Spotify Playlist Analysis with Song Recommendation

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Overview

This project aims to analyze & compare song features within my curated playlist vs. Spotify playlists

- Followed by selecting a model that can best predict song inclusion in my playlist
- We also explore different song recommendation options

Outline

- Business Problem
- Data
- Methods Used
- Song Recommenders

- Conclusions
- Recommendations
- Next Steps

Business Problem

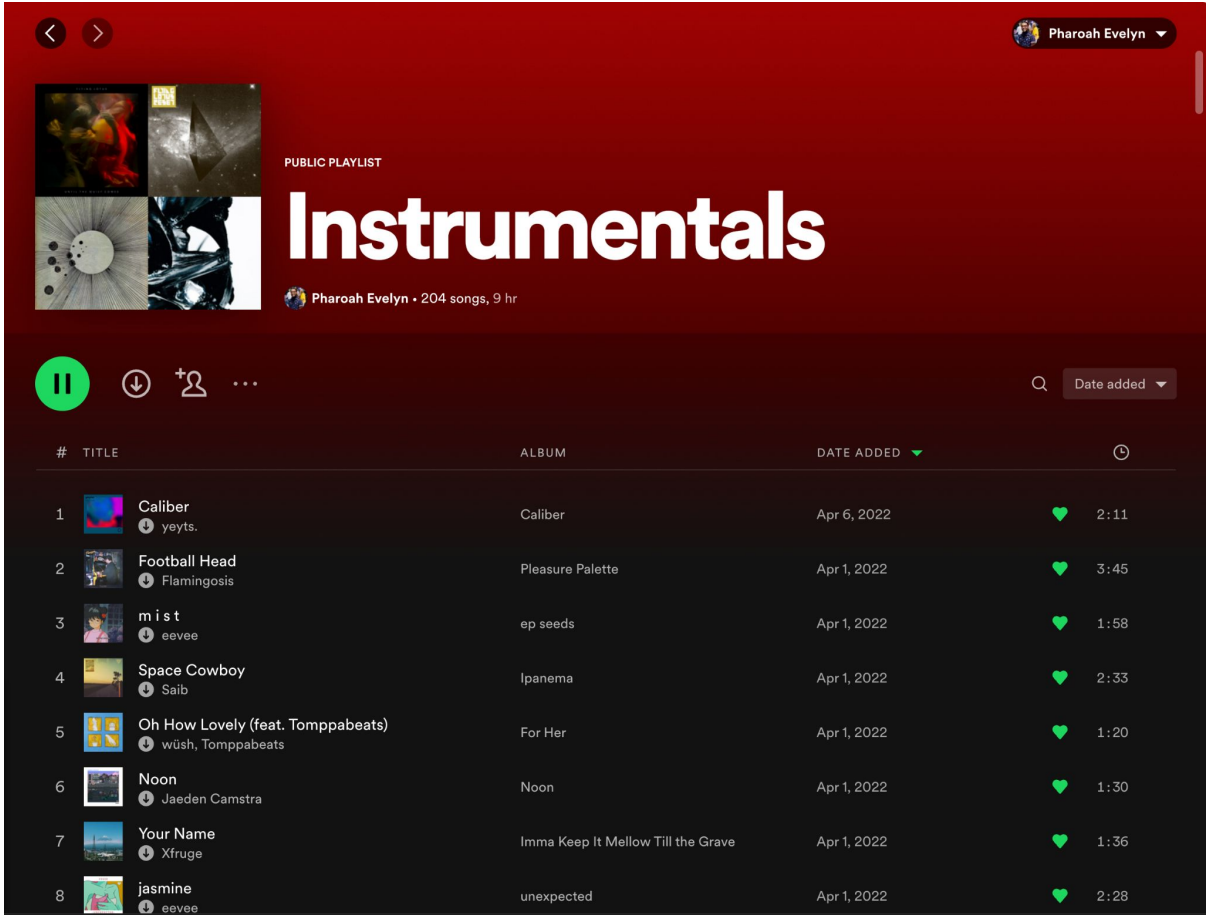
Spotify is a digital music, podcast, and video service that gives you access to millions of songs and other content from creators worldwide.

Content recommendation is vital for its success and maintaining user satisfaction.

Data

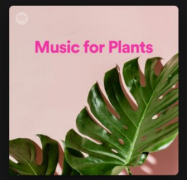
1. My curated playlist
    a. 204 songs & counting
    b. Built up over years

2. Spotify curated Playlists
    a. Based on listening history
    b. Inspired by music taste



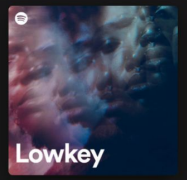
Based on your recent listening

lofi beats
Let yourself be sunkissed with beats to chill, relax,...



Music for Plants
Mellow vibrations for green leaves, green thumbs and...

Indie Sunshine
Fun in the sun with these indie pop jams!

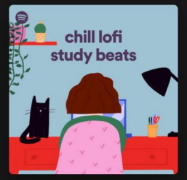


Lowkey
just chill... respectfully

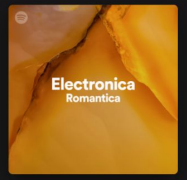
golden hour
For me, golden hour is all about being surrounded by...

Lofi Hip-Hop
Lofi's crispiest beatmakers. Cover: Cookin Soul

RetroWave / Outrun
Equal parts nostalgic synthwave sounds and...



chill lofi study beats
The perfect study beats, twenty four seven.



Electronica Romantica
Delicate digital expressions of the heart.

Brain Food
Hypnotic electronic for studies and a relax.

Jazz Vibes
The original chill instrumental beats playlist.

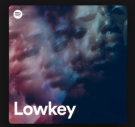
metaverses
01110000 01101100 01100001 01111001 0110110...

Chill Vibes
Just chill...

Gold Instrumental Beats
Beats inspired by the golden era of hip hop.

The Lofi Garden
beats + birds = <3

More of what you like



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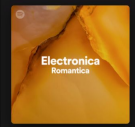
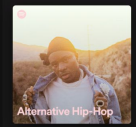
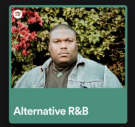


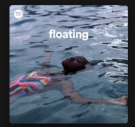
Electronica Romantica
Delicate digital expressions of the heart.



Alternative Hip-Hop
New, leftfield, and for the real hip-hop stans! Cover:...

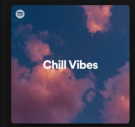


Alternative R&B
These progressive R&B and soul tracks can't be put in a...

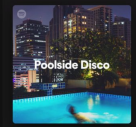


floating
Lay back. Chill out.

Serotonin
100% good vibes.

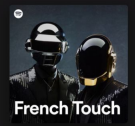


Chill Vibes
Just chill...



Poolside Disco
Disco, house, funk and soul for the good times.

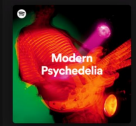
Gold Instrumental Beats
Beats inspired by the golden era of hip hop.



French Touch
Some of the biggest french touch classics! Cover: Daft...

park hangs
Spring has SPRUNG. Time to vibe outside

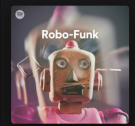
POLLEN
Genre-less. Quality first always. Cover: Flume



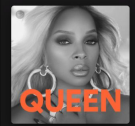
Modern Psychedelia
The best of modern psychedelic rock, neo-...

'fit check

Nu-Funk



Robo-Funk



Queen

Levitate

Disclaimer

Spotify Recommends different music, depending on your listening history

**Results are subject to change

Methods Used

- Spotify API
- Feature Evaluation on both datasets
- Feature Correlation
- Addressing Class Imbalances
- Scikit Learn
- Content Based Recommendation

Conclusions

What I Discovered in my Playlist

- Energy, instrumentalness, acousticness, & loudness have the most impact on playlist inclusion.
- Valence & danceability are a key feature
- Song length, speechiness, popularity & time signature are least relevant
- Energy & loudness are highly correlated
    - Songs with high energy tends to have an increasing rhythmic complexity

Conclusions

The best model is the Random Forests Classifier

- Random Forests had the best overall performance
- Highest ROC Curve & AUC Score

- SVM has fewer false positives than Logistic Regression while maintaining a similar True Positive rate.
- In this case, Decision Trees, despite accounting for class imbalances, seem to rely on automatically predicting for 0: songs not being in my playlist.

Recommender Conclusions

Though the two different recommenders return different results, there appears to be an agreement with some songs in their results.

Due to the songs having similar features throughout all variables, tracks that appear in both recommenders must be reliable matches

There are also some instances of recommended songs that are already present in my playlist. But that can be attributed to them being present in this dataset.

Recommender Comparisons

```
cosine_recommendation('5:32pm',5)
```

```
Recommender Score: 99.98150439207147%
```

	name	artist
2688	Tessin	lorleaf
2810	Hit Snooze	High John
1500	Kalmar	Guzimi
1599	Nest	don C
1192	Moving Day	Paul Lovett

```
cosine_recommendation('Caliber',5)
```

```
Recommender Score: 99.98147683246941%
```

	name	artist
3647	Liza waited	Sail & Weep
2643	Sleepwalking	Josa
3744	florida keys	Kolorama
822	Crescent	URCHN
1155	Algud	Konteks

```
cosine_recommendation('Space Cowboy',5)
```

```
Recommender Score: 99.98147794610426%
```

	name	artist
115	Samui Sunrise	Saib
573	Keep On	Seb Wildblood
2594	Sweet Sunset	Iassu
851	va y viene	Jiony
3606	As a friend	Boho Scottish

```
manhattan_recommendation('5:32pm',5)
```

```
Recommender Score: 99.93146742773692%
```

	name	artist
2688	Tessin	lorleaf
1569	Slanger	pesto tree
2810	Hit Snooze	High John
798	Retro Jam	Blu Tone
150	Fly Away	Altair Blake

```
manhattan_recommendation('Caliber',5)
```

```
Recommender Score: 99.9535705238757%
```

	name	artist
3647	Liza waited	Sail & Weep
3744	florida keys	Kolorama
1155	Algud	Konteks
2643	Sleepwalking	Josa
822	Crescent	URCHN

```
manhattan_recommendation('Space Cowboy',5)
```

```
Recommender Score: 99.95326372863843%
```

	name	artist
115	Samui Sunrise	Saib
1109	Afternoon Break	Raouf Beats
851	va y viene	Jiony
573	Keep On	Seb Wildblood
2164	Out All Night	Ray Ben Rue

Recommender Comparisons

```
cosine_recommendation('Sugar - Original Mix',5)
```

```
Recommender Score: 99.9814827548703%
```

	name	artist
117	When You Call Me	STR4TA
187	How Long Have You Been Away?	kryptogram
2282	THE BOTTOM	MICHELLE
149	Lost Myself	Eric Krasno
3185	ketamine	siouxxie sixxsta

```
cosine_recommendation('That\'s Just Me',5)
```

```
Recommender Score: 99.98156094192557%
```

	name	artist
2748	Segundi	Fuzl
1582	Umami	Lito Akari
3699	Well, I Guess It Has Been a Vibe	PETITE FESSE
253	runnersz	Joy Orbison
2106	Bless U	Twit One

```
cosine_recommendation('Green Lights',5)
```

```
Recommender Score: 99.98159280612485%
```

	name	artist
787	Mango Bathing	Nick Mosh
3990	Rotterdam Rita	Fletcher Reed
786	Light-Hearted Lady	High John
250	Night Owl	Cihangir Aslan
750	Hour and half	Lunatic Sad

```
manhattan_recommendation('Sugar - Original Mix',5)
```

```
Recommender Score: 99.94807886806895%
```

	name	artist
117	When You Call Me	STR4TA
2282	THE BOTTOM	MICHELLE
187	How Long Have You Been Away?	kryptogram
3185	ketamine	siouxxie sixxsta
149	Lost Myself	Eric Krasno

```
manhattan_recommendation('That\'s Just Me',5)
```

```
Recommender Score: 99.945790876697796%
```

	name	artist
2106	Bless U	Twit One
2748	Segundi	Fuzl
3699	Well, I Guess It Has Been a Vibe	PETITE FESSE
253	runnersz	Joy Orbison
991	Cloudscape	SōNE

```
manhattan_recommendation('Green Lights',5)
```

```
Recommender Score: 99.93266310852351%
```

	name	artist
786	Light-Hearted Lady	High John
3990	Rotterdam Rita	Fletcher Reed
787	Mango Bathing	Nick Mosh
250	Night Owl	Cihangir Aslan
99	Fireworks	Nymano

Recommendations

- Use the best model to predict songs in other playlists
- Use recommenders in conjunction with each other to find music that's closely related to your favorite songs
- Improve findings by creating a freshh Spotify Account, listen to a few songs and then run the recommendation algorithms

- Spotify can employ different techniques at different times in the backend,
    - Running different models and recommender systems on a playlist level as well as on the song level

Suggestions

- We could also implement this on a smaller sample size of songs, thus will impact model performance if necessary

- To further increase model performance:
  - Implement a grid search on all models to discover if higher model performance is probable.
  - Use on a smaller dataset

Next Steps

- One can run a cumulative recommendation for every song in a given playlist.
- Utilize Spotify deep audio analysis & neural networks.
    - In-depth & complex information about tracks
    - An analysis of this type will be based on the actual audio samples of songs.
    - This will lead to a much deeper analysis & model-building methodology.
- Automate radio stations based on playlists or most played songs from the playlist.

Questions?