Spotify, Play Something

A new mood-based recommendation engine

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Opportunity

I am a Data Scientist at Spotify and I've been asked to come up with an idea to increase retention and Daily Active Users (DAUs). Building upon the past success of personalization-based strategies, I have decided to build a recommendation engine that provides a curated Top 10 playlist based on the user's daily mood.

The final vision is to create an ultra-personalized recommendation engine that is built upon:

1. User's **specific music taste** (defined based on the 11 Spotify audio features of *danceability*, *energy*, *key*, *loudness*, *mode*, *speechiness*, *acousticness*, *instrumentalness*, *liveness*, *valence*, *tempo*) -- more static in nature but evolving over time
2. User's **daily mood** or feeling -- more volatile in nature
3. Daily **weather** -- exogenous variable and more volatile in nature

Given the lack of access to Spotify user-specific data, I will start by building a recommendation engine based on the daily mood that I will collect on the front-end with a simple initial question of the like "How are you feeling today?". Contingent on time and based on the fact that it was proven that weather has an impact on music selection, I will also include weather as part of this prototype. Assuming there will also be a correlation between weather and mood, the daily weather at the user's location will help refine the final list of recommended tracks.

Impact Hypothesis

By providing the user with a more personalized experience with relevant content on a daily basis, Spotify will likely succeed in increasing app stickiness, retention and the number of DAUs. The objective is to make listening to music on Spotify part of a user's daily habits and to streamline their path to daily recommendations.

Data

I will collect data on Spotify tracks by genre by using the Spotify API. In particular, to ensure the robustness of my recommendation engine, I will focus on getting data on at least 10,000 tracks split across different genres.

I will map moods and personality traits to music genres by leveraging the findings of Adrian C. North's study on Individual Differences in Musical Taste.

I will collect data on weather from AccuWeather.

Solution Path

Before presenting the solution path, it's useful to clarify the UI/UX component of this project. Once the user will access the app on Streamlit or Dash, they will be able to select their daily mood. In the back-end, the user's mood will be associated with a specific music genre which is, in itself, characterized by the 11 Spotify audio features selected above. In the front-end, the user will be able to visualize the radar graph corresponding to the genre they are represented by during that day and a recommended playlist showing the Top 10 tracks that best mirror their daily mood.

It's granted that this solution encompasses a few layers of simplification that, in a real business case scenario, would be overcome by having access to user data.

Note: a nice to have feature is a thumbs-up/thumbs-down button that would allow the user to leave feedback about the recommendations. This would be a great piece of information to collect in order to allow iterative optimization of our recommendation engine.

I am planning to follow the following solution path:

- Data Ingestion & Storage
    - Collect Spotify data using the Spotify API
    - Store data in MongoDB
    - Automate the regular update of tracks with new weekly tracks through Cron Job
    - Conduct initial EDA
- Processing
    - Define genre music profile based on the 11 Spotify Audio features
    - Build collaborative recommendation engine based on the computation of cosine similarity between the representative (seed) genre music profile and the other tracks included in the database
- Deployment
    - Build the final app on Streamlit or Dash

Tools

For general data manipulation, modeling and visualization, I will use pandas, numpy, scikit-learn, and spotipy.

To store data I will use MongoDB and to automate data updates I will use Cron Job.

Finally, I will use Streamlit or Dash to productize the recommendation engine.

MVP Goal

As an MVP, I am planning to present a preliminary version of the recommendation engine and related app.