

CS5764 Design Sprint Process Book

Team EARS

Leader: Elizabeth Christman (elizabethc99@vt.edu)

Group Member 1: Rebecca DeSipio (rdesipio26@vt.edu)

Group Member 2: Adwait Pradhan (adwaitp@vt.edu)

Group Member 3: Surendrabikram Thapa (surendrabikram@vt.edu)

Week 1: Team Agreement

Your team agreement should answer the following questions:

- How will you communicate?
Communication will be done through Discord channel for unofficial communication and short discussions. Official communication regarding updates and design decisions will be communicated via email with the team members and the teaching team. Meetings will be held via Discord.
- How and when will you meet?
On Thursdays, recurring meetings will be held over Discord to keep everyone up to date on the project's progress. After the class, there will be in-person meetings for project updates and discussions.
- How will you collaborate on implementation? [GitHub, process, ...]
There will be a Github set up for the code portions of our project. Documentation will be done over Google Drive.
- What are your team roles? [decider, GitHub czar, ...]
Team Leader: Elizabeth
 - Communicating deadlines, maintaining workflowGithub maintainer: Adwait
 - Setting up Github, merging codeReviewer: Rebecca
 - Checks work for requirements, submits final assignmentDecider: Surendrabikram
 - Keeps everyone on same page about ideas and design
- How will you deal with non-performing members?

The team leader will reach out to the member to check in and see if there are any challenges. If there is no response, the team leader will see if anyone else on the team can get in touch with the non-performing member. If there is still no response and the deliverable deadline has passed for the week, the team leader will reach out to the professor/TA.

Signatures:

Elizabeth Christman

Renecca DeSipio

Adwait Pradhan

Surendrabikram Thapa

Week 2: Map

Basic Info. The project title, your names, e-mail addresses, and your team name.

- **Title:** Trends in Popular Music Over Time
- **Team Members:**
 - Elizabeth Christman (elizabethc99@vt.edu)
 - Rebecca DeSipio (rdesipio26@vt.edu)
 - Adwait Pradhan (adwaitp@vt.edu)
 - Surendrabikram Thapa (surendrabikram@vt.edu)
- **Team Name:** Team EARS

Abstract: Our project will look at the trends in music over time from the 1960s to 2019. We want to understand what characteristics defined popular music in each decade and measure how the characteristics changed over time. Our planned datasets include albums in the Billboard Top 200 for each year and characteristics of the tracks in that album, such as danceability, energy, instrumentalness, etc. These characteristics are values defined by Spotify EchoNest. This data was found at <https://components.one/datasets/billboard-200>.

Background and Motivation. Discuss your motivations and reasons for choosing this project, especially any background or research interests that may have influenced your decision.

- All the team members are interested in music, and each of us are interested in a different era of music. We wanted to find out why we like a certain music era and how music has changed over time.

Related Work. Anything that inspired you, such as a paper, a website, visualizations we discussed in class, etc.

- Some of the visualization examples we have seen in class gave us ideas on what kind of data stories we wanted to tell.

Audience and Questions. Provide a description of your audience and the primary questions you are trying to answer with your data story. Do you have any overarching goals and objectives that you want to accomplish?

- Our audience is people who are interested in music and want to understand how music has changed over time. This might include music historians, music students, and music researchers.
- Questions:
 - How has popular music changed over time?
 - What characteristics of music were popular in certain decades?
 - How have certain characteristics changed over time?
 - What artists were popular in each decade?

- What are the characteristics of popular artists? Do they reflect the trends of their time?
 - What albums were popular in each decade?
 - What were the characteristics of albums? Do they reflect the trends of their time?
 - What characteristics define different years/decades?
 - Why do some albums chart several years after release? (e.g Beatles charted recently - is it because of nostalgia? Similar trends in music?)
 - What years/decades of music reflect the styles of music I like?
- The overarching goal is to identify key changes and trends in the data and to make possible connections to other changes in society over time.

Data. From where and how are you collecting your data? If appropriate, provide a link to your data sources.

- Data is from this source: <https://components.one/datasets/billboard-200>

Data Cleanup. Do you expect to do substantial data cleanup? What quantities do you plan to derive from your data? How will data processing be implemented? Try to minimize the amount of cleanup you have to do by finding cleaned and ready-to-go data sources whenever possible.

- We will need to remove all the data points that have dummy or incorrect values. This is about 63,000 lines.
- We will aggregate all the data by its year instead of the week it was on the Billboard charts.
- We will also need to aggregate the data values into albums - likely by averaging the values of each song in an album.
- Depending on the size of the data, we may minimize the amount of data by reducing the number of years we look at or taking top 100 albums instead of top 200.
- Due to the large size of the dataset, we will likely have to create smaller datafiles separately in Python for each visualization.

Week 3: Storyboard/Sketch/Decide

Storyboard

Hook:

- How has popular music changed over time?
- What are the defining characteristics and trends of music of each decade?

Rising Insights:

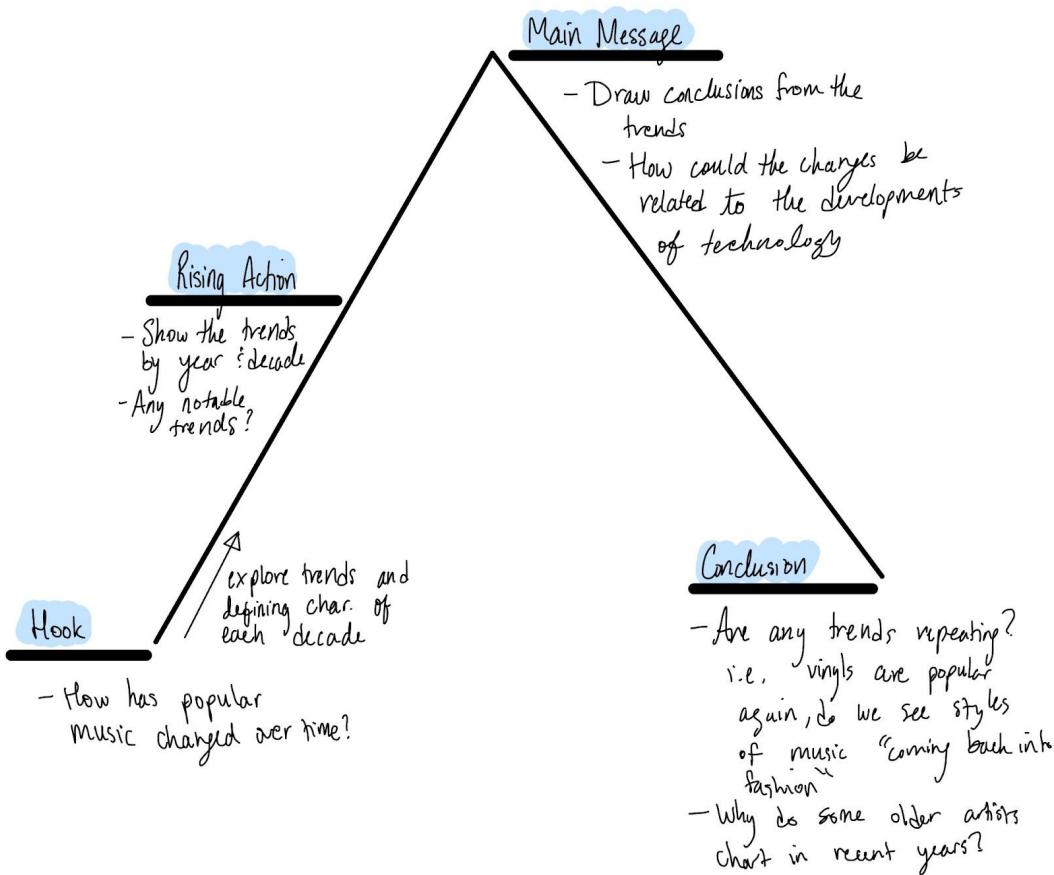
- What are the changes/trends by year and by decade?
 - Averages vs ranges?
- What are some notable trends/changes over time?

Main Message:

- What are the conclusions drawn from these trends/changes in music over time?
- How could these changes be related to the development of technology (i.e. electronic instruments)?

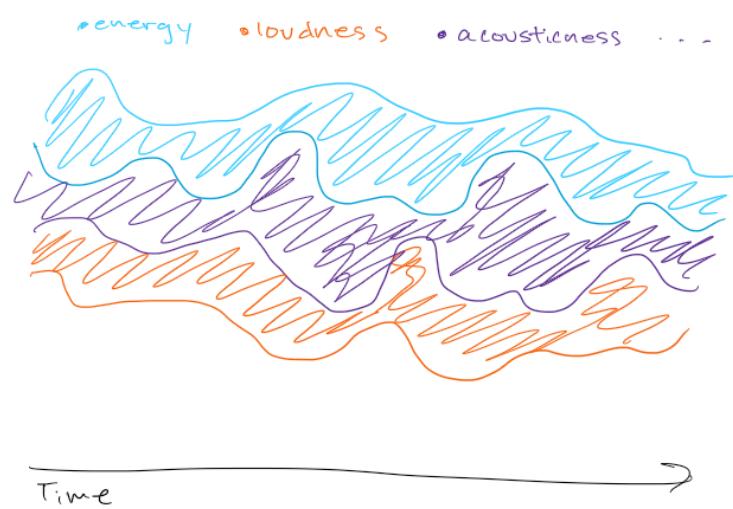
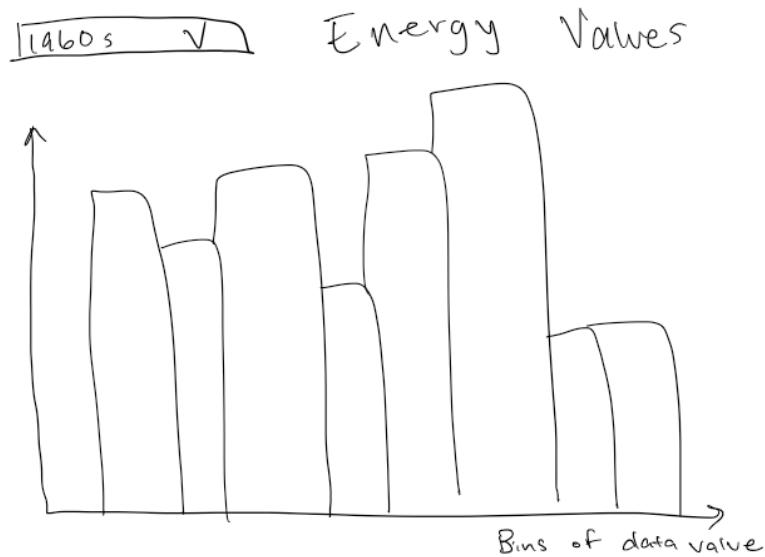
Conclusion:

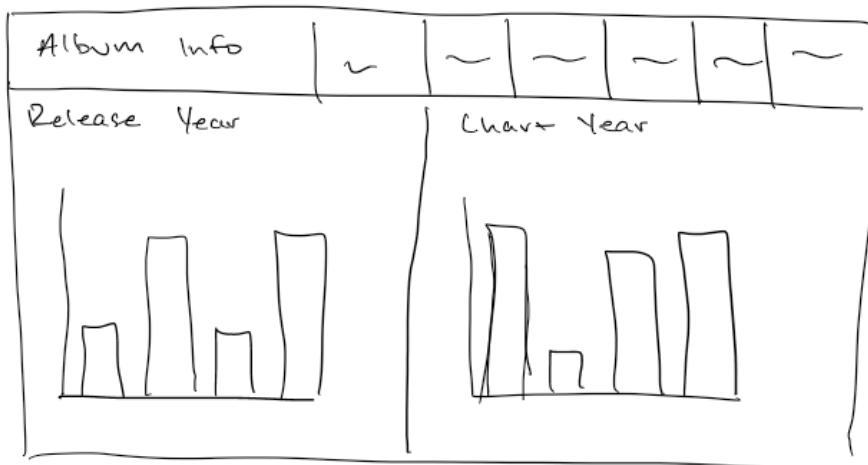
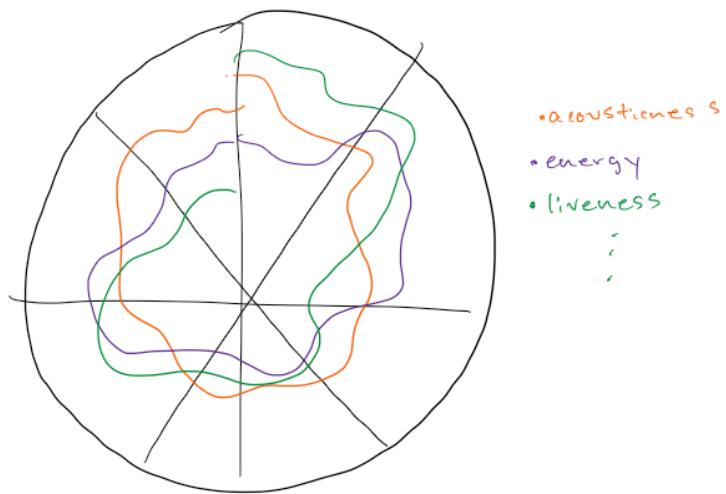
- Are trends in older music showing up again in modern music? For example, vinyls were popular in the 60s and 70s and are coming back now, will the style of music see similar trends of coming “back into fashion”?
- Why are older artists charting in recent years?

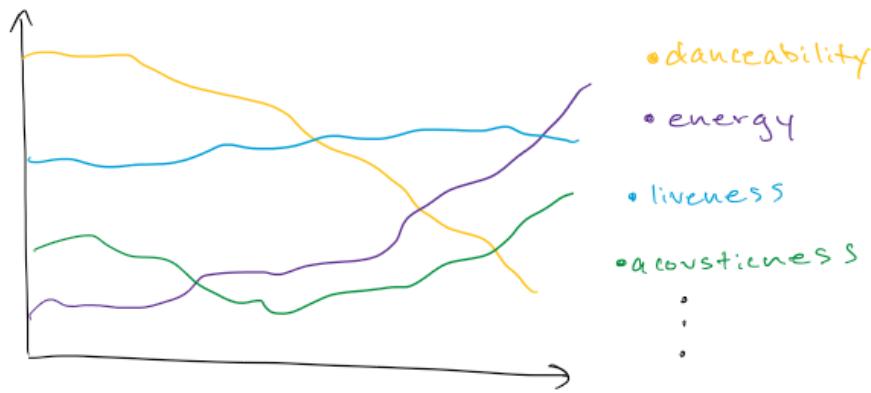


Sketch

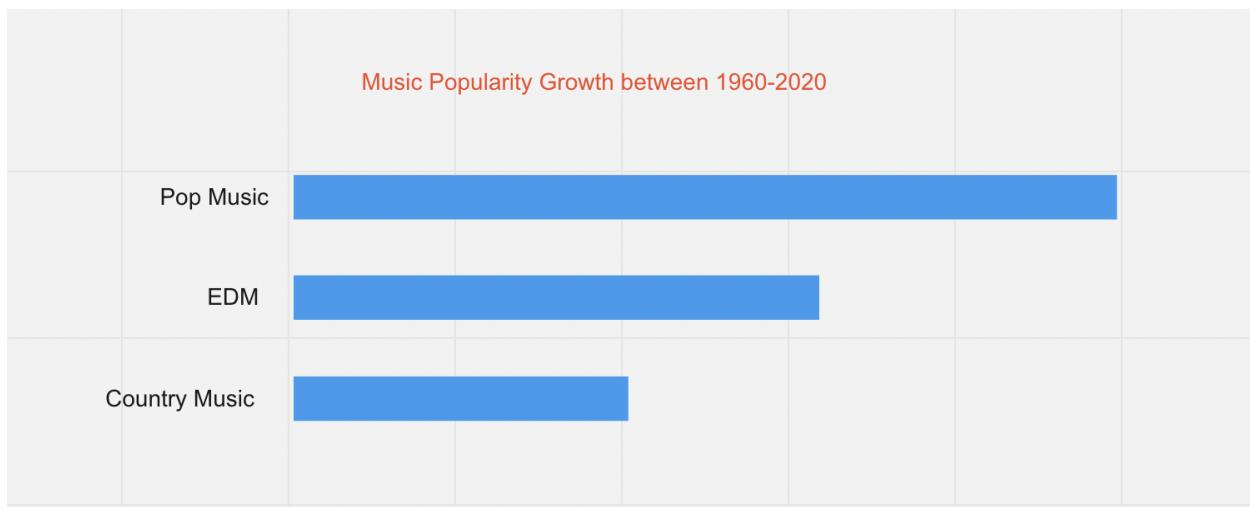
Elizabeth's Sketches



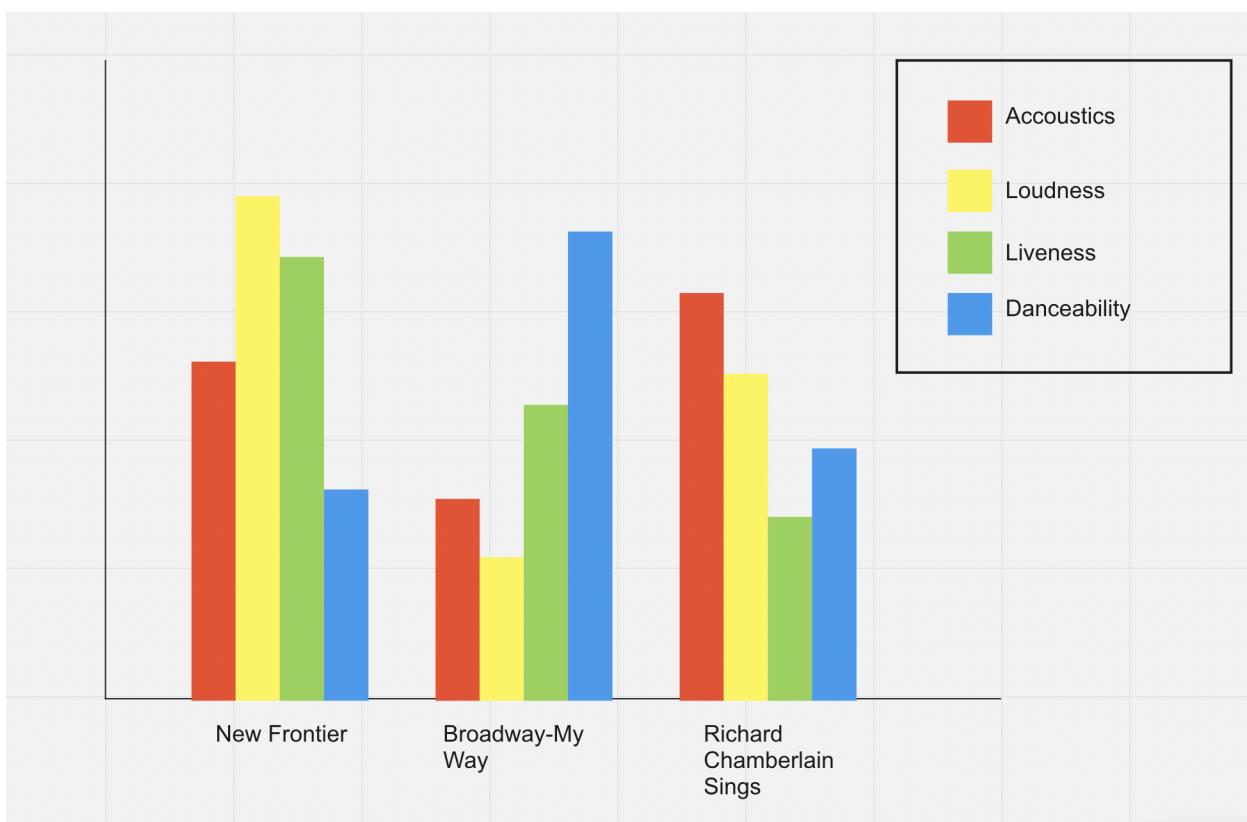
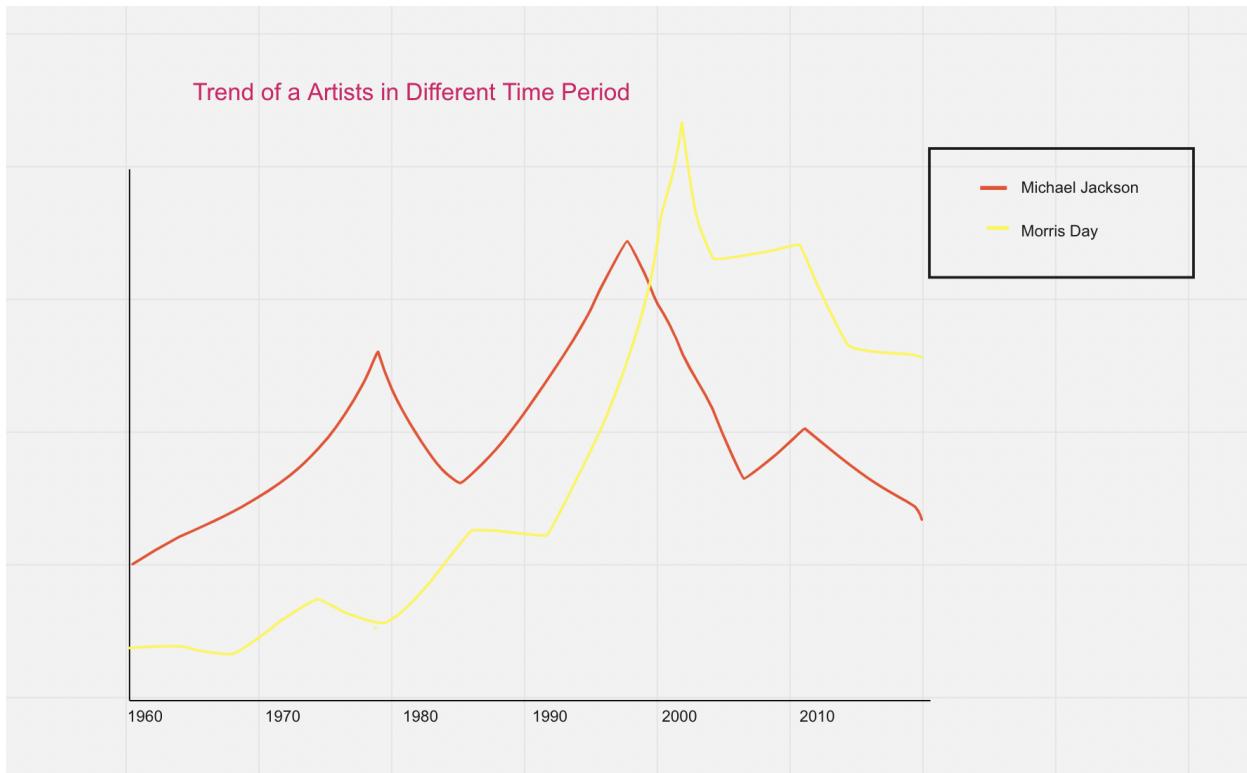




Adwait's Sketches



How the popularity of the music has changed over the years.



Artists having most hits over the period 2000-2020

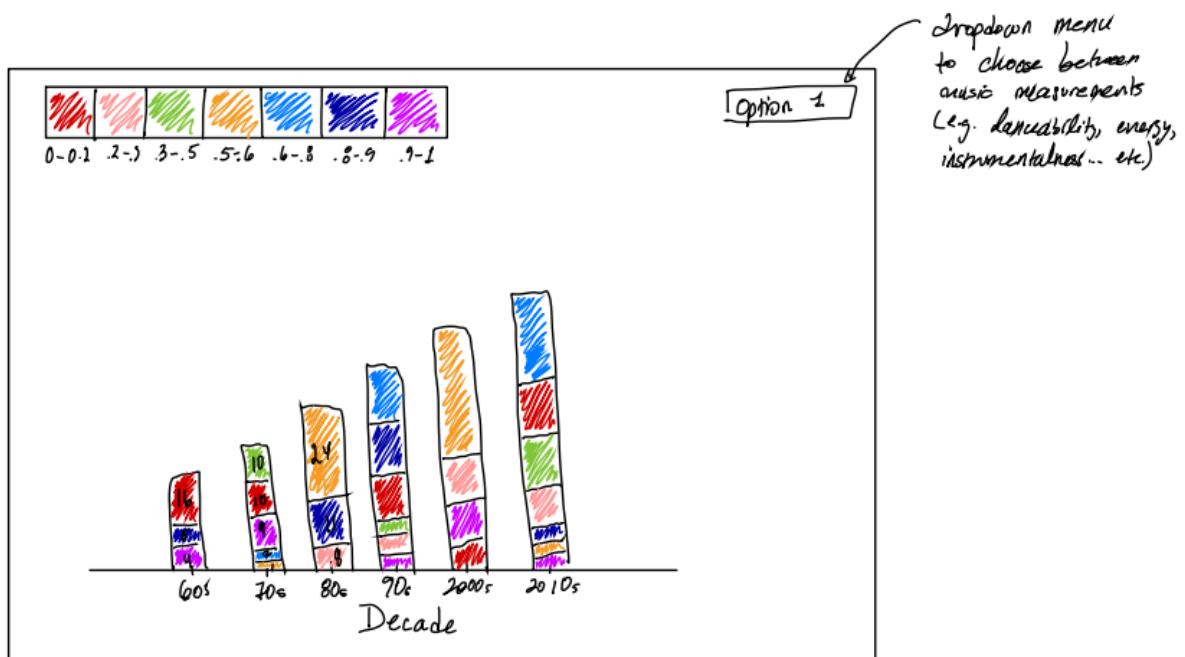
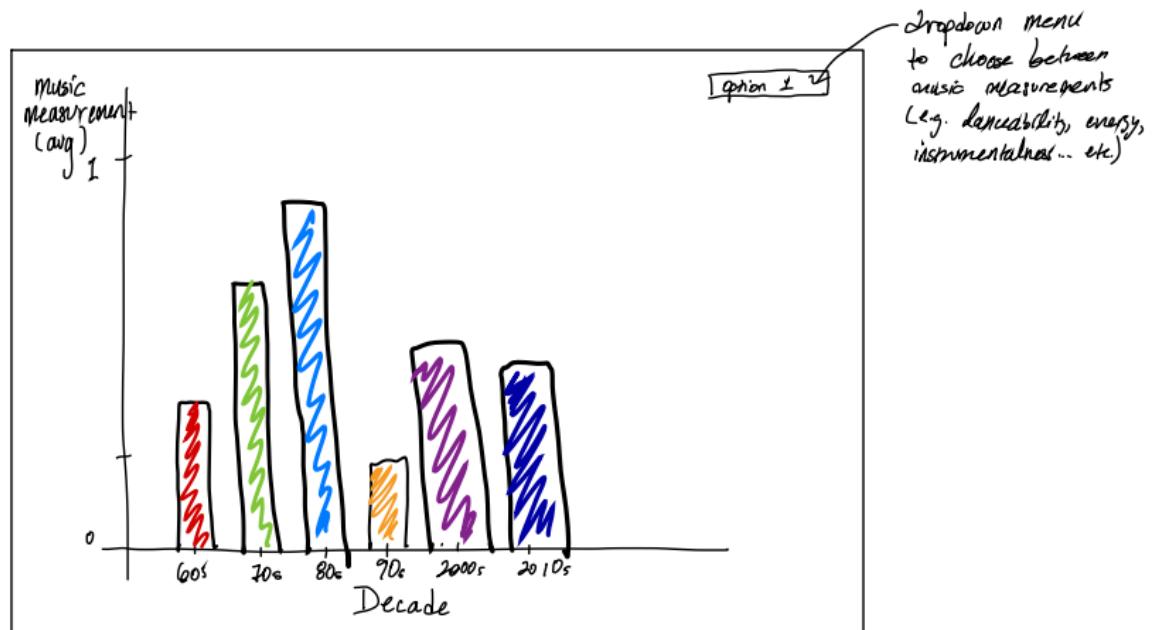


Area Chart for Different Artists
over the period of time

Choose Artist



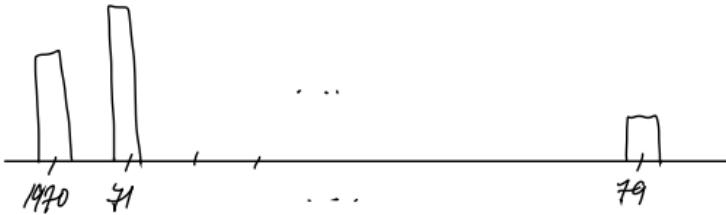
Rebecca's Sketches



Distribution (avg) of
music measurements across a
decade

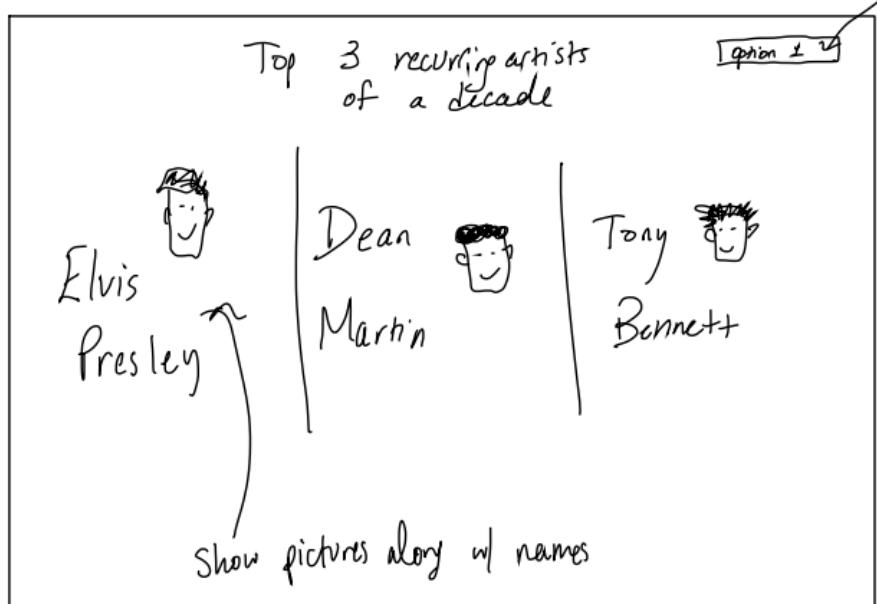
Option 1 2

Dropdown menu
to choose between
music measurements
(e.g. danceability, energy,
instrumentalness .. etc.)



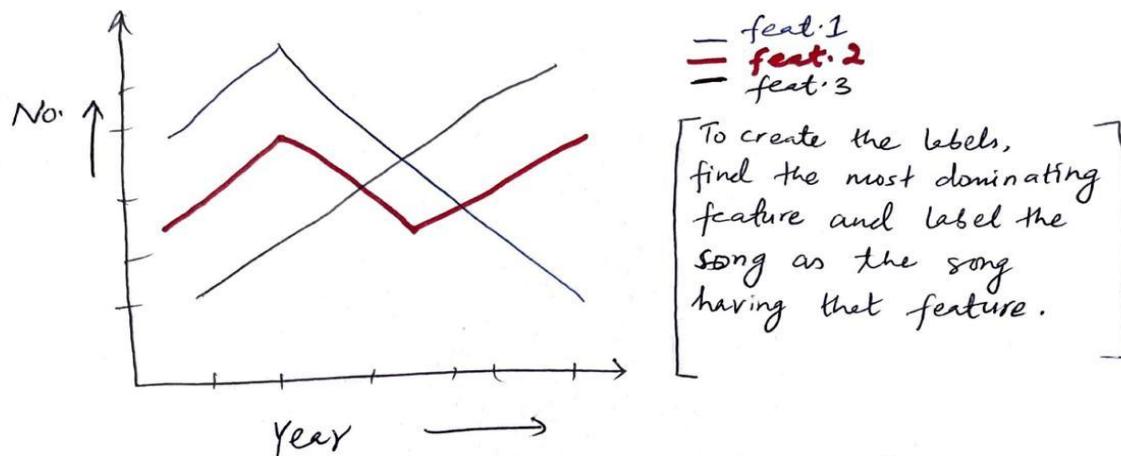
show the top 3 decades w/ the highest scores per category

acousticsness	danceability	Energy		Instrumentalness	Loudness
60s	70s				
90s	80s				
2000s	2010s		..		

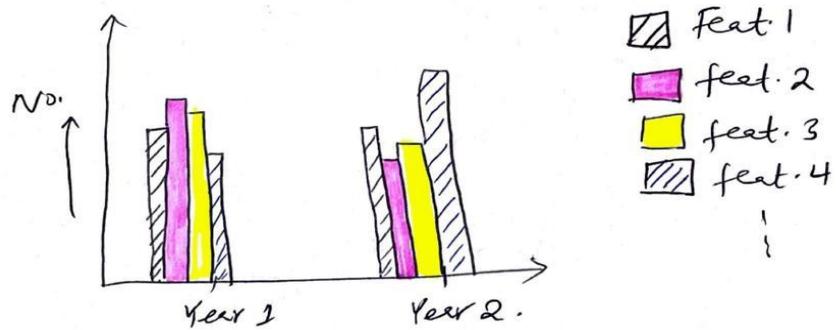


Surendrabikram's Sketches

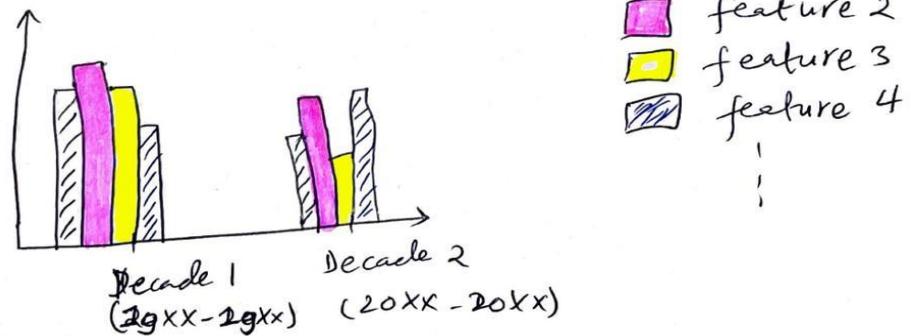
How do the trends change over time?



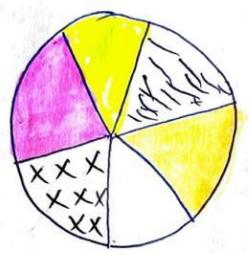
Compare two years. (Years selected from dropdown)



Compare 2 decades as above:



④ Pie chart for features

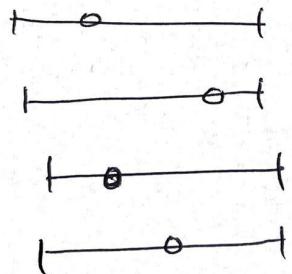


- [white square] feature 1
- [pink square] feature 2
- [yellow square] feature 3
- [light yellow square] feature 4
- [dark yellow square] feature 5.

:

Given the input, which year would the song with user's preference would have charted?

Preferences:



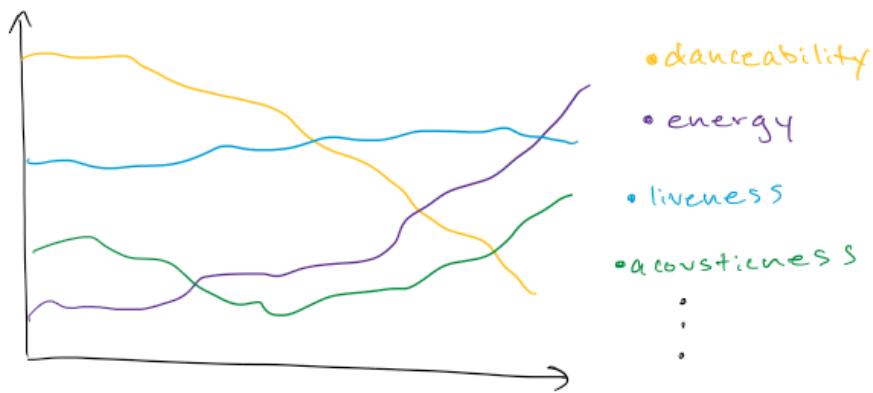
output:

It would have charted in
year XXXX.

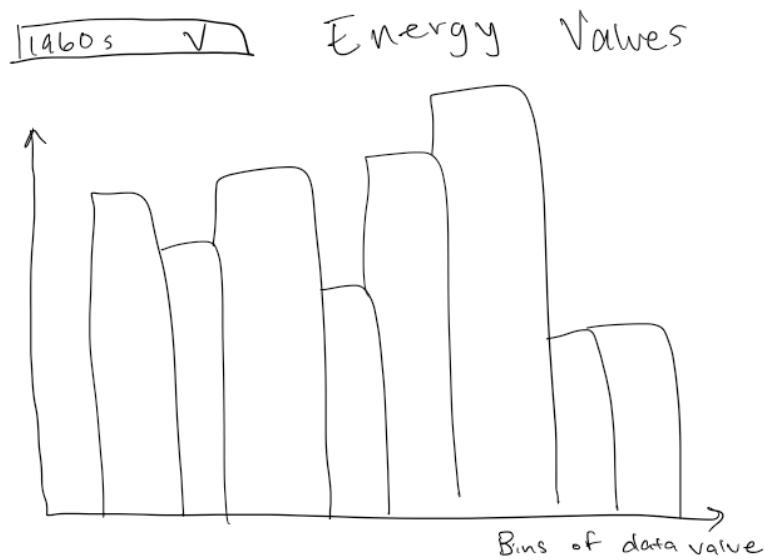
Decide

Hook:

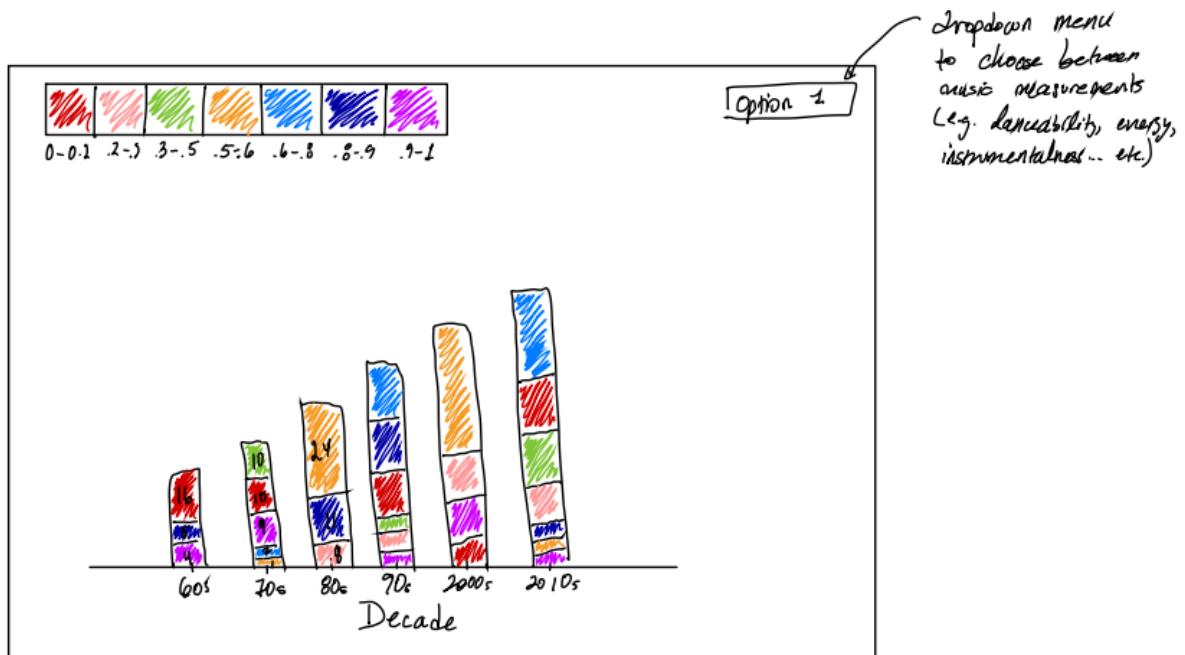
This is a line chart to compare average values over time for each characteristic.



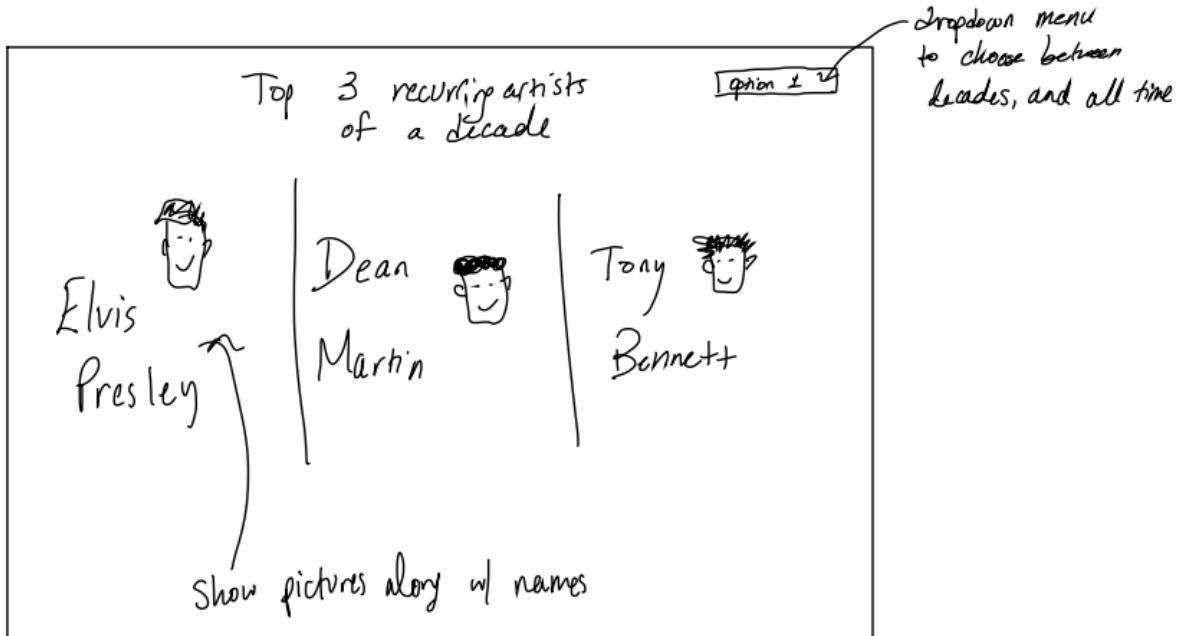
This is a histogram to show the number of albums in a certain range of values (bins) for each decade. The decade and characteristic would be selected from a dropdown menu.



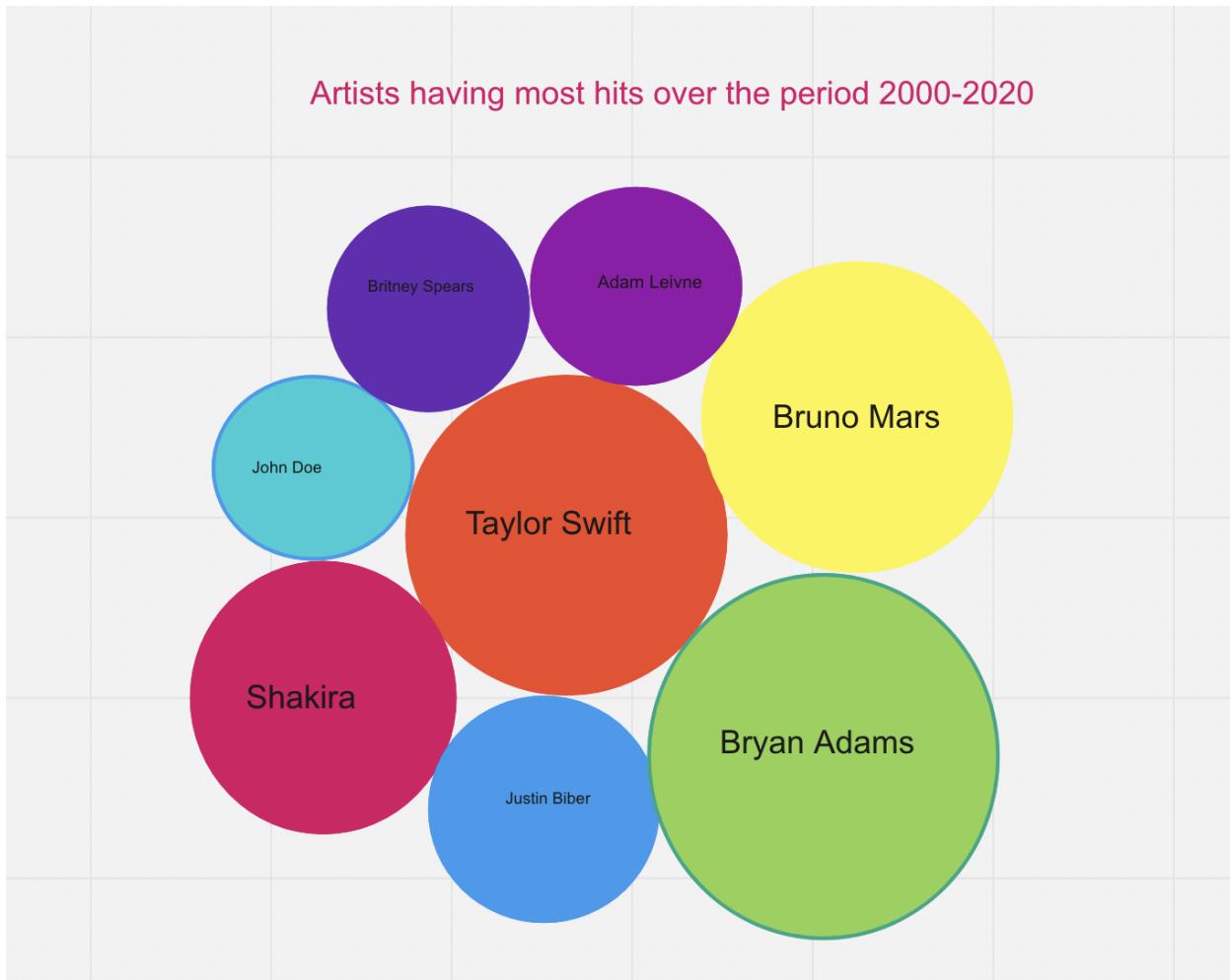
This is a bar chart to show the number of albums in a certain range of values for each characteristic. This could be combined with the above histogram in some way.



Rising Insights:



This would be a visualization of the top three artists in a decade, where the decade is selected from a dropdown menu. There would also be a tooltip for each artist showing the average values of characteristics across all of their albums, as well as the number of albums that they had on the charts.



~~This would show the top artists of each decade, potentially along with their genre to show top genres of the decade. The decade would be selected from a dropdown menu.~~

This would show the top **albums** of each decade, along with their album cover and potentially a tooltip to show more info about the album. Maybe a grid structure? 2 rows of 5 albums each row.

Main Message:

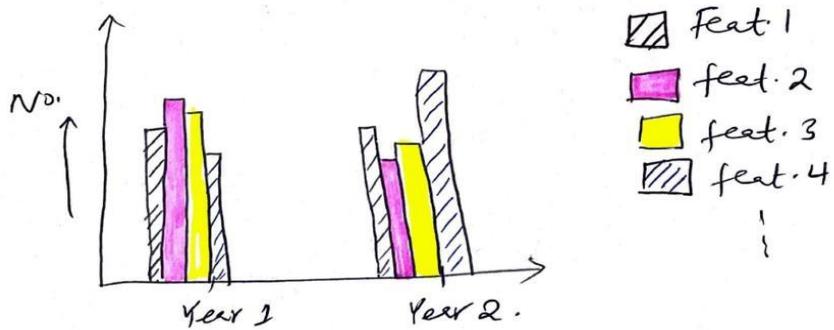
show the top 3 decades w/ the highest scores per category

acoustics	danceability	Energy		Instrumentalness	Loudness
60s	70s				
90s	80s				
2000s	2010s				
			..		

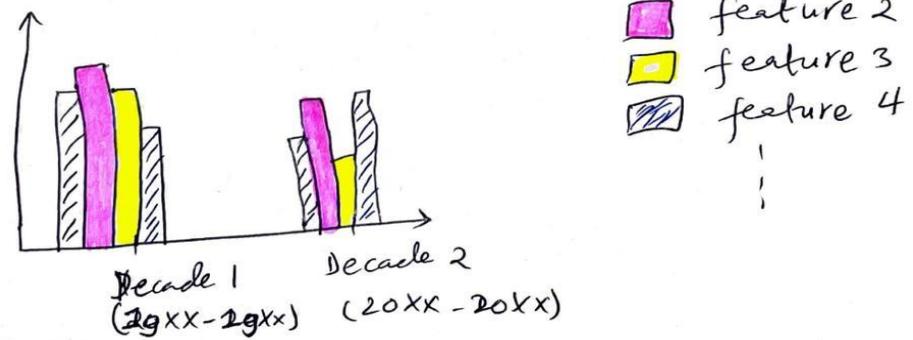
This would show the top three decades with the highest scores per characteristic.

Conclusion:

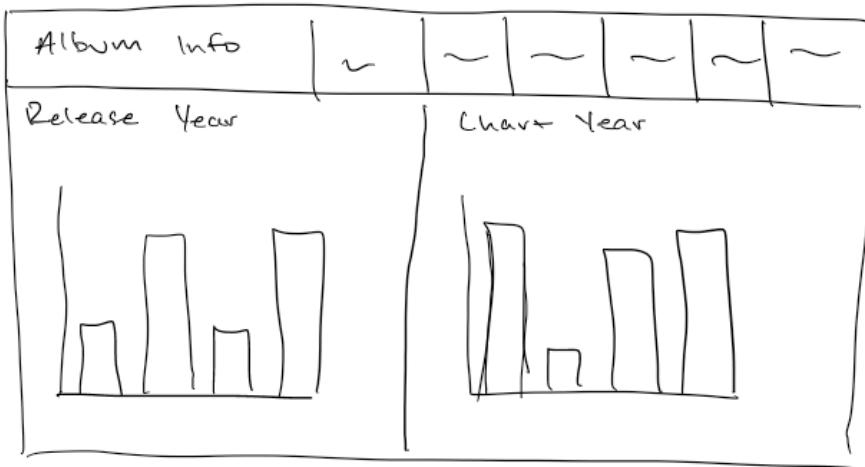
Compare two years. [Years selected from dropdown)



Compare 2 decades as above:



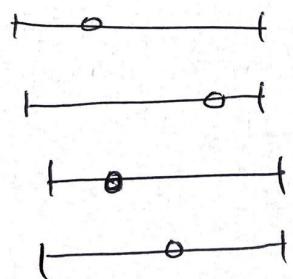
This would be a comparison of the characteristics of music between two years. The years would be selected from a dropdown menu.



This would show information about an album that charted years/decades after it was released. The album info would be in a header at the top, and information about music in the year it was released and the year it charted.

Given the input, which year would the song with user's preference would have charted?

Preferences:



output:

It would have charted in
year XXXX.

This would be a tool for the user to input different values for the music characteristics and it would output a year that has music most similar to those characteristics. Instead of the message "which year would the user's preferences have charted", it would instead be "what range of years has popular music with these characteristics".

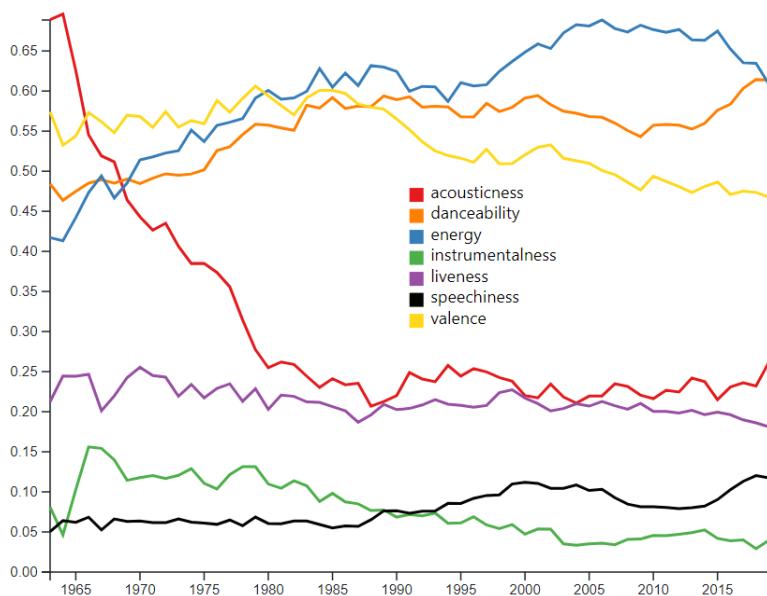
Prototypes

Links

- Original data files: <https://components.one/datasets/billboard-200/>
- Github repo: <https://github.com/AdwaitVT/Guided-Project2>
- Github Pages (complete data story): <https://elizabethc99.github.io/>

Prototypes 1 and 2

Line chart showing sound values over time

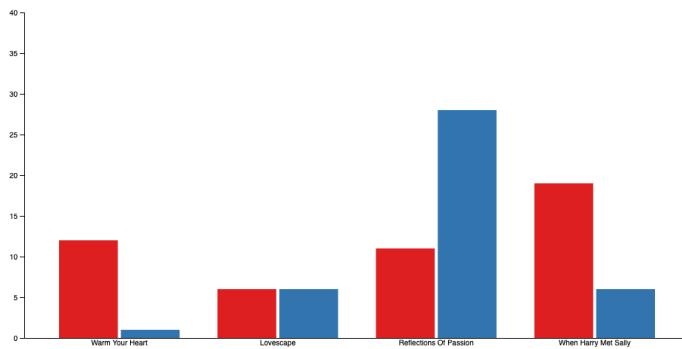


Histogram showing total counts of sound characteristics per decade - user can select a decade from a dropdown box to see a histogram. X axis is the range of values for that characteristic, y axis is counts of songs in that decade.

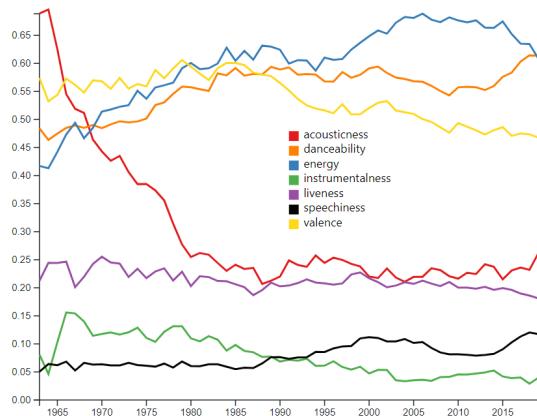
Albums Energy Values

A ranking album's energy and value in a decade

Group by Decade 1970-1980 ▾

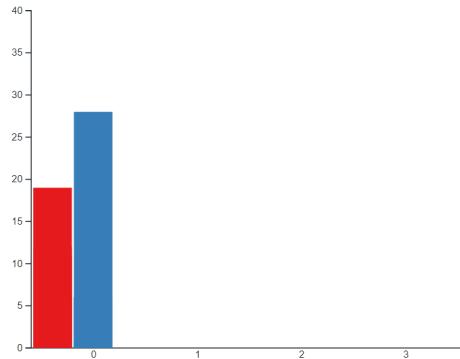


The above two visualizations will be linked - users can click on a characteristic from the line chart to see the related histogram.

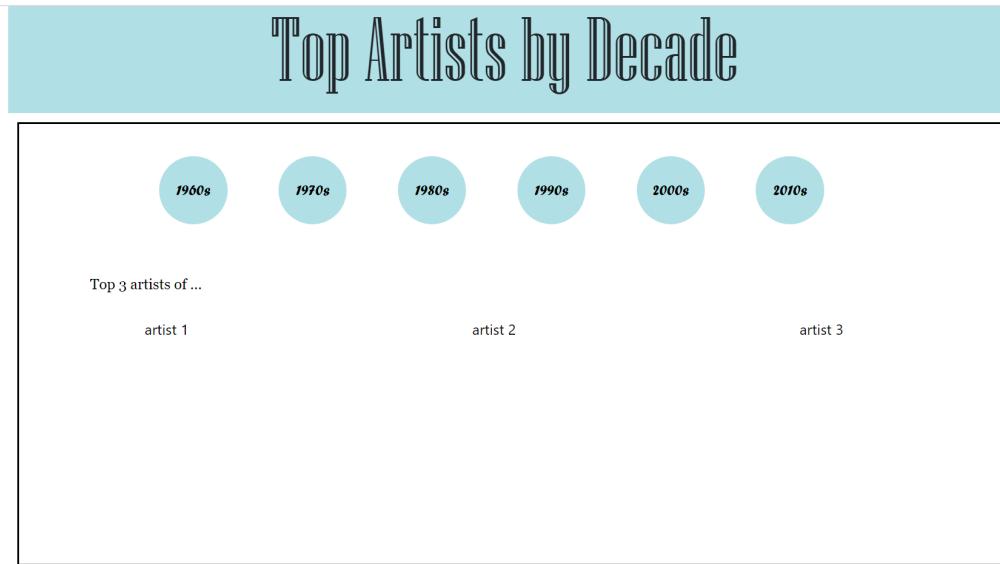


Albums Energy Values

Group by Decade
1970-1980



Visualization to show top artists from each decade. A user can select the decade and see the top three artists. Each artist will include a picture and info about them.



Progress so far:

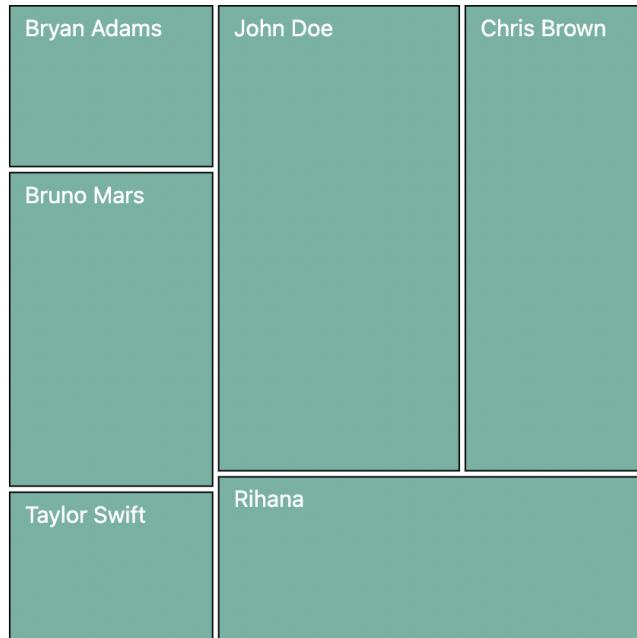
- Buttons are functional in changing the decade and displaying associated text

Finishing steps:

- Add the data for each of the artists per decade to display
- Then work on adding in displaying pictures for each artist
 - Change data displayed to be a tooltip for each artist
- Considering doing top 5 artists instead??

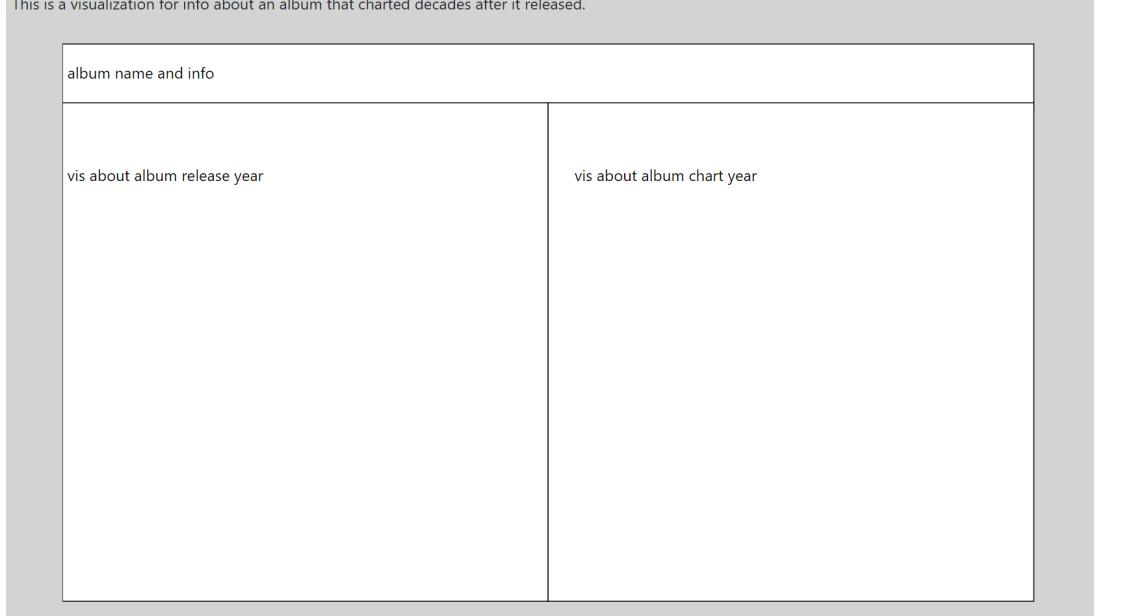
This is a visualization that will eventually show top albums of each decade, based on how many weeks the album was on the charts. The user can select the decade from a dropdown menu. Each square will have a tooltip to show more information about the album.

Popular Artists between 2000-2020

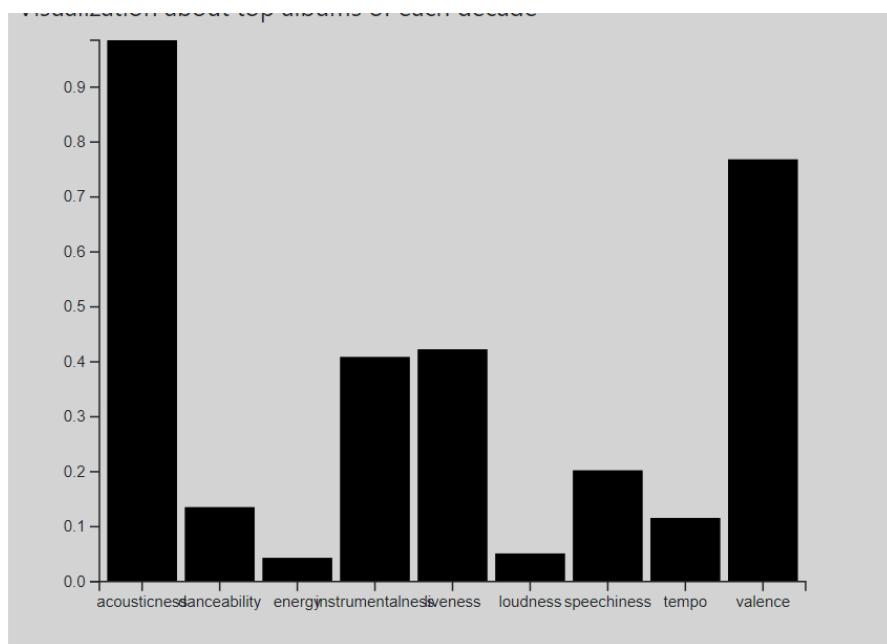


This visualization will show information about albums that charted more than 10 years after its release. The user can select the album from a dropdown menu at the top and see the album info along the header. On the left will be a dual bar chart showing the average sound characteristic values for the release year along with the values for the album. On the right will be the same type of bar chart, but for the year the album charted.

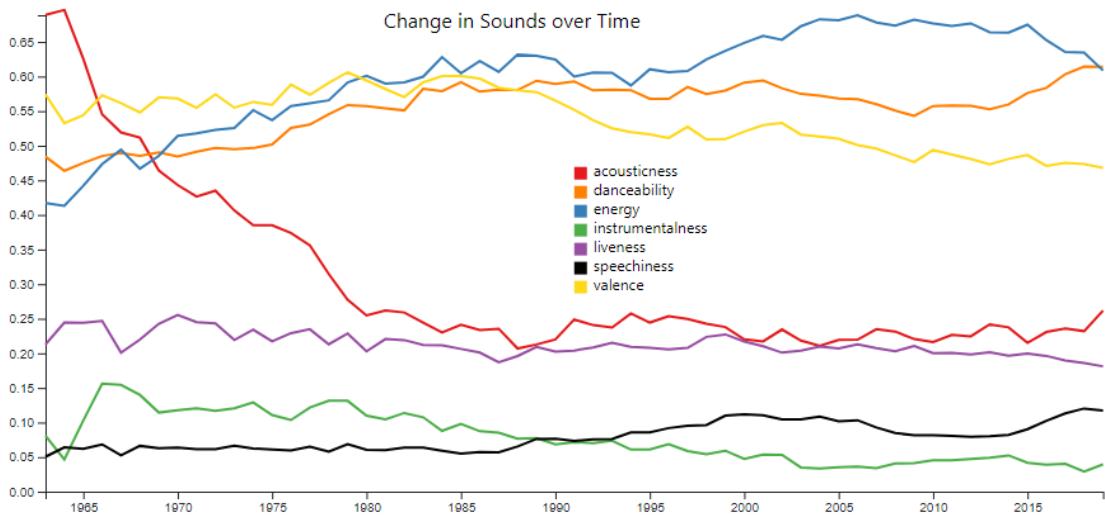
This is a visualization for info about an album that charted decades after it released.



This is a bar chart that will eventually show a comparison between values for two decades.



Prototype 3



This is a completed visualization. It shows the change in sound characteristics over time. It will be linked to the histogram - the user can click on a line to see the related histogram for that characteristic.

Artists of the Decade

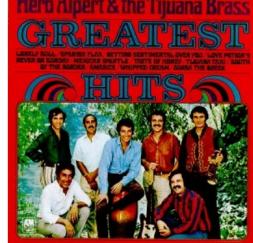
1960s
1970s
1980s
1990s
2000s
2010s



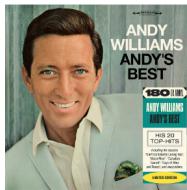
Barbra Streisand



Bill Cosby



Herb Alpert & The Tijuana Brass



Andy Williams

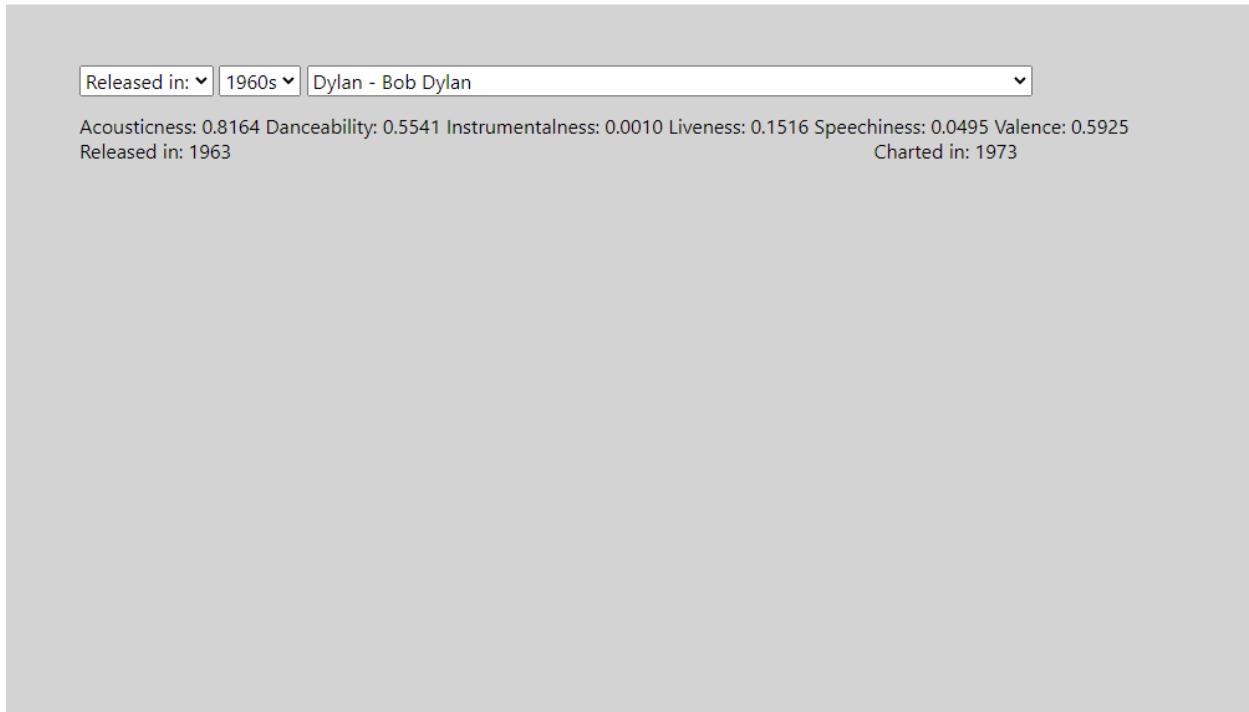


Nat King Cole

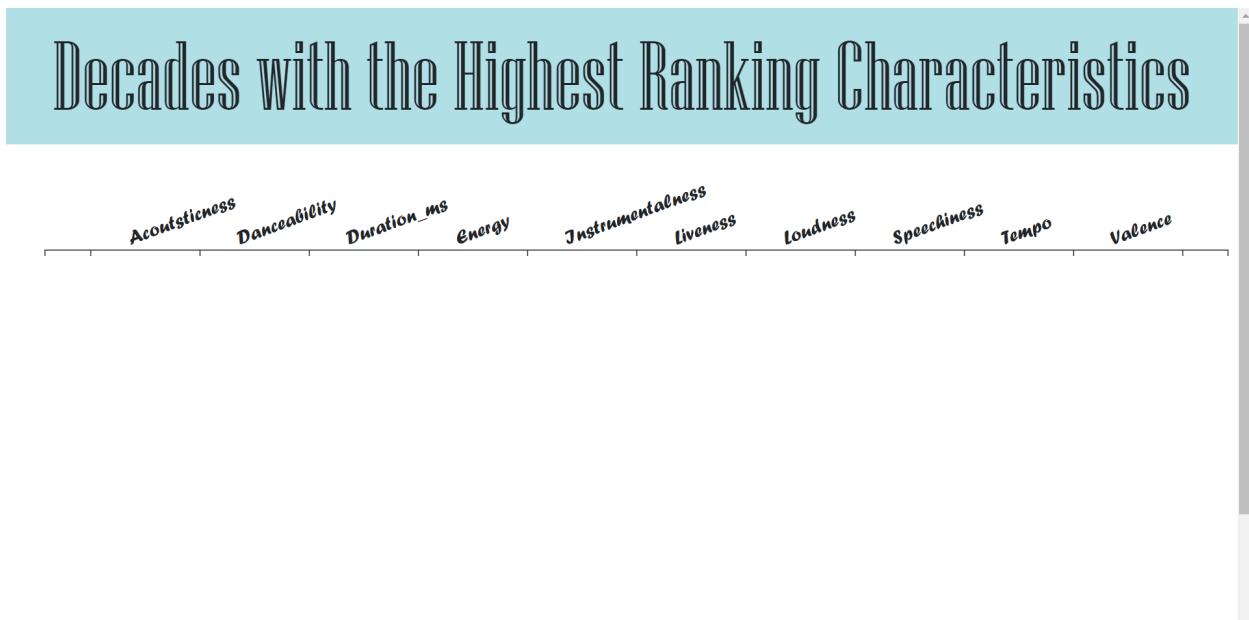
Barbra Streisand

Acousticness: 0.842
 Danceability: 0.319
 Energy: 0.273
 Instrumentalness: 0.002
 Liveness: 0.217
 Loudness: -14.087
 Speechiness: 0.064
 Tempo: 102.291

This is our second completed visualization. The decade buttons can be selected to show the top 5 artists of the decade. Then there is a tool tip feature (shown top right) that appears and changes the displayed data based on when the user hovers over an artist's name.



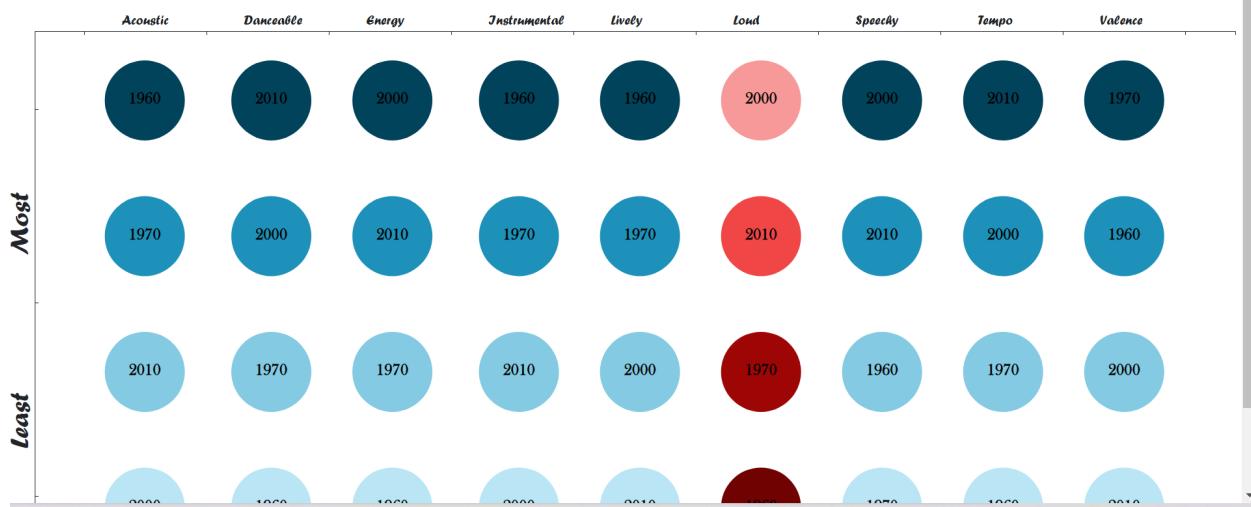
This visualization will also include bar charts that show the values of the album compared to the averages of the decade it was released in and the decade it charted in.



Basic outline has been started for the main message visualization. Need to just add in the top three ranking decades for each characteristic. Still deciding how to visually make it the most appealing. Bubbles? Boxes? Something else?

First Draft:

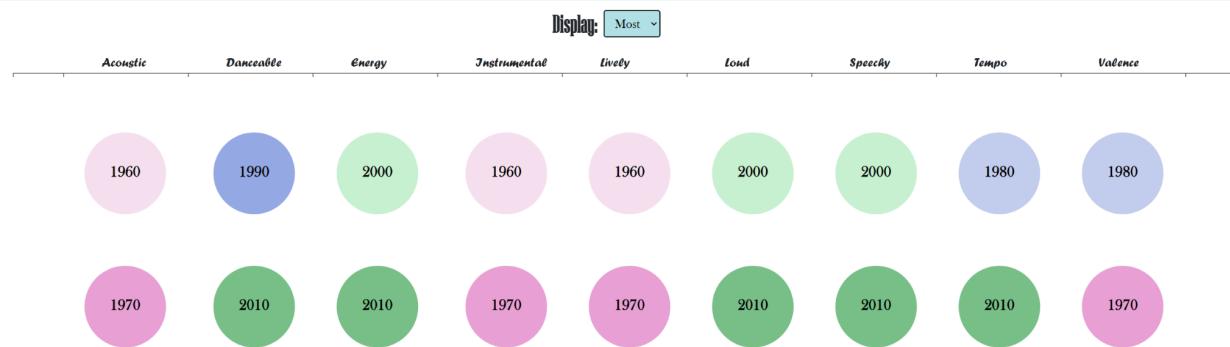
Decades with the Highest Ranking Characteristics



Changing to be a dropdown to show either least or most, and going to change the color scheme to go by decade

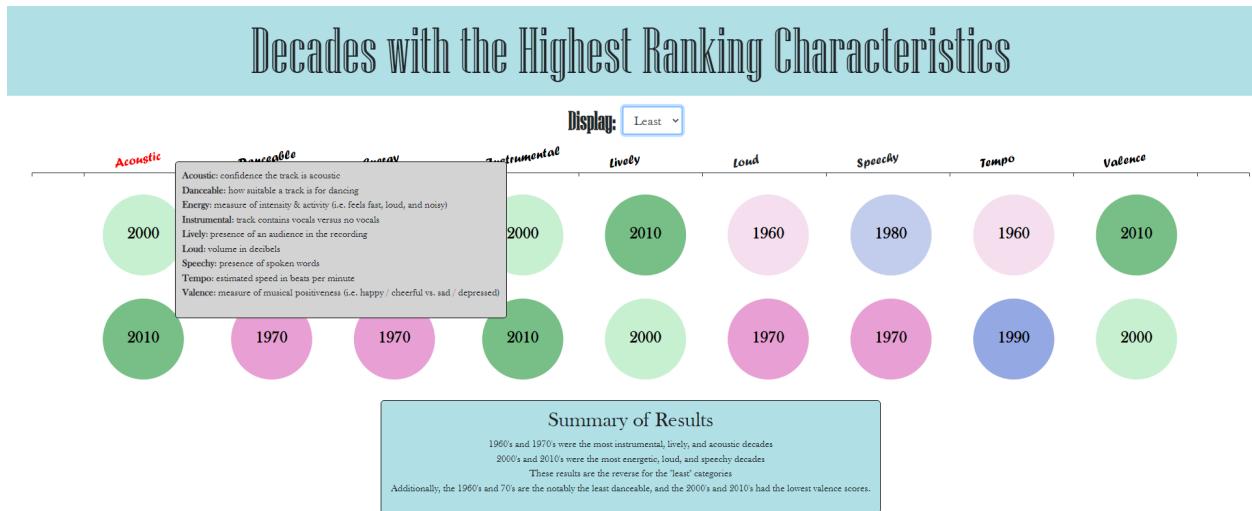
Second draft:

Decades with the Highest Ranking Characteristics

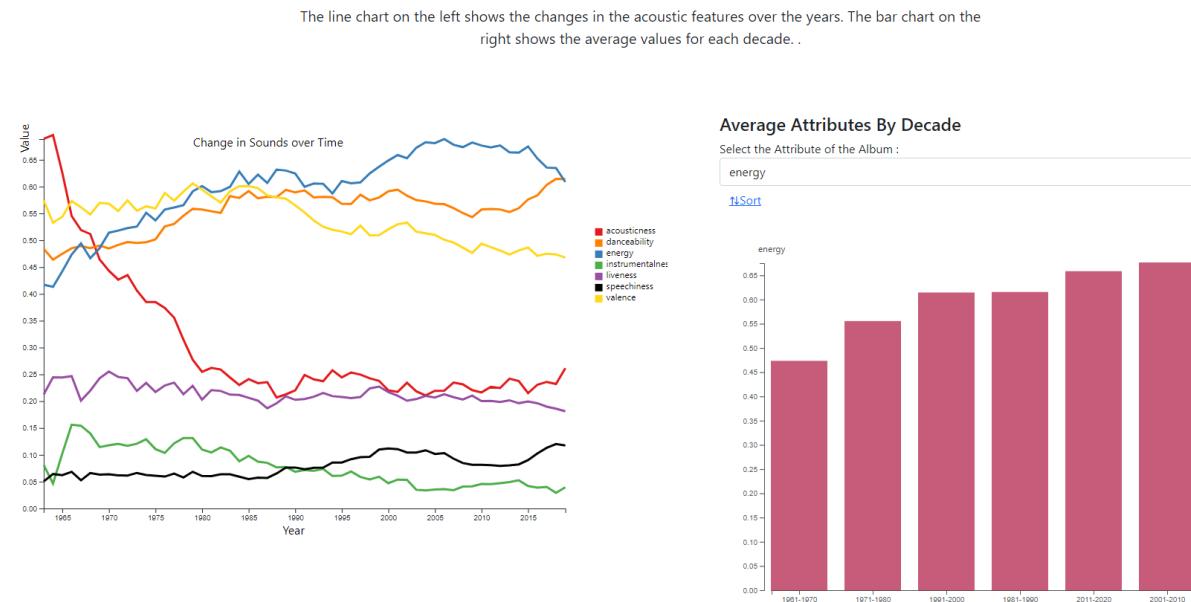


Dropdown changes the display, should probably add a legend? Planning to next add a tool tip so when you hover over the characteristics, it describes what they mean. Maybe add a summary of the table at the bottom (two to three sentences)?

Final Version:



Prototype 4



Some artists personified the trends of their time. Click the decade buttons to display the top five artists by decade. Hover over an artist's name for more details.

Top Artists by Decade

1960s **1970s** **1980s** **1990s** **2000s** **2010s**

Bob Seger & The Silver Bullet Band

Acousticness: 0.127
Danceability: 0.618
Energy: 0.734
Instrumentalness: 0.036
Liveness: 0.95
Loudness: -6.974
Speechiness: 0.109
Tempo: 115.876



Red Hot Chili Peppers



Fleetwood Mac



2Pac



Bob Seger & The Silver Bullet Band



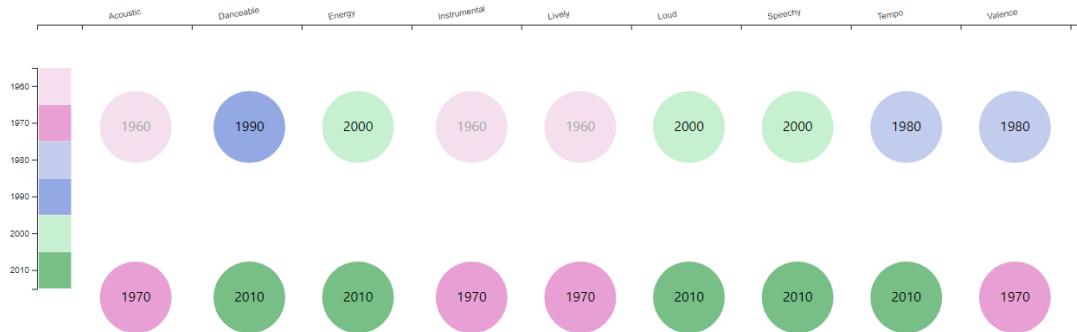
Guns N' Roses

Features of Each Decade

Display:

Most

Visualization showing the top characteristics of each decade



Summary of Results

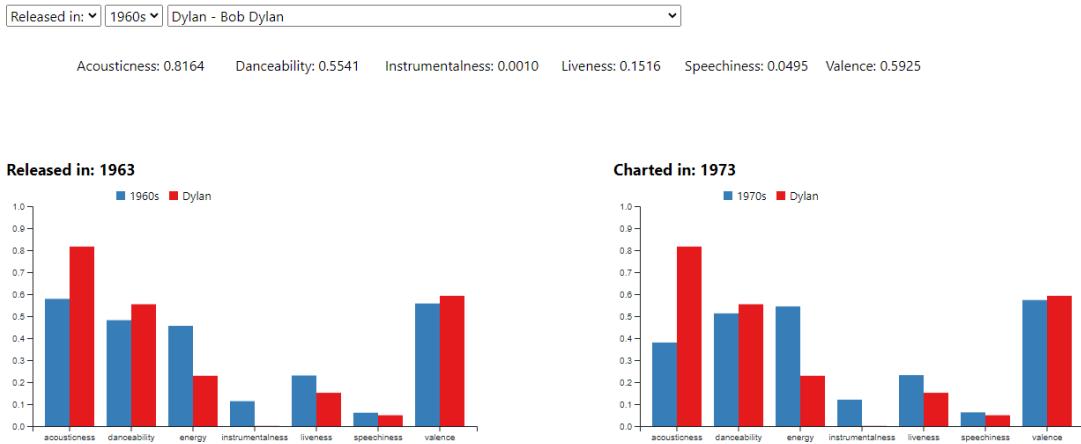
1960's and 1970's were the most instrumental, lively, and acoustic decades

2000's and 2010's were the most energetic, loud, and speechy decades

These results are the reverse for the "least" categories

Additionally, the 1960's and 1970's are notably the least danceable, and the 2000's and 2010's had the lowest valence scores.

Even though trends in music evolved over time, some albums saw a resurgence in popularity a decade or more after they were released.
Choose an album to compare its features across the decades.



These are the final iterations of our visualizations, besides some styling edits and changes based on feedback from the testing session.

Testing

Test 1

Tester Name: Sungwon In
Tester Email: sungwoni@vt.edu

General Observations from the think-aloud study:

1st vis

Accidentally selected button on first vis, didn't know that it was a dropdown option (maybe add an arrow to show a dropdown)

X-axis isn't actually changing on sort

2nd vis:

Tool tip was unclear on what exactly to do

Vis 3:

What is the number in the tooltip?

Vis 4:

Wasn't sure what the tooltip actually was - maybe should change

Didn't use the drop down for most and least

Vis 6:

Make it more clear that there is no data for 2010

Really likes this chart for comparison

Vis 7:

Found this one very interesting

Liked this one the best

Story looks nice

Random thought: add the song when hovering over artist name (or click)

Add our names at the end

Liked it a lot overall

What does the tester like about your data story?

Liked the bar charts visualization because he could select song and singer within different times - also because there is the option for released in and charted in

Liked the first line chart, liked the colors used

What improvements does the tester point out?

Use different colors for the bar chart associated with the line chart

Try to align the text a bit better

What is the y-axis on the line chart (what does 0.5 mean?)

Include the definitions of the terms in the intro

Was the intended key message clear to the tester? Why or why not?

Thought it was clear, all the visualizations and data were clear and understandable. Could tell what we wanted to emphasize.

Did the tester get your next steps or call to action? Why or why not?

Didn't really see a conclusion. It would be nice to include one after the last visualization.

Test 2

Tester Name: Darshan Vekaria

Tester Email: dvekaria@vt.edu

General Observations from the think-aloud study:

First assumption, has to do about music background.

A lot of text for the first slide, maybe highlight some of text that can stand out to the user to capture the essence of what will come.

On the linechart, label is overlapping. Likes the color scheme and the thickness. Line chart is attractive. Transition is smooth within the barchart. Try to show more significance difference between each bar on the barchart.

Tooltip is in the way. Add padding to the tooltip. Placement of the tooltip box, can that go somewhere else? Maybe change it to be all vertical instead of a horizontal layout.

Likes the top 5 albums per decade visualization. Maybe add a back arrow to get back to the decades selection.

Text transition, split it up to not just be one paragraph. Make it so it grabs the audience attention. Fix the legend overlap issue. Summary of results sounded like the end. Reword to make it more of a transition.

Likes the fact that there are a lot of options to explore the side-by-side barchart.

Label the sliders (next to each slider). Highlight the year so it stands out

Add some text to conclude it, can add key findings.

What does the tester like about your data story?

Likes the sliders at the end. It engages the user.

Likes the transitions in the main message graph

And likes the change the top 5 albums

What improvements does the tester point out?

Try to change the text to avoid paragraph based text.

Highlighting parts of the text that are most important.

Go back and check formatting within visualizations.

Was the intended key message clear to the tester? Why or why not?

Perceives we are trying to show different patterns of music over the years. Time series analysis of how music has evolved and that was clear.

Did the tester get your next steps or call to action? Why or why not?

Didn't think of it as a call to action. Saw it more as an exploratory analysis. The last visualization was conclusive.

To Do:

- Add more text - make introduction and conclusion stronger, add text to explain any parts that might be unclear
- Definitions of features - include at the beginning
- Restyling
- Add transitions between sections

Line chart (Elizabeth)

- Add definitions to tooltip
- Fix labels

Bar chart -> make this a histogram (Elizabeth)

- Link to line chart
- Update colors
- Make transitions a bit faster

Top artists (Rebecca)

- Fix tooltip

Top albums (Adwait)

- Add back button
- Add album info on tooltip

Bar chart - compare decades (Suren)

Features of each decade (Rebecca)

- Fix styling to be responsive to screensize
- Update tooltip to show a single definition
- Rework summary text

Sliders (Suren)

- Restyling
- Dropdown?