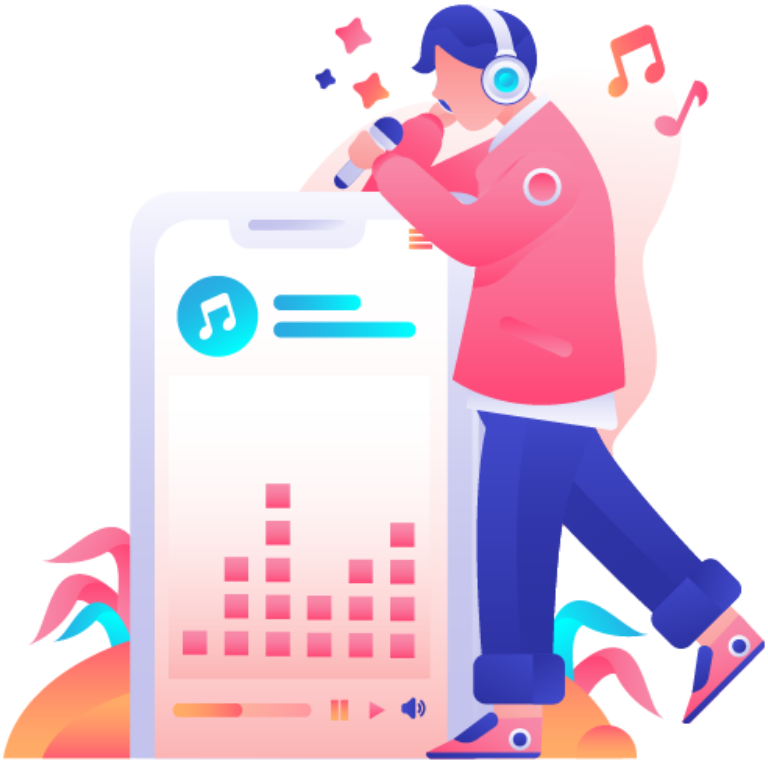
SI 206

Final Project Report

Measuring the Valence & Danceability of Three Billboard Charts: Hot100, Pop, & Alternative

REPO LINK: https://github.com/taepark109/FinalProj-206



Using the following APIs: Spotify API and Billboard API

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Table of Contents

Introduction

What determines the top charts from Billboard may be seen as an ambiguous affair. For our project, we decided to take it upon ourselves to find out if the general top Hot100 songs are the top hits for a reason. We also wanted to see if it would yield similar results for specific genres, such as Pop or Alternative. Is it because of the songs' valence? Their danceability? Using Billboard API and Spotify API, we were able to discover that the top hits may not be enigmatic as one may initially think.

Background

According to Spotify API, these are the definitions for Valence and Danceability:

- **Valence** (VA•LENCE)

  A measure from 0.0 to 1.0 describing the musical positiveness conveyed by a track. Tracks with high valence sound more positive (e.g. happy, cheerful, euphoric), while tracks with low valence sound more negative (e.g. sad, depressed, angry).

- **Danceability** (DANCE•ABIL•I•TY)

  Danceability describes how suitable a track is for dancing based on a combination of musical elements including tempo, rhythm stability, beat strength, and overall regularity. A value of 0.0 is least danceable and 1.0 is most danceable.

According to Billboard, these are the metrics used determine their music charts:

- For the **Hot100 Char**t:

  Billboard defines 2 types of streaming plays: on-demand (ex: Amazon Music, Spotify, Apple Music), and programmed (ex: Pandora, Slacker Radio). On-demand holds greater weight. The Hot100 also incorporates video streams.

- For **genre-based charts**:

Billboard utilizes a single tier for on-demand audio streams from subscription services. Unlike the Hot 100 chart, video streams and programmed audio streams are not incorporated into the algorithm for defining these charts.

Goals

1. Gather the top charts from Billboard from 2019 in the following categories: Hot100, Pop, and Alternative.
2. Discover the Valence of every song gathered in our first objective.
3. Determine whether Valence produced a trend depending on the genre.

Goals Achieved

1. Gathered the songs from the following charts in 2019: Hot100, Pop, Alternative.
    a. We gathered 100 songs from the Hot100, 50 from Pop, and 50 from Alternative using Billboard API.
2. Discovered 2 audio features, Valence and Danceability, of all songs using Spotify API.
3. Determined the effect of genre on the 2 audio features: Valence and Danceability.

Problems

1. The way songs and artists were listed on Billboard caused errors when we used them in the Spotify API search query.
    a. For instance, songs or artists with punctuation such as apostrophes or periods in their names were not compatible with the search query syntax and needed to be manually troubleshot to search them in Spotify.
    b. Additionally, Billboard listed collaborations between artists with “x” between names or said “feat.” or “featuring” which also yielded zero results unless we coded them to be omitted from their artist name when entering into the search query.

c. Since we were only pulling songs from one specific year (2019), we determined that it was okay to hardcode past these errors since our project will only grab the same songs. If we were to alter the year, different (but similar) errors would arise depending on the song title or artist name.

Calculations

```
with open(fname, "w") as f:
    for row in cur:
        title = row[0]
        artist = row[1]
        val = row[2]
        dance = row[3]

        _sum = val + dance
        _avg = _sum/2.0
        f.write(f"The average between valence and danceability for {title} by {artist} is {_avg}.\n")
```

The code above is for the Hot100calc.txt file but is reused for Popcalc.txt and Altcalc.txt

For our calculations, we thought it would be interesting to discover if the ranking of songs in each music chart (Hot100, Pop, Alternative) would have a trend in the average between Valence and Danceability for each song by joining Hot100, Pop, Alt charts to Hot100Valence, PopValence, AltValence respectively on each charts rank. Using the song title and artist name from the first 3 charts, we combined it with the average calculated from the valence and danceability columns in the last 3 charts to create our text files.

- **Hot100's** Valence and Danceability averages (found in hot100calc.txt):

```
The average between valence and danceability for Hey Look Ma, I Made It by Panic! At The Disco is 0.5249999999999999.
The average between valence and danceability for Circles by Post Malone is 0.7315.
The average between valence and danceability for Beer Never Broke My Heart by Luke Combs is 0.5875.
The average between valence and danceability for The London by Young Thug, J. Cole & Travis Scott is 0.495.
The average between valence and danceability for Con Calma by Daddy Yankee & Katy Perry Featuring Snow is 0.6965.
The average between valence and danceability for Murder On My Mind by YNW Melly is 0.538.
The average between valence and danceability for When The Party's Over by Billie Eilish is 0.3255.
The average between valence and danceability for Act Up by City Girls is 0.6255.
The average between valence and danceability for I Like It by Cardi B, Bad Bunny & J Balvin is 0.7284999999999999.
The average between valence and danceability for Trampoline by SHAED is 0.5585.
The average between valence and danceability for Leave Me Alone by Flipp Dinero is 0.767.
The average between valence and danceability for Breathin by Ariana Grande is 0.2465.
The average between valence and danceability for Bury A Friend by Billie Eilish is 0.5505.
The average between valence and danceability for Close Friends by Lil Baby is 0.6845.
The average between valence and danceability for Baby Shark by Pinkfong is 0.6725.
The average between valence and danceability for My Type by Saweetie is 0.8415.
The average between valence and danceability for Worth It by YK Osiris is 0.593.
The average between valence and danceability for Only Human by Jonas Brothers is 0.8155.
The average between valence and danceability for Knockin' Boots by Luke Bryan is 0.6855.
The average between valence and danceability for Trip by Ella Mai is 0.46699999999999997.
The average between valence and danceability for Rumor by Lee Brice is 0.6234999999999999.
The average between valence and danceability for Swervin by A Boogie Wit da Hoodie Featuring 6ix9ine is 0.5075.
The average between valence and danceability for How Do You Sleep? by Sam Smith is 0.462.
The average between valence and danceability for Baby by Lil Baby & DaBaby is 0.6405.
The average between valence and danceability for Look What God Gave Her by Thomas Rhett is 0.8454999999999999.
The average between valence and danceability for Good As You by Kane Brown is 0.614.
The average between valence and danceability for Clout by Offset Featuring Cardi B is 0.6715.
The average between valence and danceability for Love Lies by Khalid & Normani is 0.383.
The average between valence and danceability for One Thing Right by Marshmello & Kane Brown is 0.515.
The average between valence and danceability for Cash Shit by Megan Thee Stallion Featuring DaBaby is 0.7350000000000001.
The average between valence and danceability for Tequila by Dan + Shay is 0.4885.
The average between valence and danceability for Shotta Flow by NLE Choppa is 0.731.
The average between valence and danceability for Hot Girl Summer by Megan Thee Stallion, Nicki Minaj & Ty Dolla $ign is 0.5840000000000001.
The average between valence and danceability for Talk You Out Of It by Florida Georgia Line is 0.6045.
The average between valence and danceability for Beautiful by Bazzi Featuring Camila Cabello is 0.4435.
The average between valence and danceability for Eyes On You by Chase Rice is 0.6459999999999999.
The average between valence and danceability for All To Myself by Dan + Shay is 0.635.
The average between valence and danceability for Boyfriend by Ariana Grande & Social House is 0.60149999999999999.
The average between valence and danceability for Walk Me Home by P!nk is 0.542.
The average between valence and danceability for Robbery by Juice WRLD is 0.6114999999999999.
The average between valence and danceability for Old Town Road by Lil Nas X Featuring Billy Ray Cyrus is 0.7585.
The average between valence and danceability for Sunflower (Spider-Man: Into The Spider-Verse) by Post Malone & Swae Lee is 0.8400000000000001.
The average between valence and danceability for Without Me by Halsey is 0.6425000000000001.
The average between valence and danceability for Bad Guy by Billie Eilish is 0.675.
The average between valence and danceability for Wow. by Post Malone is 0.6415.
The average between valence and danceability for Happier by Marshmello & Bastille is 0.5155.
The average between valence and danceability for 7 Rings by Ariana Grande is 0.548.
The average between valence and danceability for Talk by Khalid is 0.619.
The average between valence and danceability for Sicko Mode by Travis Scott is 0.547.
The average between valence and danceability for Sucker by Jonas Brothers is 0.897.
The average between valence and danceability for High Hopes by Panic! At The Disco is 0.43899999999999995.
The average between valence and danceability for Thank U, Next by Ariana Grande is 0.5755.
The average between valence and danceability for Truth Hurts by Lizzo is 0.5429999999999999.
The average between valence and danceability for Dancing With A Stranger by Sam Smith & Normani is 0.544.
The average between valence and danceability for Senorita by Shawn Mendes & Camila Cabello is 0.754.
The average between valence and danceability for I Don't Care by Ed Sheeran & Justin Bieber is 0.8205.
The average between valence and danceability for Eastside by benny blanco, Halsey & Khalid is 0.48050000000000004.
The average between valence and danceability for Going Bad by Meek Mill Featuring Drake is 0.7165.
The average between valence and danceability for Shallow by Lady Gaga & Bradley Cooper is 0.426.
The average between valence and danceability for Better by Khalid is 0.421.
The average between valence and danceability for No Guidance by Chris Brown Featuring Drake is 0.416.
The average between valence and danceability for Girls Like You by Maroon 5 Featuring Cardi B is 0.6495.
The average between valence and danceability for Sweet But Psycho by Ava Max is 0.5345.
The average between valence and danceability for Suge by DaBaby is 0.8465.
The average between valence and danceability for Middle Child by J. Cole is 0.6759999999999999.
The average between valence and danceability for Drip Too Hard by Lil Baby & Gunna is 0.6495.
The average between valence and danceability for Someone You Loved by Lewis Capaldi is 0.47350000000000003.
The average between valence and danceability for Ran$om by Lil Tecca is 0.5670000000000001.
The average between valence and danceability for If I Can't Have You by Shawn Mendes is 0.7805.
The average between valence and danceability for Goodbyes by Post Malone Featuring Young Thug is 0.35550000000000004.
The average between valence and danceability for ZEZE by Kodak Black Featuring Travis Scott & Offset is 0.6825.
The average between valence and danceability for Better Now by Post Malone is 0.519.
The average between valence and danceability for Youngblood by 5 Seconds Of Summer is 0.374.
The average between valence and danceability for Money In The Grave by Drake Featuring Rick Ross is 0.46599999999999997.
The average between valence and danceability for Speechless by Dan + Shay is 0.5245.
The average between valence and danceability for Break Up With Your Girlfriend, I'm Bored by Ariana Grande is 0.4155.
The average between valence and danceability for Please Me by Cardi B & Bruno Mars is 0.706.
The average between valence and danceability for Money by Cardi B is 0.7005.
The average between valence and danceability for You Need To Calm Down by Taylor Swift is 0.7324999999999999.
The average between valence and danceability for Panini by Lil Nas X is 0.589.
The average between valence and danceability for Look Back At It by A Boogie Wit da Hoodie is 0.6635.
The average between valence and danceability for A Lot by 21 Savage is 0.5555.
The average between valence and danceability for ME! by Taylor Swift Featuring Brendon Urie is 0.669.
The average between valence and danceability for MIA by Bad Bunny Featuring Drake is 0.4875.
The average between valence and danceability for Pop Out by Polo G Featuring Lil Tjay is 0.5165.
The average between valence and danceability for Beautiful Crazy by Luke Combs is 0.469.
The average between valence and danceability for Thotiana by Blueface is 0.8.
The average between valence and danceability for Lucid Dreams by Juice WRLD is 0.3645.
The average between valence and danceability for Mo Bamba by Sheck Wes is 0.515.
The average between valence and danceability for Beautiful People by Ed Sheeran Featuring Khalid is 0.5940000000000001.
The average between valence and danceability for Wake Up In The Sky by Gucci Mane X Bruno Mars X Kodak Black is 0.5835.
The average between valence and danceability for Whiskey Glasses by Morgan Wallen is 0.644.
The average between valence and danceability for God's Country by Blake Shelton is 0.374.
The average between valence and danceability for Be Alright by Dean Lewis is 0.522.
The average between valence and danceability for Pure Water by Mustard & Migos is 0.40950000000000003.
The average between valence and danceability for The Git Up by Blanco Brown is 0.7865.
The average between valence and danceability for Taki Taki by DJ Snake Featuring Selena Gomez, Ozuna & Cardi B is 0.7295.
The average between valence and danceability for Close To Me by Ellie Goulding X Diplo Featuring Swae Lee is 0.5235.
The average between valence and danceability for Envy Me by Calboy is 0.5685.
The average between valence and danceability for You Say by Lauren Daigle is 0.3965.
```

- **Top Pop songs'** Valence and Danceability averages (found in Popcalc.txt):

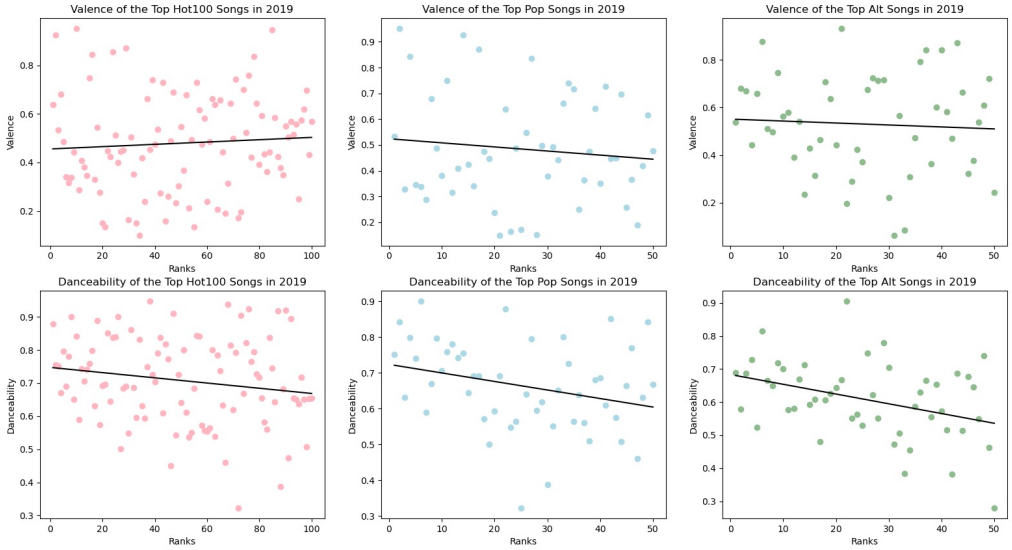
```
The average between valence and danceability for Without Me by Halsey is 0.6425000000000001.
The average between valence and danceability for Sucker by Jonas Brothers is 0.897.
The average between valence and danceability for Eastside by benny blanco, Halsey & Khalid is 0.48050000000000004.
The average between valence and danceability for I Don't Care by Ed Sheeran & Justin Bieber is 0.8205.
The average between valence and danceability for Dancing With A Stranger by Sam Smith & Normani is 0.544.
The average between valence and danceability for Talk by Khalid is 0.619.
The average between valence and danceability for High Hopes by Panic! At The Disco is 0.43899999999999995.
The average between valence and danceability for Bad Guy by Billie Eilish is 0.675.
The average between valence and danceability for Wow. by Post Malone is 0.6415.
The average between valence and danceability for Truth Hurts by Lizzo is 0.5429999999999999.
The average between valence and danceability for Senorita by Shawn Mendes & Camila Cabello is 0.754.
The average between valence and danceability for 7 Rings by Ariana Grande is 0.548.
The average between valence and danceability for Thank U, Next by Ariana Grande is 0.5755.
The average between valence and danceability for Sunflower (Spider-Man: Into The Spider-Verse) by Post Malone & Swae Lee is 0.8400000000000001.
The average between valence and danceability for Sweet But Psycho by Ava Max is 0.5345.
The average between valence and danceability for Happier by Marshmello & Bastille is 0.5155.
The average between valence and danceability for If I Can't Have You by Shawn Mendes is 0.7805.
The average between valence and danceability for Close To Me by Ellie Goulding X Diplo Featuring Swae Lee is 0.5235.
The average between valence and danceability for Someone You Loved by Lewis Capaldi is 0.47350000000000003.
The average between valence and danceability for Break Up With Your Girlfriend, I'm Bored by Ariana Grande is 0.4155.
The average between valence and danceability for Better by Khalid is 0.421.
The average between valence and danceability for Old Town Road by Lil Nas X Featuring Billy Ray Cyrus is 0.7585.
The average between valence and danceability for Goodbyes by Post Malone Featuring Young Thug is 0.35550000000000004.
The average between valence and danceability for Hey Look Ma, I Made It by Panic! At The Disco is 0.5249999999999999.
The average between valence and danceability for Breathin by Ariana Grande is 0.2465.
The average between valence and danceability for Beautiful People by Ed Sheeran Featuring Khalid is 0.5940000000000001.
The average between valence and danceability for Only Human by Jonas Brothers is 0.8155.
The average between valence and danceability for Youngblood by 5 Seconds Of Summer is 0.374.
The average between valence and danceability for Trampoline by SHAED is 0.5585.
The average between valence and danceability for Love Lies by Khalid & Normani is 0.383.
The average between valence and danceability for Be Alright by Dean Lewis is 0.522.
The average between valence and danceability for Sicko Mode by Travis Scott is 0.547.
The average between valence and danceability for Circles by Post Malone is 0.7315.
The average between valence and danceability for You Need To Calm Down by Taylor Swift is 0.7324999999999999.
The average between valence and danceability for Easier by 5 Seconds Of Summer is 0.6405.
The average between valence and danceability for Beautiful by Bazzi Featuring Camila Cabello is 0.4435.
The average between valence and danceability for How Do You Sleep? by Sam Smith is 0.462.
The average between valence and danceability for Who Do You Love by The Chainsmokers Featuring 5 Seconds Of Summer is 0.4925.
The average between valence and danceability for Cool by Jonas Brothers is 0.6615.
The average between valence and danceability for Better Now by Post Malone is 0.519.
The average between valence and danceability for ME! by Taylor Swift Featuring Brendon Urie is 0.669.
The average between valence and danceability for Girls Like You by Maroon 5 Featuring Cardi B is 0.6495.
The average between valence and danceability for This Feeling by The Chainsmokers Featuring Kelsea Ballerini is 0.512.
The average between valence and danceability for Boyfriend by Ariana Grande & Social House is 0.6014999999999999.
The average between valence and danceability for Time by NF is 0.461.
The average between valence and danceability for Never Really Over by Katy Perry is 0.5685.
The average between valence and danceability for When The Party's Over by Billie Eilish is 0.3255.
The average between valence and danceability for Speechless by Dan + Shay is 0.5245.
The average between valence and danceability for Taki Taki by DJ Snake Featuring Selena Gomez, Ozuna & Cardi B is 0.7295.
The average between valence and danceability for Good As Hell by Lizzo is 0.573.
```

- **Top Alternative songs'** Valence and Danceability averages (found in Altcalc.txt):

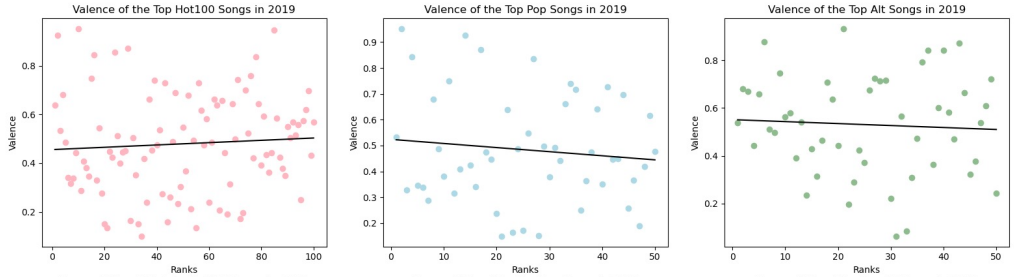
```
The average between valence and danceability for Trampoline by SHAED is 0.613.
The average between valence and danceability for High Hopes by Panic! At The Disco is 0.63.
The average between valence and danceability for Happier by Marshmello & Bastille is 0.679.
The average between valence and danceability for Cringe by Matt Maeson is 0.586.
The average between valence and danceability for Gloria by The Lumineers is 0.591.
The average between valence and danceability for 3 Nights by Dominic Fike is 0.846.
The average between valence and danceability for Broken by lovelytheband is 0.5880000000000001.
The average between valence and danceability for Doin' Time by Lana Del Rey is 0.5725.
The average between valence and danceability for Ready To Let Go by Cage The Elephant is 0.732.
The average between valence and danceability for Bad Guy by Billie Eilish is 0.6315.
The average between valence and danceability for Hey Look Ma, I Made It by Panic! At The Disco is 0.5785.
The average between valence and danceability for Alligator by Of Monsters And Men is 0.486.
The average between valence and danceability for Missed Connection by The Head And The Heart is 0.6055.
The average between valence and danceability for You're Somebody Else by flora cash is 0.474.
The average between valence and danceability for Superposition by Young The Giant is 0.5105.
The average between valence and danceability for Chlorine by twenty one pilots is 0.46199999999999997.
The average between valence and danceability for Longshot by Catfish And The Bottlemen is 0.473.
The average between valence and danceability for Lo/Hi by The Black Keys is 0.6565.
The average between valence and danceability for 100 Bad Days by AJR is 0.632.
The average between valence and danceability for Good Things Fall Apart by ILLENIUM & Jon Bellion is 0.5425.
The average between valence and danceability for Social Cues by Cage The Elephant is 0.8005.
The average between valence and danceability for Bury A Friend by Billie Eilish is 0.5505.
The average between valence and danceability for Guiding Light by Mumford & Sons is 0.42000000000000004.
The average between valence and danceability for Hurt by Oliver Tree is 0.49349999999999994.
The average between valence and danceability for The Hype by twenty one pilots is 0.4505.
The average between valence and danceability for My Blood by twenty one pilots is 0.7115.
The average between valence and danceability for Pressure by Muse is 0.673.
The average between valence and danceability for "99" by Barns Courtney is 0.633.
The average between valence and danceability for still feel. by half alive is 0.747.
The average between valence and danceability for Natural by Imagine Dragons is 0.46199999999999997.
The average between valence and danceability for Love It If We Made It by The 1975 is 0.26755.
The average between valence and danceability for Go by The Black Keys is 0.5349999999999999.
The average between valence and danceability for Bad Liar by Imagine Dragons is 0.23285.
The average between valence and danceability for Beloved by Mumford & Sons is 0.381.
The average between valence and danceability for Running Up That Hill by Meg Myers is 0.53.
The average between valence and danceability for Can't Knock The Hustle by Weezer is 0.7110000000000001.
The average between valence and danceability for Home by morgxn Featuring WALK THE MOON is 0.753.
The average between valence and danceability for Joy by Bastille is 0.459.
The average between valence and danceability for Harmony Hall by Vampire Weekend is 0.6265000000000001.
The average between valence and danceability for Die Happy by DREAMERS is 0.7075.
The average between valence and danceability for Choke by I Dont Know How But They Found Me is 0.5495.
The average between valence and danceability for Why Did You Run? by Judah & The Lion is 0.4255.
The average between valence and danceability for Dissolve by Absofacto is 0.78.
The average between valence and danceability for Northern Lights by Death Cab For Cutie is 0.5895.
The average between valence and danceability for You Should See Me In A Crown by Billie Eilish is 0.5005000000000001.
The average between valence and danceability for Fast Talk by Houses is 0.511.
The average between valence and danceability for It Doesn't Matter Why by Silversun Pickups is 0.5435000000000001.
The average between valence and danceability for Worst Nites by Foster The People is 0.675.
The average between valence and danceability for Father Of All... by Green Day is 0.592.
The average between valence and danceability for Maybe, I'm Afraid by lovelytheband is 0.2615.
```

Visualizations

We created 6 visualizations for the Valence and Danceability of Hot100 songs, Top Pop songs, and Top Alternative songs.



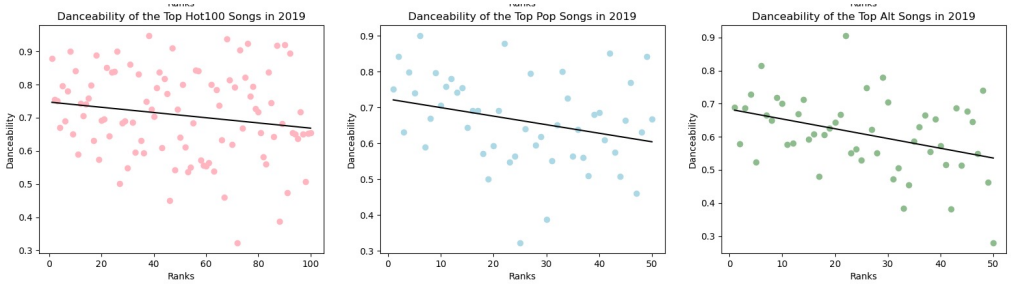
Valence



Looking more closely at the Valence of all the songs in our 3 top music charts (Hot100, Pop, Alternative), valence does not seem to have an impact on whether songs will make the top charts either generally, based on the Hot100 chart, or within genres, such as Pop or Alt.

As noted from our lines of best fit, there is a slight positive correlation only in the Hot100 chart, and slight negative correlations in Pop and Alt. So as the rank increases in Hot100, the positivity (valence) of a song increases, but the inverse occurs for Pop and Alt.

Danceability



From analyzing the Danceability trends among the songs in the Top Hot100, Top Pop, and Top Alternative songs, we concluded that there is a trend. As seen by the negative correlation in all charts, we deduced that as the ranking of songs becomes greater, no matter the genre or chart it is on Billboard, the danceability of the songs decreases.

Valence & Danceability

Since there does not seem to be a trend in valence in the top songs across our three chosen charts, it is inconclusive to say whether valence and danceability are related to each other.

Instructions for Running

1. **Install** Billboard API in one of the following 2 methods:
    a. **Install** with pip: `pip install billboard.py`
    b. **Clone** repo (in billboard-charts folder) and run: `python setup.py install`
2. **Open** billboard-data.py, spotify.py, calculations.py
3. **Run** billboard-data.py 4 times (Wait until each run is completed)
    a. Each run will create tables Hot100, Pop, and Alt if they don't already exist and add 25 rows of data (rank, song title, artist name)
    b. After 4 runs, there will be 100 rows in Hot100, 50 in Pop, and 50 in Alt.

4. **Run** spotify.py 4 times (Due to Spotify's Search feature structure in their API, this will take around 1 minute and 40 seconds to complete each run)
    a. Each run uses the data from the charts, Hot100, Pop, and Alt, from "Music.db" and creates 3 more charts if they don't exist, Hot100Valence, PopValence, and AltValence. And adds 25 rows of data (song title, artist name, rank, valence, danceability)
    b. After 4 runs, there will be 100 rows in Hot100Valence, 50 in PopValence, and 50 in AltValence.
5. **Run** calculations.py 1 time
    a. 3 text files will be created: Hot100.txt, Popcalc.txt, and Altcalc.txt
    b. With Matplotlib, 6 visualizations/scatter plots will be made

---

Documentation of Functions

billboard-data.py		
FUNCTION	**INPUT**	**OUTPUT**
def Hot100	**Title** of chart ('hot-100-songs') from Billboard in a specified **year** (2019)	Returns a class with the rank, song title, and artist for the Hot100 songs in 2019
def pop	**Title** of chart ('pop-songs')) from Billboard in a specified **year** (2019)	Returns a **class** with the rank, song title, and artist for the top Pop songs in 2019
def alt	**Title** of chart ('alternative-songs')) from Billboard in a specified **year** (2019)	Returns a **class** with the rank, song title, and artist for the top Alt songs in 2019
def setuphot100	From def hot100's outputted class, we insert the **title, artist, and rank** of each row	Insert the input into a row in our database, 'Music.db' as the **chart 'Hot100'** for every song
def setupPop	From def pop's outputted class, we insert the **title,**	Insert the input into a row in our database, 'Music.db'

	artist, and rank of each row	as the **chart 'Pop'** for every song
def setupAlt	From def alt's outputted class, we insert the **title, artist, and rank** of each row	Insert the input into a row in our database, 'Music.db' as the **chart 'Alt'** for every song

spotify.py		
FUNCTION	**INPUT**	**OUTPUT**
def read_from_db	Takes in the name of the **table** that is to be read from 'Music.db'	Returns all the **data** from the specified chart
def track_id_lstPop	Takes the **data** from "read_from_db" on the "Pop" chart to get the track IDs from all songs	Returns a **list of track IDs** from all the songs in the Pop chart
def track_id_lstHot100	Takes the **data** from "read_from_db" on the "Hot100" chart to get the track IDs from all songs	Returns a **list of track IDs** from all the songs in the Hot100 chart
def track_id_lstAlt	Takes the **data** from "read_from_db" on the "Alt" chart to get the track IDs from all songs	Returns a **list of track IDs** from all the songs in the Alt chart
def check_tracks	Takes in a **list of track IDs** (from past 3 functions)	Prints a **list of the song titles** given the track IDs (for testing purposes)
def setuphot100valence	Takes in a **list of track IDs** (similar to check_tracks)	For each track ID, the song title, artist, rank, valence, and danceability were inserted into a **table** created called **Hot100Valence**
def setupaltvalence	Takes in a **list of track IDs** (similar to check_tracks)	For each track ID, the song title, artist, rank, valence, and danceability were

		inserted into a **table** created called **PopValence**
def setuppopvalence	Takes in a **list of track IDs** (similar to check_tracks)	For each track ID, the song title, artist, rank, valence, and danceability were inserted into a **table** created called **AltValence**

calculations.py		
FUNCTION	**INPUT**	**OUTPUT**
def Hot100avg	Selects **data from Hot100 and Hot100Valence** to calculate the average between valence and danceability (from Hot100Valence) for each song and the artist (from Hot100)	Creates text file "Hot100calc.txt"
def Popavg	Selects **data from Pop and PopValence** to calculate the average between valence and danceability (from PopValence) for each song and the artist (from Pop)	Creates text file "Popcalc.txt"
def Altavg	Selects **data from Alt and AltValence** to calculate the average between valence and danceability (from AltValence) for each song and the artist (from Alt)	Creates text file "Altcalc.txt"
def hot100xy	Selects **rank and valence data** from Hot100Valence chart	Returns a **tuple** of 2 lists: ranks and valences
def popxy	Selects **rank and valence data** from PopValence chart	Returns a **tuple** of 2 lists: ranks and valences
def altxy	Selects **rank and valence data** from AltValence chart	Returns a **tuple** of 2 lists: ranks and valences

def dancehotxy	Selects **rank and danceability data** from Hot100Valence chart	Returns a **tuple** of 2 lists: ranks and danceability
def dancepopxy	Selects **rank and danceability data** from PopValence chart	Returns a **tuple** of 2 lists: ranks and danceability
def dancealtxy	Selects **rank and danceability data** from AltValence chart	Returns a **tuple** of 2 lists: ranks and danceability
def visualize	Separates the **lists from the tuples** returned in the last 6 functions to get the **x/y values** for each visualization	Creates a **plot** with **6 visualizations**

Documentation of Resources

DATE	ISSUE DESCRIPTION	RESOURCE LOCATION	RESULT
3 December 2020	Original idea included using KKBOX API but upon signing up, we received an error that it was not available in the US. Found an unofficial Billboard API wrapper, but was not sure if it would be allowed on the project.	206 Instructors Email	AJ and Dr. Ericson approved of the Billboard API wrapper.
7 December 2020	We were unable to figure out how to limit the amount of data added to our database's charts to 25 rows in each run.	Office Hours	Tyler guided us on how to look through the database to see what has already been added before the new set of 25 rows were to be

			added in a single run.
10 December 2020	We needed assistance in figuring out the syntax for joining tables when we did our calculations to create text files	W3Schools & Runestone Join Assignment	Combining the information on both resources, we successfully joined all our tables
10 December 2020	When running calculations.py, our visualizations were blank/not responding. The subplot argument was also not correct.	LinePlot-MIGA-side2.py & Matplotlib powerpoint slides	Referring back to the matplotlib lecture and assignment, we figured out how to subplot and to ensure that all of our x/y values for the charts were correct
10 December 2020	We were not sure how to create lines of best fit for our visualizations (scatter plots)	StackOverflow	User suggested a single line code that would correctly intake our data and create a line of best fit for each visualization