Data Visualization - Project Proposal
Spotify Analytics (Spotiviz)

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GitHub: https://github.com/md-hassan/CS571-Project-Spotiviz

Background and Motivation:

Music consumption has evolved significantly over time, influenced by cultural shifts, technological advancements, and platform-driven recommendations. Understanding these trends can provide valuable insights into how genre preferences, artist longevity, and album popularity change across different periods. Additionally, with the rise of social media platforms like TikTok, certain songs experience viral success, significantly impacting their streaming performance.

This project aims to explore how music tastes evolve, both at a societal level and on an individual scale. Which genres have grown or declined in popularity? Do certain albums maintain their relevance years after release? How long do artists typically stay in the mainstream before fading out or reinventing themselves?

Beyond genre and artist longevity, this project also aims to explore how mood influences listening habits. With streaming services providing audio feature analysis—such as energy, danceability, and valence—it is possible to map how people gravitate toward different moods in their music choices over time. Additionally, the rise of social media has introduced a new dynamic: songs can go viral overnight due to trends on TikTok, Instagram, or YouTube, leading to surges in streaming numbers. This raises the question of how external cultural forces shape music consumption patterns.

Podcasts have also emerged as a major component of digital audio streaming. Understanding podcast popularity, genre trends, and user engagement can provide insights into how people consume spoken-word content compared to music.

Finally, this project is not just about broad trends—it also aims to provide personal insights. Many listeners are curious about their own habits: How have their preferences shifted over time? Do they gravitate toward different moods in different seasons? Which artists have been constants in their playlists? By combining population-wide analysis with user-specific insights, this project will offer an engaging and interactive way to explore music data.

Possible Objectives and Insights we could gain :

Some questions that this project aims to answer are:

Genre Evolution

- How have people's genre preferences shifted over time?

Artist Longevity & Activity

- Which artists maintain relevance over extended periods?
- How frequently do they release new content?
- Have artists had to change their styles to keep up with current trends?
- Which artists saw the fastest rise in popularity? Did they sustain it or fade quickly?

Album Popularity

- Which albums remain popular long after release?
- How do album sales and streaming numbers compare over time?

Mood-Based Listening Trends

- How do different moods correlate with listening habits?
- Are certain genres or moods more popular in specific seasons? (e.g., do people listen to more melancholic music in winter?)

Cultural Impact of Songs

- Can we track songs that have gone viral due to external factors like TikTok?
- Do viral songs fade quickly, or do they lead to sustained popularity?

Podcast Consumption

- What are the most popular podcast genres?
- How does podcast streaming behavior compare to music streaming habits?
- Are longer or shorter podcast episodes more engaging?

Personalized Insights

- Provide users with a way to analyze their own listening history through similar metrics and questions as above.
- How often do people replay their favorite songs/albums vs. exploring new music?

The insights derived from our analysis could serve not only the music industry, but also everyday users who want to explore their own musical journey in a more structured and visual way.

Data Sources:

We plan to collect data from multiple sources for this project:

- **Spotify Charts:** this will be our main source of weekly and daily statistics of top songs, albums, and artists

- **Official Spotify API:** we plan to use this source to collect additional metadata on the individual songs. eg. song length, featured artists, genres, features like danceability, energy, instrumentalness, liveness, etc.

- **Kworb.net, Last.fm:** contains historical music trends

- **Stats.fm:** provides detailed personal listening statistics

- **Tokhits.com, Tokchart.com:** to extract TikTok music trends

Data Processing:

Since these data sources originate from different platforms, significant data cleaning and preprocessing may be required.

Data Aggregation: aggregate and merge artist, album, song trends from Spotify, Last.fm, and Kworb.net while handling discrepancies.

Genre Classification: categorizing music genres using Spotify's API.

Mood Estimation: Using Spotify's audio features (e.g., valence, energy) to categorize songs by mood.

Cultural Impact Indicators: Identifying spikes in song popularity from external sources (e.g., TikTok music trends).

Visualization Preparation: Formatting the processed data for different visualization types.

Visualization Design:

Prototype 1:
The user can search for songs, artists, and albums. The user can then click on any of the results to get more details on that entry. Specifically, we plan to show the following three visualizations:

Fig1: Album popularity over time:
- Displays the artist's total album streams for a specific year using a barchart.
- The user can select from the dropdown the specific year they want to visualize.
- This chart allows us to show three points of information: the artist's top albums, album streams and the year under consideration.

Fig2: Genre-based listening trend:
- Displays comparative popularity of music genres across time, highlighting the searched entity's (song/artist/album) genre.

- A line chart is apt here because it can show a continuous comparative trend

Fig3: Artist collaborations:
- Shows the selected artist and their collaborations and features in the form of a network.
- A network works well here since that is the nature of data we are working with: multiple artists, their albums, and the connections between them.

Prototype 2:
This page shows weekly analytics. The user selects a week they are interested to know the statistics of, and the following visualizations are displayed:

Fig4: Total streams of top artists weekly
- Shows the number of streams of top artists throughout the week.
- Line chart used as it makes it easy to visualize trends in the data - peaks, declines and patterns.

Fig5: Popular albums of the week
- Shows the number of streams for the most popular albums of the week. Bar chart used.
- The bar chart allows for an easy comparison of multiple albums and their changing popularity levels.

Fig6: Popular podcast genres of the week
- Shows the number of streams of popular podcast genres in the week on a donut chart.
- The donut chart provides a clear, visually appealing breakdown of the most popular music genres, allowing us to compare proportions easily.

Fig7: Popular music genres of the week
- Shows the number of streams of popular music genres in the week.
- Uses a bubble chart to show similar genres close to each other, bubble size represents the number of streams

Prototype 3:
This prototype shows the page layout of the analytics dashboard. On choosing Music Analytics, visualizations on genre popularity and album popularity are displayed. On choosing Podcast Analytics, visualizations on genre popularity along with top podcasts charts are displayed.

Visuals

Visual 1: Listening Trends Over Time
We used a line chart to effectively show how listening trends fluctuate over time, making it easy to identify peaks, declines, and seasonal patterns in music consumption.

Visual 2: Album Popularity Over Time

A horizontal bar chart was chosen to display album popularity trends over time, as it allows for an easy comparison of multiple albums and their changing popularity levels.

Visual 3: Most Popular Song Genre
The donut chart provides a clear, visually appealing breakdown of the most popular music genres, allowing us to compare proportions easily.

Visual 4: Music Network: Genre, Artists, and Albums
A network chart was selected to showcase the relationships between music genres, artists, and albums, revealing connections and collaborations effectively.

Visual 5: Trending Podcasts Over Time
We used a line chart to track how different podcasts have trended over time, making it easy to observe growth, popularity spikes, and seasonality in podcast listening.

Visual 6: Most Popular Podcast Genre (Based on Views and Average Rating)
A vertical bar chart was chosen to compare podcast genres based on views and average ratings, providing a clear visual representation of audience preferences.

Must-Have Features:

Our must have features include:

- Artists trends
- Song trends
- Album trends

Optional Features:

Our optional features include:

- Mood-based trends
- Podcast trends
- Impact of virality (Tiktok)
- Personalized insights

Project Schedule:

Mar 3 - Mar 10: Data scraping
Mar 10 - Mar 17: Data cleaning
Mar 17 - Mar 23: Music Analytics
Mar 23 - Mar 30: Podcast Analytics
Mar 30 - Apr 6: Key Performance Indicators
Apr 6 - Apr 13: Settings Page
Apr 13 - Apr 20: Finishing up
Apr 20 - end: Process book, Demo video

BRAINSTORM

INSIGHTS TO GAIN FROM SPOTIFY DATA :-

USER DATA : (FOR PERSONAL ACCOUNTS)

- → Listening History
- → Top Artists, Songs & Genres
- → Playlists
- → Liked Songs & Albums
- → Listening Habits

STREAMING ANALYTICS (FOR ARTISTS & CREATORS)

- → Stream Counts
- → Listiner Demographics
- → Retention & Skip Rates
- → Playlist Inclusion

MARKET TRENDS AND INDUSTRY INSIGHTS

- → Trending Songs and Artists
- → Viral Playlist
- → Genre Popularity
- → Streaming & sales impact
- → Track Global Users of spotify
- → User Ratings and their impact

QUESTIONS WE AIM TO ANSWER

Visualization

1. How has the user Preferences changed over time? (daily, monthly, yearly).
   → Possible charts: Line, Area, Bar chart
   Chosen Chart: Line chart
2. How has the popularity of a specific album evolved over time based on streams, likes. chart Rankings?
   → Possible charts: Line, Horizontal Bar Chart, Scatter Plot
   Chosen Chart: Horizontal Bar Chart
3. What music genres has the highest number of streams, likes or listener engagement?
   → Possible Charts: Pie Chart, Donut, Treemap, Barchart
   chosen Chart: Donut Chart
4. How are different music genres, artists and albums interconnected based on collaborations, shared audiences or stylistic similarities.
   → Possible charts: Network Graph, Chord Diagram, Sankey Diagram.
   Chosen Chart: Network Chart
5. Which Podcasts have gained or lost popularity over time, and what factors contribute to their trends.
   → Possible Charts: Line Chart, Area Chart, Heatmap
   Chosen Chart: Line Chart
6. Which podcast genre attracts the highest number of listeners and the best Rating indicating strong audience engagement.
   → Possible Charts: Bar Chart, Pie chart, Scatter Plot
   Chosen Chart: Vertical BarChart

PROTOTYPE-1

Spotiviz

Explore spotify through interactive visualizations.
Click on any song to see information through fun and creative vizualizations.

Weekly Top Songs Global

BASED ON THE SONG SELECTED THE VISUALIZATIONS ACROSS THE WEBPAGE CHANGES

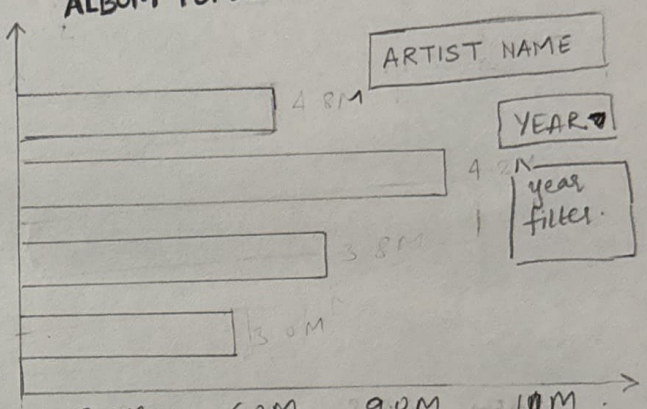
Search song, album or artist...

album image	1	SONG NAME	ARTIST NAME	
album image	2	SONG NAME	ARTIST NAME	
⋮				
album image	20	SONG NAME	ARTIST NAME	

SHOW MORE

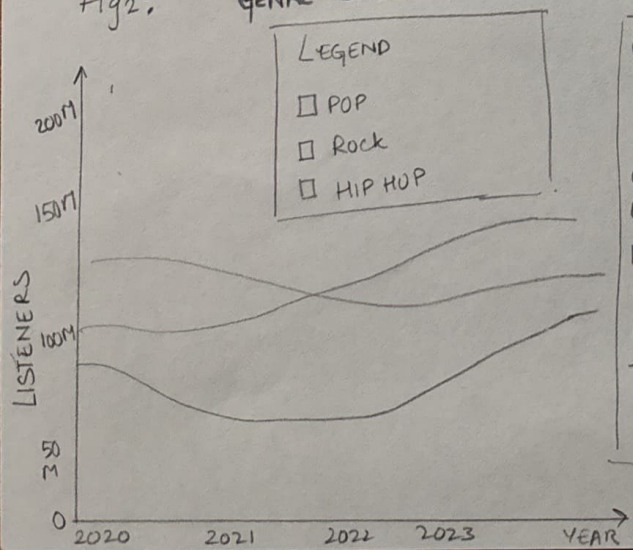
Fig 1:

ALBUM POPULARITY OVER TIME



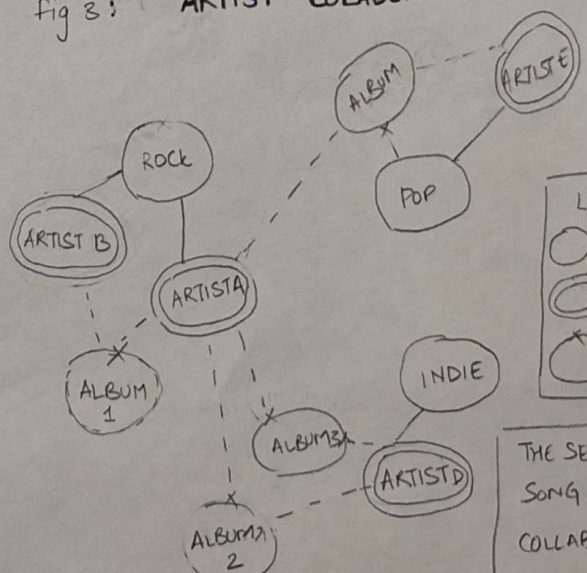
ON SELECTING THE SONG THE ARTIST OF THE SONG'S ALBUM RELEASES AND THE ALBUMS POPULARITY OVER THE PAST 5 YEARS WILL BE SHOWN

Fig 2: **GENRE-BASED LISTENING TREND**



ON SELECTING THE SONG THE GENRE OF THE SONG WILL BE HIGHLIGHTED IN THE GRAPH BASED LISTENING TREND.

Fig 3: **ARTIST COLABORATIONS**



THE SELECTED SONG ARTIST'S COLLABORATION WORK

PROTOTYPE - 2

Spotiviz

music streaming analytics

THIS DASHBOARD IS BASED ON TIME PERIOD ONCE THE TIME PERIOD IS SELECTED IN THIS DROP DOWN THE WEB PAGE CHANGES

DASHBOARD

this Week ▼

Weekly Overview – TOP 5 ARTISTS

Rank	Top Artist of Week	Streams
1	Taylor Swift	248M
2	Drake	213M
3	kendric Lamar	150M
4	Beyonce	100M
5	Lewis Capidi	50M

fig 4: TOTAL STREAMS OF TOP ARTISTS WEEKLY

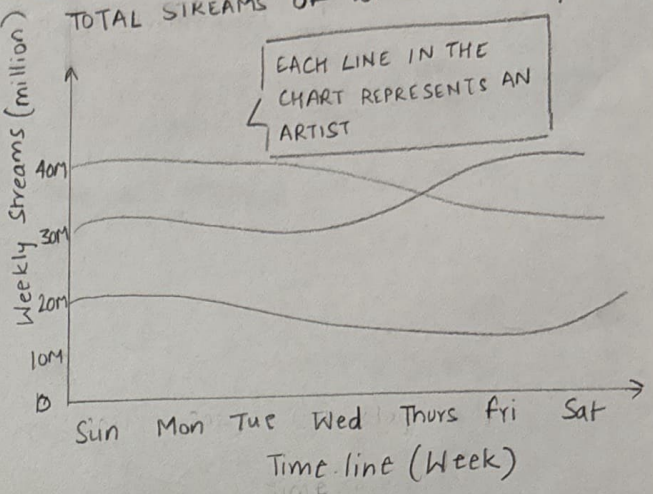


fig 5: POPULAR ALBUMS OF THE WEEK

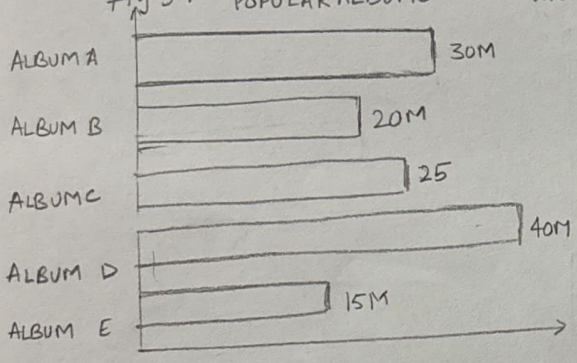


fig 6: POPULAR PODCASTS GENRES OF THE WEEK

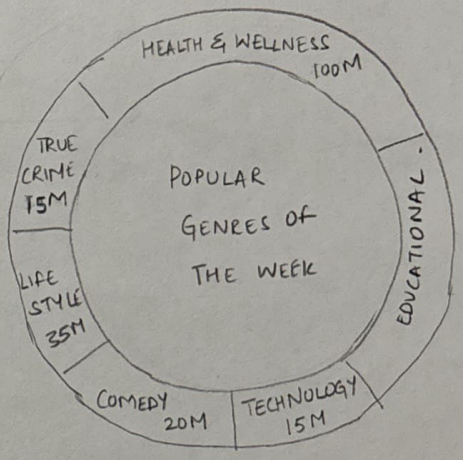
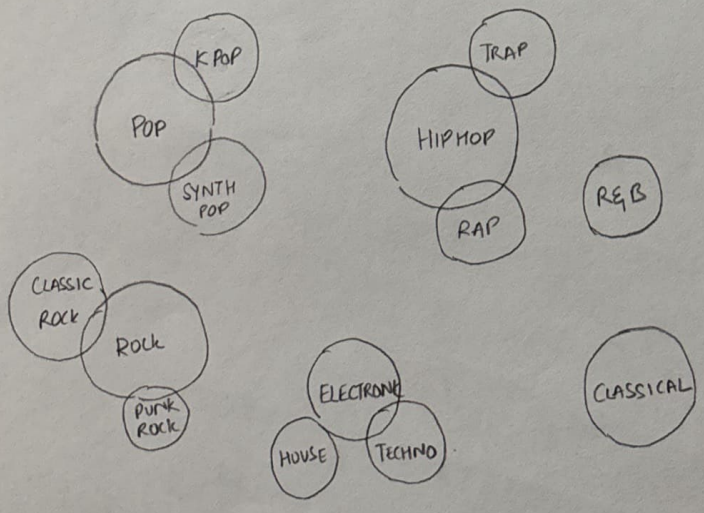


fig 7: POPULAR GENRESES OF THE WEEK



RELATIVE GENRES ARE POSITIONED TOGETHER
SIZE OF THE BUBBLE INDICATES POPULARITY
GREATER THE SIZE MORE THE POPULARITY. EACH GENRE BUBBLE WILL BE OF A DIFFERENT COLOUR

WEEKLY OVERVIEW – TOP 5 PODCASTS

RANK	PODCAST NAME	STREAMS
1	PODCAST 1	248M
2	PODCAST 2	213M
3	PODCAST 3	150M
4	PODCAST 4	100M
5	PODCAST 5	50M

PROTOTYPE - 3 (Page Layout prototype)

Spotiviz ANALYTICS DASHBOARD

MUSIC ANALYTICS

PODCAST ANALYTICS

fig 7: ALBUM POPULARITY OVER TIME

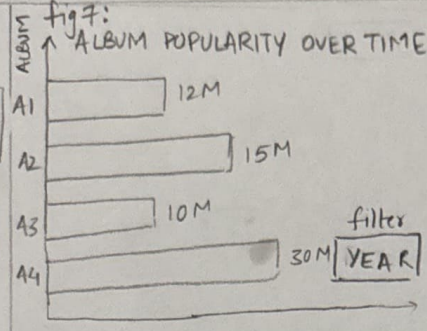
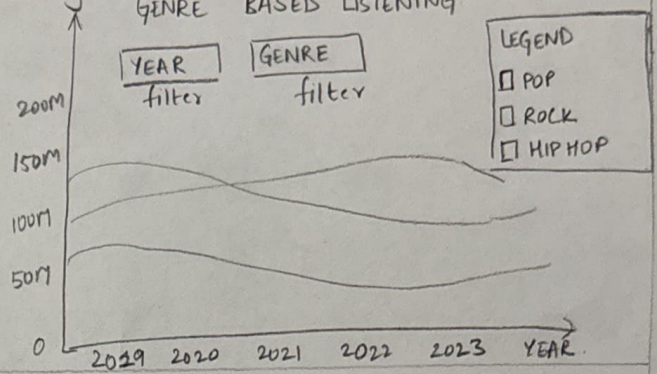


fig 8: GENRE BASED LISTENING



Spotiviz ANALYTICS DASHBOARD

MUSIC ANALYTICS

PODCAST ANALYTICS

YEAR
2016
:
2024

GENRE BASED POPULARITY : fig 9

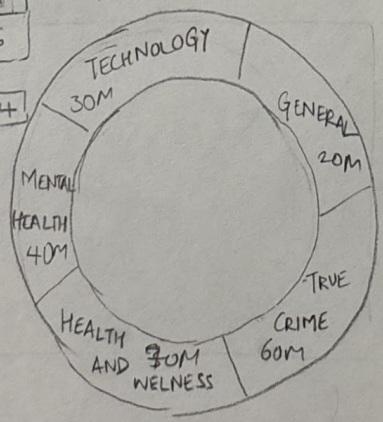


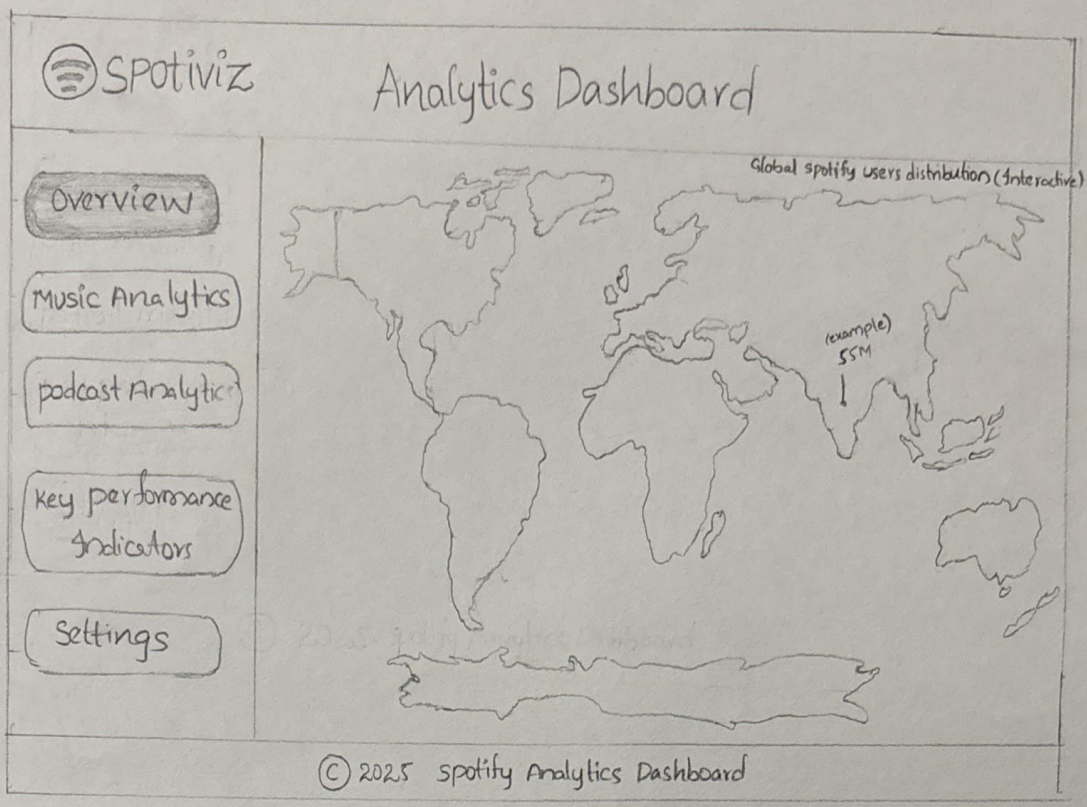
fig 10: TOP PODCAST OF THE YEAR

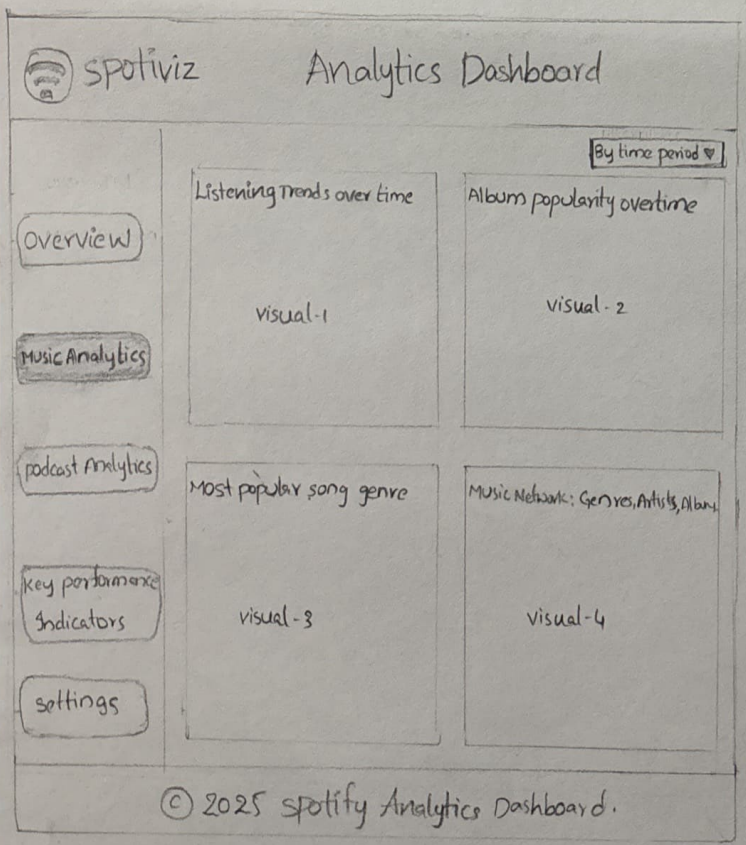
filter: YEAR

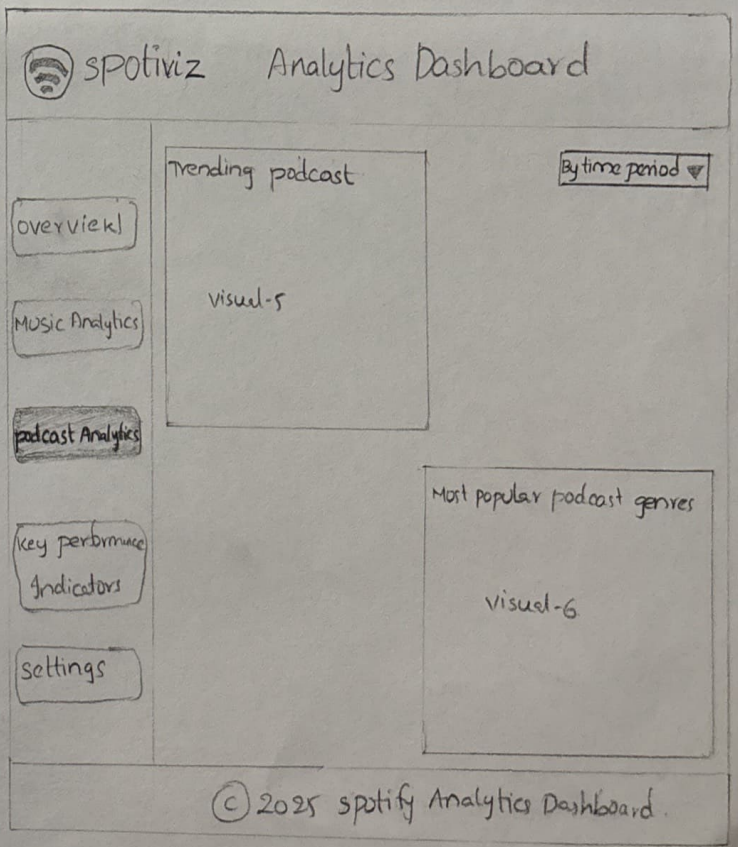
RANK	PODCAST NAME	HOST
1	podcast name	host
2	podcast name	host
3	podcast name	host
4	podcast name	host
5	podcast name	host

Show more

Finalized prototype:







* These visualizations will be interactive based on the filters we include (Ex: included time period filter like by year, month or week through which all the visualizations in the webpage displays accordingly.

Spotiviz Analytics Dashboard

overview
Music Analytics
podcast Analytics
key performance indicators
settings

1502312 song streams
350 Podcast streams
5000 Number of Artists
30 Number of Genre
Top songs Global
(selectable)
Year
Month
Week.
3:14 ↓0.8% Avg song duration
40:10 ↑2.5% Avg podcast duration

© 2025 spotify Analytics Dashboard

Spotiviz Analytics Dashboard

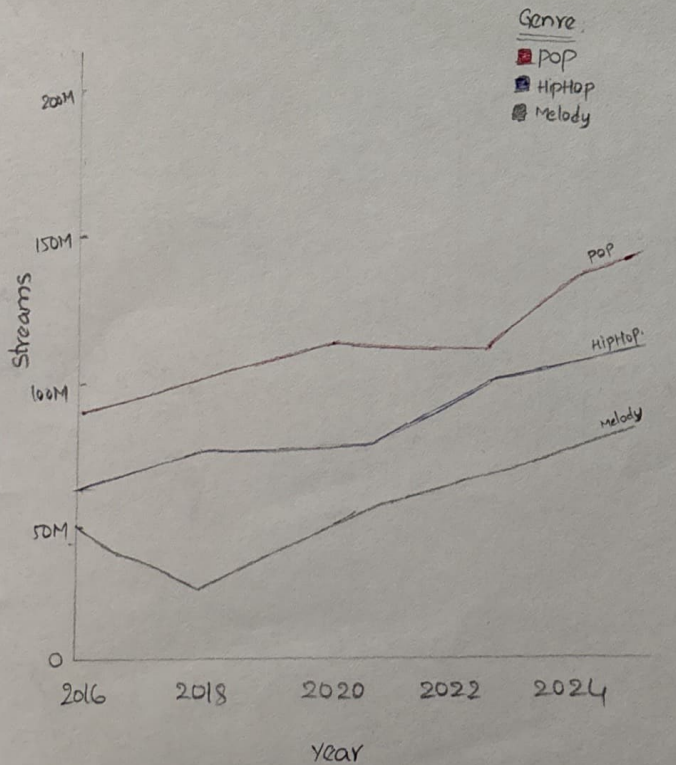
overview
Music Analytics
podcast Analytics
key performance indicators
settings

Theme preferences
light Dark.
Data Refresh Interval
every 3 hrs
Export Format
CSV

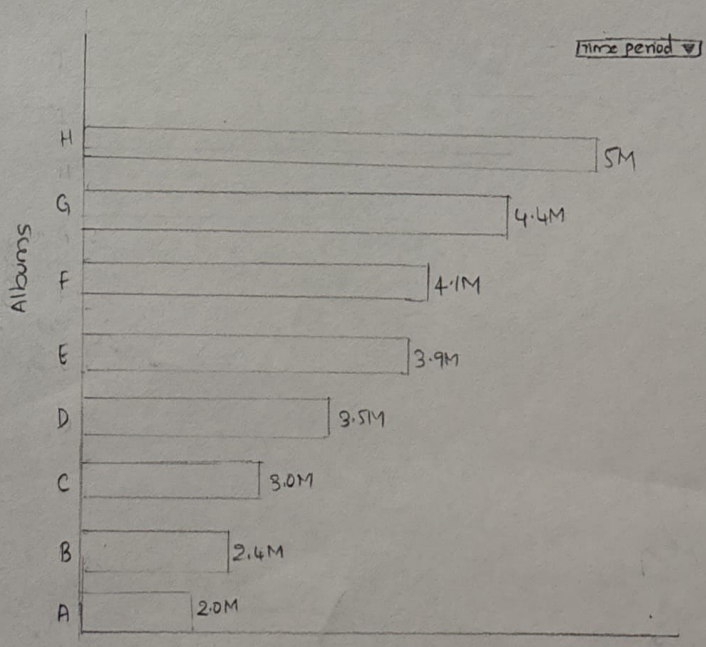
© 2025 spotify Analytics Dashboard

* some of the KPI's would be interactive using filters, markers & colours.

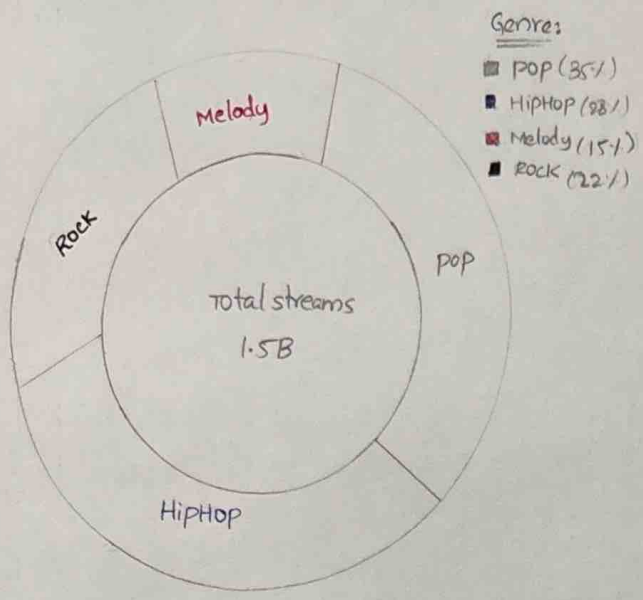
Visual-1: Listening trends over time



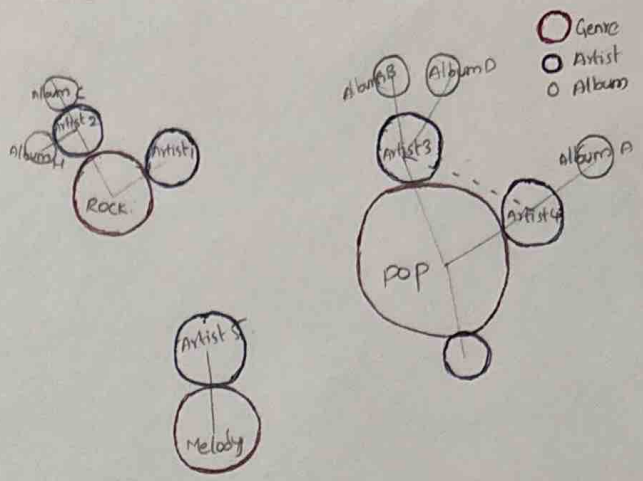
Visual-2: Album popularity overtime



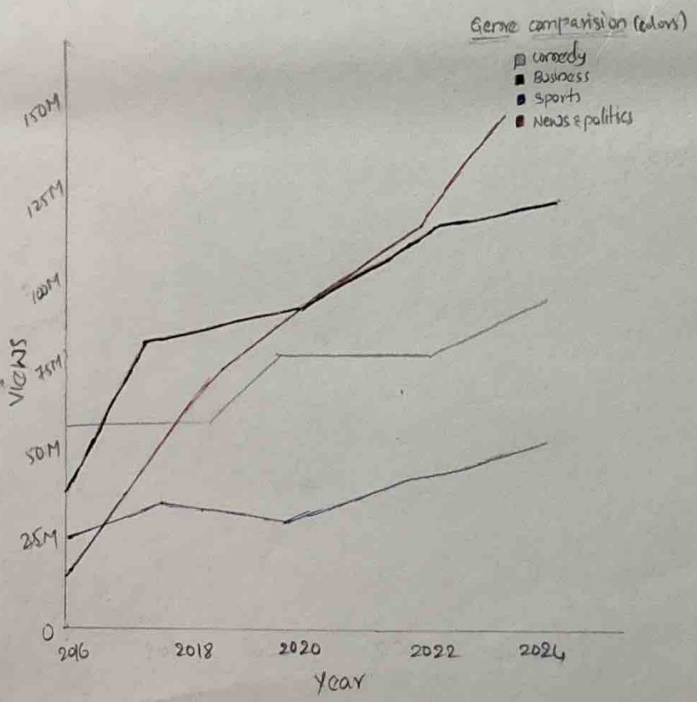
Visual-3 : Most popular song genre



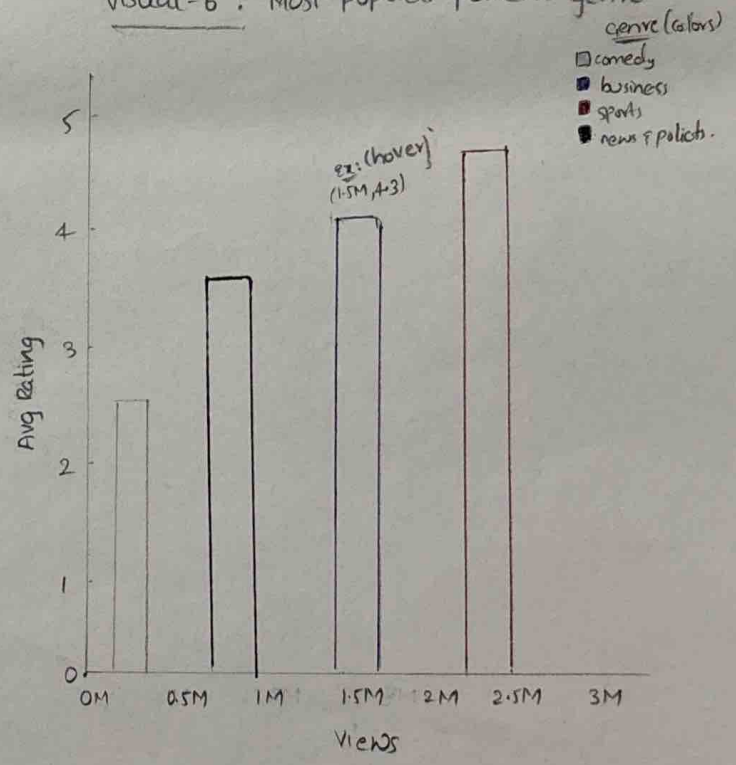
Visual-4 : Music Network : Genre, Artist, Albums



Visual 5 : Trending podcast over time



Visual-6 : Most popular podcast genre



* We use hovering, popups in most of the visualizations along with the color differentiation b/w bars, lines etc. As a whole, All the visualizations in the webpage will be in interactive with proper colour textures
* This is a hand-sketched idea of prototype of website, webpages & visualizations.