UNIVERSITY OF NORTH CAROLINA CHARLOTTE

Group: Group No. 9
Course: ITCS-5121 – Information Visualization
Members: Hinduja Bikki, Sriranga Srivathsav Akula, Neeraj Chandel

Visualizing the Relationship Between Musical Metrics and Levels of Depression/Anxiety

What we are thinking in terms of a possible project?
We are trying to create a simple dashboard with multiple interactive visualizations based on the metrics of multivariate music data (like BPM, valence, acousticness, tempo) and their relationships to depression/anxiety levels. Based on the data dimensions checked, we are planning on building scatterplot matrices and choropleth maps (as of now).

What we hope to accomplish by the end of the project?

The project aims to provide a comprehensive understanding of the complex relationship between music and mental health by visualizing and analyzing existing data. This data can be used to identify patterns and correlations between the two. The visualizations can help highlight key trends and patterns and make it easier to identify areas that need further research or intervention.

What datasets we might use?

We have found a few datasets on Kaggle that we might work with:

- 1. Music Production Across The World: https://www.kaggle.com/code/pieca111/music-production-across-the-world
- 2. Spotify Multi-Genre Playlists Data:
- https://www.kaggle.com/datasets/siropo/spotify-multigenre-playlists-data
- 3. Music and Mental Condition:
- https://www.kaggle.com/code/totoro29/music-and-mental-condition/input

How the task distribution is going to be like?
We will each create multiple visualizations based on the dataset and document them respectively. The analysis part will be a group discussion before we finalize on a summary.

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Music Production Across the World

Report | Script | Input | Output | Logs | Comments (3)

18

Show 10 entries

Search:

	artist	listeners_lastfm	scrobbles_lastfm	country	genre
1	Coldplay	5381567	360111850	United Kingdom	rock
2	Radiohead	4732528	499548797	United Kingdom	alternative
3	Red Hot Chili Peppers	4620835	293784041	United States	rock
4	Rihanna	4558193	199248986	United States	pop
5	Eminem	4517997	199507511	United States	hip-hop
6	The Killers	4428868	208722092	United States	indie
7	Kanye West	4390502	238603850	United States	hip-hop
8	Nirvana	4272894	222303859	United States	grunge
9	Muse	4089612	344838631	United Kingdom	alternative rock
10	Queen	4023379	191711573	United Kingdom	classic rock

alternative_music_data.csv (792.79 kB)

Detail | Compact | Column

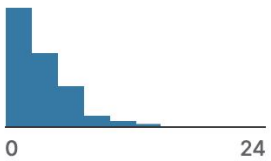
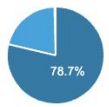
10 of 22 columns

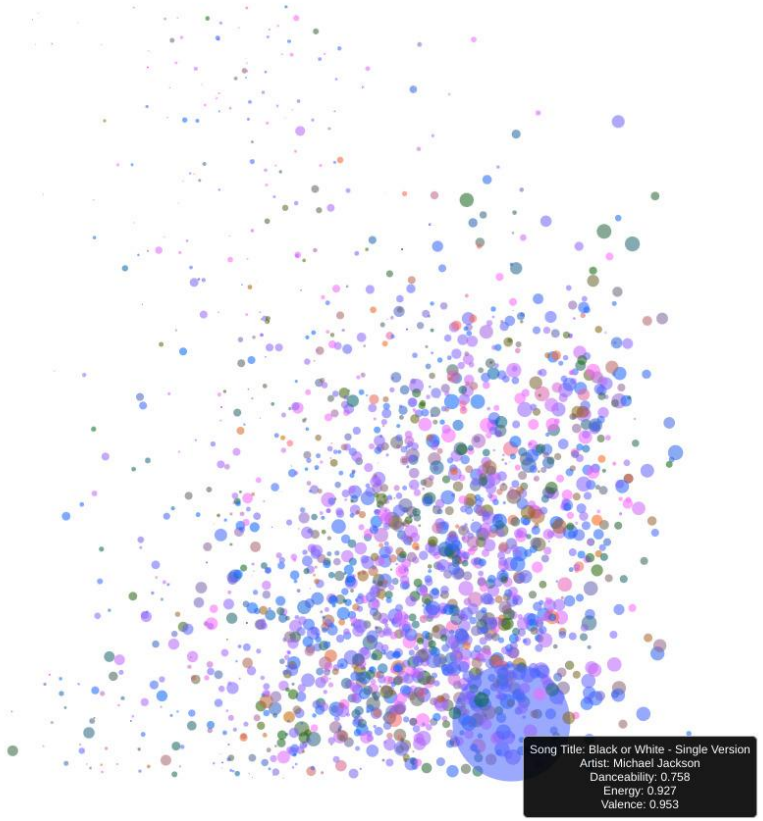
Artist Name	Track Name	Popularity	Genres	Playlist	danceability
Band/Artist name	Track/Song name	Spotify track popularity rating	Artist's genres	Track's playlist of origin	Spotify audio feature
1489 unique values	1966 unique values	0 – 89	[] 12%; ['neo-psychedelic'] 1%; Other (1887) 87%	New Alt-Rock Mixta... 5%; Modern Eclectic 5%; Other (1963) 91%	0.06 – 0.98
James	Laid	66	['britpop', 'madchester', 'new wave', 'new wave pop', 'permanent wave', 'pop rock', 'rock']	Alternative 90s	0.457
grandson	In Over My Head	60	['modern alternative rock', 'modern rock', 'rock']	Alternative Beats	0.582
Foals	On The Luna	51	['alternative dance', 'indie rock', 'modern alternative rock', 'modern rock', 'new rave', 'oxford in...	Alternative 10s	0.525
Longpigs	She Said	47	['britpop', 'sheffield indie']	Alternative 90s	0.21
Beastie Boys	Sure Shot	57	['alternative rock', 'east coast hip hop', 'golden age hip hop', 'hip hop', 'old school hip	Alternative 90s	0.692

Music and Mental Condition

Notebook | Input | Output | Logs | Comments (13)

27

Primary streamin...	Hours per day	While working	Instrumentalist	Composer
Respondent's primary streaming service	Number of hours the respondent listens to music per day	Does the respondent listen to music while studying/working?	Does the respondent play an instrument regularly?	Does the respond compose music?
Spotify 62% YouTube Music 13% Other (184) 25%		 true 579 79% false 154 21% [null] 3 0%	 true 235 32% false 497 68% [null] 4 1%	 tr 1 fa 6 [r 1
Spotify	3	Yes	Yes	Yes
Pandora	1.5	Yes	No	No
Spotify	4	No	No	No
YouTube Music	2.5	Yes	No	Yes
Spotify	4	Yes	No	No
Spotify	5	Yes	Yes	Yes
YouTube Music	3	Yes	Yes	No
Spotify	1	Yes	No	No


Song Title: Black or White - Single Version
Artist: Michael Jackson
Danceability: 0.758
Energy: 0.927
Valence: 0.953

A Quick Recap

Problem Statement:

By displaying and examining existing data, the initiative seeks to provide a thorough understanding of the complex relationship between music and mental health. To find patterns and relationships between the two, use this data. The visualizations might make it easier to spot areas that require additional research or intervention by highlighting important trends and patterns.

Progress (so far):

- Data Preprocessing - cleaned multiple datasets and merged them.
- Visualization(s): To find correlations between various metrics (through mutliple genres of music), we built scatterplot matrices.
- Currently adding interactive individual scatter plots for each genre (by plotting two metrics at a time).

Data Pre-processing:

```
data = pd.read_csv('./mxmh_survey_results.csv')
```

```
data.head()
```

	Timestamp	Age	Primary streaming service	Hours per day	While working	Instrumentalist	Composer	Fav genre	Exploratory	Foreign languages	...	Frequency [R&B]	Frequency [Rap]	Frequency [Rock]	Frequency [Video game music]	Anxiety	Depression	Insomnia	OCD	D
0	8/27/2022 19:29:02	18.0	Spotify	3.0	Yes	Yes	Yes	Latin	Yes	Yes	...	Sometimes	Very frequently	Never	Sometimes	3.0	0.0	1.0	0.0	0
1	8/27/2022 19:57:31	63.0	Pandora	1.5	Yes	No	No	Rock	Yes	No	...	Sometimes	Rarely	Very frequently	Rarely	7.0	2.0	2.0	1.0	0
2	8/27/2022 21:28:18	18.0	Spotify	4.0	No	No	No	Video game music	No	Yes	...	Never	Rarely	Rarely	Very frequently	7.0	7.0	10.0	2.0	0
3	8/27/2022 21:40:40	61.0	YouTube Music	2.5	Yes	No	Yes	Jazz	Yes	Yes	...	Sometimes	Never	Never	Never	9.0	7.0	3.0	3.0	0
4	8/27/2022 21:54:47	18.0	Spotify	4.0	Yes	No	No	R&B	Yes	No	...	Very frequently	Very frequently	Never	Rarely	7.0	2.0	5.0	9.0	0

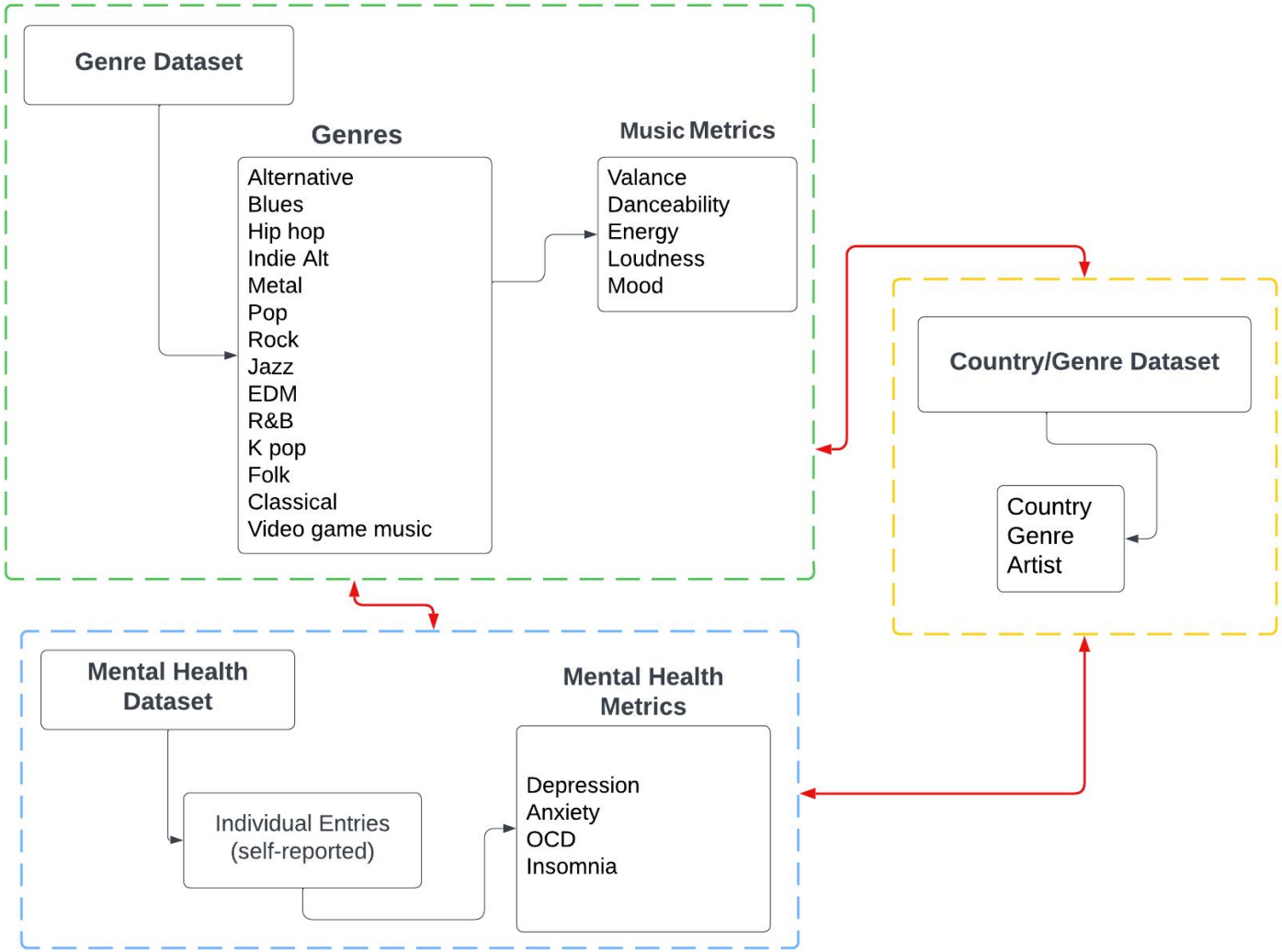
5 rows × 33 columns

```
data.drop(data.loc[:, ~data.columns.isin(['Music effects', 'Anxiety', 'Depression', 'OCD', 'Insomnia', 'Fav genre'])], axis=1, inplace=True)
data['Music effects'] = data['Music effects'].fillna(data['Music effects'].mode()[0])
```

```
data.head()
```

	Fav genre	Anxiety	Depression	Insomnia	OCD	Music effects
0	Latin	3.0	0.0	1.0	0.0	Improve
1	Rock	7.0	2.0	2.0	1.0	Improve
2	Video game music	7.0	7.0	10.0	2.0	No effect
3	Jazz	9.0	7.0	3.0	3.0	Improve
4	R&B	7.0	2.0	5.0	9.0	Improve

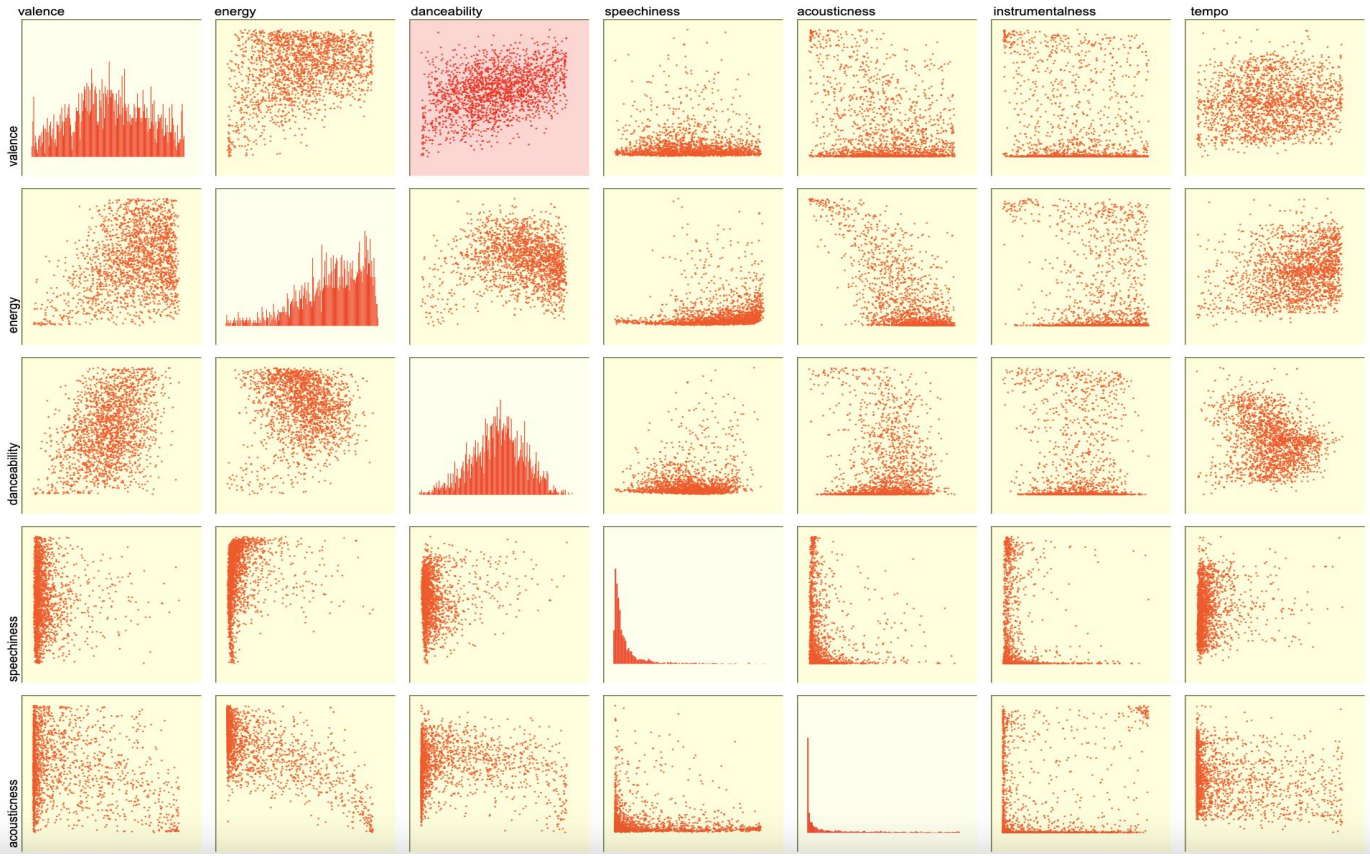
Data Flowchart



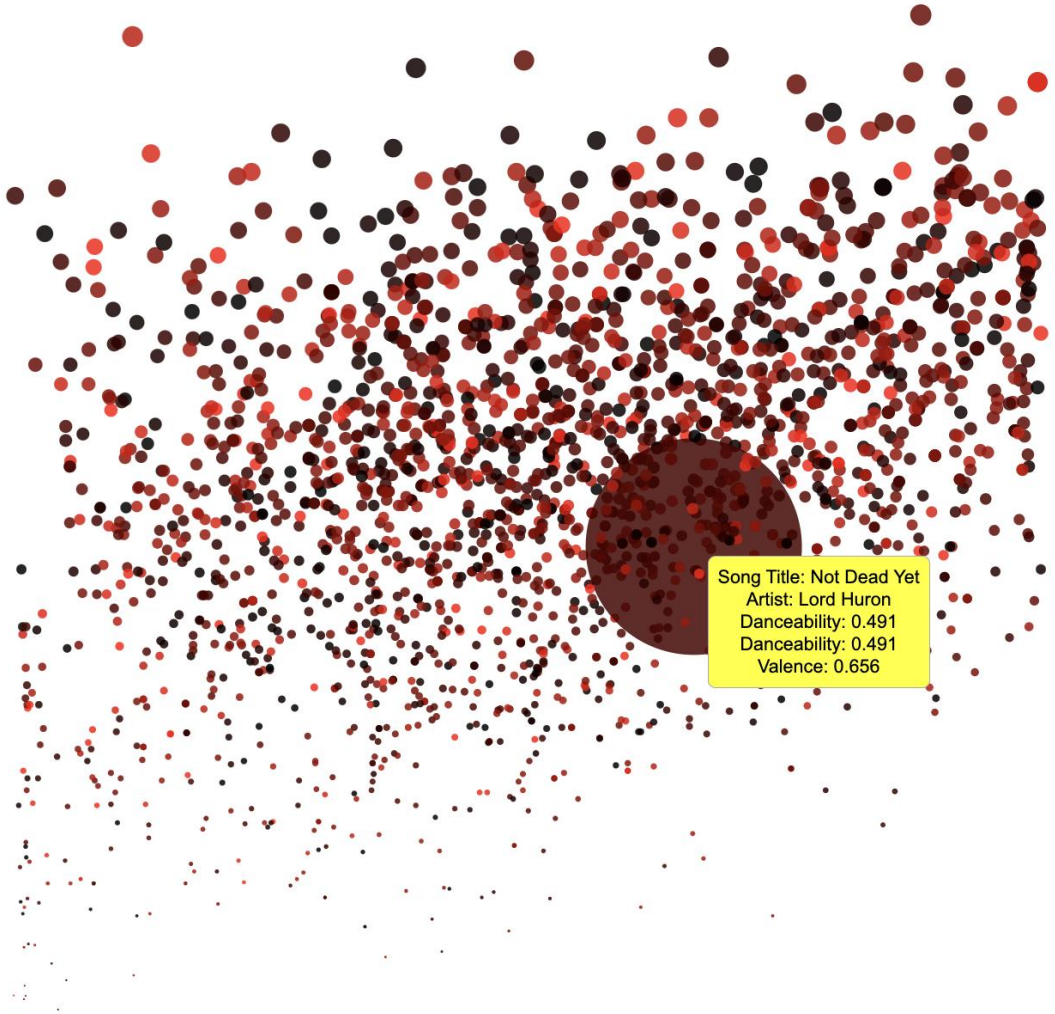
Scatterplots by Genres

Click:

- Alternative
- Blues
- Hip/Hop
- Indie Alt
- Metal
- Pop
- Rock



Valence vs. Danceability



To Do:

- Data linking (musical metrics and mental health metric)
- Stacked bar charts for mental health metrics
- Choropleth Map (based on genre, mental health)

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Group 9
Title: **Music and Mental Health**

Progress (so far):

Review 1:

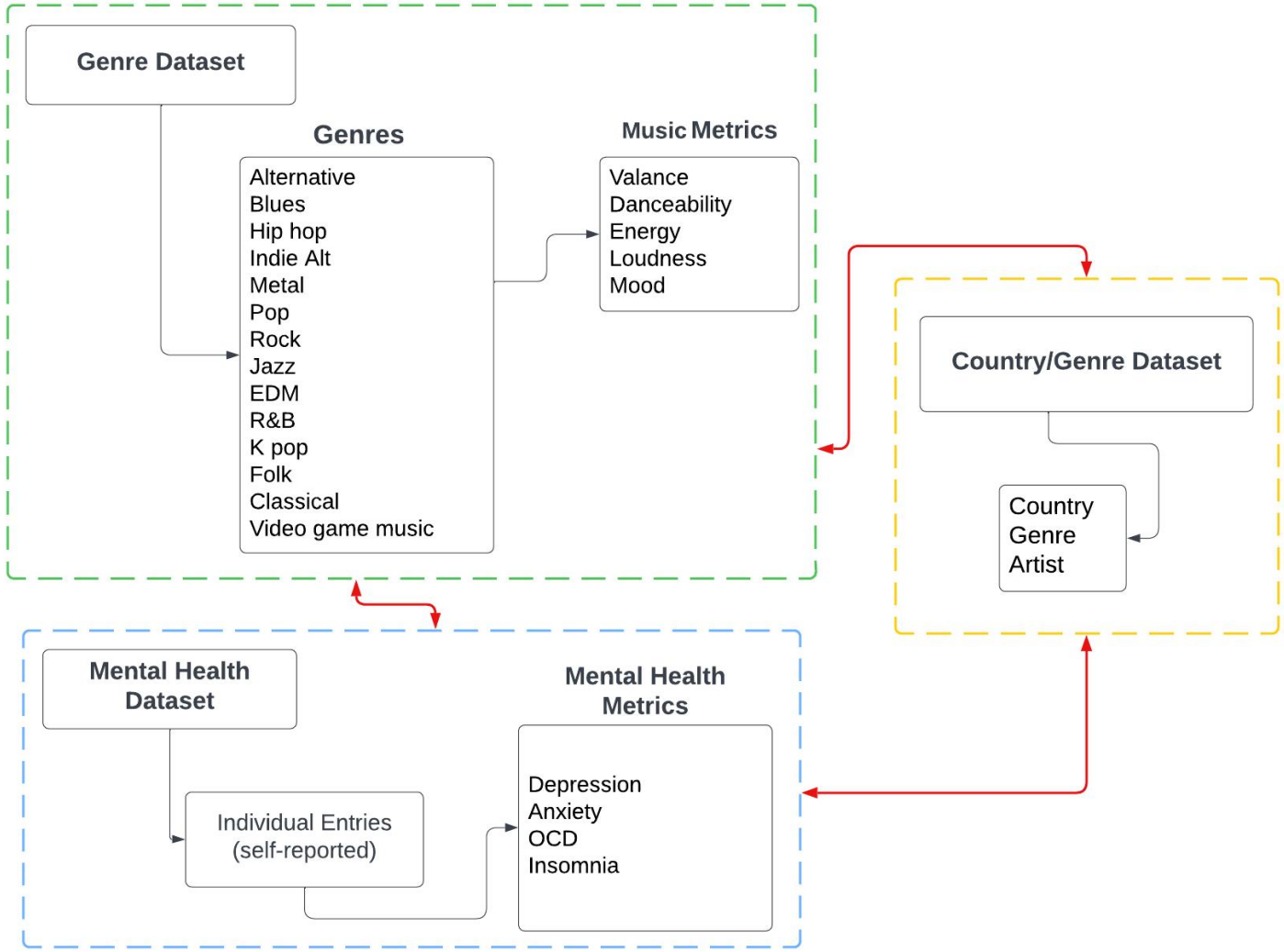
- Data Pre-processing - cleaned multiple datasets and merged them.
- Visualization(s): To find correlations between various metrics (through multiple genres of music), we built scatter-plot matrices.
- Currently added interactive individual scatter plots for each genre (by plotting two metrics at a time).

Progress (so far):

Review 2:

- Performed Analysis on Mental Health Dataset
- Linked Music and Mental Health Dataset based on genre
- Visualization(s): To find correlations between mental health conditions vs genres, we built stacked bar-charts.
- Currently adding interactive visualizations based on the music effect it has on the person (Improve, Worsen, No Effect).

Datasets


Genre Dataset
Genres
Alternative
Blues
Hip hop
Indie Alt
Metal
Pop
Rock
Jazz
EDM
R&B
K pop
Folk
Classical
Video game music
Music Metrics
Valance
Danceability
Energy
Loudness
Mood
Country/Genre Dataset
Country
Genre
Artist
Mental Health Dataset
Individual Entries (self-reported)
Mental Health Metrics
Depression
Anxiety
OCD
Insomnia

Scatterplots by Genres

Click:

- Alternative
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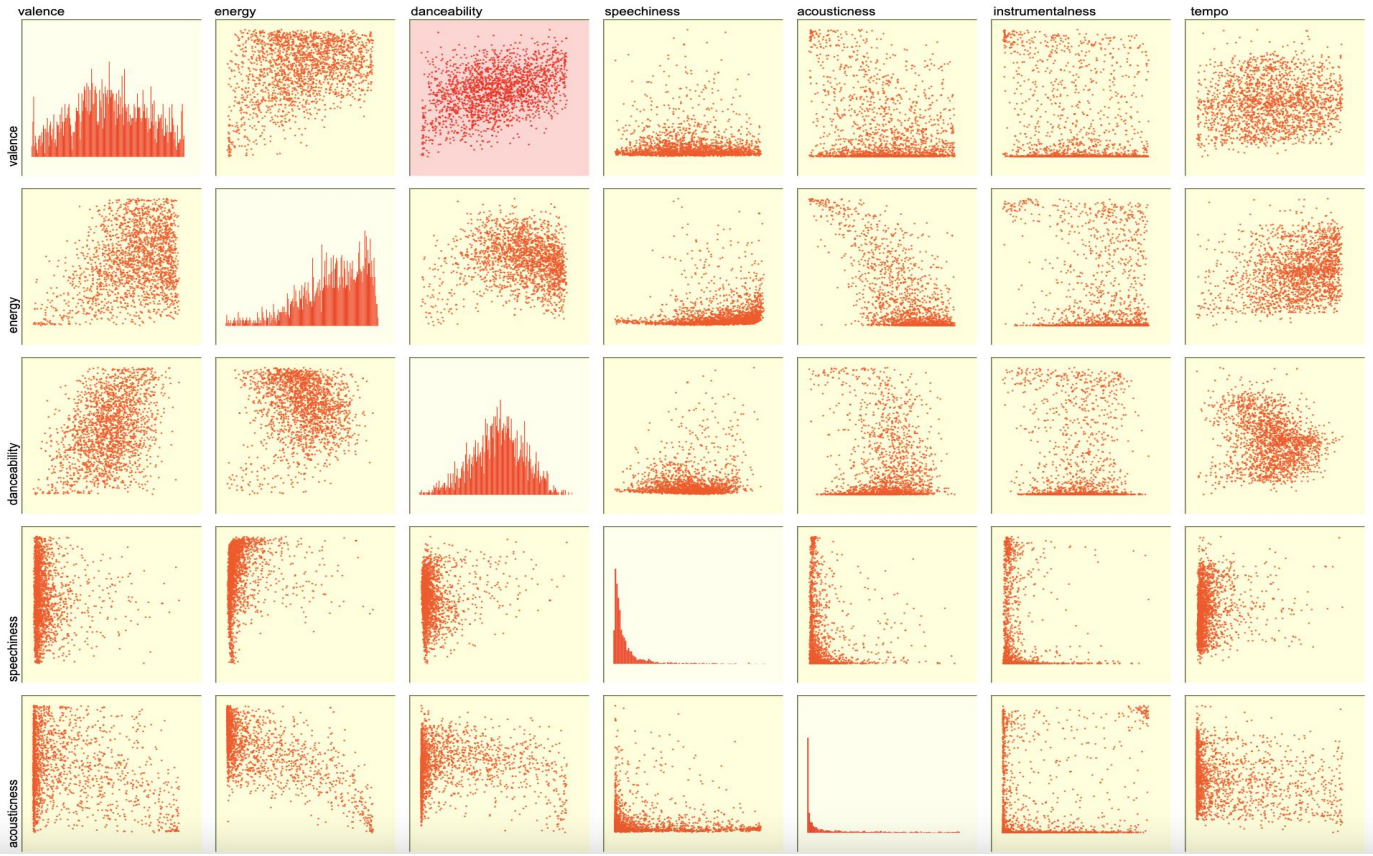
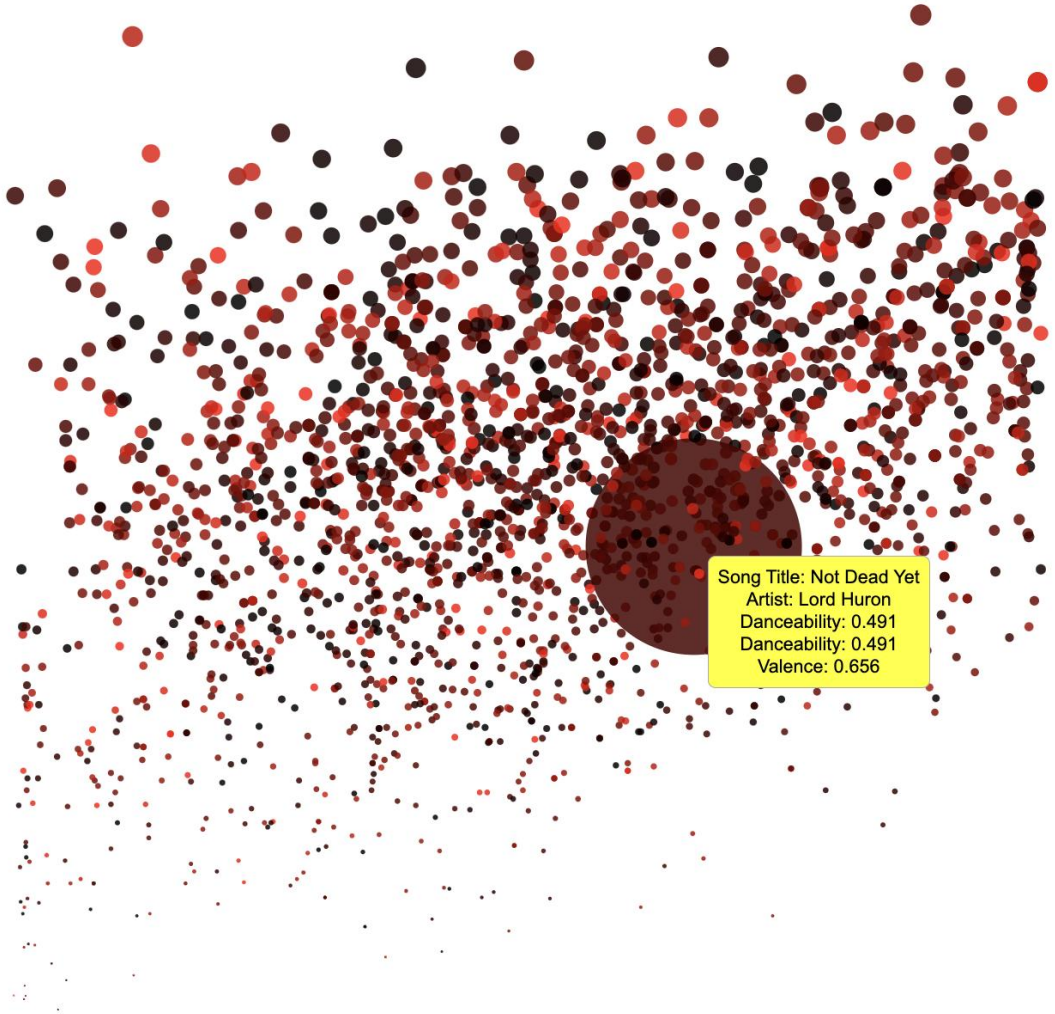
- Metal
- Pop
- Rock



Valence vs. Danceability



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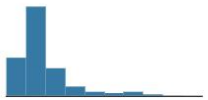
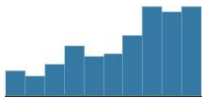
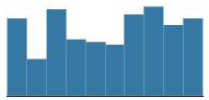
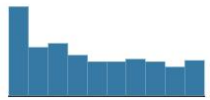
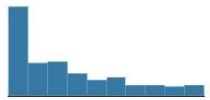
Mental Health Survey Dataset

# Age Respondent's age	Fav genre Respondent's favorite or top genre	# Anxiety Self-reported anxiety, on a scale of 0-10	# Depression Self-reported depression, on a scale of 0-10	# Insomnia Self-reported insomnia, on a scale of 0-10	# OCD Self-reported OCD, on a scale of 0-10	Music effects Does music improve/worsen respondent's mental health conditions?
 10 89	Rock 26% Pop 15% Other (434) 59%	 0 10	 0 10	 0 10	 0 10	Improve No effect Other (25)
18	Latin	3	0	1	0	
63	Rock	7	2	2	1	
18	Video game music	7	7	10	2	No effect
61	Jazz	9	7	3	3	Improve
18	R&B	7	2	5	9	Improve
18	Jazz	8	8	7	7	Improve
18	Video game music	4	8	6	0	Improve
21	K pop	5	3	5	3	Improve
19	Rock	2	0	0	0	Improve
18	R&B	2	2	5	1	Improve
18	Country	7	7	4	7	No effect
19	EDM	1	0	0	1	Improve
	Hip hop	9	3	2	7	Improve
19	Country	2	1	2	0	Improve
18	Jazz	6	4	7	0	Improve
17	Pop	7	5	4	1	Worsen
16	Hip hop	8	8	4	3	Improve

Goal:

1. What effect does music have on mental health - will it improve it, worsen it, or have no effect?
2. In what ways does music impact mental health? Are there any specific aspects of mental health that are affected, such as anxiety, depression, or stress?
3. Are there specific types of music that are more effective at improving mental health conditions than others?
4. Are there any potential negative effects of music on mental health, such as increased anxiety or depression?
5. Are there certain music genres that are associated with lower levels of anxiety and depression?
6. Are there certain music genres that are associated with higher levels of anxiety and depression?

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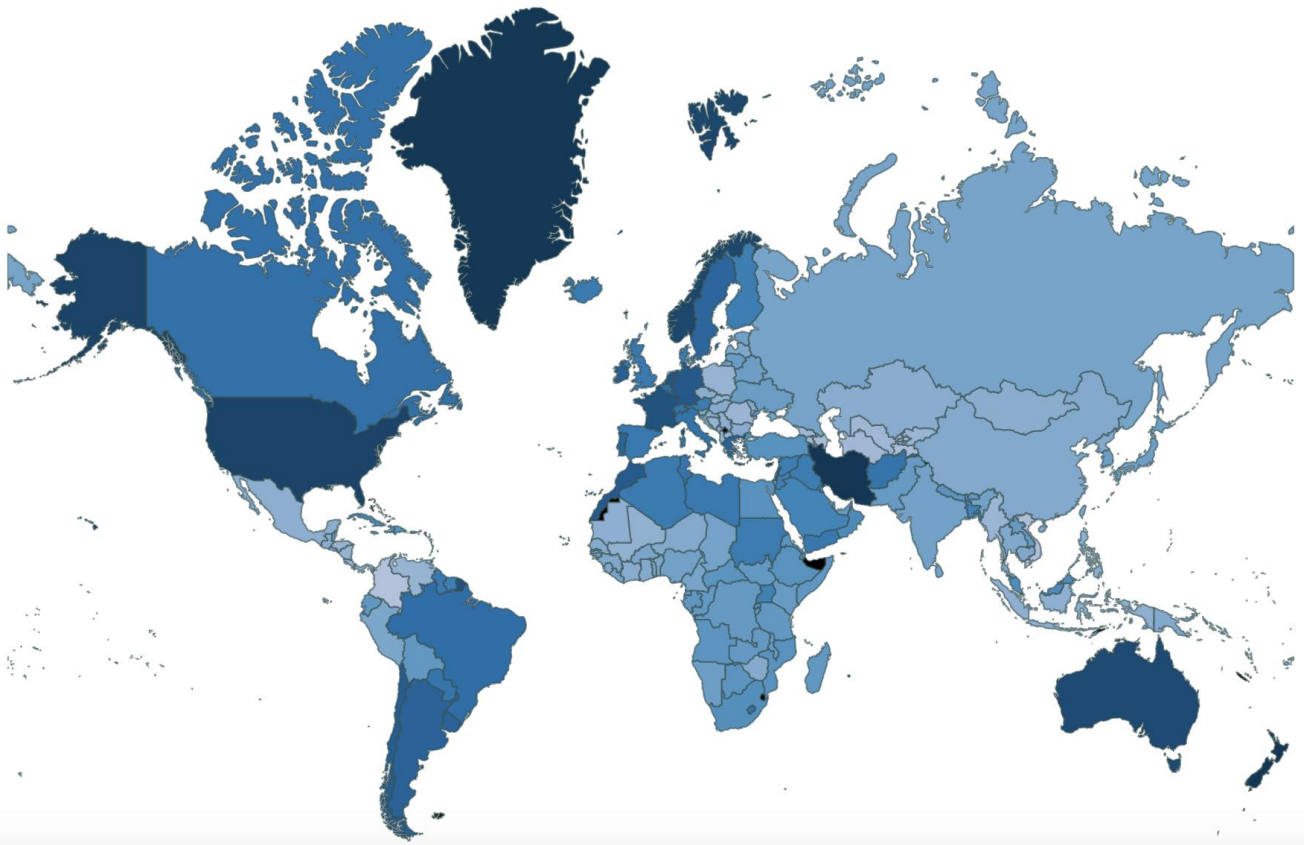
Choropleth | Scatterplot/Radar | Barcharts | Genre Metrics | HeatMap

Color Schemes



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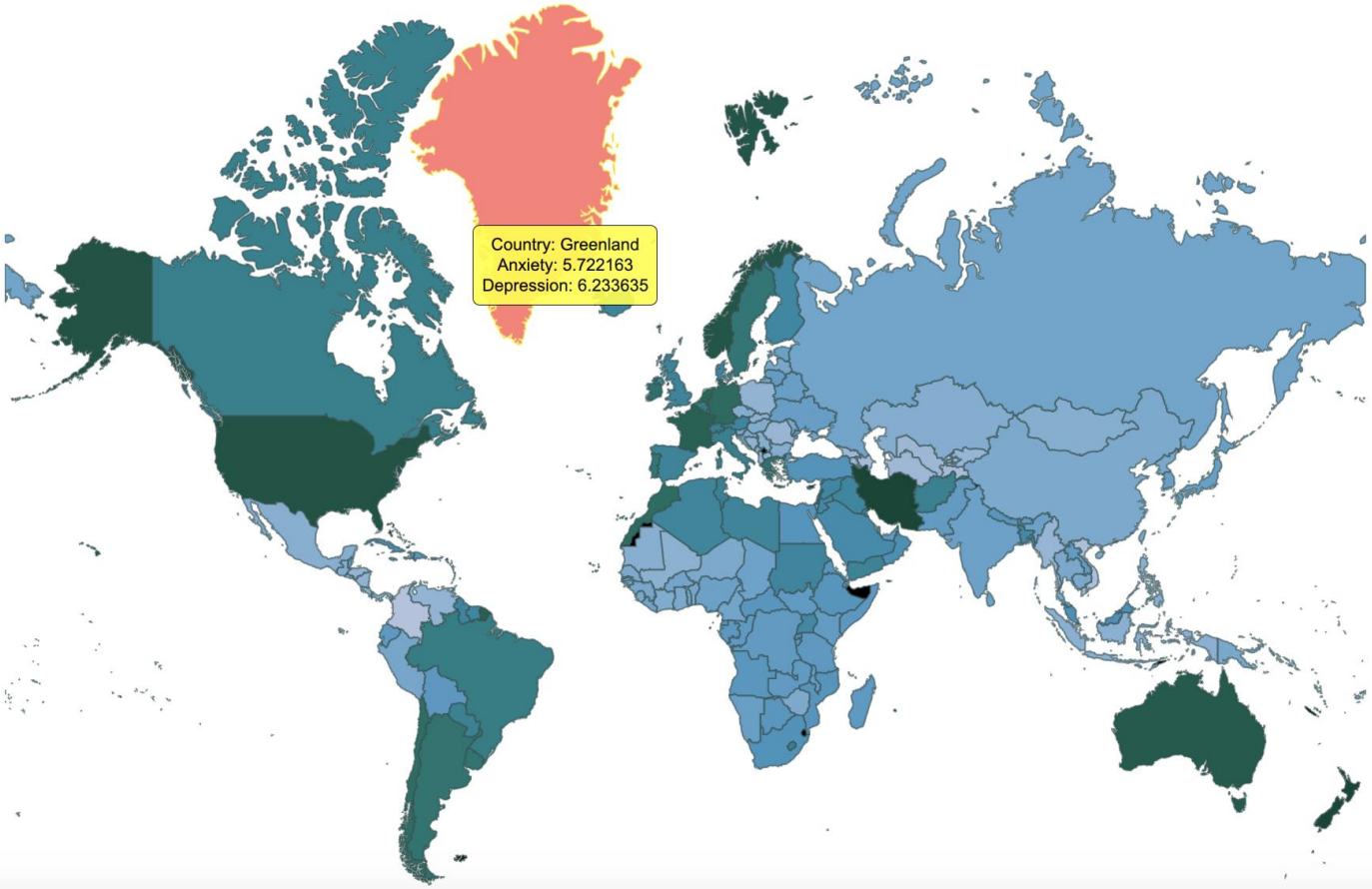
Choropleth | Scatterplot/Radar | Barcharts | Genre Metrics | HeatMap

Color Schemes



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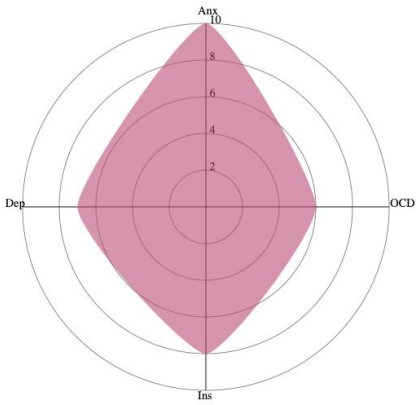
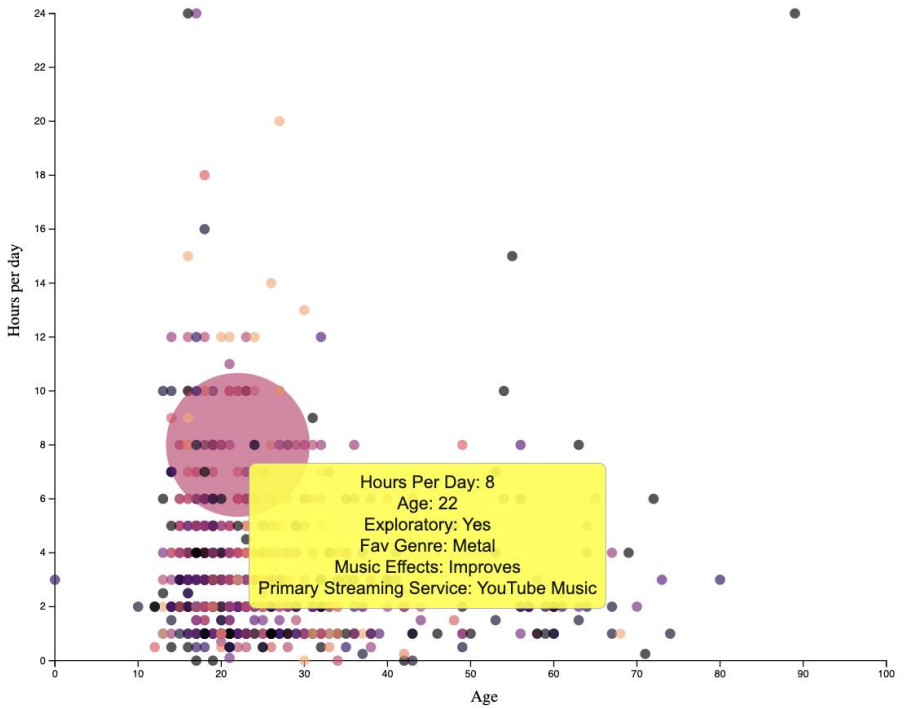
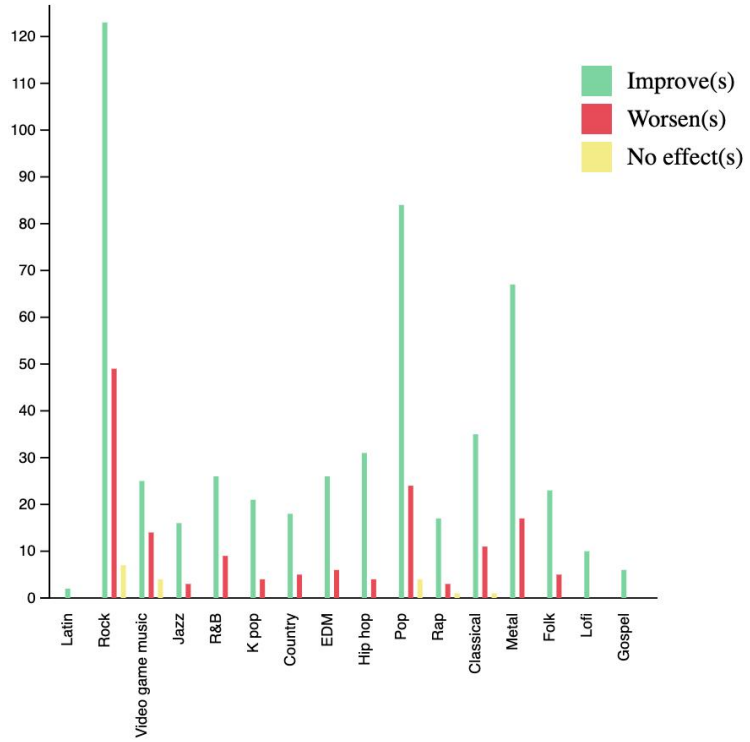
Choropleth | Scatterplot/Radar | Barcharts | Genre Metrics | HeatMap





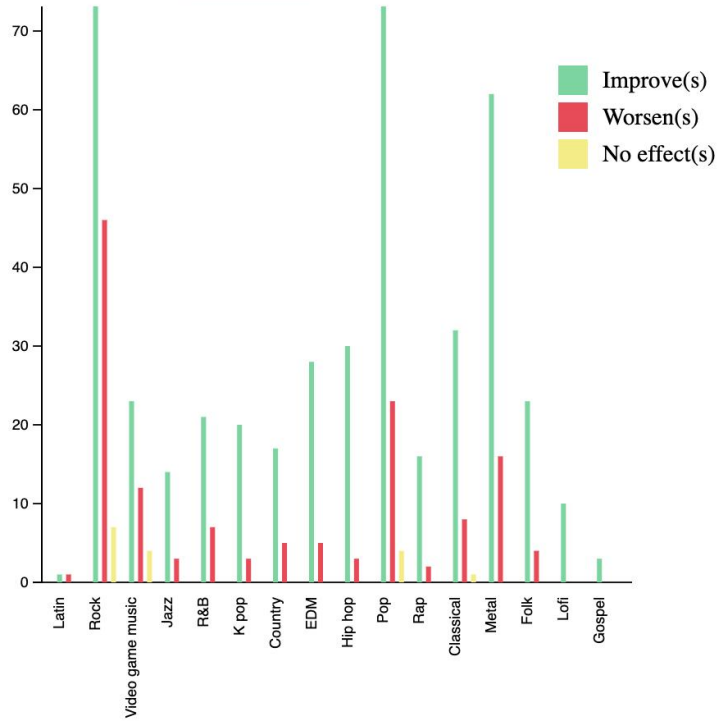
Choropleth | Scatterplot/Radar | Barcharts | Genre Metrics | HeatMap

Anxiety | Depression | Insomnia | OCD



Choropleth | Scatterplot/Radar | Barcharts | Genre Metrics | HeatMap

Anxiety | Depression | Insomnia | OCD



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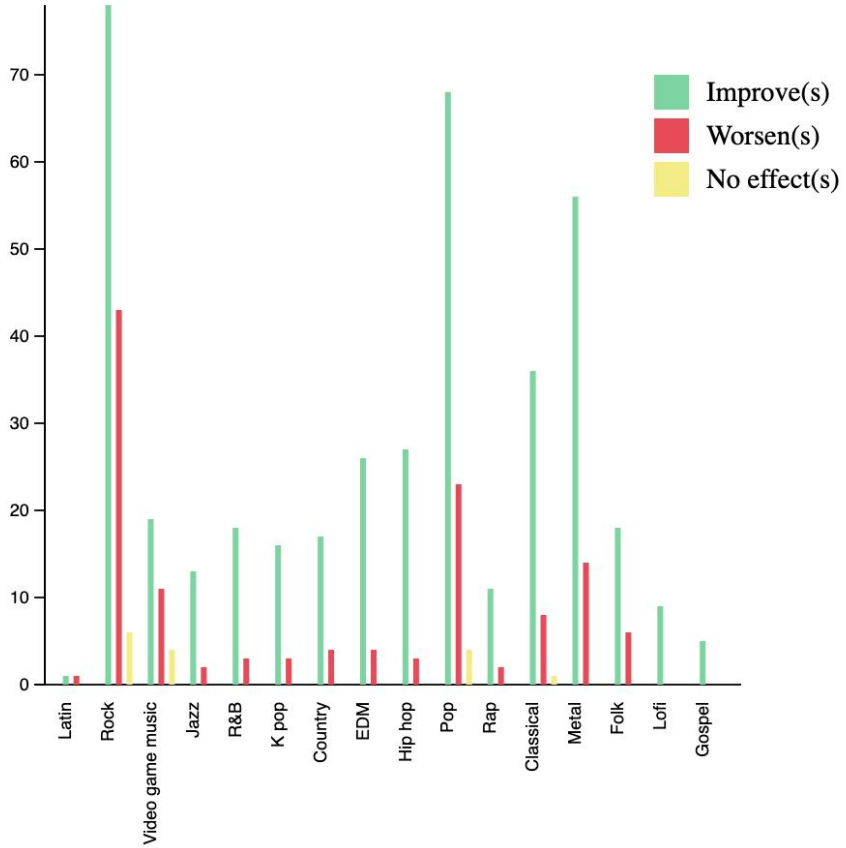
Choropleth | Scatterplot/Radar | Barcharts | Genre Metrics | HeatMap

Anxiety | Depression | Insomnia | OCD



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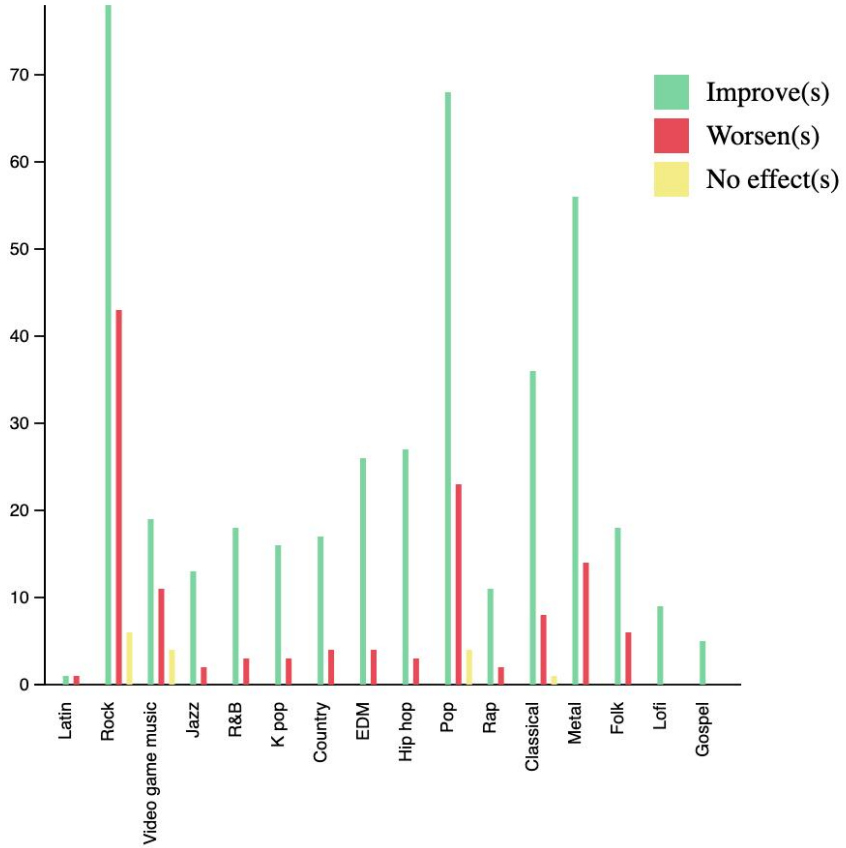
Choropleth | Scatterplot/Radar | Barcharts | Genre Metrics | HeatMap

Anxiety | Depression | Insomnia | OCD



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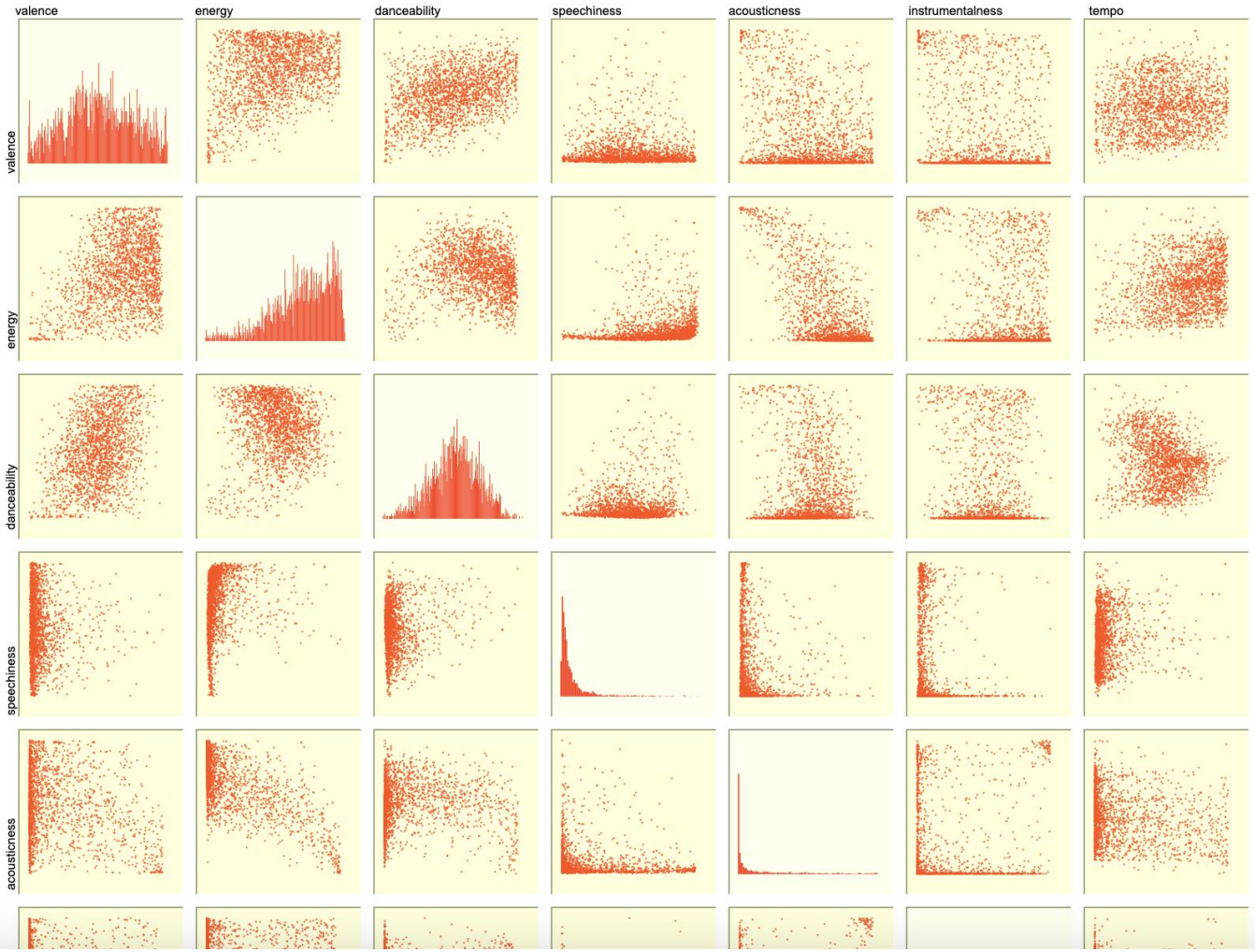
Choropleth | Scatterplot/Radar | Barcharts | Genre Metrics | HeatMap

Click:

- Alternative
- Blues
- Hip/Hop
- Indie Alt
- Metal
- Pop
- Rock



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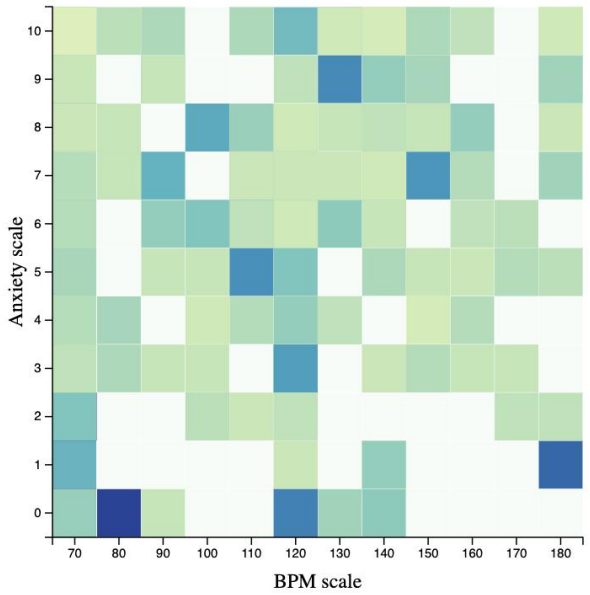
Choropleth | Scatterplot/Radar | Barcharts | Genre Metrics | HeatMap

Anxiety | Depression | Insomnia | OCD



What can we infer from this?
Mental health issues such as anxiety and depression are prevalent in Western nations, with higher levels than in African and Asian countries.
1. The prevalence of anxiety and depression varies by country, with Norway having the highest proportion of its population suffering from depression, while Greenland has the highest proportion of its population experiencing anxiety.
2. Rock music is the most popular genre, but younger people tend to prefer genres like rap, R&B, lo-fi, and K-pop.
3. People who suffer from mental health issues such as anxiety, depression, insomnia, and OCD can benefit from listening to specific genres of music, such as gospel, lo-fi, and Latin.
4. People who prefer video game music have the most varied responses when it comes to the effects of music on their mental health, with approximately 40% saying they did not find music to be beneficial, and 10% saying it had a detrimental effect on their mental health.
5. Classical, Pop, Rap, and Rock music are the genres that people listed as their preferred genre and also reported negative effects on their mental health.

Main purpose of the project:

Since we chose three datasets relating to music and mental health, the main question we are trying to explore is '**what type of metric is correlated to what kind of effect it has on an individual's mental health?**'

Thank You.