

Recommendations in



Product Teardown

Learn in Public Challenge (5/6)
By Aditi Kalkal

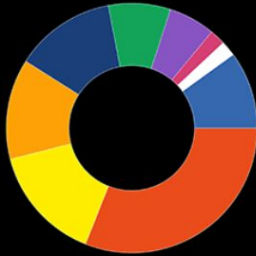


Spotify Overview

Spotify is a **music streaming service** that offers a range of features including **personalized recommendations, collaborative playlists, and social sharing options.**

Global Streaming Music Subscription Market Quarter 2, 2021 (Midia Research)

Spotify	31%
Apple Music	15%
Amazon Music	13%
Tencent Music	13%
YouTube Music	8%
NetEase	6%
Deezer	2%
Yandex	2%
Other	10%



TONE ISLAND

Spotify dominates the global music streaming industry with a 31% share of paid subscribers, leaving its closest competitor, Apple Music, with a 15% share in second place.

The screenshot displays the Spotify home page with several personalized recommendations:

- Discover Weekly**: A playlist titled "New Music For You To Discover!" created by Lori Pineda, containing 25 songs and lasting 1 hour and 22 minutes. It features album covers for "Lionheir" and "The Sound of Silence".
- Made For Aditi**: A section with two "Daily Mix" playlists. "Daily Mix 1" features A.R. Rahman, Amit Trivedi, and Shankar-Ehsaan-Loy. "Daily Mix 2" features Ed Sheeran, Snakehips, Linkin Park, and more.
- Your 2020 Wrapped**: A section with two main cards: "Your Top Songs 2020" (all wrapped up) and "Missed Hits" (top songs from 2020 that you won't want to miss).
- Based on your recent listening**: A section with two main cards: "India" featuring Nick Jonas, Selena Gomez, and Imagine Dragons; and "TODAY'S TOP HITS" featuring The Weeknd, Ariana Grande, and Selena Gomez.

Spotify places a strong emphasis on **personalized recommendations** by incorporating tailored suggestions throughout their platform, offering popular features like **Discover Weekly, Daily Mixes,** and personalized playlists such as **Release Radar and Your Library.**

Recommendation System

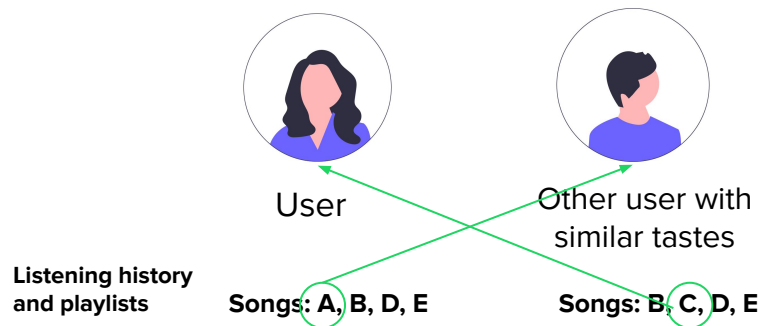
Spotify's recommendation system uses the following parts of the larger field of recommender systems to generate song recommendations:

Collaborative filtering

It uses weighted matrix factorization algorithm and approximate nearest neighbour to **suggest songs based on the behavior of other users with similar tastes.**

Weighted matrix factorization is a machine learning algorithm that simplifies large data sets by identifying patterns and relationships.

Approximate nearest neighbor is a technique used to quickly find the closest matches to a query in a large dataset.



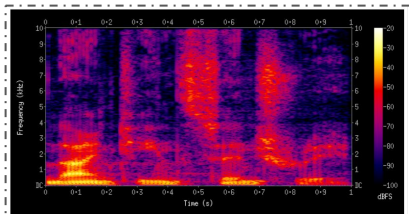
Content-based filtering

Solution

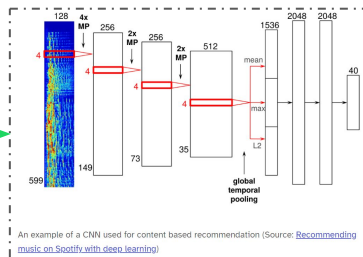
Popular songs tend to dominate recommendations

Collaborative filtering heavily relies on listening data

Cold start problem



Spectrogram, a picture of the music



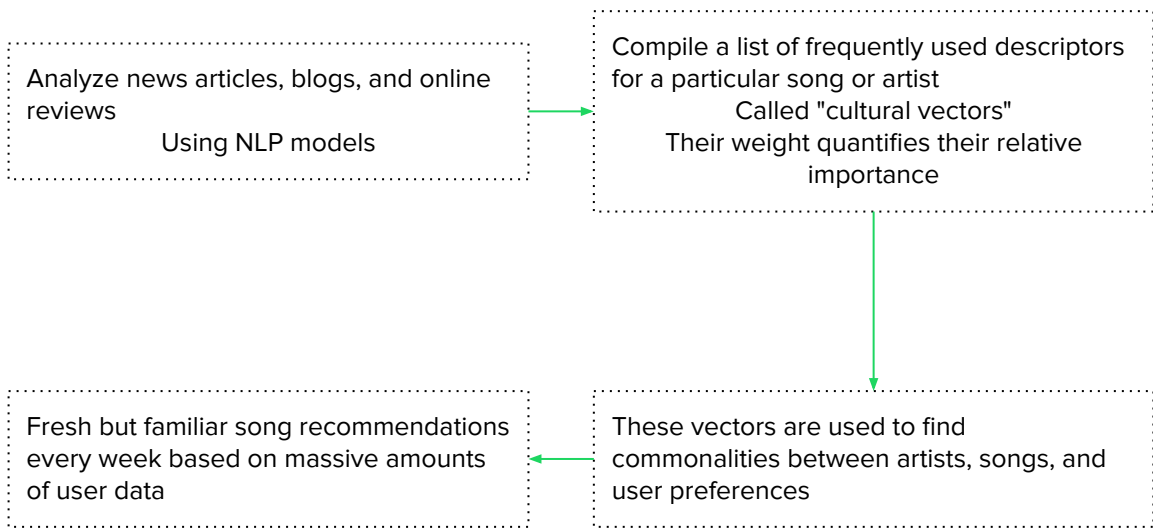
An example of a CNN used for content based recommendation (Source: [Recommending music on Spotify with deep learning](#))

Processed through a convolutional neural network to understand characteristics like time signature, tempo, and loudness

New song with similar characteristics to ones the user likes, gets added to their playlist.

Natural Language Processing (NLP)

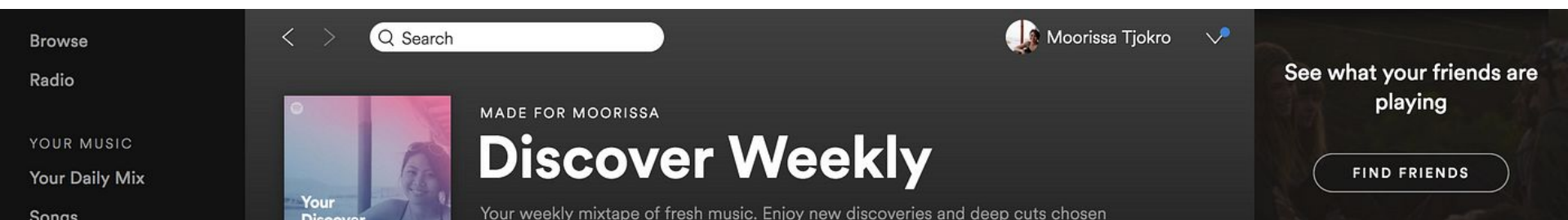
Spotify acquires Echo Nest in 2014, which likely influenced their NLP techniques.



For example, here are the cultural vectors used to describe the Swedish pop group 'Abba':

n2 Term	Score	np Term	Score	adj Term	Score
dancing queen	0.0707	dancing queen	0.0875	perky	0.8157
mamma mia	0.0622	mamma mia	0.0553	nonviolent	0.7178
disco era	0.0346	benny	0.0399	swedish	0.2991
winner takes	0.0307	chess	0.0390	international	0.2010
chance on	0.0297	its chorus	0.0389	inner	0.1776
swedish pop	0.0296	vous	0.0382	consistent	0.1508
my my	0.0290	the invitations	0.0377	bitter	0.0871
s enduring	0.0287	voulez	0.0377	classified	0.0735
and gimme	0.0280	something's	0.0374	junior	0.0664
enduring appeal	0.0280	priscilla	0.0369	produced	0.0616

Top words used to describe 'Abba' (Source: [How Does Spotify Know You So Well? | by Sophia Ciocca](#))



Metrics to measure effectiveness of recommendations

Metrics through which Spotify can measure the effectiveness of its song recommendations

Click-through rate (CTR) on recommended songs

Number of times a user saves a recommended song to their library

Number of times a user adds a recommended song to one of their playlists

Number of plays per recommended song

Time spent listening to recommended songs

Increase in user retention and engagement

Percentage increase in the number of songs listened to per session after receiving recommendations

Increase in user engagement with the app (e.g. frequency of visits, duration of sessions)

Conversion rate from free to premium users following exposure to recommendations

User feedback through ratings and reviews



How to innovate further?

- **Podcast recommendations:** Spotify can use its recommendation engine to provide personalized podcast recommendations. This can help users discover new podcasts based on their interests, listening habits, and other factors.
- **Integration with other services:** Spotify can integrate with other services such as fitness apps, smart home devices, and car systems to provide personalized recommendations based on the user's context and environment.
- **Further personalization:** Spotify's recommendation algorithm can be further improved to provide more personalized recommendations. This can be achieved by considering the user's listening habits, mood, location, and other factors to create a unique listening experience.