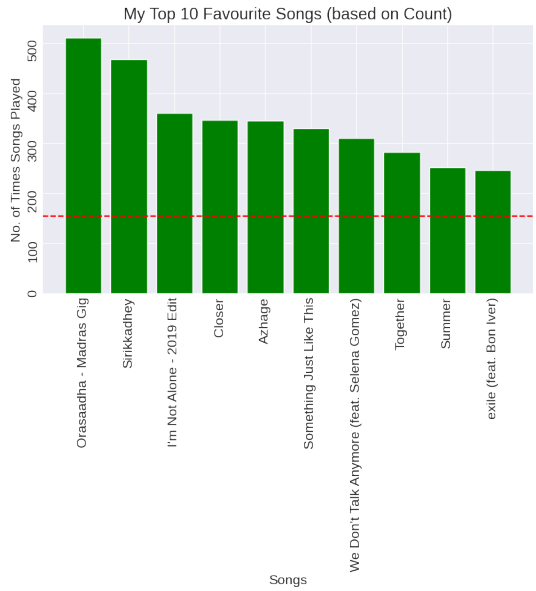
5.7 3.2.2 We can also check the top 10 unique songs we have

[32]:
```
top_10_songs_time_df = spotify_stream_df.
 ↪groupby(["master_metadata_track_name"])[["Listening Time(Hours)","Listening␣
 ↪Time(Minutes)","Count"]].sum().sort_values(by="Listening␣
 ↪Time(Minutes)",ascending=False)
top_10_songs_count_df = spotify_stream_df.
 ↪groupby(["master_metadata_track_name"])[["Listening Time(Hours)","Listening␣
 ↪Time(Minutes)","Count"]].sum().sort_values(by="Count",ascending=False)
```

[33]:
```
fig, (ax1,ax2) = plt.subplots(1,2,figsize=(20,5))

# first graph
ax1.bar(top_10_songs_time_df.head(10).index,top_10_songs_time_df["Listening␣
 ↪Time(Hours)"].head(10), color="green")
ax1.set(title="My Top 10 Favourite Songs (based on␣
 ↪Hours)",xlabel="Songs",ylabel="No. of Hours Songs Played");
ax1.tick_params(labelrotation=90);
ax1.axhline(top_10_songs_time_df["Listening Time(Hours)"][:100].mean(),␣
 ↪linestyle="--", color="r")
```

```
# second graph
ax2.bar(top_10_songs_count_df.head(10).index,top_10_songs_count_df["Count"].
 ↪head(10), color="green")
ax2.set(title="My Top 10 Favourite Songs (based on␣
 ↪Count)",xlabel="Songs",ylabel="No. of Times Songs Played");
ax2.tick_params(labelrotation=90);
ax2.axhline(top_10_songs_count_df["Count"][:100].mean(), linestyle="--",␣
 ↪color="r");
```

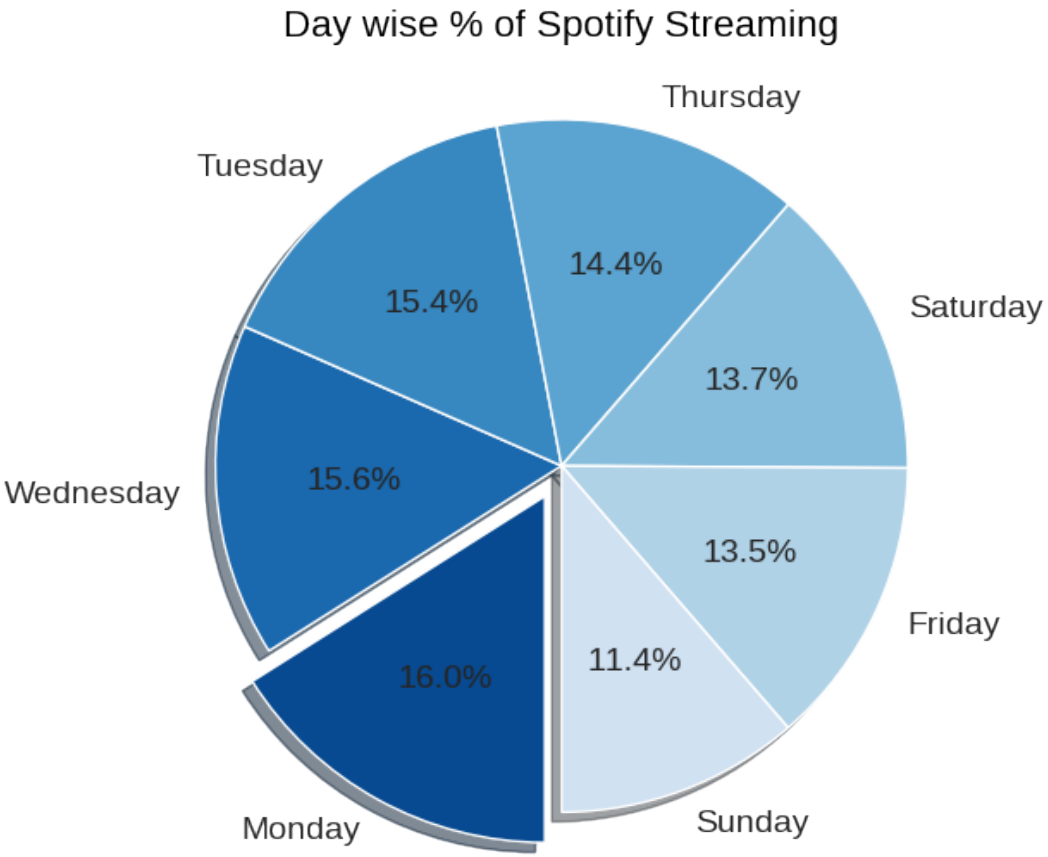




5.8 3.3 Day Wise Usage (Exploration)

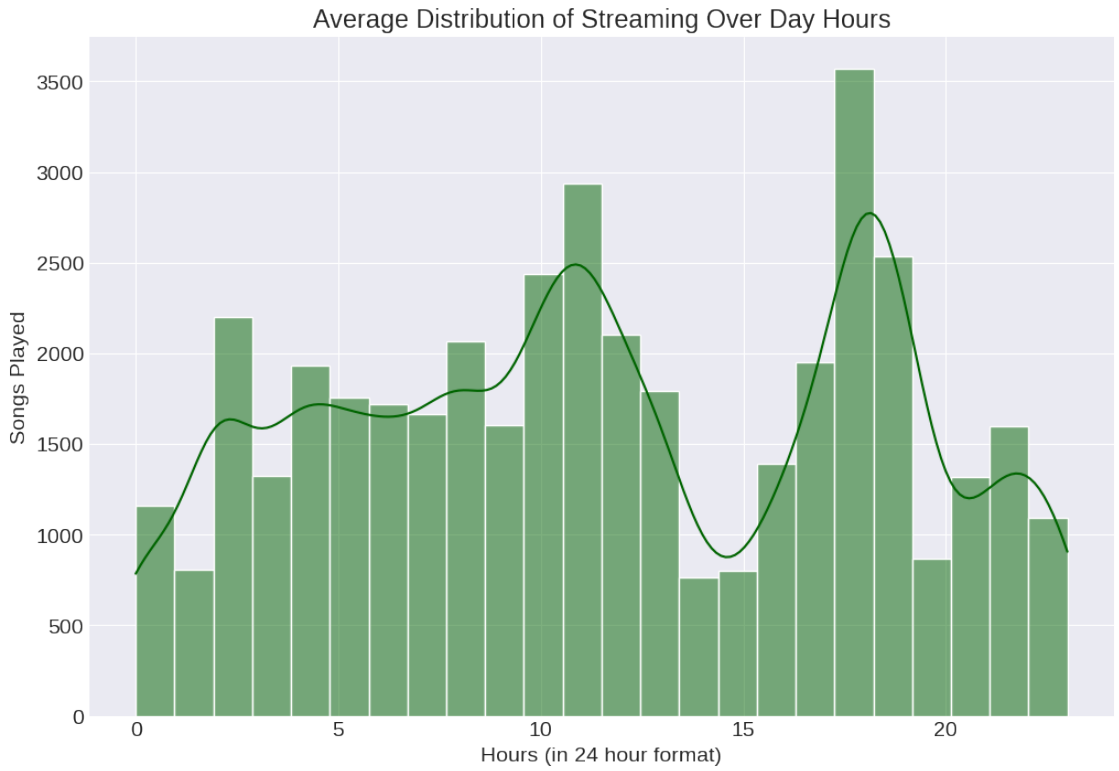
[34]:
```
import matplotlib.cm as cm

day_name_counts = spotify_stream_df["day-name"].value_counts()
fig = plt.figure(figsize=(8, 6))
ax = fig.add_subplot(111)
colors = cm.Blues(np.linspace(0.9, 0.2, len(day_name_counts)))

# Get the maximum index
max_index = day_name_counts.argmax()

# Create an explode list
explode = [0] * len(day_name_counts)
explode[max_index] = 0.1

# Plot the pie chart
```

```
ax.pie(day_name_counts, labels=day_name_counts.index, colors=colors,␣
 ↪autopct='%1.1f%%', startangle=-90,
       textprops={'fontsize': 14}, explode=explode, shadow=True,␣
 ↪counterclock=False)

# Set the title and axis aspect ratio
ax.set_title('Day wise % of Spotify Streaming', pad=20, fontdict={'color':␣
 ↪'black', 'weight': 'normal', 'size': 16})
ax.axis('equal')

plt.show()
```



5.9 3.4 Average Usage over a day (Exploration)

[35]:
```
fig, ax = plt.subplots(figsize=(12,8))
ax.set(title="Average Distribution of Streaming Over Day Hours",xlabel="Hours␣
 ↪(in 24 hour format)", ylabel="Songs Played")
sns.histplot(spotify_stream_df["hours"], bins=24,kde=True, color="darkgreen");
```

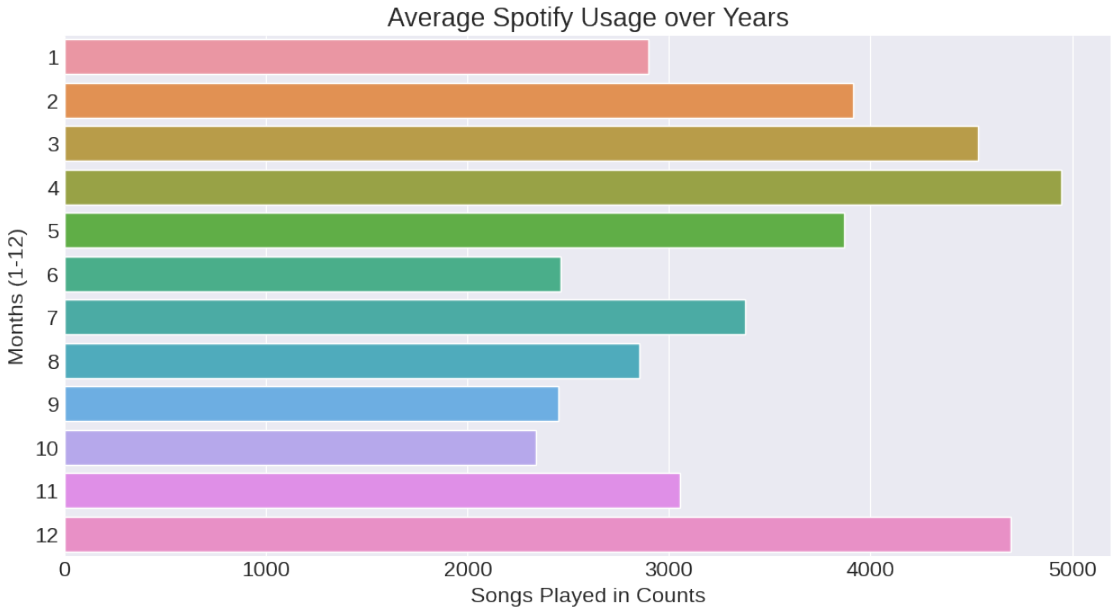


With this histogram graph we can see about my average usage:

1. Maximum around `5-6 PM` hour mark
2. Minimum around `1-2 AM` hour mark

5.10 3.5 Average Usage In a Year (Exploration)

[36]:
```
fig, ax = plt.subplots(figsize=(12,6))

ax = sns.countplot(y=spotify_stream_df["month"], ax=ax)
ax.set(title="Average Spotify Usage over Years", xlabel="Songs Played in␣
 ↪Counts", ylabel="Months (1-12)");
```



5.10.1 How many hours did I spent on Spotify Streaming since the day I signed up for it

Here we want to know, how many hours I spend while streaming spotify since start.

[37]:
```
time_spent_hours = spotify_stream_df["Listening Time(Hours)"].sum()
time_spent_hours
```

[37]:
```
1190.1299999999999
```

For this we can simply do a summation of all the time I spent on listening to all songs. * This comes out to be around **1190 Hours**.

5.10.2 What is actual usage in percentage compared to to the total possible

Here we want to know, what is the percentage of time I spend on spotify.

This question might seem bit odd, but here we want to know that out of maximum possible hours since the start, how much time I actually spent streaming `Spotify` and we want to calculate that in percentage.

[38]:
```
date_df = spotify_stream_df["Play-Time"]
time_difference = (date_df.iloc[10803] - date_df.iloc[0]) / np.
 ↪timedelta64(1,"D")
time_difference_hours = time_difference*24
time_difference_hours
```

[38]:
```
5079.516666666666
```

5.10.3 What is the average numbers of songs I played daily

[39]:
```
total_songs = spotify_stream_df["master_metadata_track_name"].count()
```

[40]:
```
time_difference
```

[40]:
```
211.64652777777778
```

[41]:
```
average_songs_played_daily = (total_songs / time_difference).round()
average_songs_played_daily
```

[41]:
```
192.0
```

Here we can see that on an average I played **192** songs per day

6 Some More Observations

6.1 On which day I played maximum number of songs via scatterplot

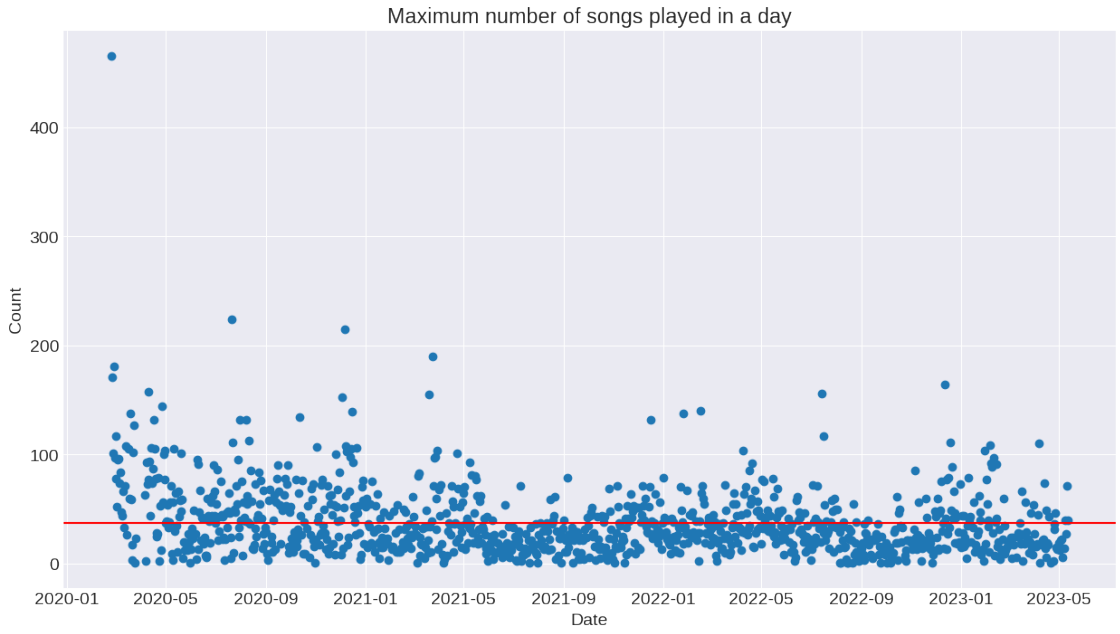
[42]:
```
spotify_stream_df["date"] = spotify_stream_df["Play-Time"].dt.date # Creating a␣
 ↪new column with date
```

[43]:
```
most_songs = spotify_stream_df.groupby(["date"])[["Count"]].sum().
 ↪sort_values(by="Count", ascending=False)
most_songs.head(1)
```

[43]:
```
            Count
date
2020-02-24    466
```

Here we can see that I played most songs which is `466 Songs` on `24th Feb 2020`

[44]:
```
fig,ax = plt.subplots(figsize=(15,8))
ax.scatter(most_songs.index,most_songs["Count"]);
ax.set(title="Maximum number of songs played in a␣
 ↪day",xlabel="Date",ylabel="Count");
ax.axhline(most_songs["Count"].mean(), linestyle="-", color="r");
```



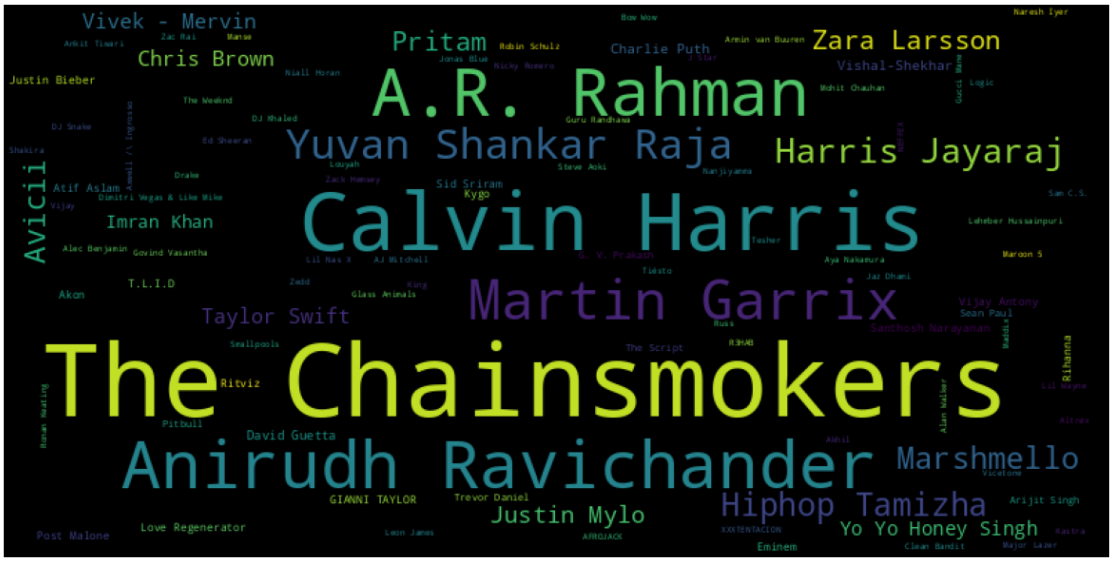
6.2 My favourite 100 Artist in word could

[45]:
```
fav_artist = spotify_stream_df.
 ↪groupby(["master_metadata_album_artist_name"])["Count"].count()
fav_artist.sort_values(ascending=False).head(100)
```

[45]:
```
master_metadata_album_artist_name
The Chainsmokers       2448
Calvin Harris          1957
A.R. Rahman            1610
Anirudh Ravichander    1595
Martin Garrix          1335
                       …
Maddix                   87
Clean Bandit             86
DJ Khaled                84
Glass Animals            84
Akhil                    83
Name: Count, Length: 100, dtype: int64
```

[46]:
```
def plot_cloud(wordcloud):
    fig = plt.figure(figsize=(15,8))
    plt.imshow(wordcloud)
    plt.axis("off");
wordcloud = WordCloud(width=800,height=400,␣
 ↪max_words=100,relative_scaling=1,normalize_plurals=False,
```

```
                        collocations=False).generate_from_frequencies(fav_artist)
plot_cloud(wordcloud)
```



6.3 My Favourite Artist playlist based on count of songs.

[47]:
```
my_fav_artist_playlist = spotify_stream_df.
  ↪groupby(["master_metadata_album_artist_name","master_metadata_track_name"])[["Count"]].
  ↪count().sort_values(by="Count",ascending=False).head(100)
my_fav_artist_playlist
```

[47]:

		Count
master_metadata_album_artist_name	master_metadata_track_name	
Vivek - Mervin	Orasaadha - Madras Gig	510
Anirudh Ravichander	Sirikkadhey	467
Calvin Harris	I'm Not Alone - 2019 Edit	360
Hiphop Tamizha	Azhage	345
The Chainsmokers	Closer	342
…		…
Naresh Iyer	Valayapatti	91
Alec Benjamin	Let Me Down Slowly	91
Yo Yo Honey Singh	Brown Rang	90
Lil Wayne	Lollipop	89
King	Tu Aake Dekhle	89

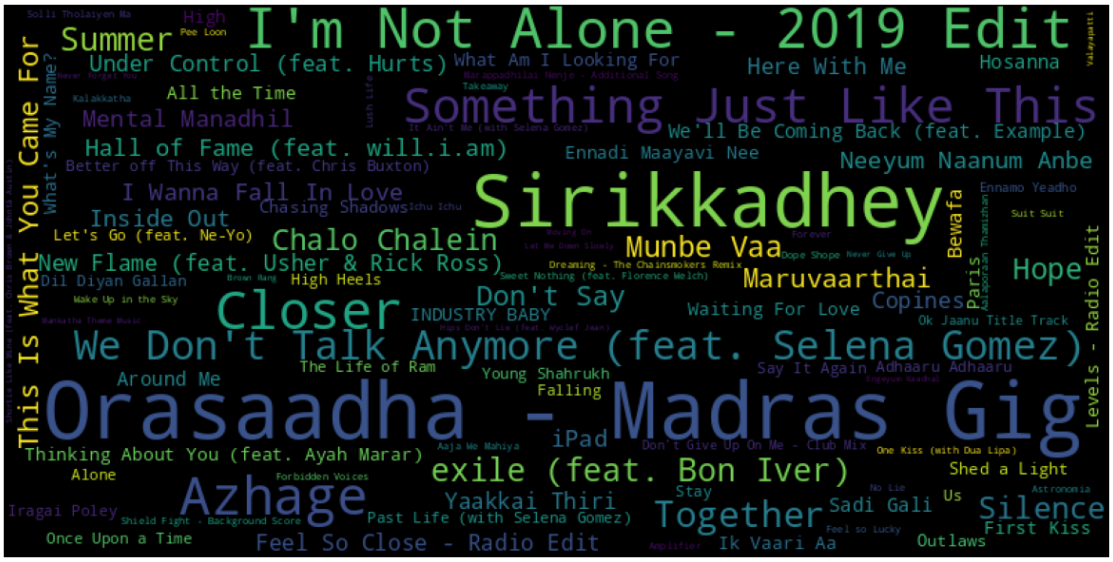
[100 rows x 1 columns]

6.4 My Favourite 100 Songs In Word Cloud.

To see what are top 100 songs that I usually listen to.

[48]:
```
fav_songs = spotify_stream_df.groupby(["master_metadata_track_name"])["Count"].
 ↪count()
```

[49]:
```
def plot_cloud(wordcloud):
    fig = plt.figure(figsize=(15,8))
    plt.imshow(wordcloud)
    plt.axis("off");
wordcloud = WordCloud(width=800,height=400,␣
 ↪max_words=100,relative_scaling=1,normalize_plurals=False,
                      collocations=False).generate_from_frequencies(fav_songs)
plot_cloud(wordcloud)
```



6.5 Most Usage (Active usage in a day over a week) via a heatmap.

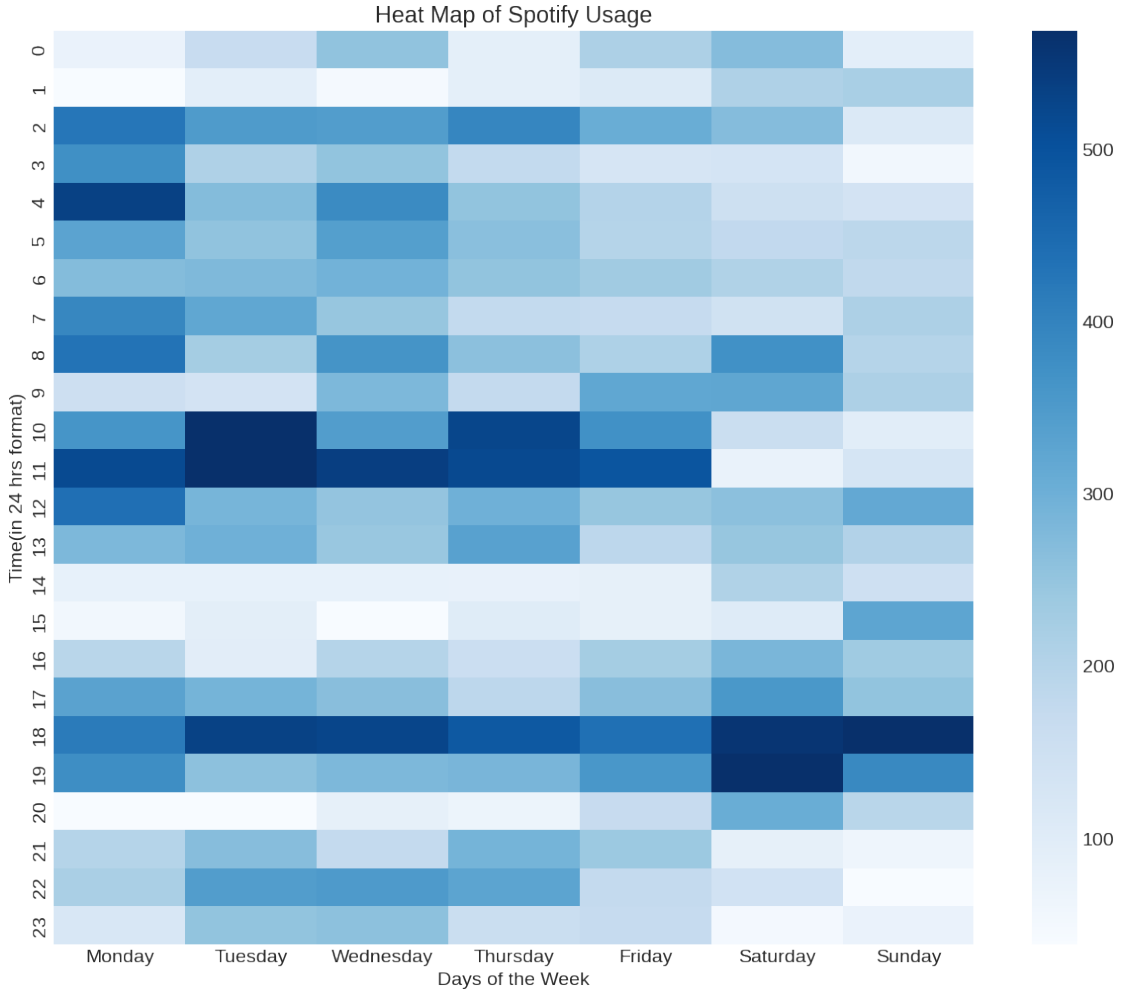
[50]:
```
active_usage = spotify_stream_df.groupby(['hours',␣
 ↪'day-name'])['master_metadata_album_artist_name'].size().reset_index()
active_usage_pivot = active_usage.pivot("hours", 'day-name',␣
 ↪'master_metadata_album_artist_name')
active_usage_pivot.head()
```

```
<ipython-input-50-cace104e1787>:2: FutureWarning: In a future version of pandas
all arguments of DataFrame.pivot will be keyword-only.
  active_usage_pivot = active_usage.pivot("hours", 'day-name',
'master_metadata_album_artist_name')
```

[50]:

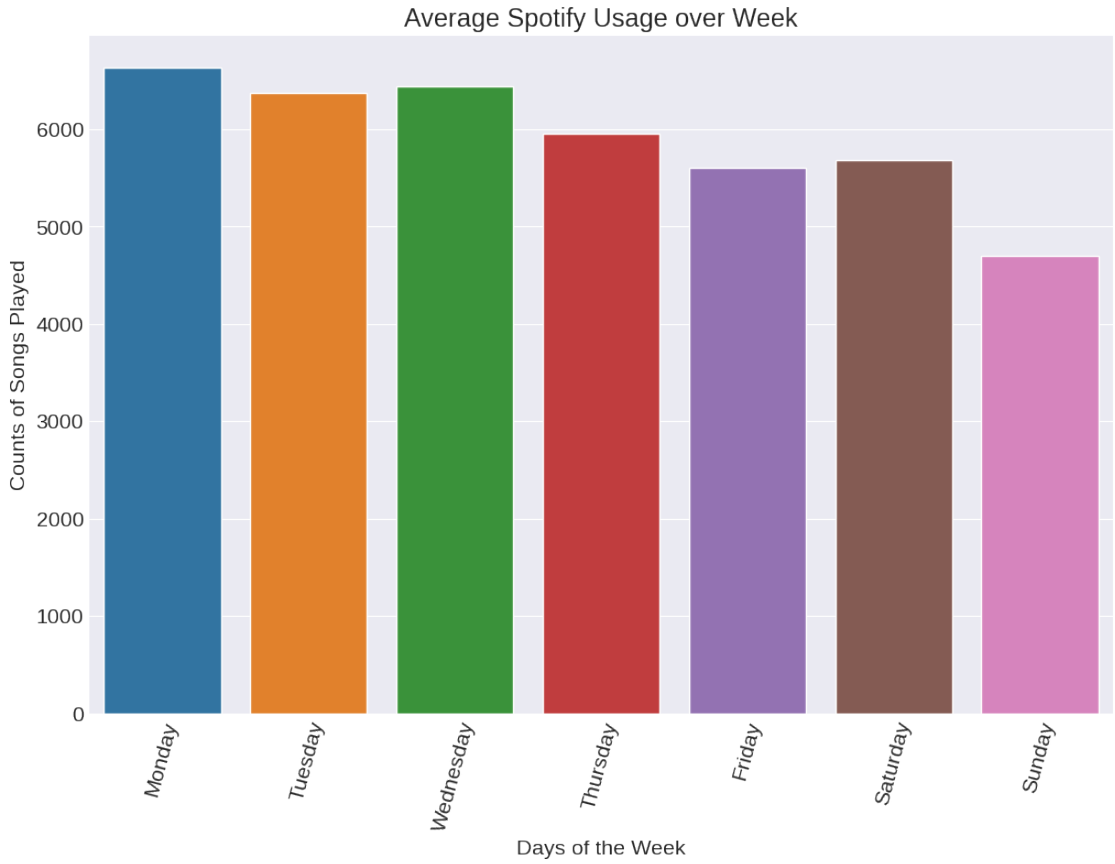
day-name	Friday	Monday	Saturday	Sunday	Thursday	Tuesday	Wednesday
hours							
0	214	75	269	92	90	166	255
1	109	38	210	220	89	92	47
2	306	426	269	114	395	349	344
3	129	373	132	55	177	209	252
4	201	536	151	137	253	272	383

[51]:
```
days = ["Monday", 'Tuesday', "Wednesday", "Thursday", "Friday", "Saturday",␣
 ↪"Sunday"]

fig, ax = plt.subplots(figsize=(15,12))
ax = sns.heatmap(active_usage_pivot[days].fillna(0), robust=True, cmap="Blues",␣
 ↪ax = ax);
ax.set(title="Heat Map of Spotify Usage", xlabel="Days of the␣
 ↪Week",ylabel="Time(in 24 hrs format)");
```



6.6 Usage Analysis over a week via countplot

[52]:
```
fig, ax = plt.subplots(figsize=(12,8))
ax = sns.countplot(x=spotify_stream_df["day-name"],ax=ax)
plt.xticks(rotation=75);
ax.set(title="Average Spotify Usage over Week",xlabel="Days of the␣
 ↪Week",ylabel="Counts of Songs Played");
```



6.7 What is the percentage of usage distribution between Weekday and Weekend

[53]:
```
extra_df = spotify_stream_df.copy()
extra_df['is_weekend'] = extra_df["day-name"].isin(['Sunday','Saturday'])
weekday_vs_weekend = extra_df.groupby(['is_weekend'])[['Count']].sum()
weekday_vs_weekend
```

[53]:

is_weekend	Count
False	31010
True	10379

[54]:
```
weekday_vs_weekend["Percentage"] = weekday_vs_weekend["Count"]/
 ↪weekday_vs_weekend["Count"].sum()*100
weekday_vs_weekend
```

[54]:

is_weekend	Count	Percentage
False	31010	74.923289
True	10379	25.076711

[55]:
```
fig, (ax1,ax2) = plt.subplots(1,2,figsize=(18,6))
ax1 = sns.barplot(x=["False","True"],y="Count",data=weekday_vs_weekend,ax=ax1)
ax1.set(title="Weekday vs Weekend",xlabel="Is it Weekend",ylabel="Counts of␣
 ↪Songs Played");

ax2 = sns.
 ↪barplot(x=["False","True"],y="Percentage",data=weekday_vs_weekend,color="Olive",ax=ax2)
ax2.set(title="Weekday vs Weekend (Percentage)",xlabel="Is it␣
 ↪Weekend",ylabel="Percentage of Songs Played");
```