What makes a song “syncable”?

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Intro

As a music supervisor, I've always wanted to know what audio features of certain songs make them perfect for matching to film and TV A/V.

In this project, I'll use Tunefind's Top 100 Songs of 2019 list merged with Spotify's API to highlight common patterns and run a multivariable Logistic Regression model to predict what variables make these songs so "syncable".

EDA

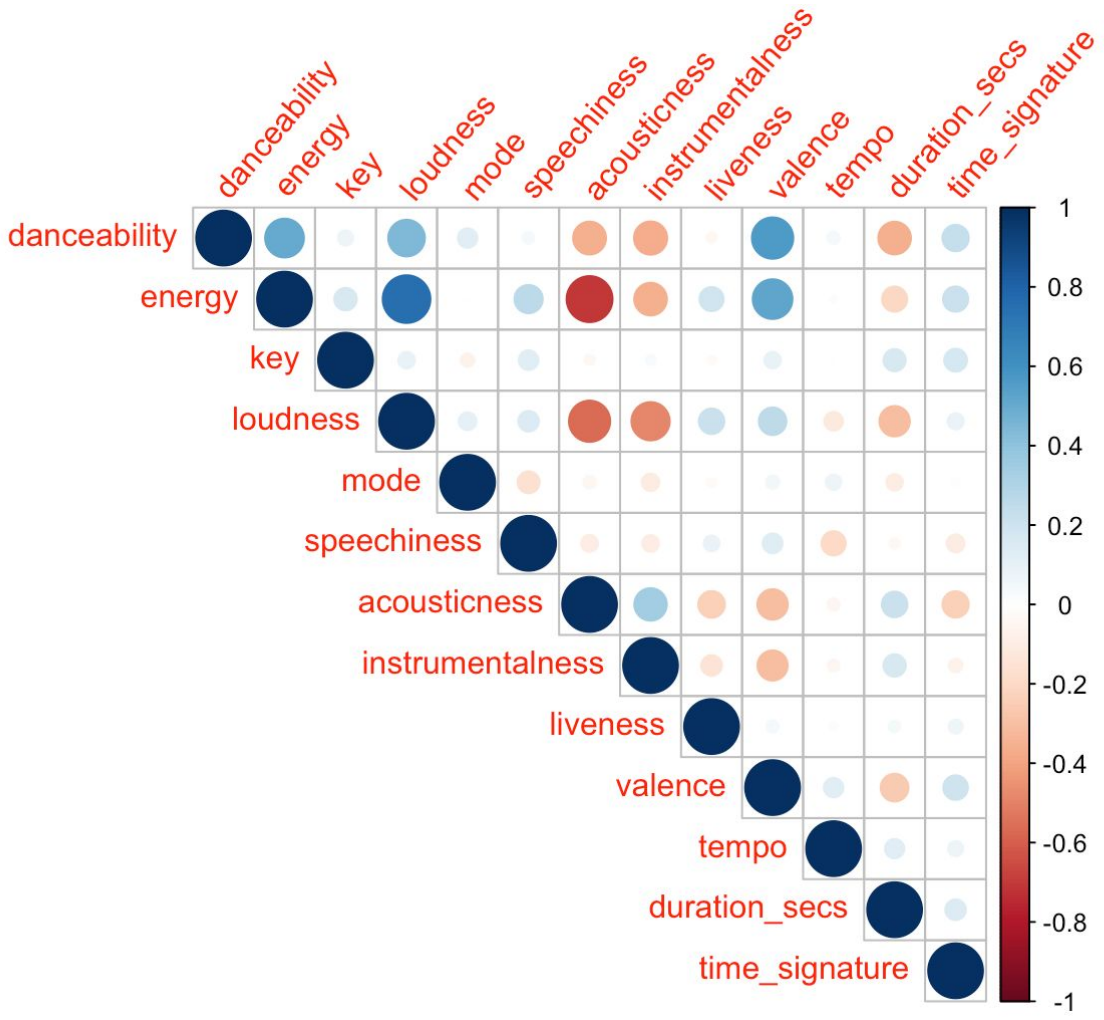
Building the Dataset
I was lucky enough to obtain a dataset from Tunefind (www.tunefind.com), which is an industry standard index of music and songs appearing in popular television shows and movies.

I'll use this (which contains Spotify track IDs) to obtain audio features from the Spotify API and add those to the dataset for analysis.

I'll be looking for trends and patterns in the audio features of these 100 songs.

Corrplot

Using the corrplot function, I can see the correlation between variables.



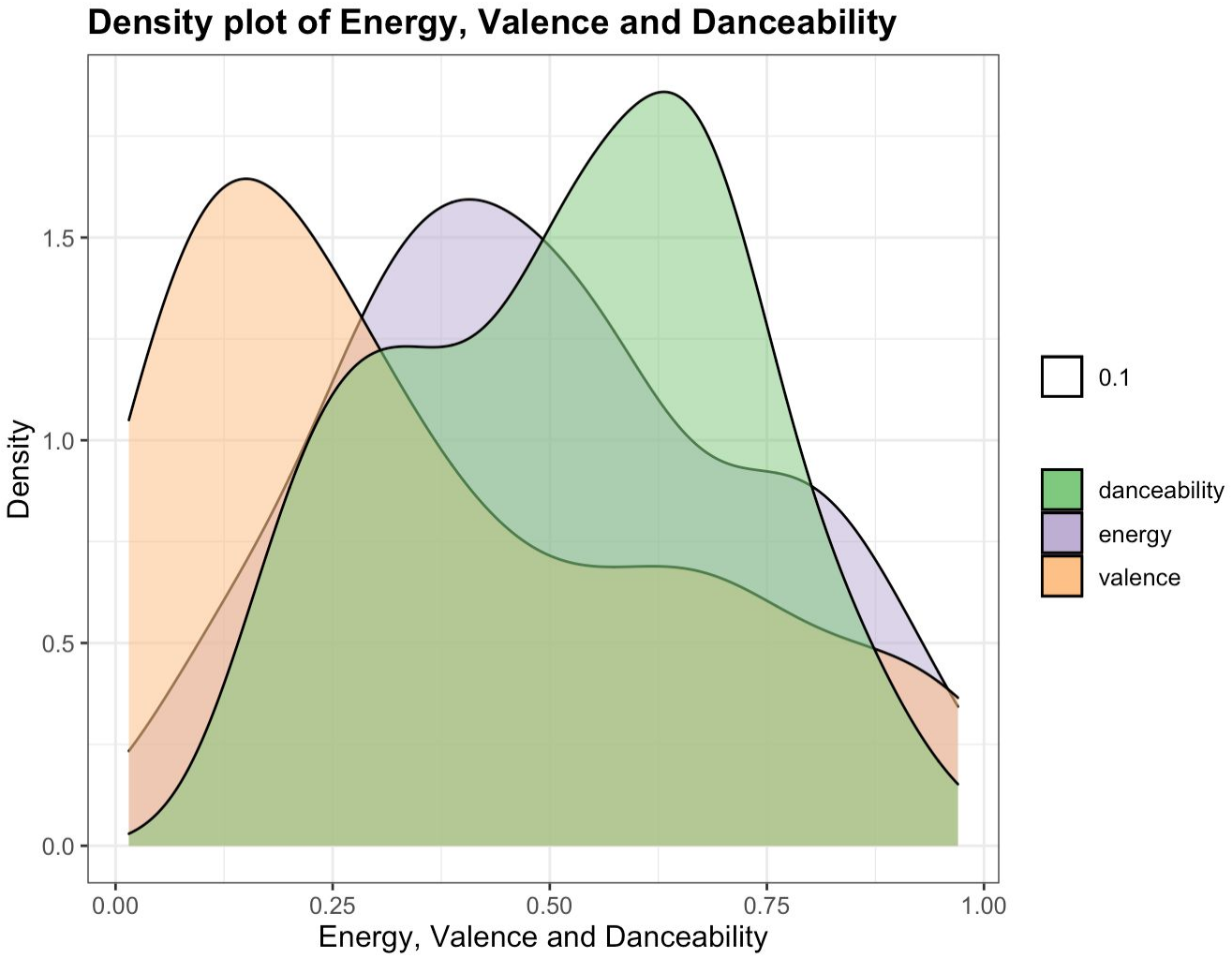
Loudness and Energy are highly positively correlated.

Also, Danceability is positively correlated with Energy, Loudness, and Valence.

Energy and Acousticness are negatively correlated (a lot of acoustic songs are slow-tempo ballads!).

Density Plot

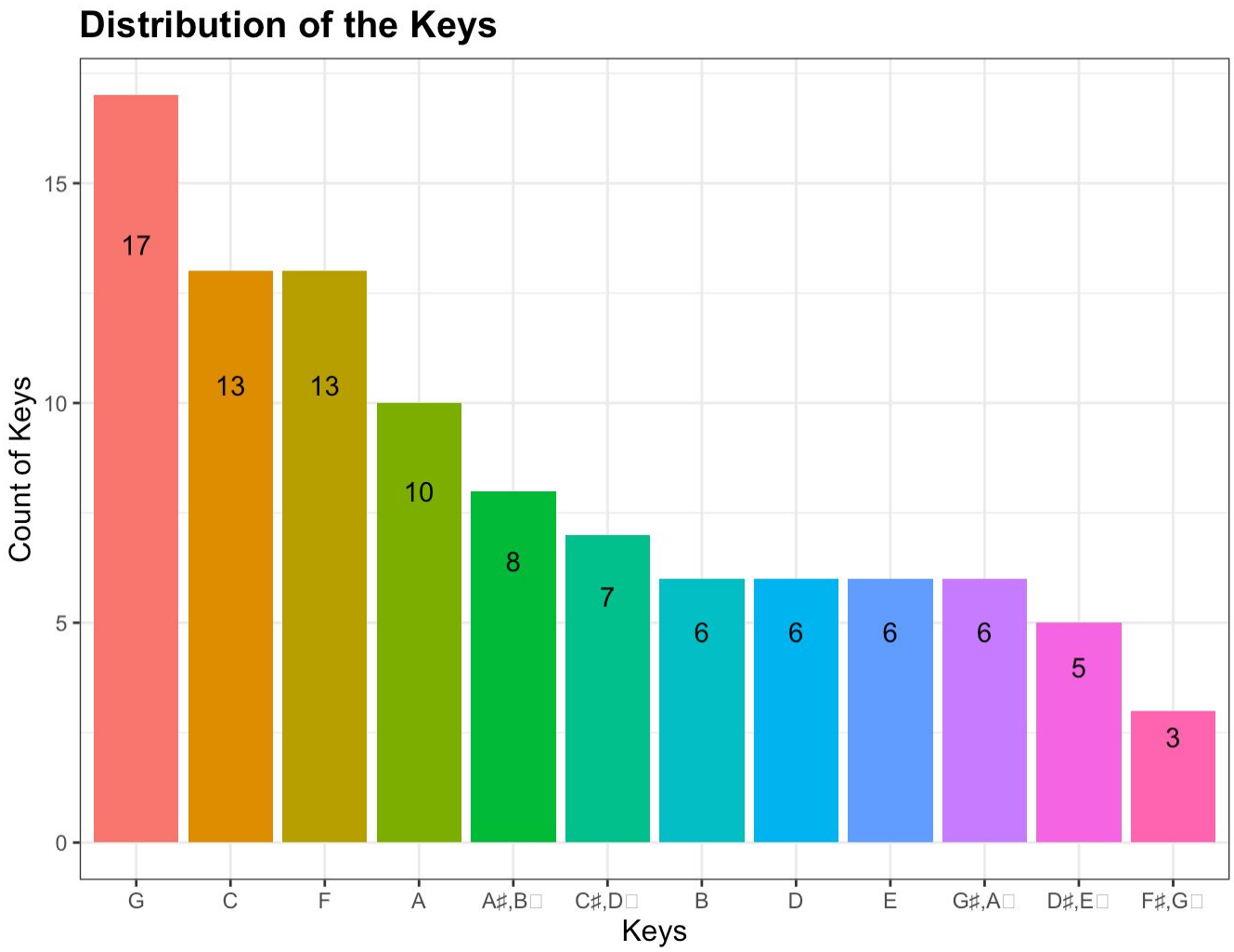
I can use a density plot to see how these three variables are distributed.



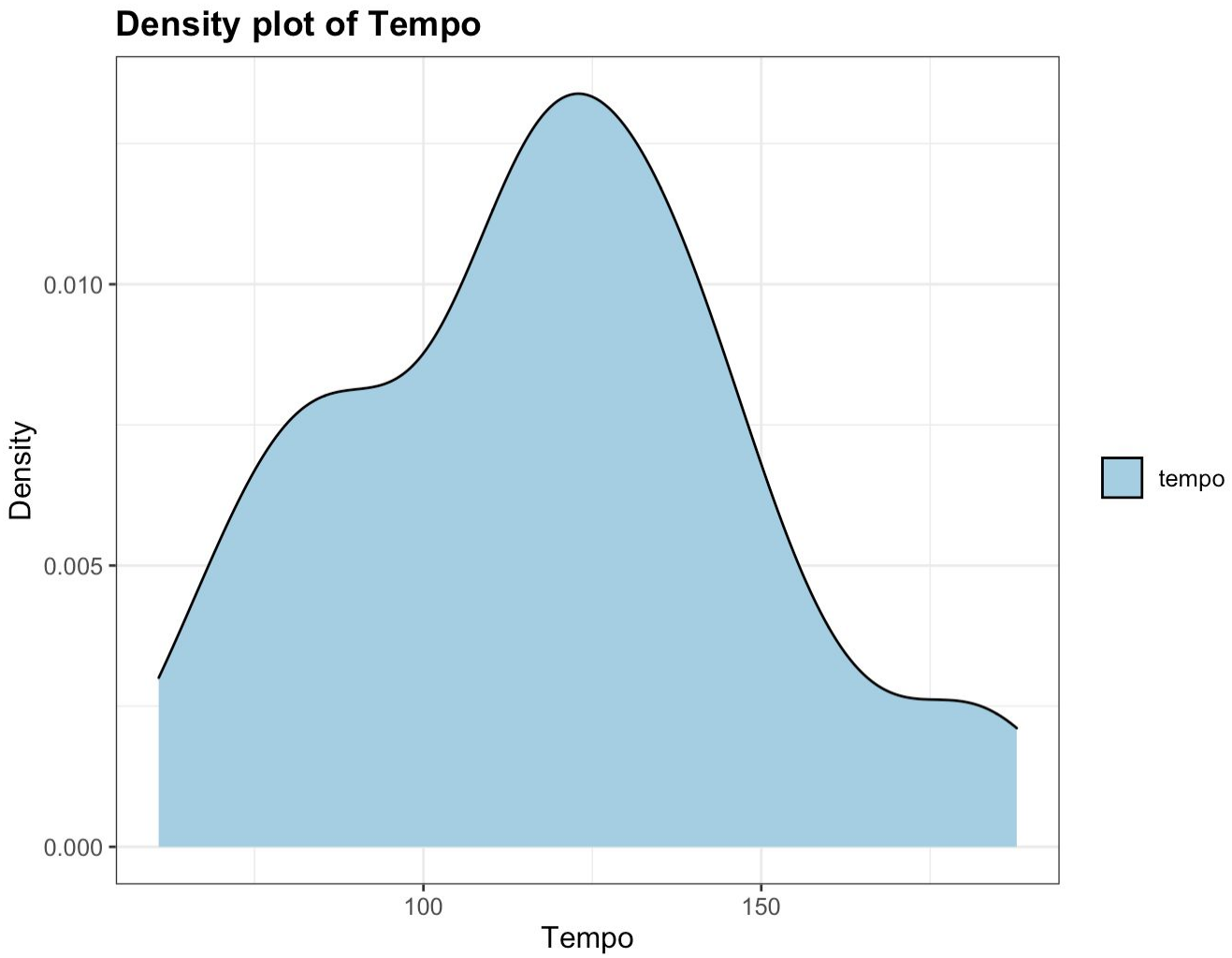
The distribution of these three variables are very similar to each other (limited between 0 and 1).

Common Keys and Tempos

I'll uncover the most common key(s) and tempo(s) among these songs.



Looks like G, C and F are the most common keys.



Looks like most songs are hovering around 100-150 BPM.

Summary
"Syncable" songs seems to have the following features:

- Energy, Valence and Danceability with a value between 0 and 1.
- Loudness with a higher value, typically more than -7.
- G, C and F are the most common Keys.
- Tempo is around 100-150 BPM.

ML

I'll run a multivariable Logistic Regression model to predict which variables make a song "syncable" to see if it matches my findings. To do so, I'll add additional data to my dataset and create a binary variable to indicate if the song was part of my original Tunefind list of songs that were synced or not.

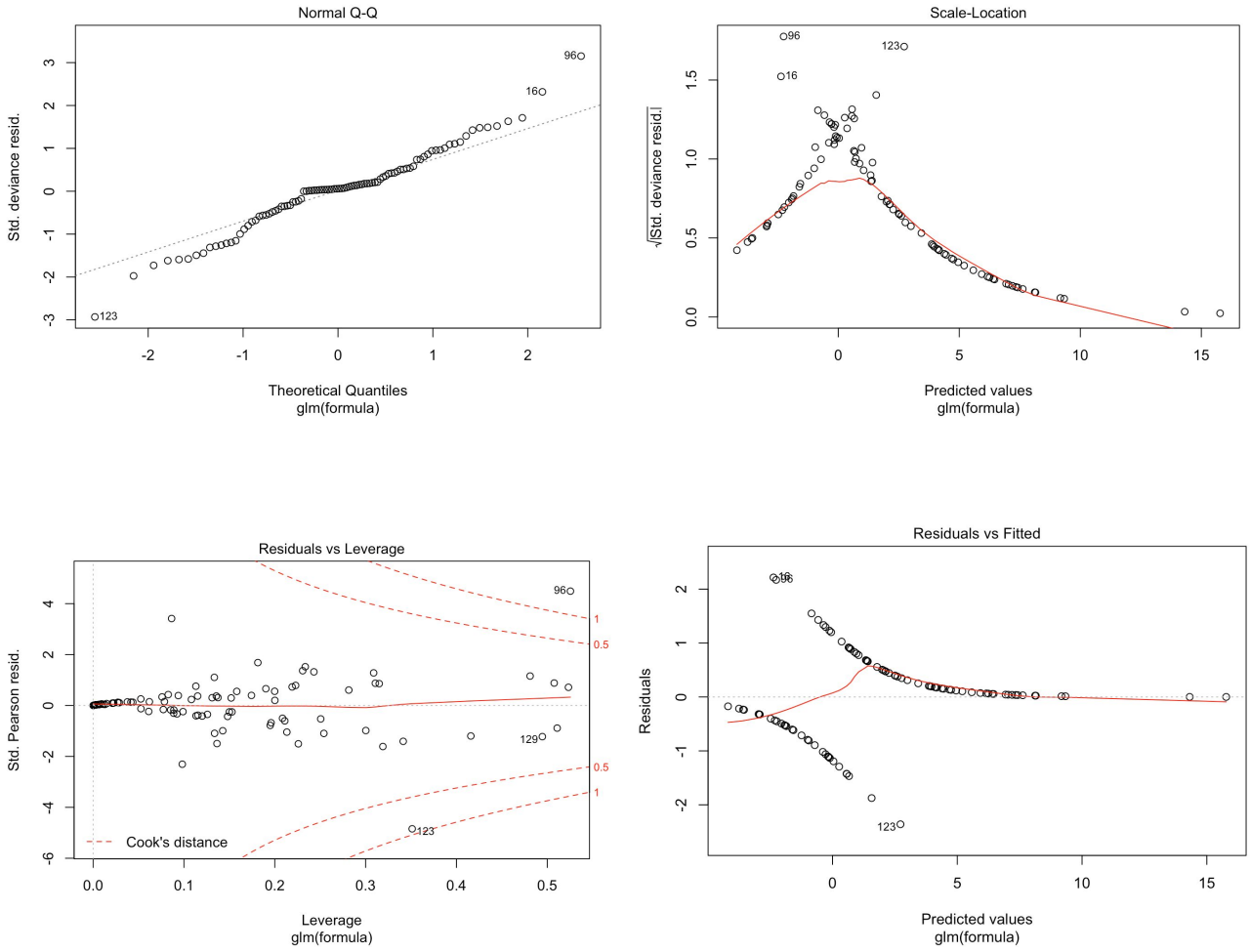
Key, Danceability and Loudness seem to be the best predictors based on the Coefficients.

This varies slightly from my analysis, as I thought tempo would matter more.

Deviance Residuals are roughly symmetrical, but max and min are a bit high.

With a low AIC number and plots being mostly straight lines, this model is a fit for the prediction.

Fit Plots



Conclusion

Overall, Key, Danceability, and Loudness are the best predictors of if a song will be synced or not.

As a musician myself, I would have thought tempo would matter more. This may be for a variety of reasons:

- Most popular songs are a faster tempo, and therefore don't drop below the 100 bpm mark.
- Some slower tempo songs do end up synced for more emotional, slow scenes.
- The dataset is too small to do a proper analysis of the variable.

Another way to analyze this dataset could also be running a linear regression model on one of the continuous variables to predict audio features of the synced songs in the future.

All that being said, music supervision is in itself an art form within and art form and the ability to predict use of data is ultimately limited.

"Truly fertile music, the only kind that will move us, that we shall truly appreciate, will be a music conducive to dream, which banishes all reason and analysis. One must not wish first to understand and then to feel. Art does not tolerate Reason."

- Albert Camus

Glossary

Key: group of pitches, or scale, that forms the basis of a piece.

Tempo: how many beats are in each bar or measure (e.g. how fast or slow a piece is).

Danceability (from Spotify API): based on a combination of musical elements including tempo, rhythm stability, beat strength, and overall regularity.

Valence (from Spotify API): describing the musical positiveness conveyed by a piece - songs with high valence sound more positive (e.g. happy, cheerful, euphoric), while songs with low valence sound more negative (e.g. sad, depressed, angry).