Exploring the Trends of Top Spotify Songs

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1 Introduction

Spotify offers over 70 million tracks and yet its Top 50 Songs every year seems to share many characteristics. At the same time, there are also changes and differences in the music taste at every given year.

In this project, we will be developing a website to visually represent the traits of Spotify's Top 50 Songs from 2010 to 2019. We can break down each song into other characteristics (i.e. tempo, energy, etc.), and discover music trends and patterns.

2 One-sentence description

Through interactive data visualizations, we can explore characteristics of the top songs on Spotify to discover the trends in popular songs over time.

3 Project Type

Comparative Data Visualizations for Data Exploration and Analysis

4 Audience

Our project is aimed at anyone who is interested in music and the trends of popular songs over time. The project will provide a space to explore the traits of popular music and allow users to delve into the progression of Spotify's Top 50.

5 Approach

What is your approach and why do you think it is cool and will be successful?

The plan is to design a website with various visuals for different song traits. One of the visualization will be a stacked graph to show the number of popular songs of a particular genre over time. I want to include a key for users to filter out specific genres and also include simple growing animations when the graph initializes. In addition for the stacked graph, being able to reorder the layers may also be useful for users [1].

For the other attributes, I may use a scatter plot and draw a line through the averages of each year for that particular trait. With the scatter plots, I want to include a tooltip to hover over each point for more song information, as well as highlighting that song in the other scatter plots. If time allows, I may want to include a side table with the top 50 songs of a particular year and provide links to each one if a user wants to listen to it. A rough mockup of the website interface can be found in Figure 1.

Music plays a large role in many people's lives, so it is interesting to see how it has evolved even in these past couple of years. I believe that having a space to

examine popular songs can show a lot about the culture in a given year.

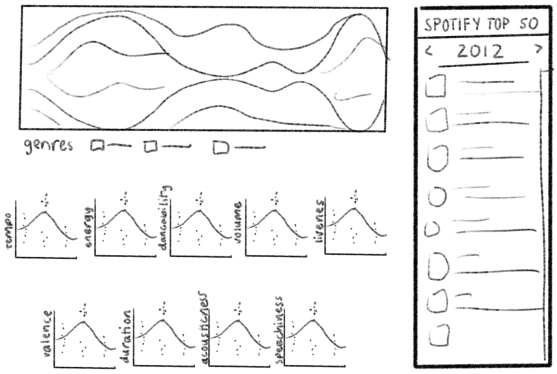

Figure 1. Mockup of the website

6 Best-case Impact Statement

In the best-case scenario, we will provide some insight into how people's music tastes have changed or stayed the same over the past 10 years.

In addition to that, the visualizations may inspire users, specifically songwriters or composers, to create songs with similar characteristics to the Spotify Top 50 based on the trends and patterns.

7 Major Milestones

- Determine a set of visualizations to best compare different characteristics of songs based on the year
- Determine the types of interactions the user should be able to do for the best experience for exploring the data
- Designing the website interface and how the visualizations should be arranged to establish a visual hierarchy for users to follow
- Creating the website to display the final data visualizations

8 Obstacles

8.1 Major Obstacles

- Unfortunately, this term has been very busy for me so I didn't want to bring down my team due to my time commitments. Because of this, I decided to work on this project alone, which may put more work on myself.
- I want to explore using visualizations similar to ThemeRiver [1], but I'm not sure how to tackle that using D3.js due to the curves and the overall silhouette due to the discrete time points [2].

8.2 Minor Obstacles

- There are 11 different characteristics that I want to showcase in my final project, however, it may take some time and planning to organize all the data so that the viewer is not overwhelmed.
- For the song traits such as the tempo or energy, I know that scatter plots are usually used on a continuous x-scale, but I'm not sure of another way to show the changes over time with discrete time points.
- As mentioned as a design challenge for developing ThemeRiver [1], developing an appropriate color

scheme for each genre where it is both aesthetic and contrasting may pose some difficulty.

9 Resources Needed

- Code to create the different visualizations and allow for interaction
- Dataset of the top 50 songs on Spotify from 2010 to 2019
- Help from Professor Harrison or the TA for any issues or guidance on how to tackle this project

10 Related Publications

List 5 major publications that are most relevant to this project, and how they are related.

- Havre developed ThemeRiver, which is a prototype system that displays thematic changes over time [1].
- Byron goes through the design process in creating a complex layered graph, including techniques, design decisions, and how it compares to traditional stacked graphs [2].
- Aigner provides appropriate methods and frameworks when analyzing time-oriented data for visual representation [3].
- Gulik develops a new way to visualize and navigate music based on other contextual information. The artist map UI proposes an interesting way to visualize songs based on their attributes [5].
- Nguyen utilizes dendrograms and maps based on a similarity/distance matrix to find correlations between classical European music composers [4].

11 Define Success

If viewers are able to recognize patterns over time in song traits, such as genres or the danceability of songs, we will have successfully developed a set of interactive visualizations for the CS573 Data Visualization final project.

References

[1] S. Havre, B. Hetzler and L. Nowell, "ThemeRiver: visualizing theme changes over time," *IEEE Symposium on Information Visualization 2000. INFOVIS 2000. Proceedings*, Salt Lake City, UT, USA, 2000, pp. 115-123, doi: 10.1109/INFVIS.2000.885098.

[2] L. Byron and M. Wattenberg, "Stacked Graphs – Geometry & Aesthetics," in *IEEE Transactions on Visualization and Computer Graphics*, vol. 14, no. 6, pp. 1245-1252, Nov.-Dec. 2008, doi: 10.1109/TVCG.2008.166.

[3] W. Aigner, S. Miksch, W. Müller, H. Schumann and C. Tominski, "Visual Methods for Analyzing Time-Oriented Data," in *IEEE Transactions on Visualization and Computer Graphics*, vol. 14, no. 1, pp. 47-60, Jan.-Feb. 2008, doi: 10.1109/TVCG.2007.70415.

[4] Georges, P., Nguyen, N. Visualizing music similarity: clustering and mapping 500 classical music composers. *Scientometrics* 120, 975–1003 (2019). https://doi.org/10.1007/s11192-019-03166-0

[5] Gulik, van, R.G.C. ; Vignoli, F. ; Wetering, van de, H.M.M. Mapping music in the palm of your hand, explore and discover your collection. *Proceedings 5th International Conference on Music Information Retrieval* (ISMIR 2004, Barcelona, Spain, October 10-14, 2004). 2004.