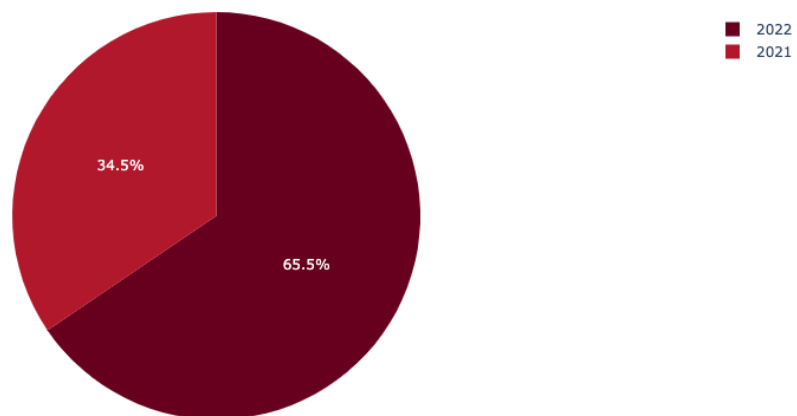## Section A: Data Visualization

Here are the questions that I try to answer after manipulating my dataset:
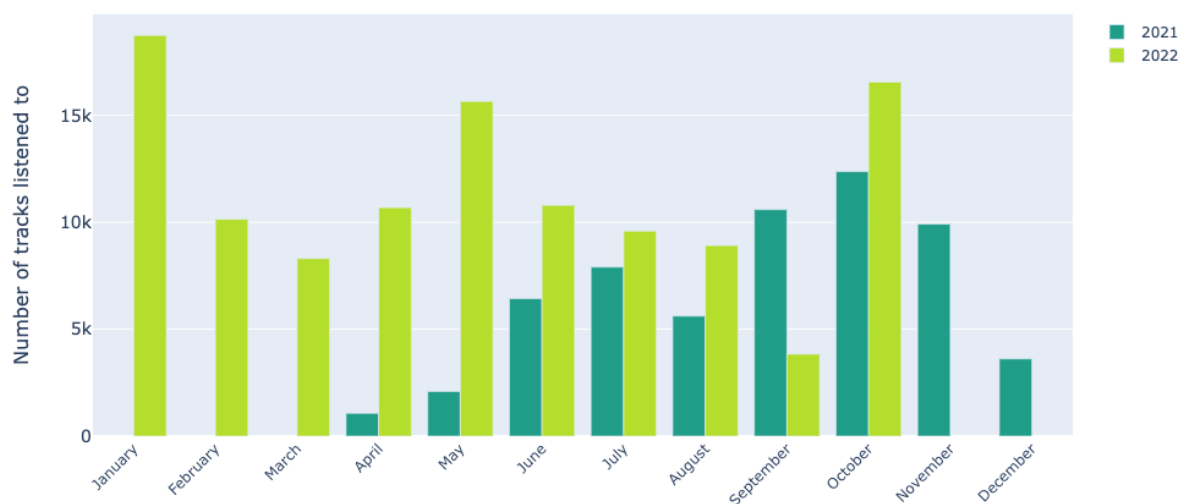
Section A.1: Listening Trends

1. Do we observe any trends on my listening activity from 2021 to 2022?

Distribution in Percentage across 2021 and 2022

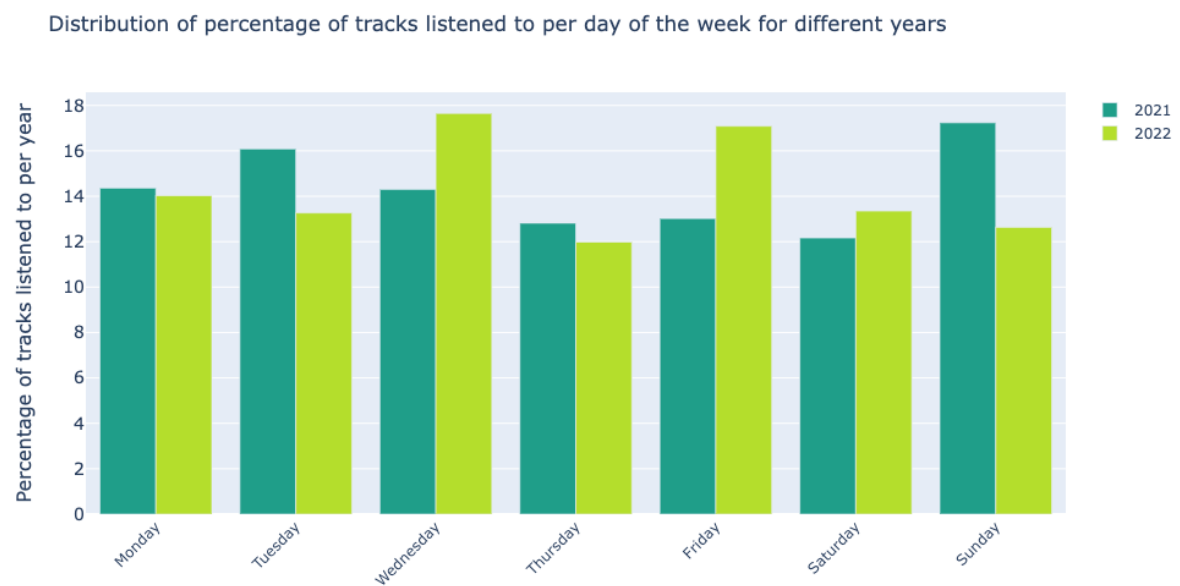2. *Can I plot the distribution of tracks listened to per month for each year?*

Distribution of the number of tracks listened to each month for different years

3. Can I plot the distribution of tracks listened to per day of the month for each year?

**Distribution of the number of tracks listened to each day of the month for different years**
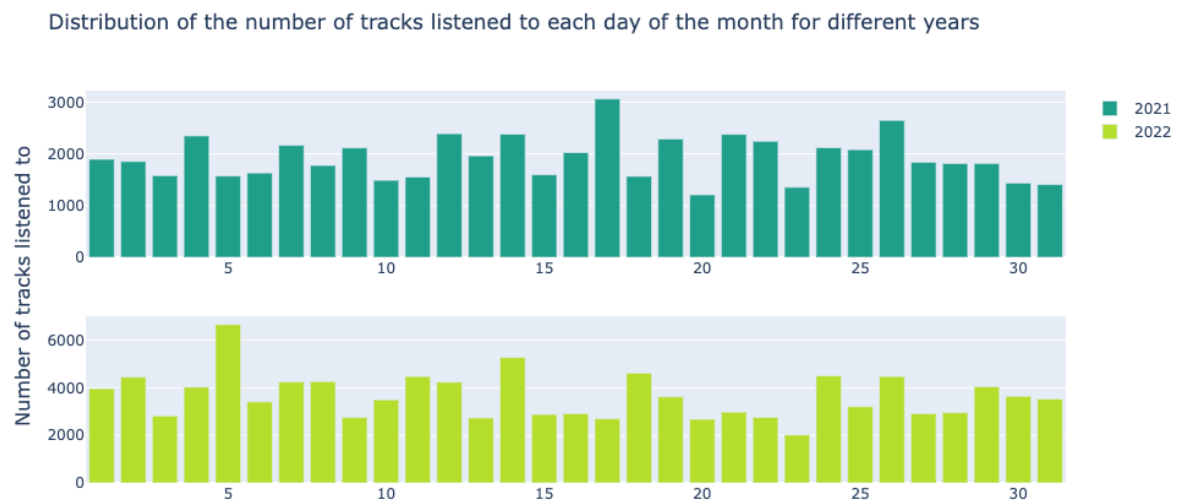
4. Can I plot the distribution of tracks listened to per day of the week for each year? Do I listen to songs more on the weekdays or the weekends?

Distribution of percentage of tracks listened to per day of the week for different years

5. Can I plot the distribution of tracks listened to per hour of the day? Do I listen to songs more during the day or the night?

Distribution of percentage of tracks listened to per hour of the day for different years (in local time)
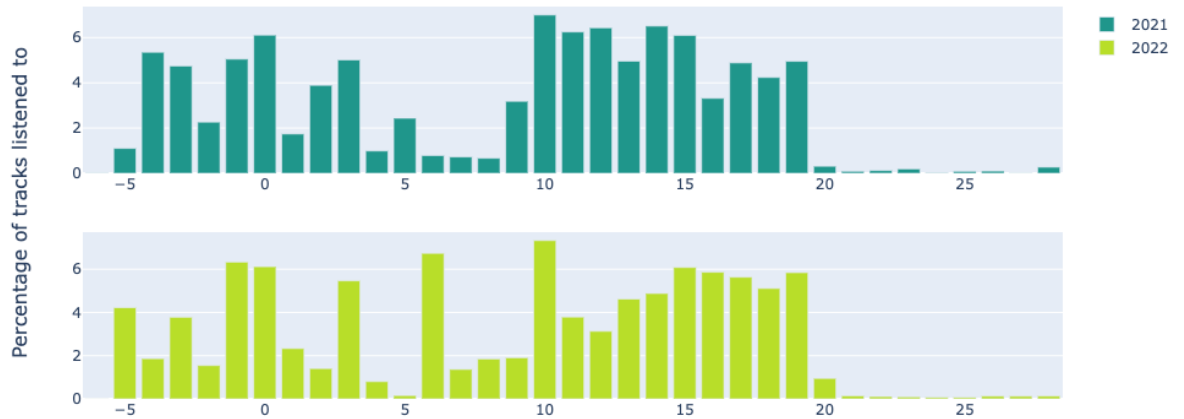
Conclusion:

1. **2022 has been the most active year. My listening activity has doubled in 2022 when compared to 2021. This year, January and October recorded the highest level of listening activity.**

2. **When I looked at the distribution per day of the month, I notice that there is a slight increase in my listening activity in the first two weeks of each month for 2022.**

3. **When we look at the distribution per day of the week, activity is higher during the week in comparison to the weekends. Additionally, the plot clearly shows I am actively listening to more songs during the night for both years.**
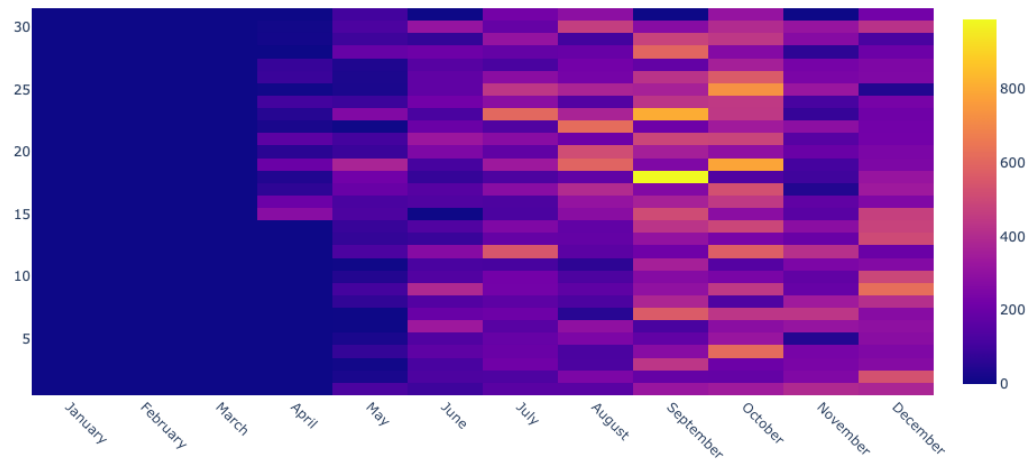
Section A.2: Listening Duration

For this section, I answer the following questions:

1. Can I develop a visualization which depicts the number of minutes spent per day listening to music in 2022 and 2021 and compare trends between these two years?
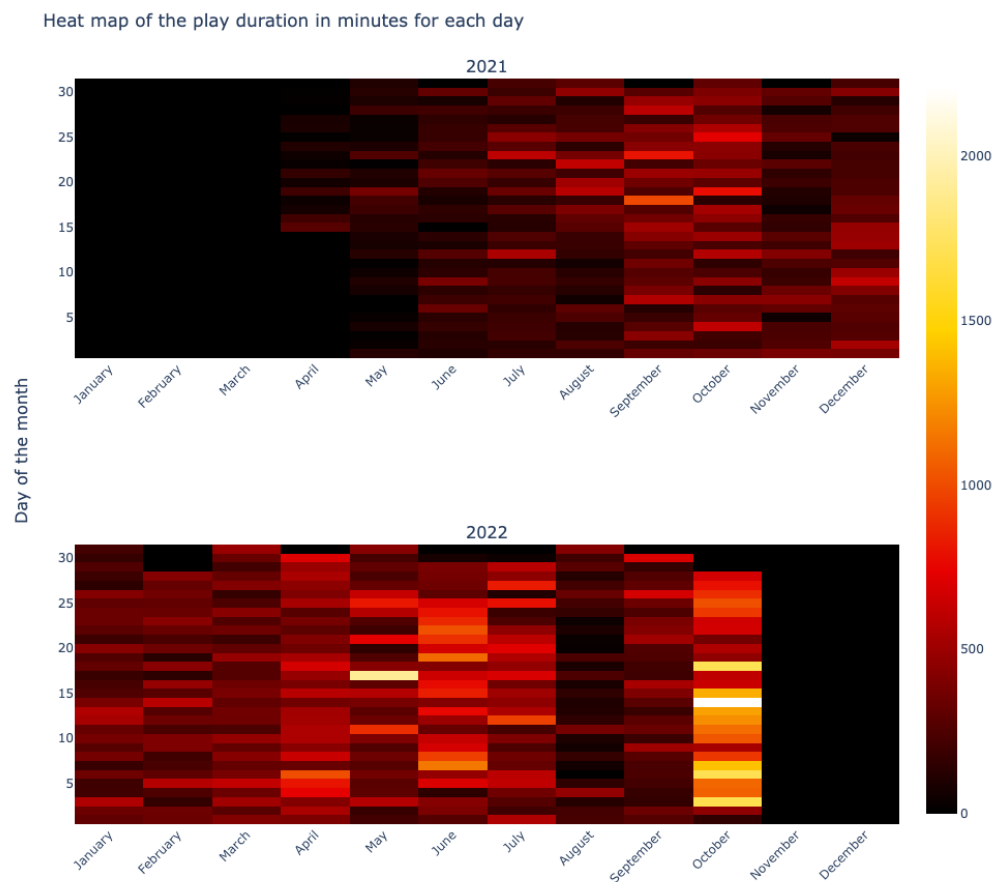
Heat map of the play duration in minutes for each day in 2022
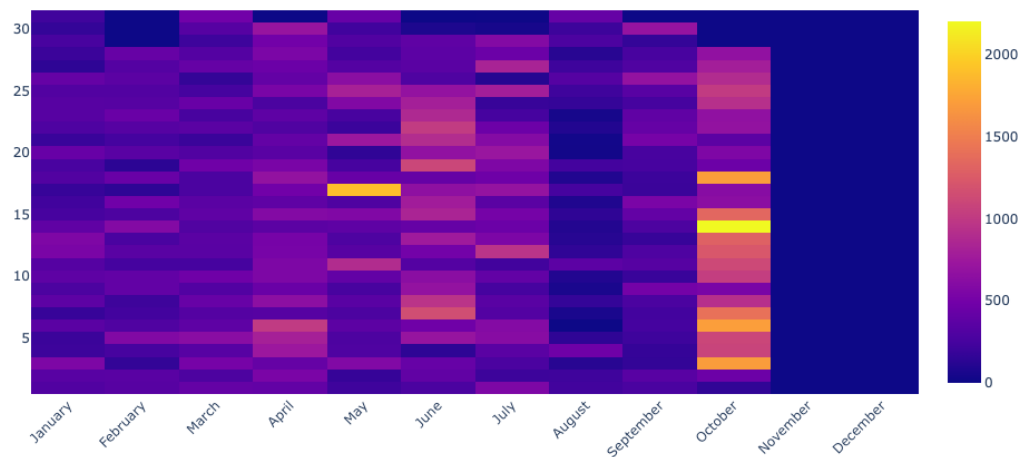
Heat map of the play duration in minutes for each day in 2021

After managing to plot heat maps of the listening time per day of each month for each year, I plot it for both 2021 and 2022 so that I can actually compare the trends across years.

Heat map of the play duration in minutes for each day

On comparison, the time spent listening to music in 2022 has increased considerably. We observe darker shades of red and orange in 2022 when compared to 2021. In 2022, I spent more time listening to music in the month of October, notably due to the amount of time spent cleaning and manipulating the data for this project. I love working while grooving to unique tracks as it boosts my productivity. Interestingly, I spent 2,200 minutes(equivalent to 37 hours) listening to music on October 14th this year.

2. Can I develop a visualization which depicts my listening patterns/trends for these three genres: Rap, Pop, and Electronic?

*Now, I play with filters on this visualization. For example, I want to visualize the time spent listening to my favourite genres each day.*

Here, I develop a visualization of the time spent listening to my favourite genre: Rap

Heat map of the play duration in minutes for each day
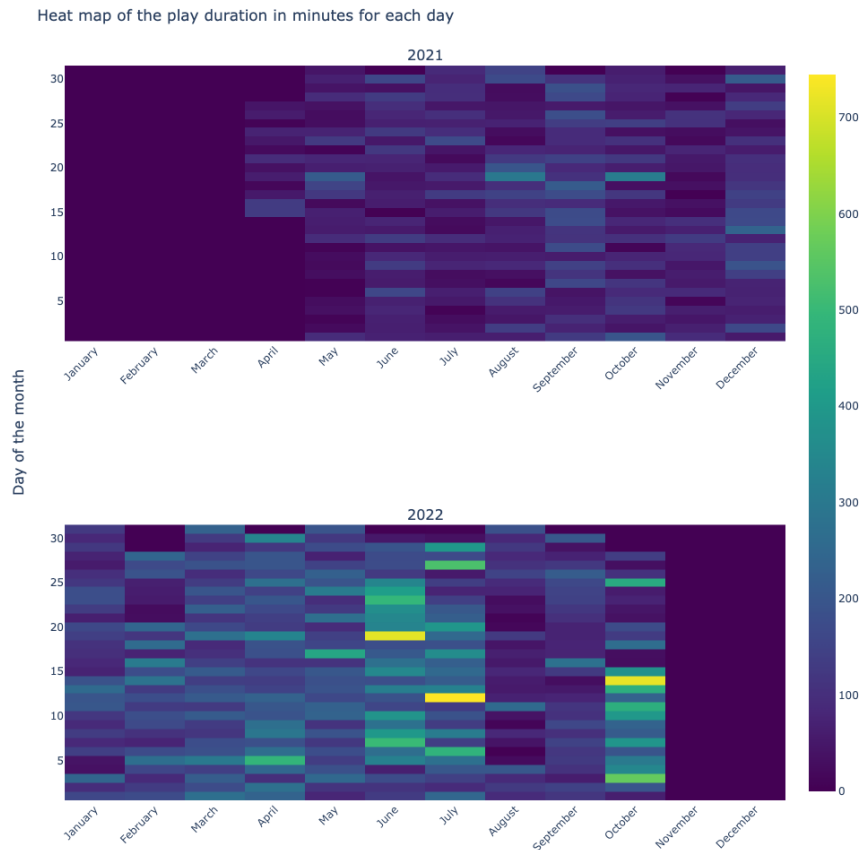
Looks like I have been listening to rap music more than ever. 2022 is covered with shades of green with most time spent listening to Rap music in the months of June, July, and October. Interestingly, June and July was the period where I had an outgoing personality. So, it's apparent that I enjoy listening to rap when I am hanging out with my friends. On the other hand, I started with data manipulation for this personal project during the month of October during which I developed overwhelming feelings of anxiety. Listening to these artists regularly helped me overcome my fears and have faith in my dreams. Listening to the stories shared by the artists through music pushed me to work even harder. Hence, I attribute my productivity and philosophy to rap music. Listening to hip hop shields out the noise of the outside world and encourages me to live a life true to myself. In fact, perhaps more than any other genre of music, hip hop embodies the American Dream itself.

Here, I develop a visualization of the time spent listening to my second favourite genre: Pop

Heat map of the play duration in minutes for each day
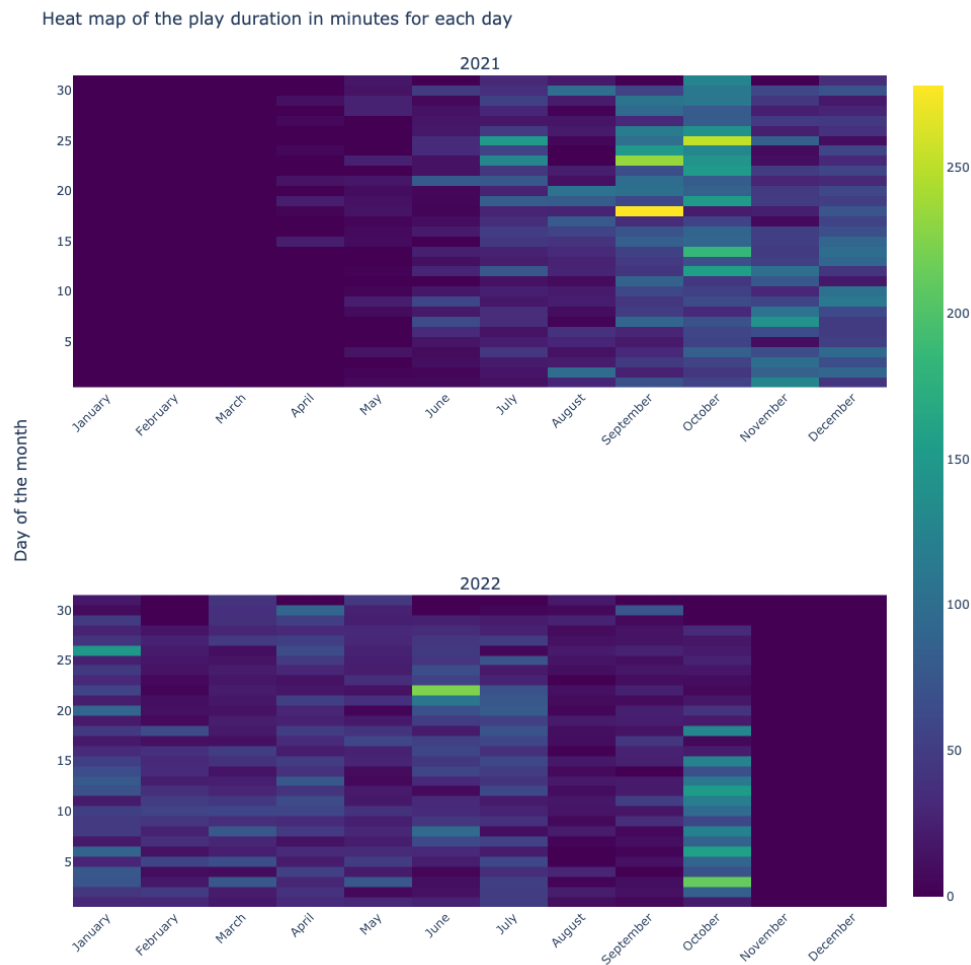
As expected, I spent more time listening to pop music during the months of October, November and December in 2021. This was a period of deep sadness for me as I didn't know how to cope up with the present circumstances. The end of a treasured relationship is always difficult, but pop music helped me provide a kind of reverse empathy for the other person in comparison to what I was experiencing. This helped me recognize my own feelings and also distracted me from my own predicament. It greatly helped me in suggesting directions to improve my current situation.

Here, I develop a visualization of the time spent listening to R&B Soul

Heat map of the play duration in minutes for each day
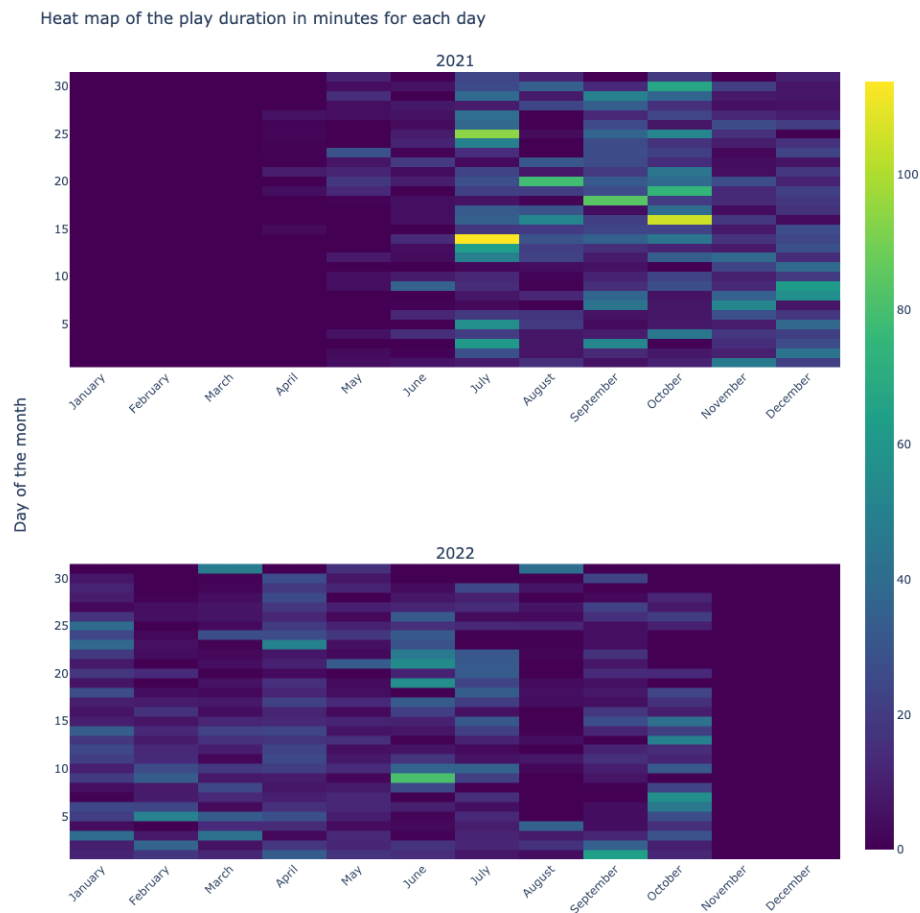
I expected a similar listening pattern for R&B/Soul which envokes a mix of emotions inside me as this genre offers a mix of soul, hip hop, funk, and pop. These artists often relay their own difficult narratives and show that there is a light at the end of the tunnel. The lyrics were capable of uplifting my spirits and improving my mood.

Here, I develop a visualization of the time spent listening to my new favourite genre: Electronic Music

Heat map of the play duration in minutes for each day
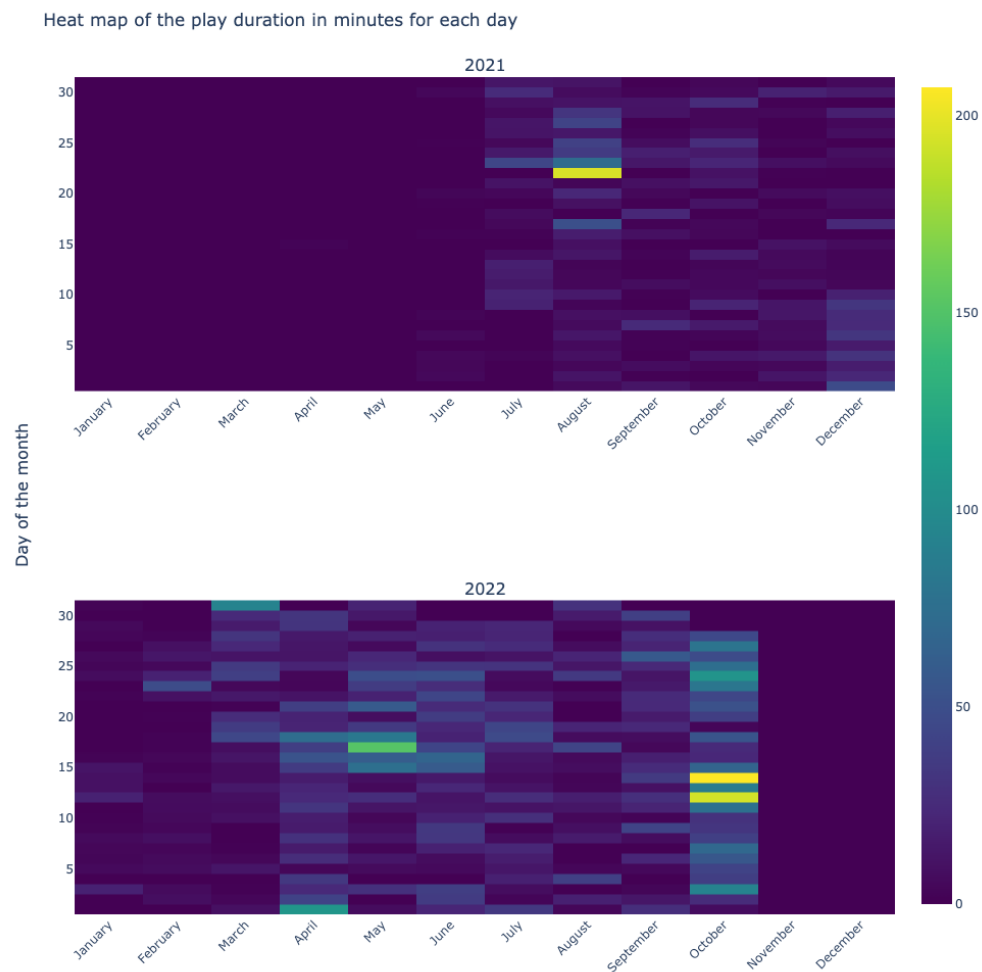
Next, I wanted to visualize my listening patterns for Electronic Music as its melodic aspect in combination with the trap foundation makes me feel thought provoking in a different way. The combination of emotion and instrumentation makes it a great genre. They help me feel relaxed one day and energized the next day. Looking at the heat map below confirms the fact that I have started listening to electronic music more often than ever. Again, the maximum time spent per day listening to this genre was observed in October

3. Can I develop a visualization which depicts my listening patterns/trends for my two favourite artists: Eminem and Russ?

Subsequently, I was curious to know how much time did I spend this year listening to my favourite artist, Eminem. Eminem is my favourite artist for a variety of reasons. Throughout his songs, he has spoken about his struggles, discussed controversial topics and told stories – which are brought to life by imagery and metaphors. I admire Eminem for fighting his demons, and for coming back stronger than ever, despite all the hardships he has faced along the way.

Heat map of the play duration in minutes for each day
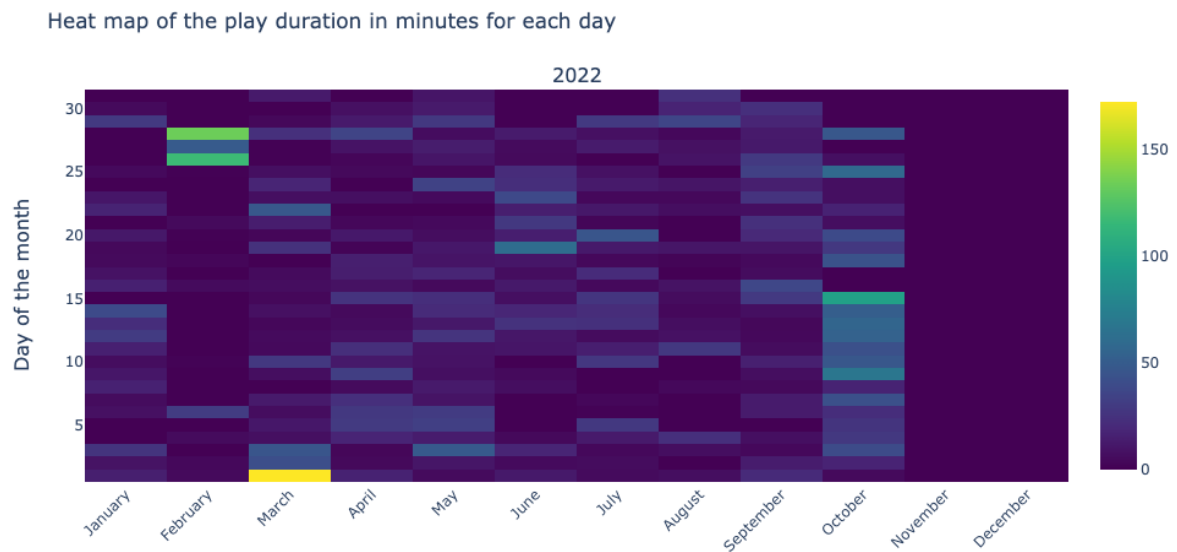
Interestingly, the heatmap looks pretty uniform as opposed to my expectations. There is a spike in listening activity for the month of October though.

Next, I investigated my listening activity for another artist: Russ. He knows the power of believing in yourself which has greatly inspired me to achieve my dreams. Lyrics such as "You decide whether to be your greatest obstacle or your biggest fan" and "Don't hesitate. Don't doubt. Don't even worry about falling. Wings will grow." resonate with me.

Heat map of the play duration in minutes for each day
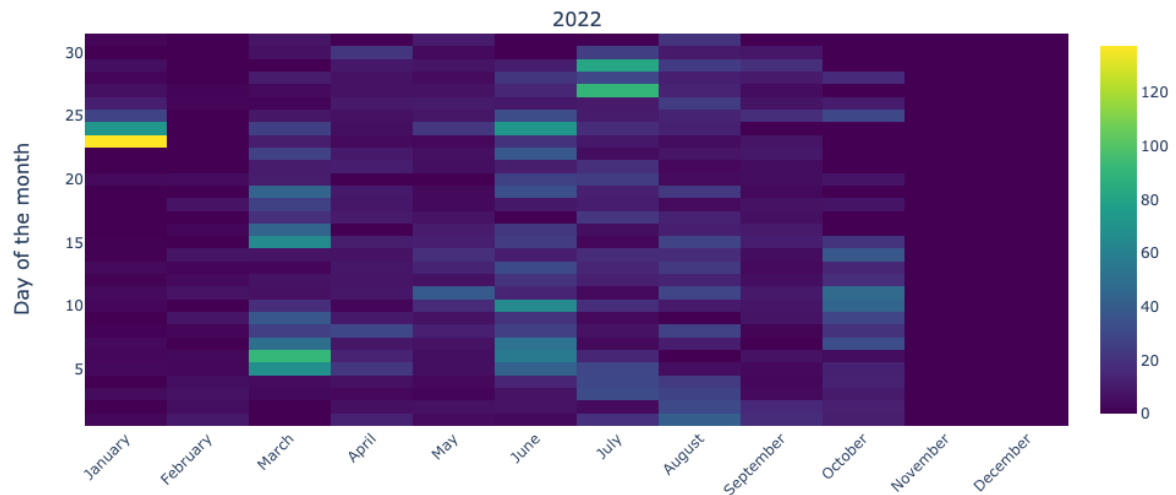
This observation was pretty intriguing for me. I discovered this artist in the month of January through one of my friends who's a big fan of Russ. The heatmap clearly shows that the maximum time spent listening to his songs was in the month of January, a period when I still lacked self-belief and hence, could not relate to his songs as much as I do now. Infact, the prominent shades of blue in the month of February depict that I didn't even listen to the artist after that day in January until March, a period during which I started believing in myself again. It's very surprising that my music taste reflects the personality changes I was going through.

4. Can I develop a visualization which depicts my listening pattern for the artist(Sickick) whom I discovered later this year?

Next, I wanted to explore my listening patterns for another artist: Sickick. In a world dominated by the desire for fame, Sickick is the enigmatic artist making a name for himself in music without ever showing his face. Despite his musical talent, the idea of fame and crowds was once a cause of anxiety for Sickick. The iconic mask which is now ubiquitous with his image and music has allowed him to overcome his fears. His music is a complex blend of pop, hip-hop, and EDM

Heat map of the play duration in minutes for each day
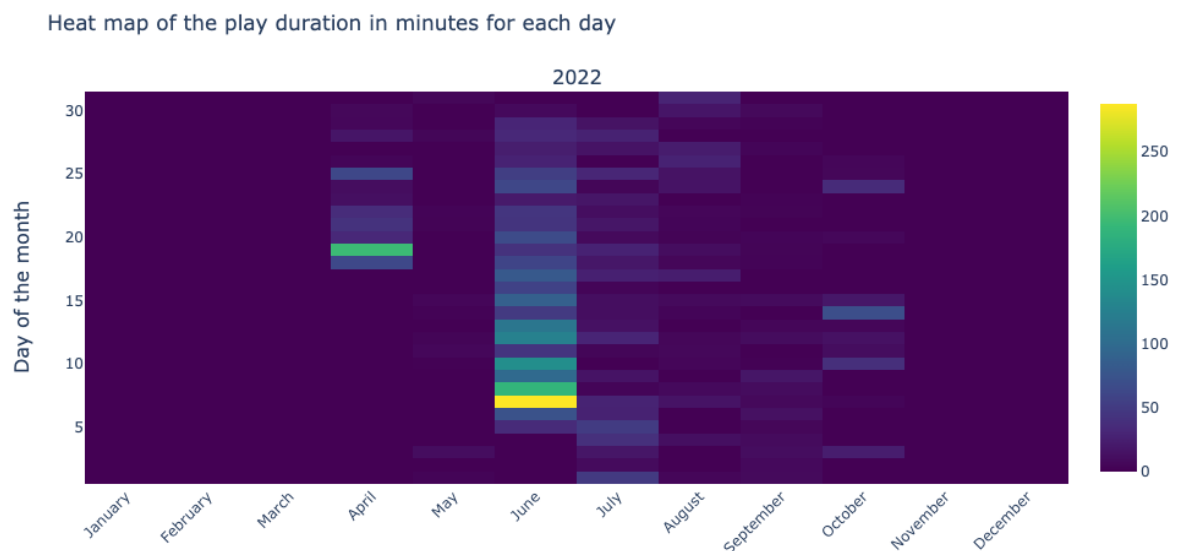
Looking at the heatmap, I listened to his music a lot in the month of June, when I discovered all the tracks that he had produced. But, then I moved to other artists who produced EDM and hence, the time spent listening to his tracks gradually decreased. I respect this artist for introducing me to EDM.
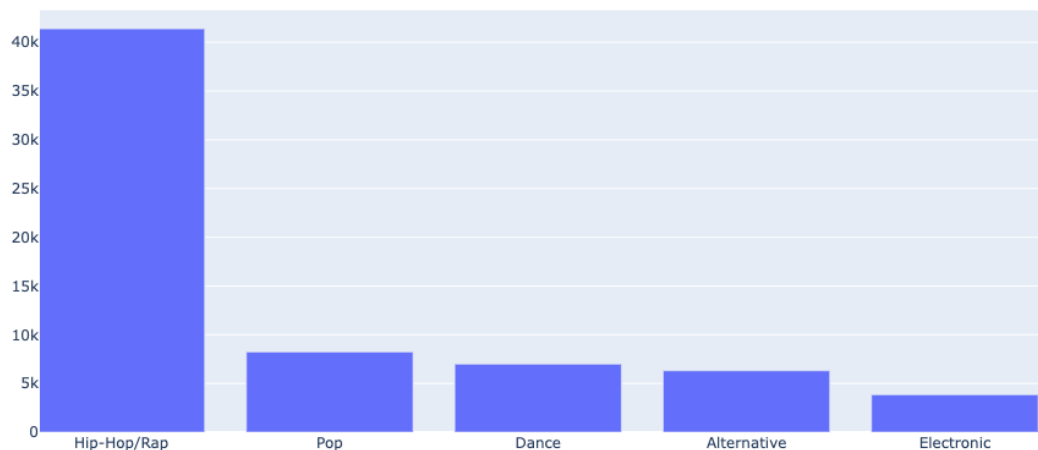
Section A.3: Ranking

For this section, I answer the following questions:

1. Can I establish a ranking of artists and the genres of music I like to listen to for each year: 2021 and 2022?

Top Genres for 2021
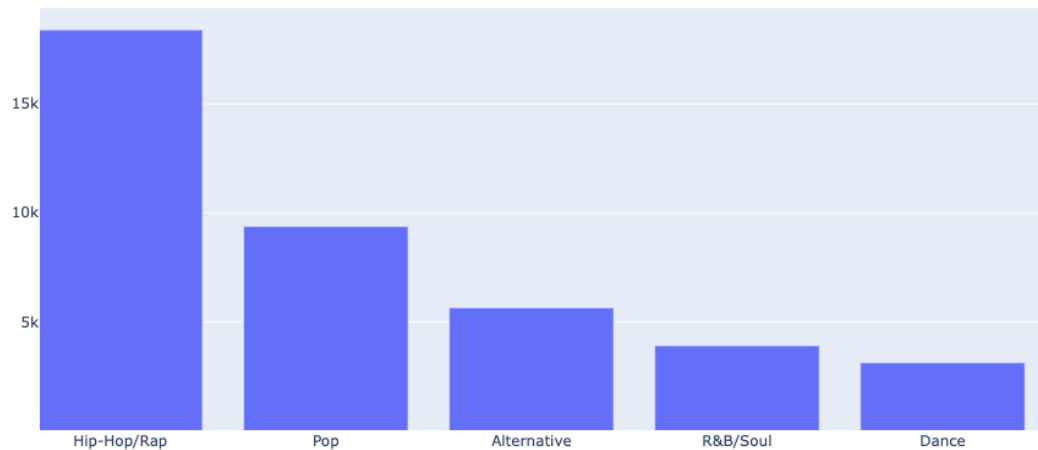
Top Genres for 2022

*On comparison, it is a runaway WIN for Hip-Hop music for two consecutive years . In 2022, I have listened to rap music thrice as many times as pop music. Pop music retained its second position. Electronic music climbed one spot in the rankings for 2022. It rose to No. 5, up one spot from its No. 6 ranking last year. However, R&B Soul dropped two spots this year, with a No. 6 ranking right behind Electronic music.*

Next, I wanted to play with some additional filters on these rankings.

This sunburst plot displays the rankings based on the criteria that I have searched for the song.

Ranking across years of Genres
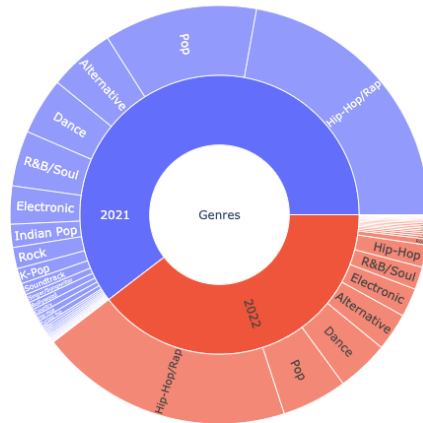
I have browsed for more Pop songs in 2021 when compared to 2022. There's a stark difference between the size of the pie in 2021 and 2022

This sunburst plot displays the rankings based on the criteria that the song appeared on my radio stations.
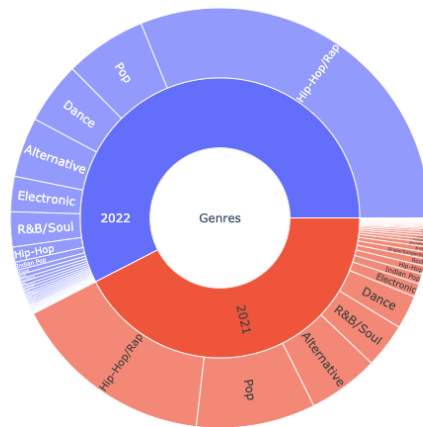

Ranking across years of Genres
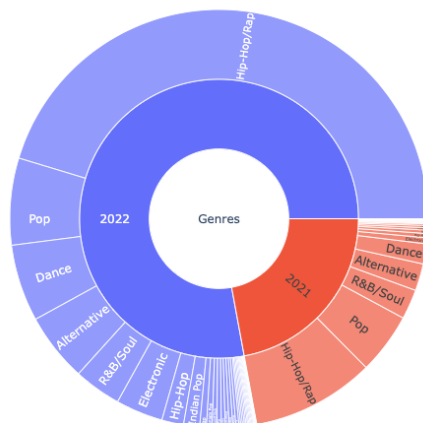
Hip-hop music has consistently appeared on my stations indicating that the app likes to recommend the kind of music I enjoy listening to.

This sunburst plot displays the rankings based on the criteria that I skipped the song.

Ranking across years of Genres

This sunburst plot confirms that my odd behaviour of skipping tracks is even reflected when I am listening to rap music.

Now, I derive rankings of my top artists for each year:

```
### My top 5 Artists for 2021 and 2022

query_params = {
    'year': df_visualization['Play_Year'].unique(),
}


list_top_ranked(df_visualization, 'Artist', 5, query_params)
```
```
Top ranking for 2022
    {'Russ': 2527, 'Sickick': 2072, 'Eminem': 1841, 'Kanye West': 1488, 'Drake': 1464}


Top ranking for 2021
    {'Post Malone': 1196, 'The Weeknd': 1112, 'Drake': 1033, 'Kanye West': 1025, 'Travis Scott': 1007}
```

Additionally, I filter these artist rankings on three genres of music: Rap, Pop, and Electronic Music.

```
###My top 5 Rap Artists for 2021 and 2022

query_params = {
    'year': df_visualization['Play_Year'].unique(),
    'genre':['Rap']
}

list_top_ranked(df_visualization, 'Artist', 5, query_params)
```
```
Top ranking for 2022
    {'Russ': 2346, 'Sickick': 1662, 'Eminem': 1644, 'Kanye West': 1303, 'Drake': 1031}

Top ranking for 2021
    {'Post Malone': 1122, 'Drake': 974, 'Kanye West': 943, 'Travis Scott': 883, 'Eminem': 557}
```

```
#### My top 5 Pop artists for 2021 and 2022

query_params = {
    'year': df_visualization['Play_Year'].unique(),
    'genre':["Pop"]
}

list_top_ranked(df_visualization, 'Artist', 5, query_params)
```
```
Top ranking for 2022
    {'Bazzi': 441, 'Ed Sheeran': 399, 'XXXTENTACION': 393, 'Labrinth': 334, 'Dua Lipa': 248}


Top ranking for 2021
    {'Maroon 5': 565, 'Ed Sheeran': 457, 'Doja Cat': 410, 'LSD': 384, 'Dua Lipa': 381}
```

```
### My Top 5 Artists for 2021 and 2022 who produce electronic music

query_params = {
    'year': df_visualization['Play_Year'].unique(),
    'genre':["Electronic"]
}


list_top_ranked(df_visualization, 'Artist', 5, query_params)

Top ranking for 2022
    {'RL Grime': 371, 'Claptone': 274, 'Serhat Durmus': 255, 'TroyBoi': 201, 'G-Eazy': 200}


Top ranking for 2021
    {'Metro Boomin': 88, 'M.I.A.': 87, 'Anhad + Tanner': 81, 'Royal & the Serpent': 80, 'Jeremy Olander': 78}
```

Next, I filter the artist rankings based on whether it's a library track or not. These rankings display the artists that I listen to the most through my playlists.

```
### My top 5 Rap Artists that I listen to through my playlists

query_params = {
    'year': df_visualization['Play_Year'].unique(),
    'genre':['Rap'],
    'library': [True]
}


list_top_ranked(df_visualization, 'Artist', 5, query_params)

Top ranking for 2022
    {'Russ': 2346, 'Sickick': 1662, 'Eminem': 1644, 'Kanye West': 1303, 'Drake': 1031}


Top ranking for 2021
    {'Post Malone': 1122, 'Drake': 974, 'Kanye West': 943, 'Travis Scott': 883, 'Eminem': 557}
```

```
### My top 5 Pop Artists that I listen to through my playlists

query_params = {
    'year': df_visualization['Play_Year'].unique(),
    'genre':['Pop'],
    'library': [True]
}


list_top_ranked(df_visualization, 'Artist', 5, query_params)

Top ranking for 2022
    {'Bazzi': 441, 'Ed Sheeran': 399, 'XXXTENTACION': 393, 'Labrinth': 334, 'Dua Lipa': 248}


Top ranking for 2021
    {'Maroon 5': 565, 'Ed Sheeran': 457, 'Doja Cat': 410, 'LSD': 384, 'Dua Lipa': 381}
```

My top Rap and Pop artists in my library closely resemble the top artists derived for the entire year, which reconfirms that I spend most of my time in my library.

Next, I filter the artist rankings based on the origin of the song and the genre of the song. For example, I wanted to know which are the top 5 rap artists that I manually browse for or consistently appear on my radio.

```
### My top 5 Rap Artists that I listen through browsing

query_params = {
    'year': df_visualization['Play_Year'].unique(),
    'genre':['Rap'],
    'origin': ['search']
}

list_top_ranked(df_visualization, 'Artist', 5, query_params)
```
Top ranking for 2022
    {'Russ': 49, 'Kanye West': 37, 'Eminem': 37, 'Post Malone': 33, 'Travis Scott': 31}

Top ranking for 2021
    {'Kanye West': 96, 'Post Malone': 86, 'Drake': 63, 'Travis Scott': 40, 'A Boogie wit da Hoodie': 37}

```
### My top 5 Rap Artists that I listen through radio

query_params = {
    'year': df_visualization['Play_Year'].unique(),
    'genre':['Rap'],
    'origin': ['radio']
}

list_top_ranked(df_visualization, 'Artist', 5, query_params)
```
Top ranking for 2022
    {'Sickick': 206, 'Russ': 184, 'Drake': 183, 'J. Cole': 119, 'Kanye West': 112}

Top ranking for 2021
    {'Post Malone': 72, 'Kanye West': 43, 'Drake': 42, 'Travis Scott': 42, 'DaBaby': 34}

```
### My top 5 Artists who produce Electronic Music that I listen through radio

query_params = {
    'year': df_visualization['Play_Year'].unique(),
    'genre':['Electronic'],
    'origin': ['radio']
}

list_top_ranked(df_visualization, 'Artist', 5, query_params)
```
Top ranking for 2022
    {'RL Grime': 54, 'TroyBoi': 27, 'RÜFÜS DU SOL': 26, 'Claptone': 22, 'Shpongle': 20}

Top ranking for 2021
    {'Mura Masa': 9, 'Anhad + Tanner': 7, 'ZHU': 6, 'Dua Lipa': 5, 'RÜFÜS DU SOL': 4}

2. Can I establish a ranking of my favourite song titles for each year?

This displays my top 5 tracks for each year:

```
### My top Tracks for 2021 and 2022

query_params = {
    'year': df_visualization['Play_Year'].unique()
}

list_top_ranked(df_visualization,"Song_Title", 5, query_params)
```
```
Top ranking for 2022
    {'Puppet Theatre (feat. Peter Bjorn and John)': 509, 'Meditate (feat. J.I.D.)': 484, 'Run for Your Life': 429, 'B
ruuuh': 393, 'Parables (Remix) [feat. Eminem]': 388}


Top ranking for 2021
    {'Ni**as in Paris': 291, 'Collard Greens (feat. Kendrick Lamar)': 232, 'After Party': 226, 'Frequency': 174, 'I L
ove It': 174}
```

I filter these rankings on the genre:

```
### My top 5 Rap Tracks for 2021 and 2022

query_params = {
    'year': df_visualization['Play_Year'].unique(),
    'genre': ['Rap']
}

list_top_ranked(df_visualization,"Song_Title", 5, query_params)
```
```
Top ranking for 2022
    {'Meditate (feat. J.I.D.)': 484, 'Run for Your Life': 429, 'Parables (Remix) [feat. Eminem]': 388, 'Pt. 2': 353,
'SMALL TALK': 342}


Top ranking for 2021
    {'Collard Greens (feat. Kendrick Lamar)': 232, 'After Party': 226, 'Frequency': 174, 'No Role Modelz': 171, 'Blac
k Beatles (feat. Gucci Mane)': 169}
```

```
#### My Top 5 Pop Tracks for 2021 and 2022

query_params = {
    'year': df_visualization['Play_Year'].unique(),
    'genre': ['Pop']
}

list_top_ranked(df_visualization,"Song_Title", 5, query_params)
```
```
Top ranking for 2022
    {'Mount Everest': 323, 'Focus (feat. 21 Savage)': 253, 'Instant Crush (feat. Julian Casablancas)': 215, "I don't
even speak spanish lol (feat. Rio Santana, Judah & Andrez Babii)": 177, 'Outrunning Karma': 157}


Top ranking for 2021
    {'Headshots (4r Da Locals)': 160, 'Confetti (feat. Saweetie)': 152, 'Toosie Slide': 133, 'Need To Know': 108, 'Sh
anti': 108}
```

Next, I was curious to know the top 5 tracks that I have manually browsed for

```
### My top 5 Tracks that I have browsed for

query_params = {
    'year': df_visualization['Play_Year'].unique(),
    'origin': ['search']
}

list_top_ranked(df_visualization,"Song_Title", 5, query_params)
```
```
Top ranking for 2022
    {'Outrunning Karma': 46, 'Isis (feat. Logic)': 39, 'SMALL TALK': 31, 'HANDSOMER (Remix)': 25, 'By My Side': 22}


Top ranking for 2021
    {'Clout (feat. Cardi B)': 37, 'I Love It': 36, 'Startender (feat. Offset and Tyga)': 36, 'Stronger': 34, 'Bang!':
27}
```
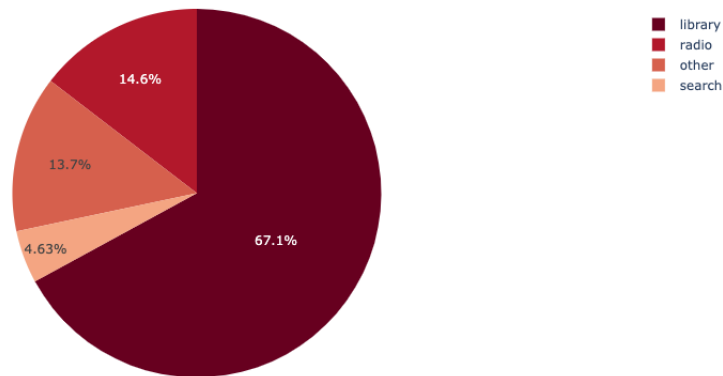
Section A.4: Listening Habits

Now, moving on to the last part of our analysis, I answer the following questions:

1. Can I develop a compact view of how the tracks are usually found?

Distribution in percentage of how the tracks were found for 2021 and 2022

67 percent of the tracks that I have listened to originate from my library which was quite expected as I love making new playlists every month and I mostly listen to it until I get bored. Surprisingly, I listen to the personalized radio on Apple Music more often than expected in order to find more songs that are unique to me.

2. Do I skip tracks a lot? Can I observe any trend between 2021 and 2022?

Ratio of tracks skipped, versus listened to completely, per year
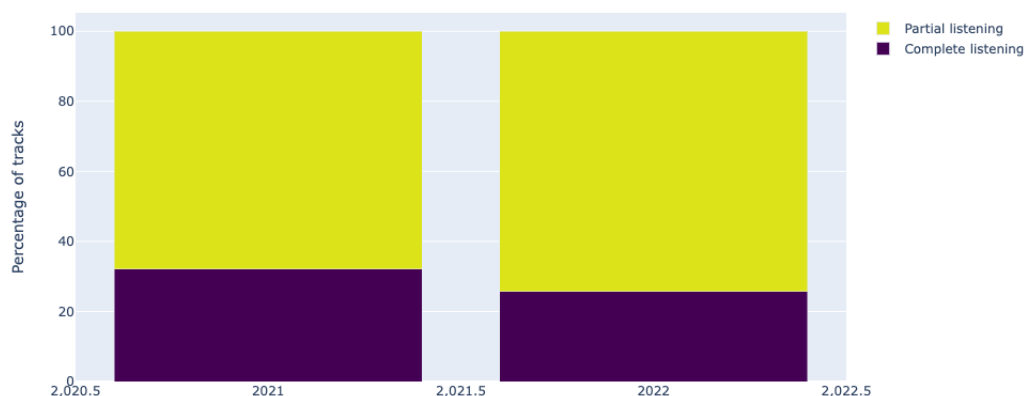
In 2021, I tended to listen to the entire song more than in 2022, where I skipped songs after partial listening.

3. Can I know how do I usually find songs that are added to my library? Are the suggested songs really relevant?

After finding out that I spend most of my time listening to my library tracks, I wanted to visualize a correlation between the fact that a song is in my library, and how my music's added to the library. The purpose here is to appreciate how relevant the suggestions are.

Distribution in percentage of how the library tracks were found, for all years
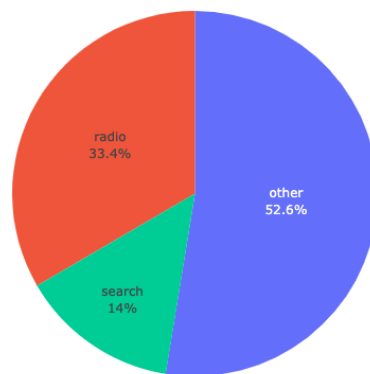
Surprisingly, I discover a lot of songs through stations, which are automatically generated and ongoing mixes based on a song, artist, or theme.¶

4. Next, can I know my favourite artists that I have discovered through radio?

Artist	Play_duration_in_minutes
Sickick	358.425383
Russ	247.562100
The Weeknd	242.460417
Post Malone	211.959900
Drake	170.935167

Sickick and Russ are my top artists that I have discovered through stations.

Next, I was curious to know why do I have such a high percentage of play activity associated with the 'other' section. On introspection, I found out that I have one of my favourite tracks as my iPhone charging sound which gets played whenever I plug my iPhone to charge.

:

Song_Title	Play_duration_in_minutes
Meditate (feat. J.I.D.)	1169.123433
Stockholm Syndrome (feat. KXNG Crooked)	55.765500
Bruuuh	48.693950
Isis (feat. Logic)	39.945233
Confused (feat. Future)	39.593717

I have Meditate(feat J.I.D) as my automated charging sound